BODY ELECTRICAL

MULTIPLEX COMMUNICATION

■ DESCRIPTION

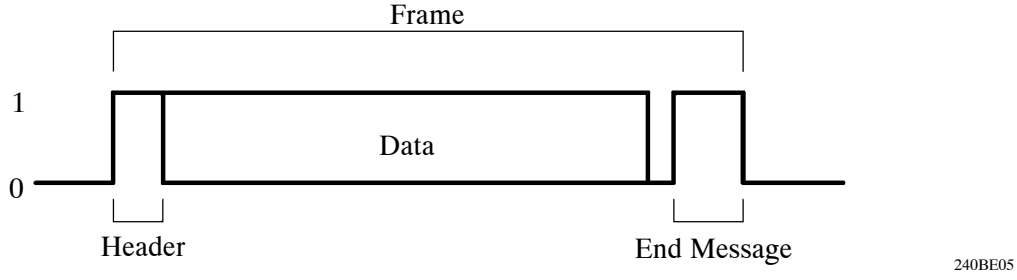
- The multiplex communication system of the new LX 570 uses the 3 communication protocols described below in order to achieve a streamlined wiring harness configuration.
  - CAN (Controller Area Network): This protocol is used for real-time control applications at high-speed communication rates. The CAN consists of 3 busses and is used for communication among 25 ECUs for power train, chassis and body electrical systems.
  - LIN (Local Interconnect Network): This 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): This protocol is used for communication only between the audio-visual systems.
- 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-18.

— REFERENCE —

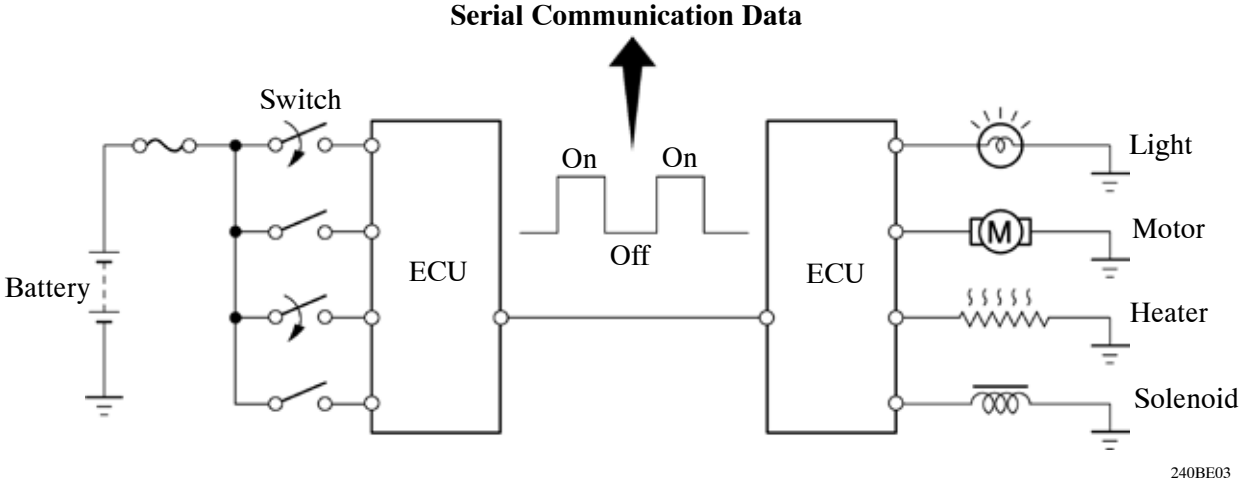
MPX communication uses serial communication data that consists of bits and frames in order to exchange information among the various ECUs. This allows a reduction of the amount of wiring on the vehicle.

- *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 ◀

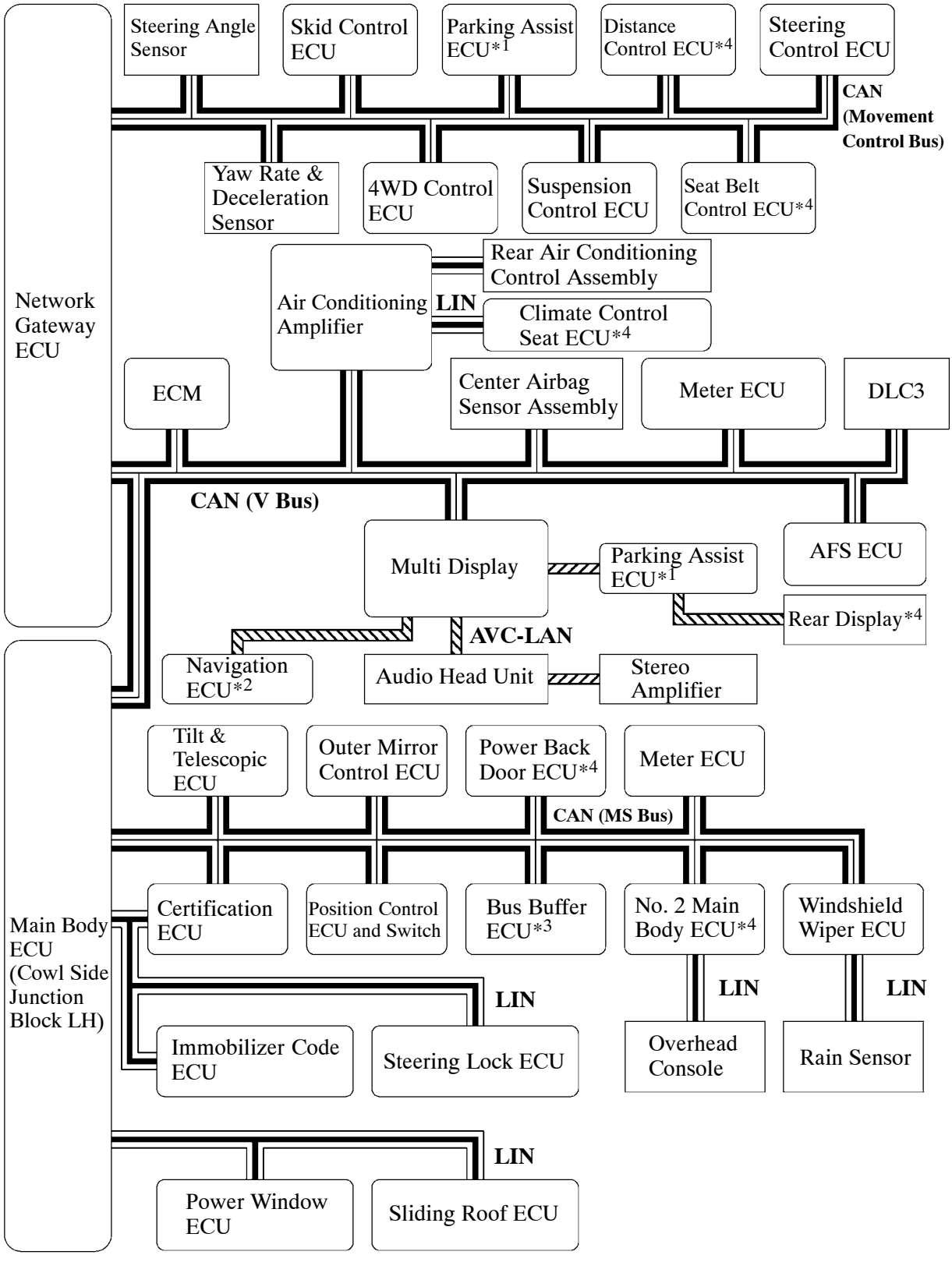


240BE05



240BE03

▶ System Diagram ◀



08GBE15Y

*1: Models with LEXUS Parking Assist-sensor System, Parking Assist Monitor System or Wide-view Front & Side Monitor System
*2: Models with Navigation with AV System
*3: Optional Equipment for G.C.C. Countries Models
*4: Optional Equipment

■ DIFFERENCES BETWEEN CAN, LIN, AND AVC-LAN

1. General

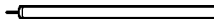
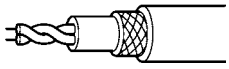
- The protocols, which are the rules for establishing data communication, differ between the CAN, LIN, and AVC-LAN. If the ECUs in the networks use different frameworks for their data, such as communication speed, communication wire, and signals, they will be unable to understand each other. Therefore, protocols (rules) must be established among them.
- Compared to the LIN and AVC-LAN, 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.

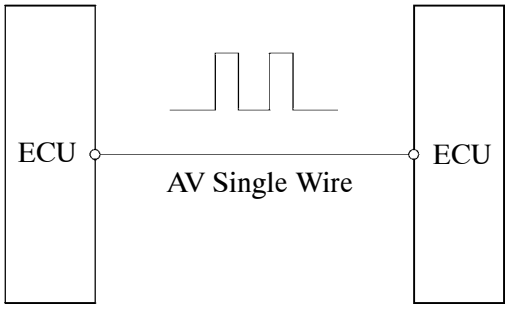
Protocol	CAN (ISO Standard)	LIN (LIN Consortium)	AVC-LAN (TOYOTA Original)
Communication Speed	500 kbps*/HS-CAN 250 kbps*/MS-CAN (Max. 1 Mbps)	Max. 20 kbps*	Max. 17.8 kbps*/AVC-LAN 7.5 Mbps*/AVC-LAN plus
Communication Wire	Twisted-pair Wire	AV Single Wire	Twisted-pair Wire
Drive Type	Differential Voltage Drive	Single Wire Voltage Drive	Differential Voltage Drive
Data Length	1-8 Byte(s) (Variable)	2, 4, 8 Bytes (Variable)	0-32 Byte(s) (Variable)

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

2. Communication Wire

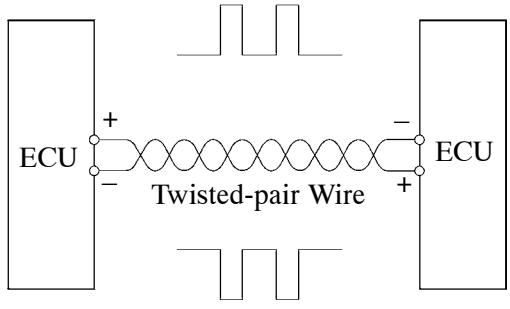
A twisted-pair wire is used for CAN and AVC-LAN communication. A single, AV (Automobile Vinyl) wire is used for LIN communication.

Communication Wire	Outline
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".
Twisted-pair Wire for AVC-LAN  240BE10	In this communication wire, a pair of lines are twisted together and covered with insulation. Communication is driven by applying positive (+) and negative (–) voltage to the two lines in order to send a single signal. This system, which is called a "Differential Voltage Drive", can reduce noise.
Twisted-pair Wire for CAN  241BE168	



240BE11

Single Wire Voltage Drive



240BE12

Differential Voltage Drive

BE

■CAN

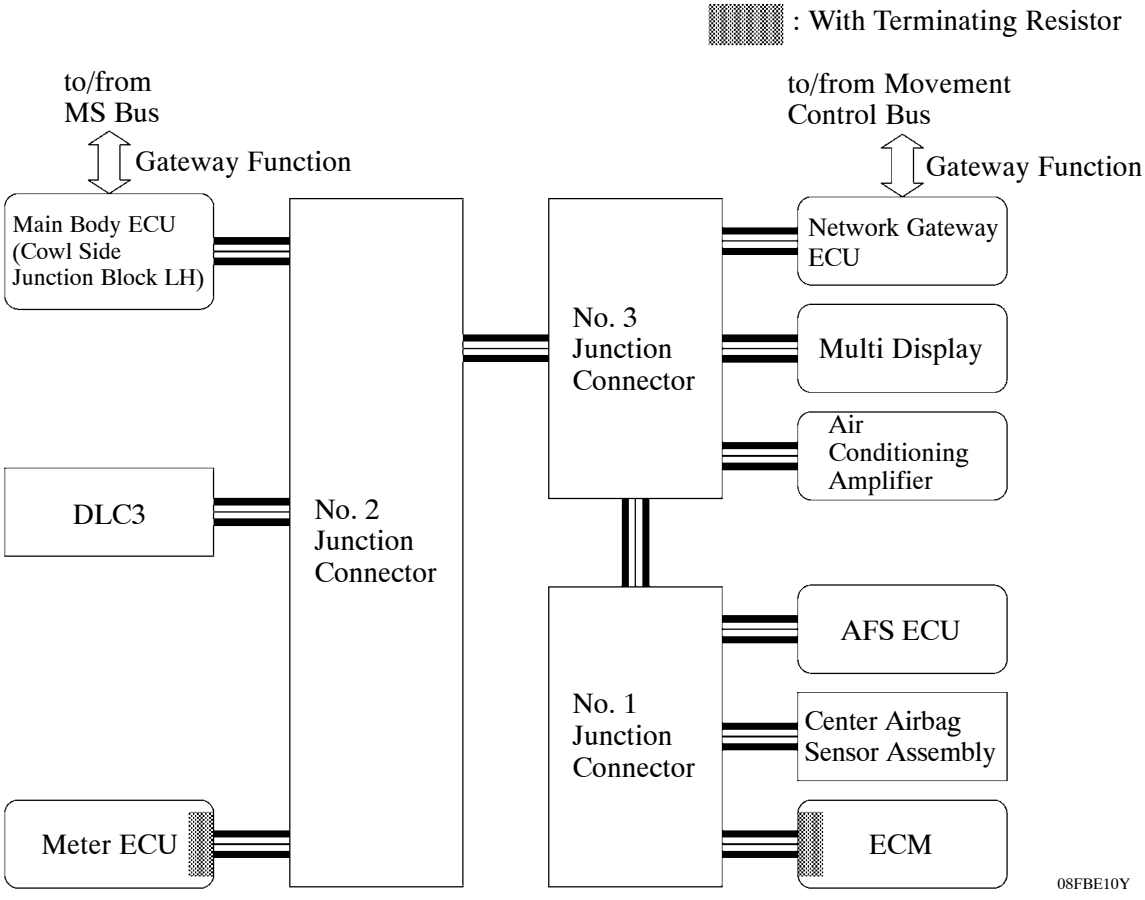
1. General

- On the new LX 570, the CAN (Controller Area Network) is classified into the two following types according to the communication speed: The HS (High Speed)-CAN, whose communication speed is 500kbps, is used for the power train, chassis and body electrical systems. The MS (Medium Speed)-CAN, whose communication speed is 250 kbps, is used for the body electrical system.
- The HS-CAN consists of the V bus and Movement Control bus.
- The MS-CAN consists of only the MS bus.
- Some ECUs and junction connector are provided with a terminating resistor for each bus.
- The data transmission among busses can be attained by arranging the ECUs with gateway function among the busses.

▶ Bus Configuration and ECU Functions ◀

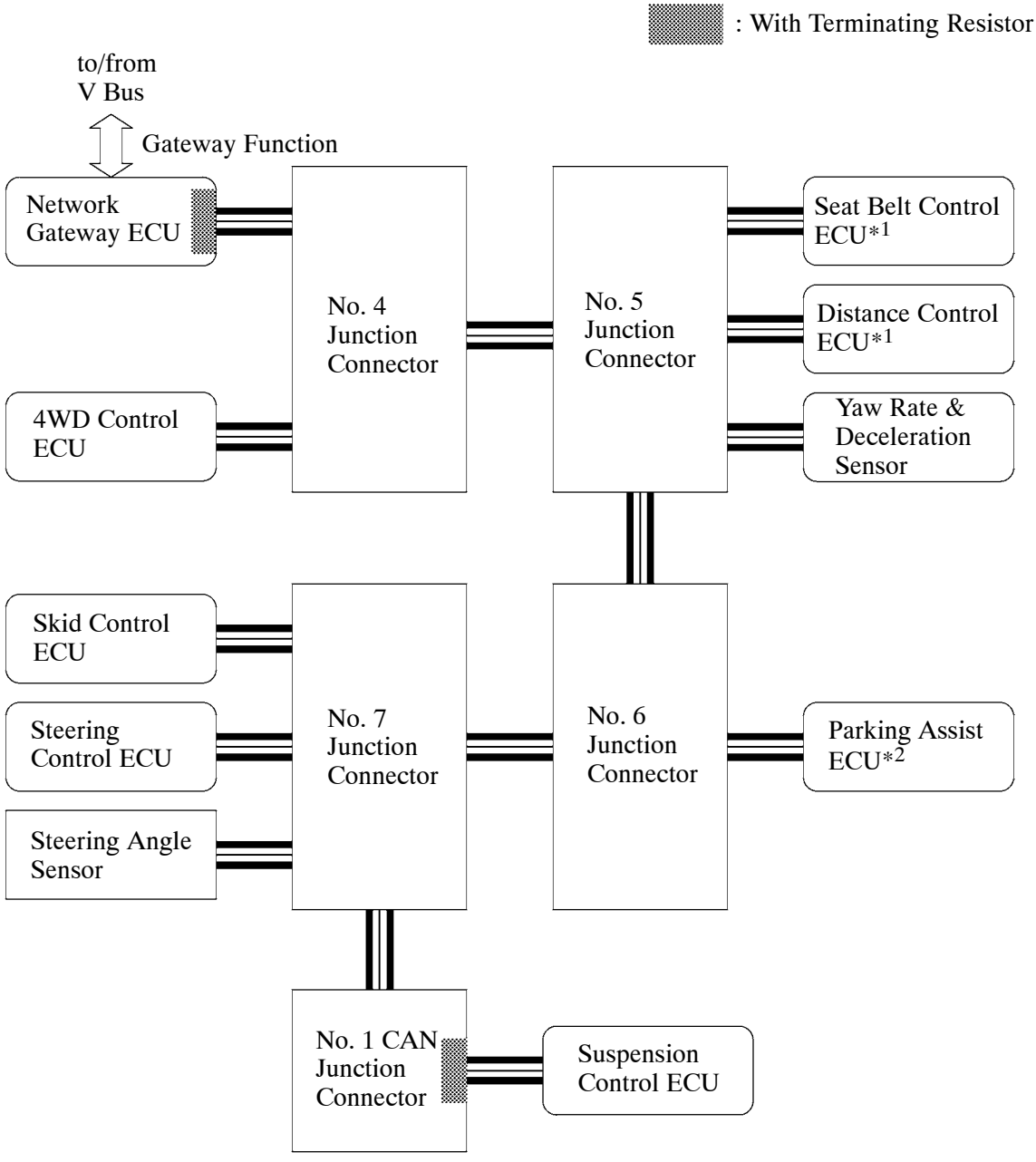
CAN	Bus	ECUs with Gateway Function	Connected Bus	ECUs with Terminating Resistor
HS-CAN	V Bus	Main Body ECU	MS Bus	● ECM ● Meter ECU
		Network Gateway ECU	Movement Control Bus	
	Movement Control Bus	Network Gateway ECU	V Bus	● No. 1 CAN Junction Connector ● Network Gateway ECU
MS-CAN	MS Bus	Main Body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

▶ V Bus ◀



LHD Models

▶ Movement Control Bus ◀



LHD Models

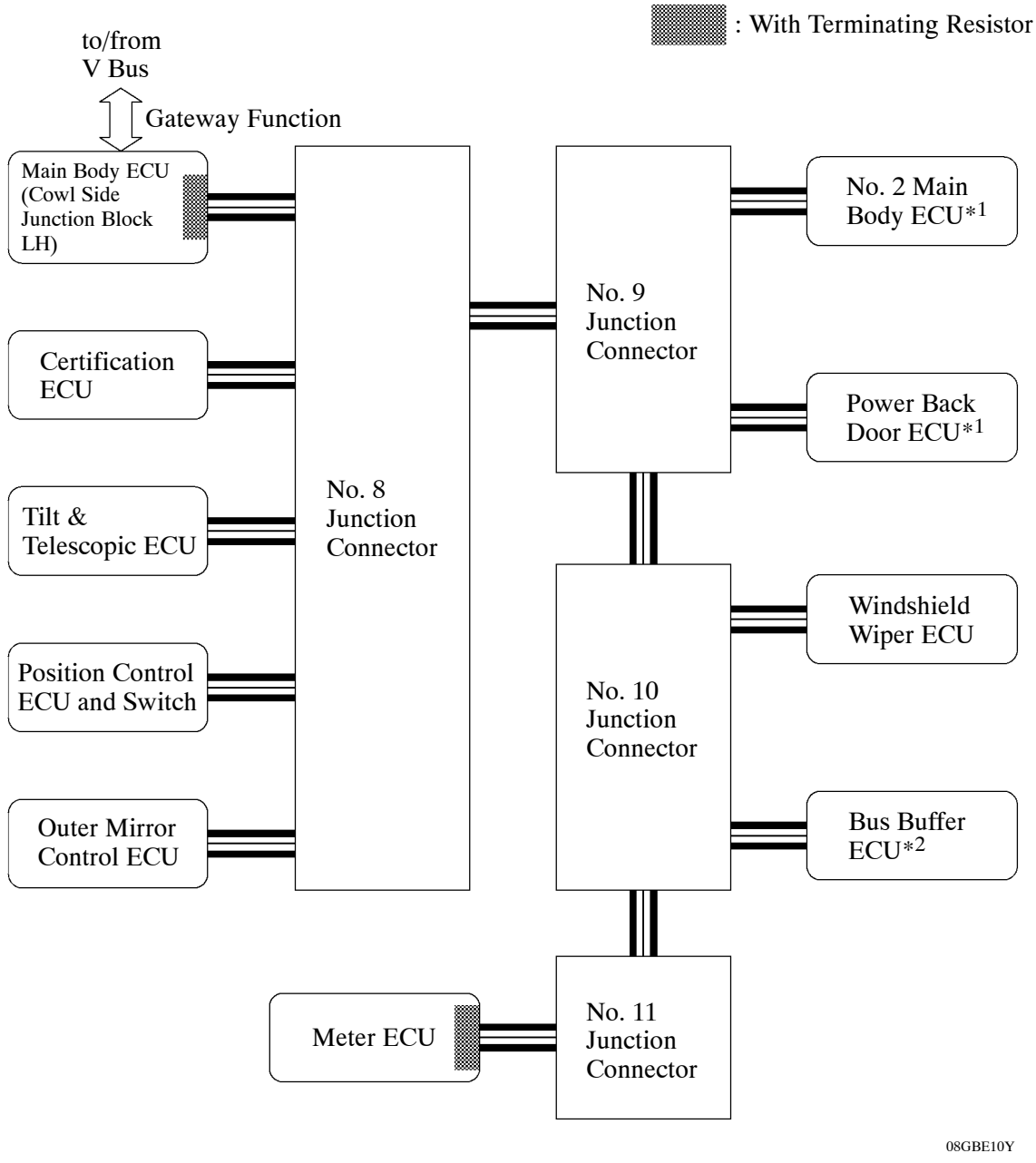
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*1: Optional Equipment

*2: Models with LEXUS Parking Assist-sensor System, Parking Assist Monitor System or Wide-view Front & Side Monitor System

BE

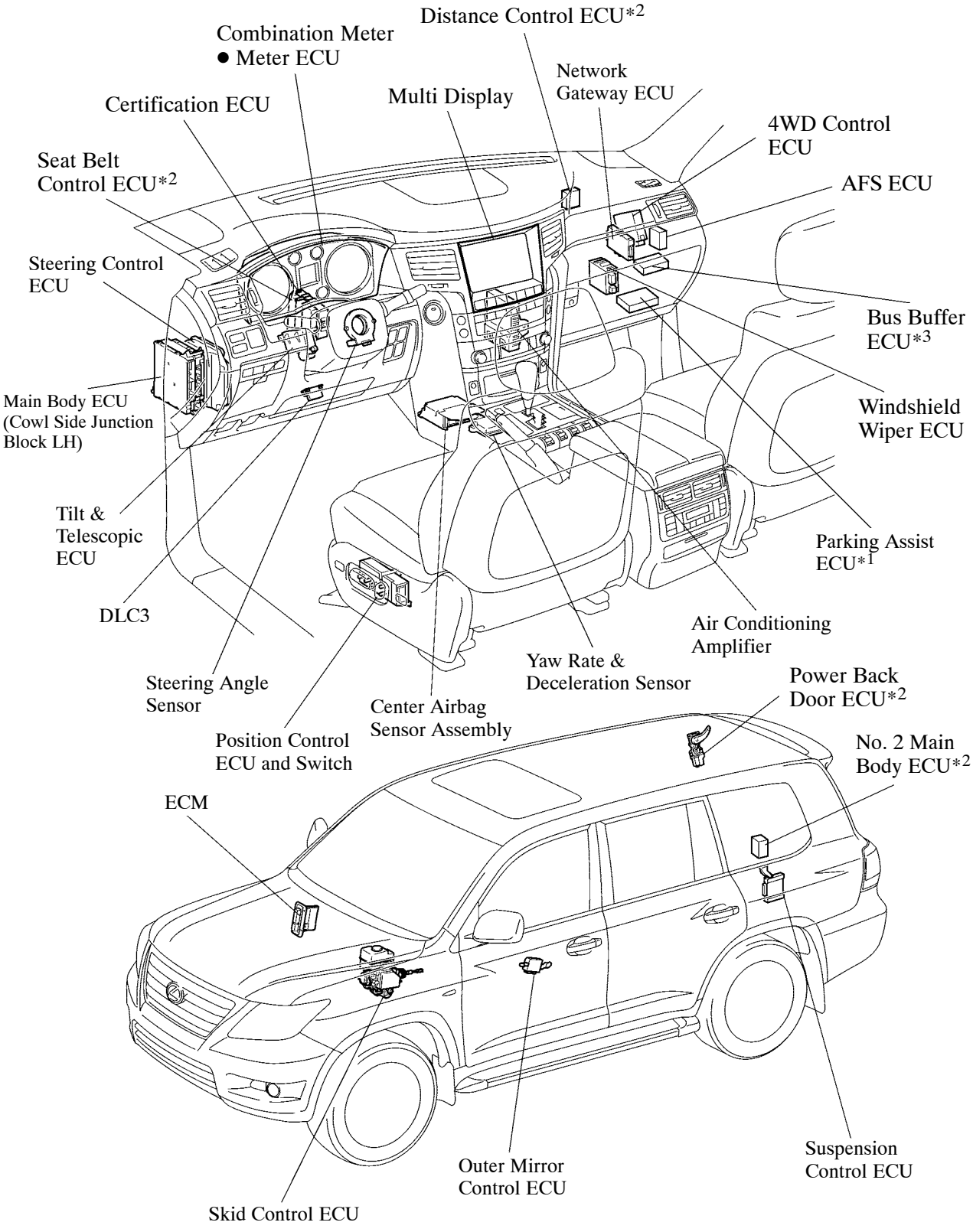
▶ MS Bus ◀



LHD Models

*1: Optional Equipment
*2: Optional Equipment for G.C.C. Countries Models

2. Layout of Main Components



08GBE17Y

LHD Models

*1: Models with LEXUS Parking Assist-sensor System, Parking Assist Monitor System or Wide-view Front & Side Monitor System
*2: Optional Equipment
*3: Optional Equipment for G.C.C. Countries Models

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 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 LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

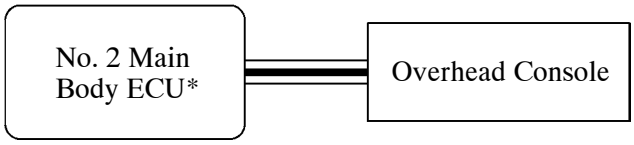
■ LIN

1. General

- The LIN (Local Interconnect Network) consists of bus for each system of the body electrical system, and is 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, climate control seat system, power window system, entry & start system, and sliding roof system.

2. System Diagram

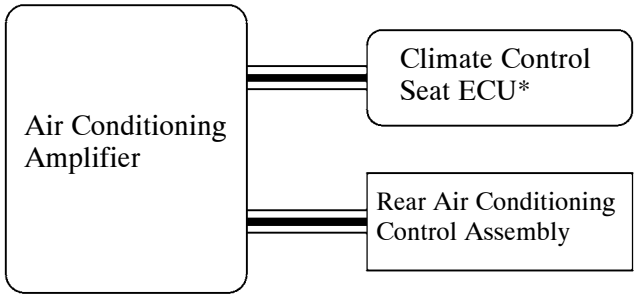
▶ Lighting System ◀



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*: Optional Equipment

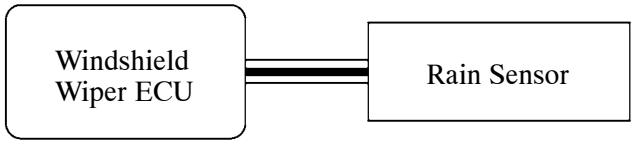
▶ Air Conditioning System and Climate Control Seat System ◀



08FBE214Y

*: Optional Equipment

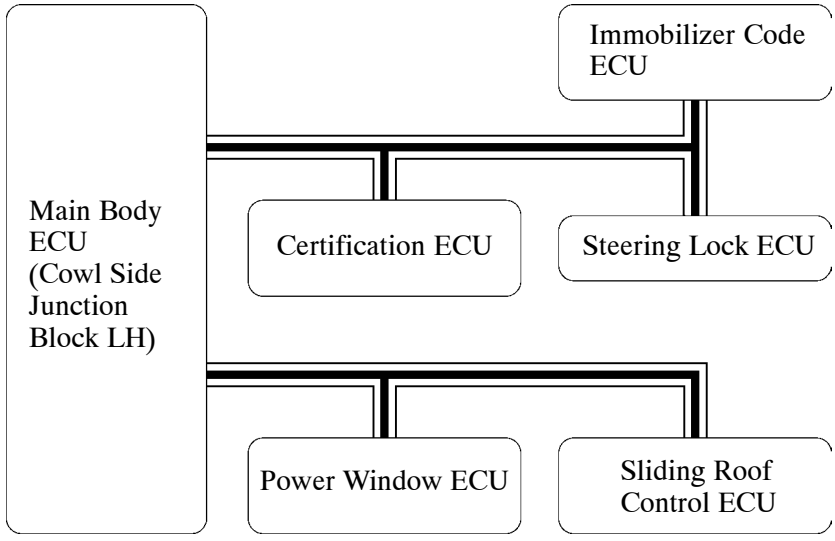
▶ Wiper and Washer System ◀



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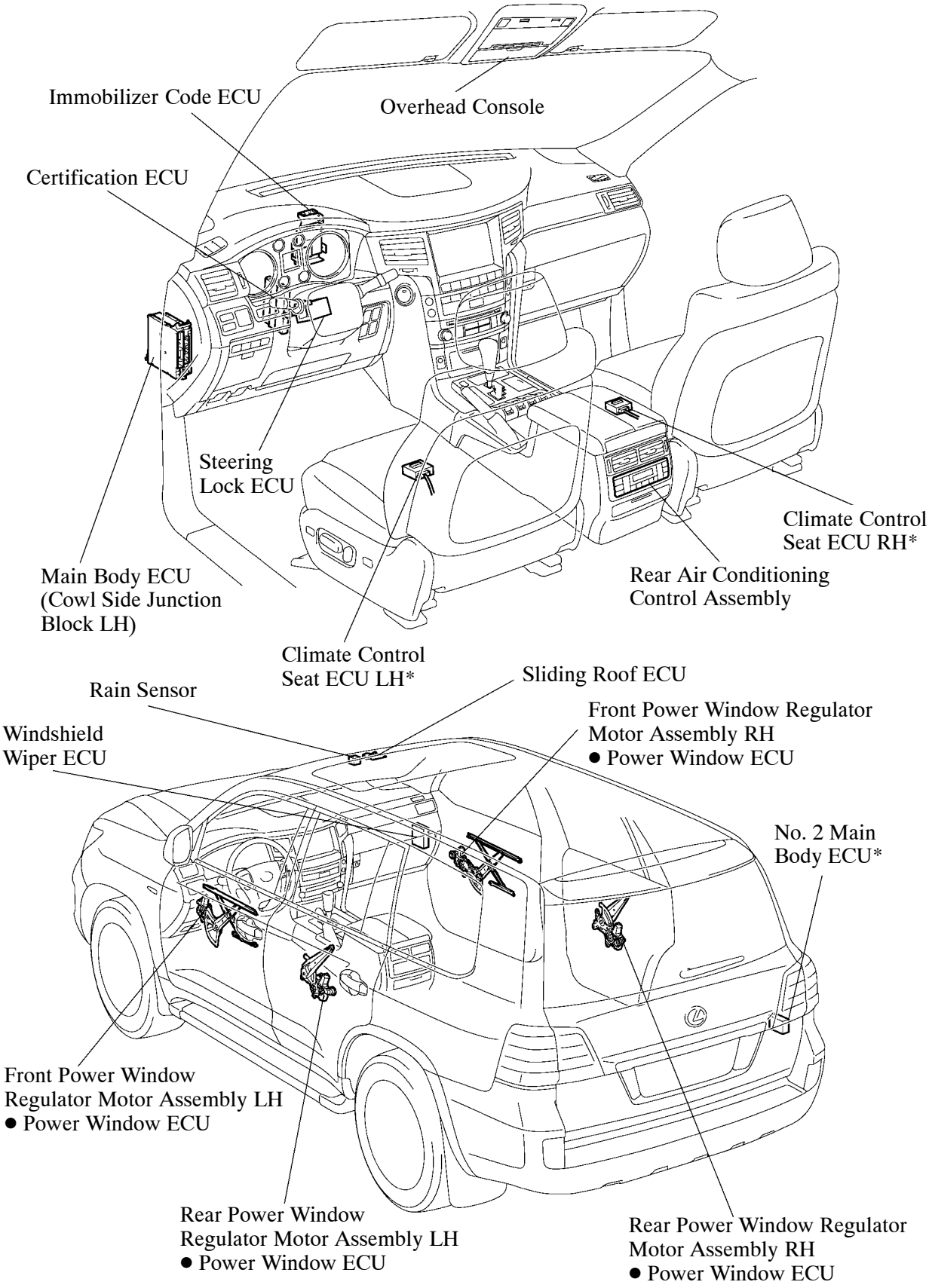
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▶ Power Window System, Entry & Start System, and Sliding Roof System ◀



06J0BE45C

3. Layout of Main Components



LHD Models

08GBE80Y

*: Optional Equipment

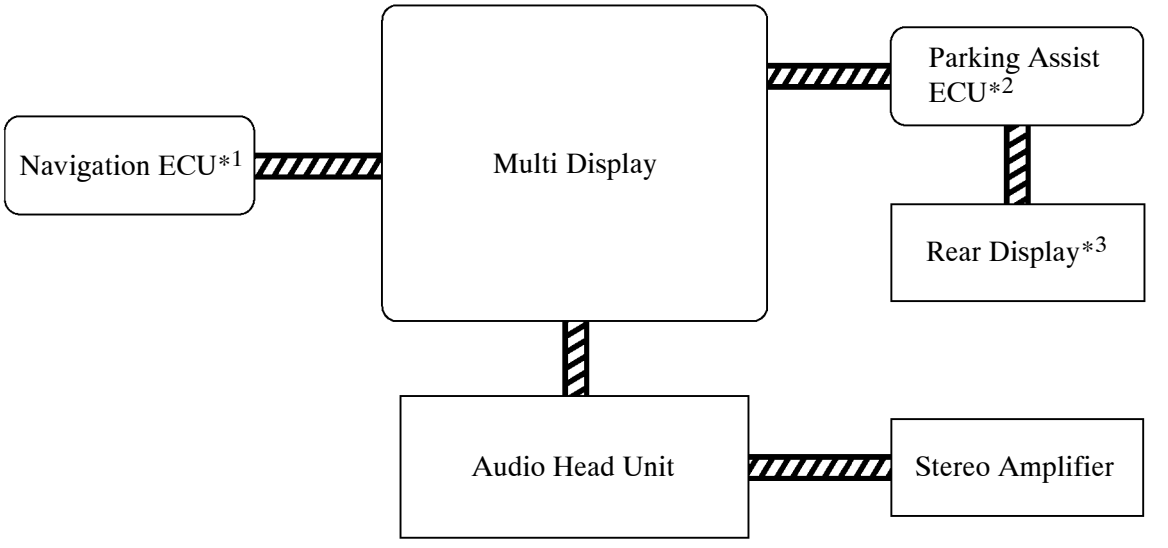
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■AVC-LAN

1. General

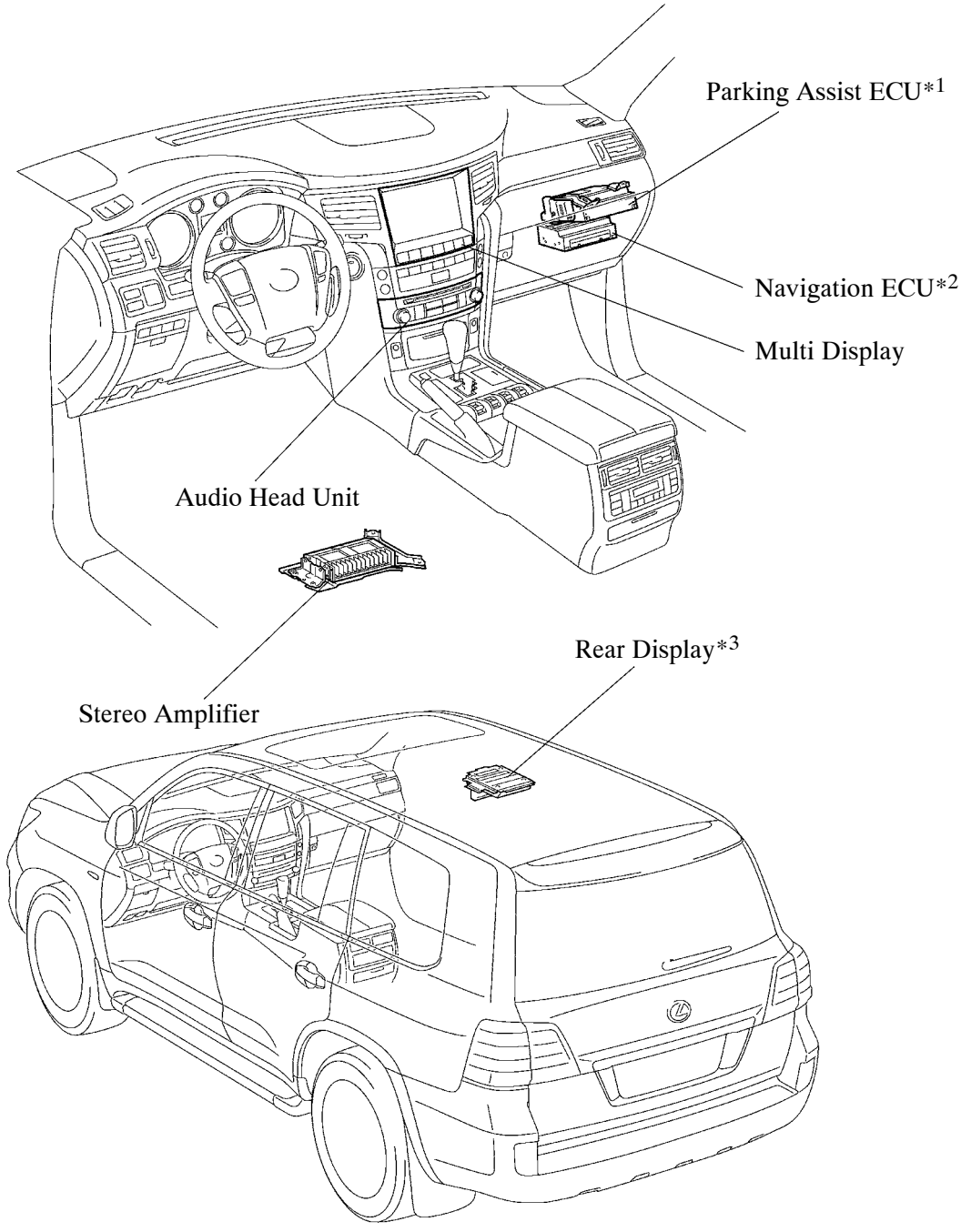
The AVC-LAN is used among the multi display, audio head unit, stereo amplifier, parking assist ECU and rear display.

▶ System Diagram ◀



*1: Models with Navigation with AV System
*2: Models with LEXUS Parking Assist-sensor System, Parking Assist Monitor System or Wide-view Front & Side Monitor System
*3: Optional Equipment

2. Layout of Main Components



LHD Models

08GBE08Y

*1: Models with LEXUS Parking Assist-sensor System, Parking Assist Monitor System or Wide-view Front & Side Monitor System
*2: Models with Navigation with AV System
*3: 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.
- The DTC of models with the multi display can be read on the diagnosis menu on the multi display.

For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

■ 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*	ON/OFF*
	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 once 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/120s
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
	Auto Unlock/Open – Close	Function to unlock all the other doors when opening the driver's door within 10 seconds after turning the power source to OFF from ON (IG).	OFF	ON/OFF
Power Window	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	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	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	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	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	ON/OFF

*: Only OFF is set for the default setting and available settings on China models

(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 (IG).)	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 “ON (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*	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.	2.5s	0.5s/1.5s/ 2.5s/5s
	Key Low Battery Warning	Function to set a warning function for the time when a key battery becomes weak.	ON	ON/OFF

*: Except Europe Models

(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*	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

*: G.C.C. Countries Models

(Continued)

System	Display Content	Contents	Default Setting	Available Setting
Clearance Sonar*	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

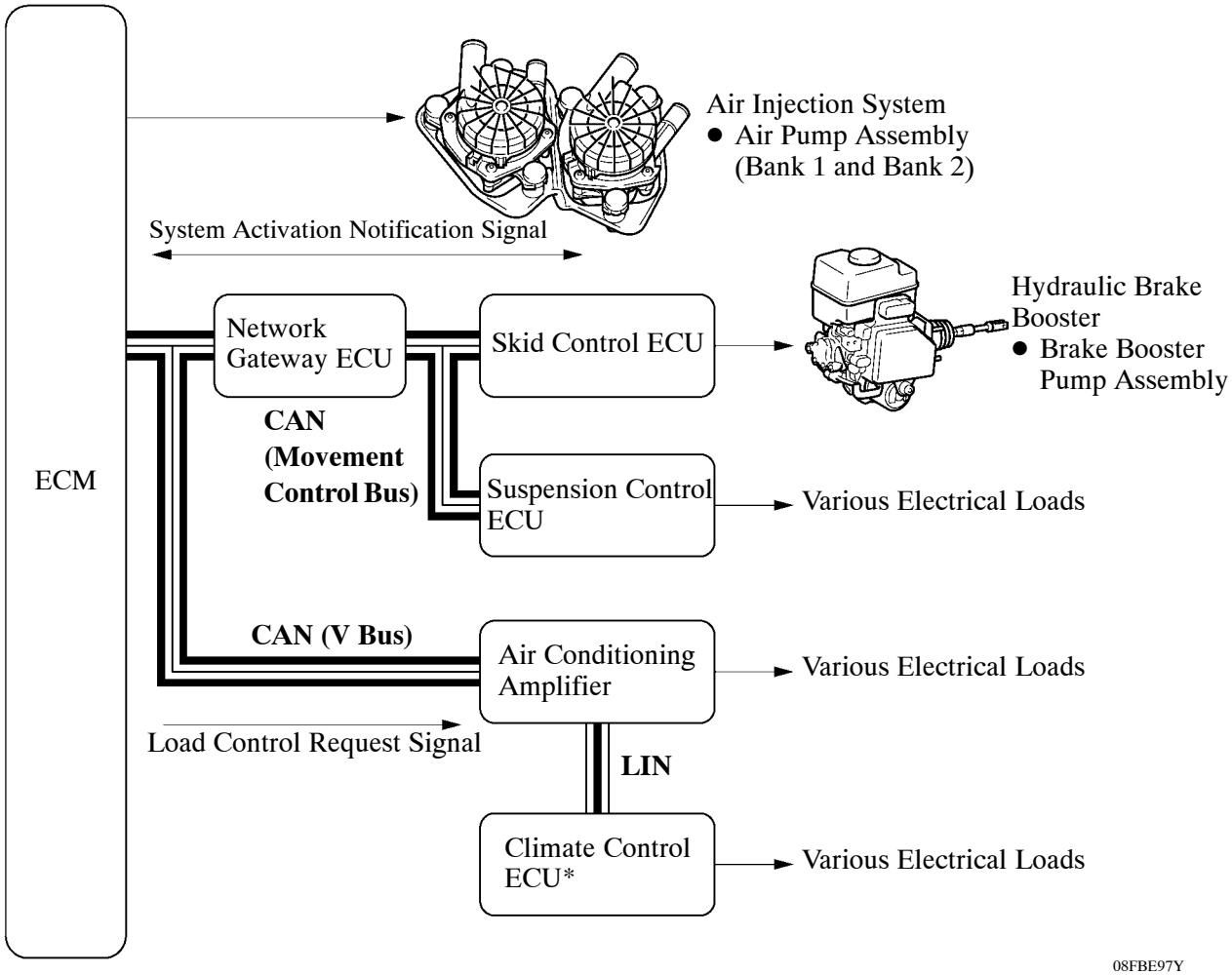
*: Optional Equipment

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.
- 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 ◀



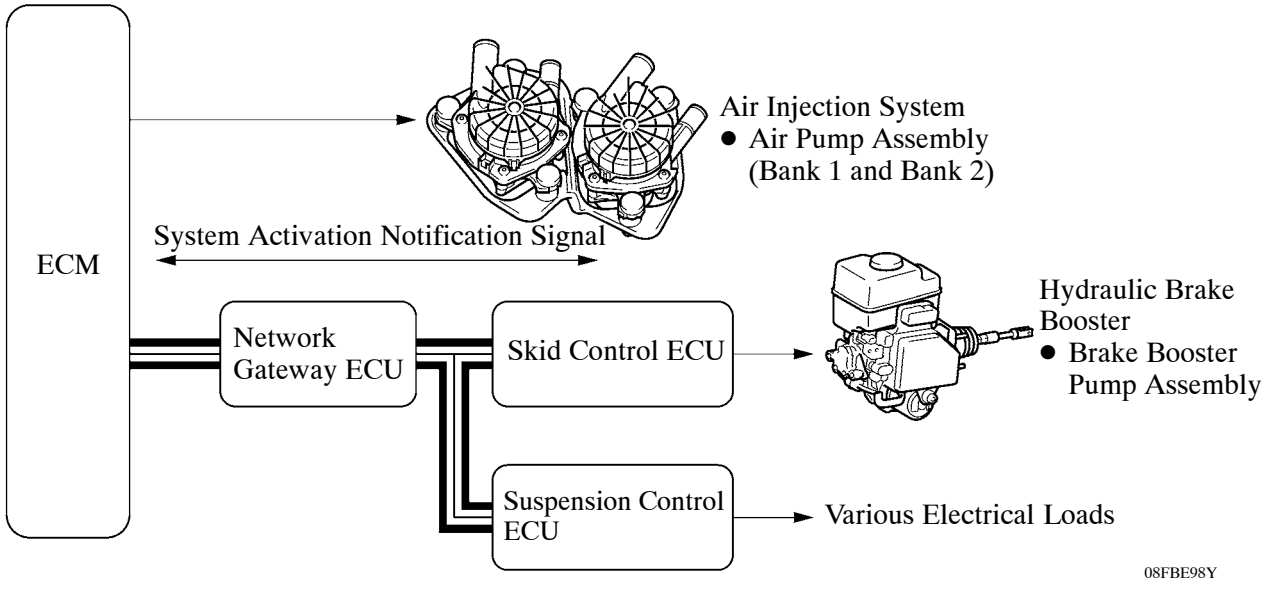
*: Optional Equipment

■SYSTEM OPERATION

1. System Activation Timing Control

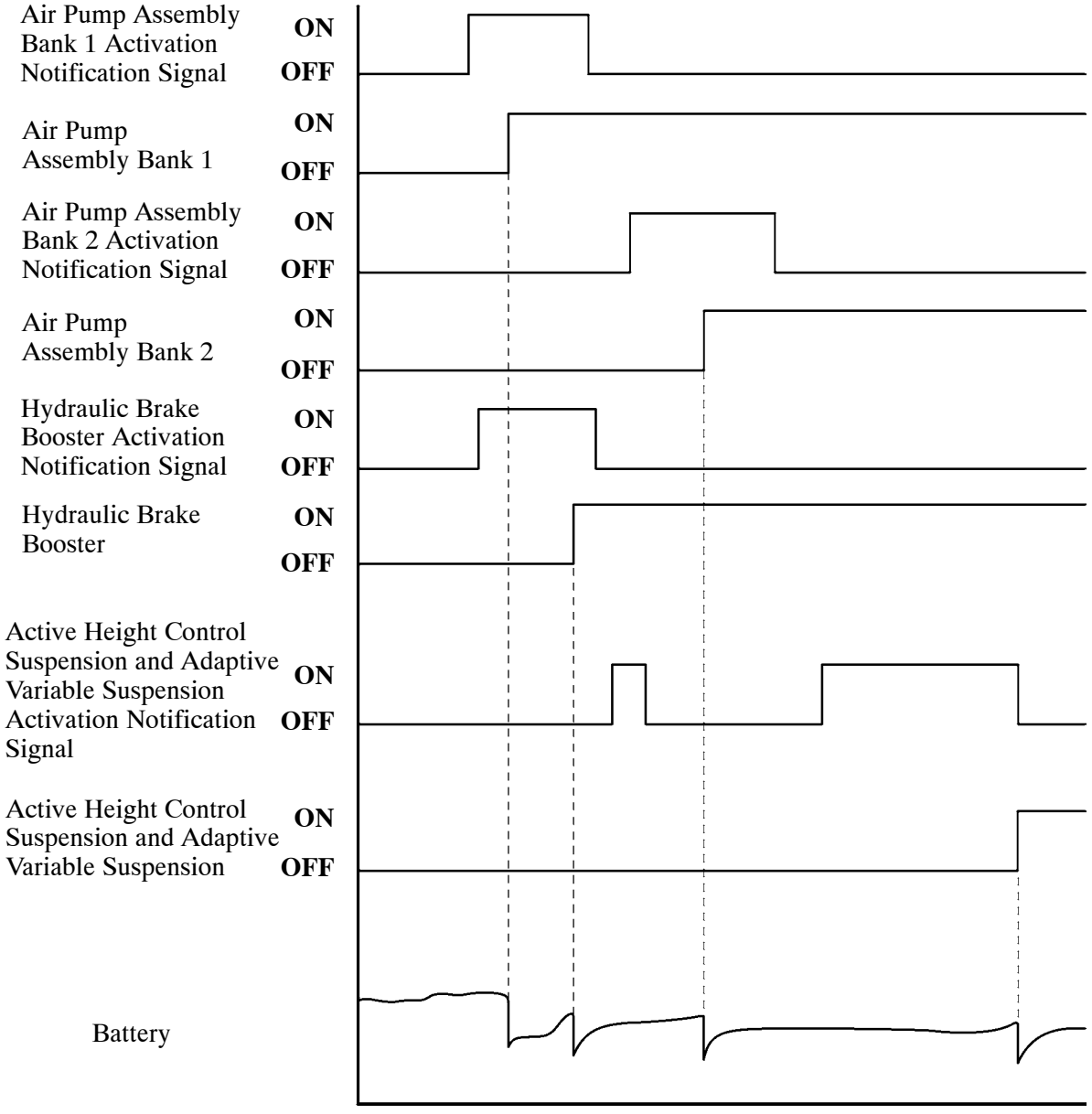
- This control controls the air injection system, hydraulic brake booster, and active height control suspension and adaptive variable suspension. It adjusts the activation timing of each system to prevent systems which use a relatively high amount of electrical power from being activated simultaneously and enables those systems to operate efficiently.
- When the engine is being started, the ECM receives the following signals: a brake booster pump assembly activation notification signal from the skid control ECU; and an active height control suspension and adaptive variable suspension activation notification signal from the suspension control ECU. Then, the ECM advances the activation timing of the air pump assembly bank 1. This prevents the air injection pump, brake booster pump assembly, and active height control suspension and adaptive variable suspension from being activated simultaneously.

▶ System Diagram ◀



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▶ Timing Chart ◀

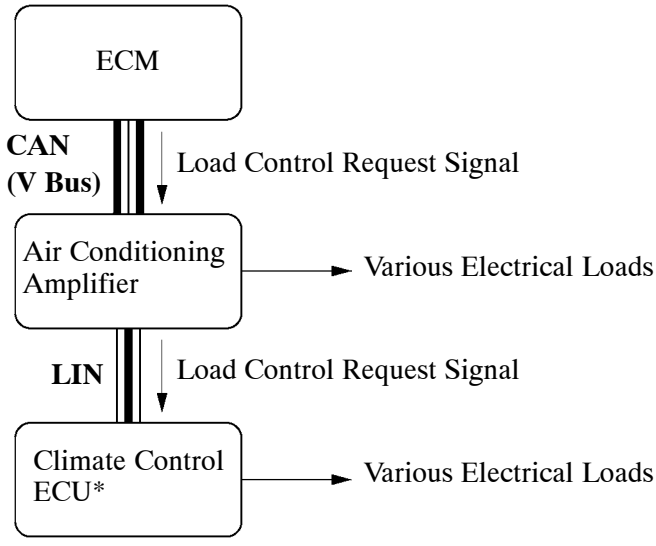


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2. Load Control

When the engine is started, the ECM transmits the load control request signal to the air conditioning amplifier and climate control ECU. Upon receiving this signal, the air conditioning amplifier and climate control ECU suspend the relevant system operations for a few seconds. In conjunction with the system activation timing control, this control prevents the power supply voltage from decreasing excessively when the engine is started, providing a stable power supply.

▶ System Diagram ◀



*: Optional Equipment

LIGHTING

■ DESCRIPTION

1. General

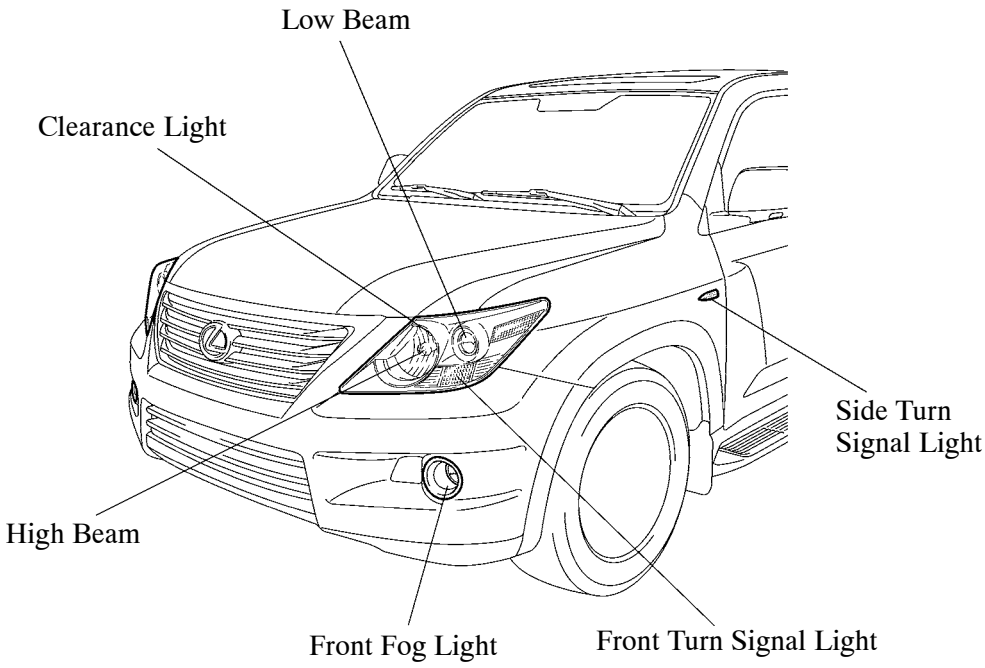
The lighting system includes the following features:

○: Standard OP: Option

Item		Availability
Front Fog Light		○
Rear Fog Light		○*1
Low Beam Headlight	Halogen	○
High Beam Headlight	HID	○
Intelligent AFS		○
Automatic Headlight Beam Level Control System		○
Automatic Light Control System		○
Illuminated Entry		○
Light Turn-off System		○
Headlight Cleaner System		○*2/OP*3

*1: Except G.C.C. Countries Models
*2: Europe Models
*3: G.C.C. Countries, Australia and China Models

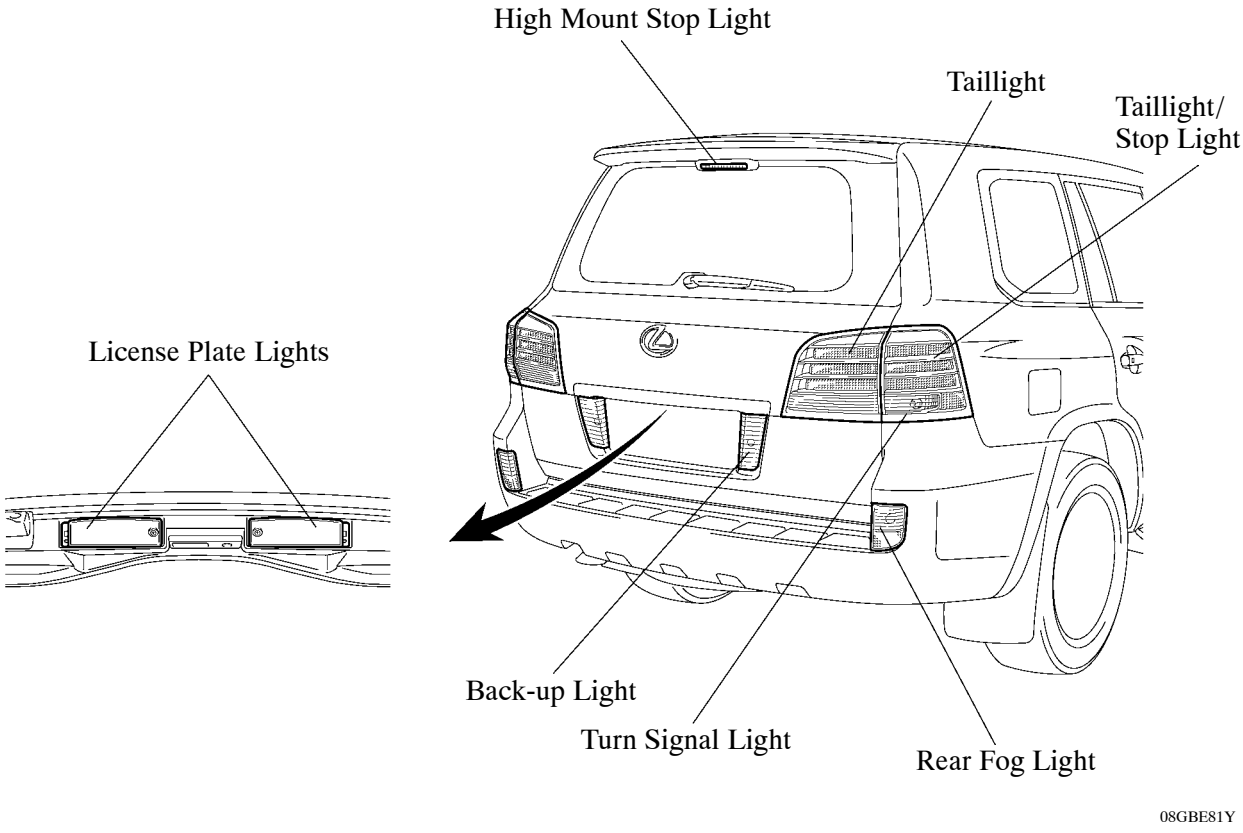
2. Front Exterior Light



▶ Specifications ◀

Light		Type	W
Headlight Unit	High Beam (Multi-reflector Type)	Discharge Bulb	35
	Low Beam (Projector Type)	Halogen Bulb	55
	Front Turn Signal Light	Wedge Base Bulb (Amber)	27
	Clearance Light	Wedge Base Bulb (Clear)	5
	Side Turn Signal Light	Assembly Unit (Amber)	5
Fog Light	Multi-reflector Type	Halogen Bulb	55

3. Rear Exterior Light



▶ Specifications ◀

Light		Type	W
Combination Light	Taillight/Stop Light	LED × 18	0.4/6.2
	Taillight	LED × 15	0.4
	Turn Signal Light	Wedge Base Bulb (Clear)	21
	Back-up Light	Wedge Base Bulb (Clear)	16
License Plate Light		LED × 2	1.7
Rear Fog Light		Wedge Base Bulb (Clear)	21
High Mount Stop Light		LED × 6*1 or 4*2	2.2*1 or 1.0*2

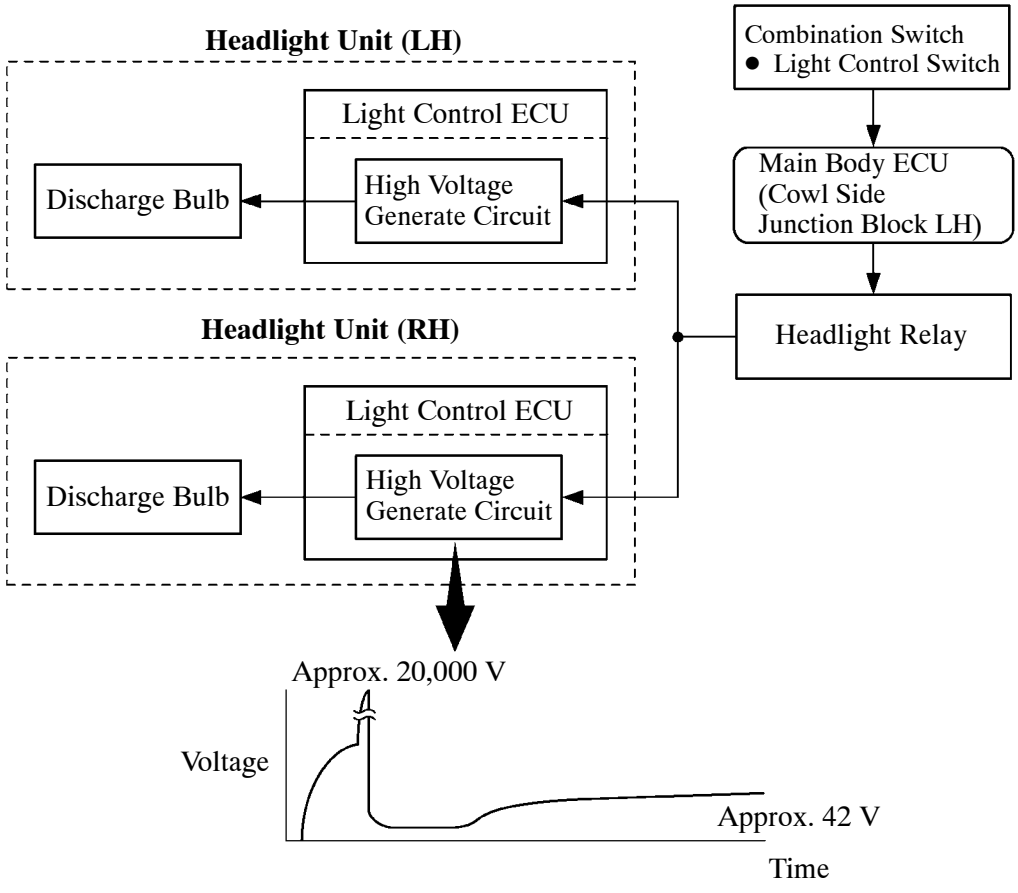
*1: Australia and China Models
*2: Europe and G. C. C. Countries Models

■HID HEADLIGHT SYSTEM

1. General

- The HID (High Intensity Discharge) headlight system is provided as standard equipment on all models.
- The HID headlight system uses a discharge bulb as its light source for the high 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 light control ECUs.
- The light control ECU transforms the voltage that is input from the battery to a high voltage of up to 20,000 V 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.

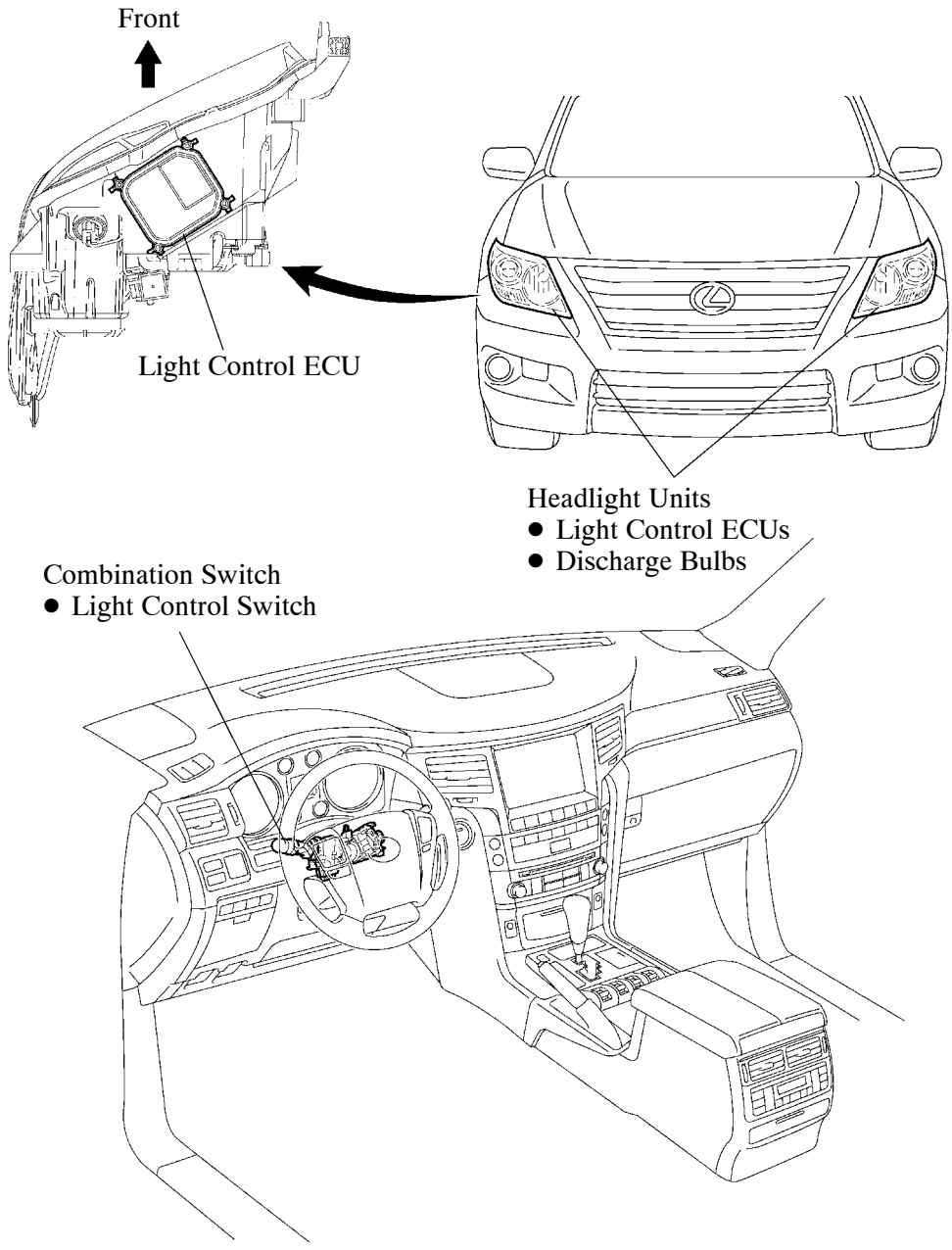
▶ System Diagram ◀



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2. Layout of Main Components

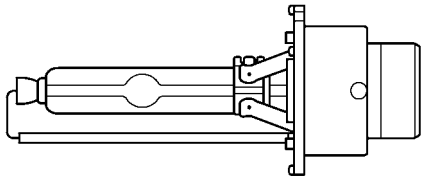


LHD Models

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3. Discharge Bulb

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



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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 light control ECU deviates from the normal operating voltage (10 – 16 volts), the light control ECU stops illuminating the high beam. It resumes illuminating the high beam once the voltage reverts to the operating voltage range. However, if the input voltage decreases after the headlights have illuminated, the high beam 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 light control ECU or if the bulb flashes, the light control ECU stops illuminating the high beam and will maintain this state until the power is reinstated. Power is reinstated by turning the high beam from OFF to ON with the light control switch.
Detection of Bulb Open	If a bulb is not inserted in its socket, the light control ECU stops generating high voltage until the bulb is inserted correctly and the power is reinstated. Power is reinstated by turning the high beam from OFF to ON with the light control switch or turning the engine switch from OFF to ON (IG).

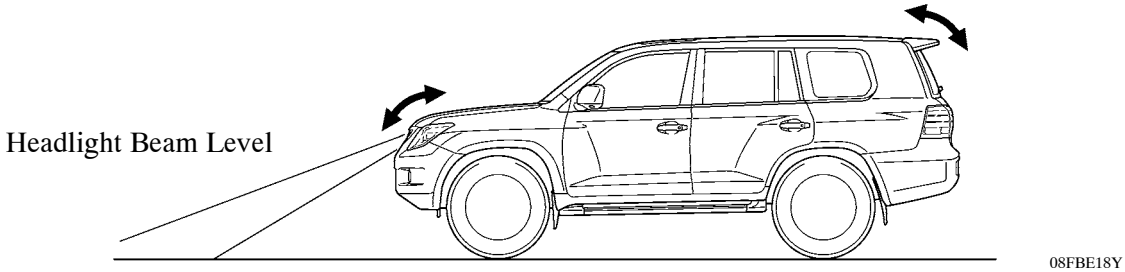
5. Precautions for HID Headlight System

- When the HID headlights illuminate, a high voltage (approximately 20,000 V) 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 light control ECU is disconnected.
- Whenever operating the HID headlight, make sure assembling 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 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.

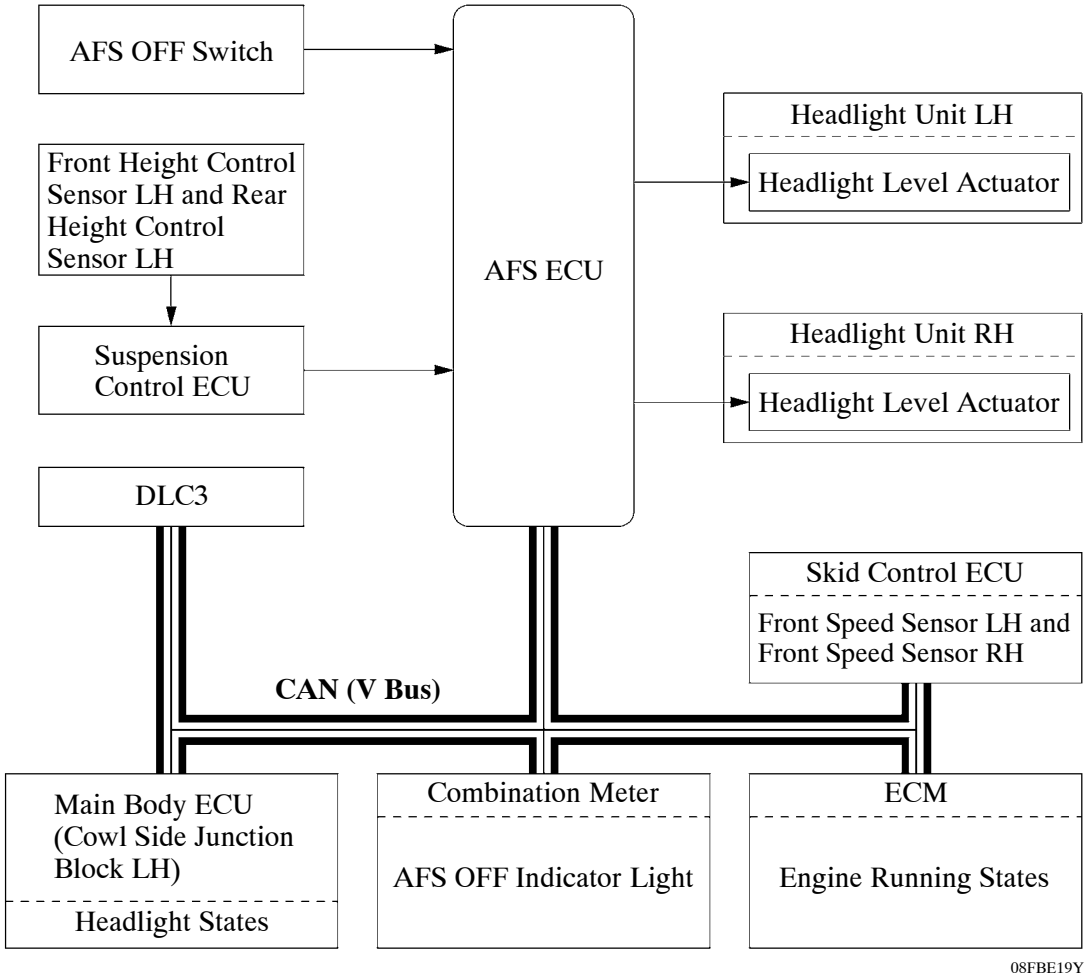
■AUTOMATIC HEADLIGHT BEAM LEVEL CONTROL SYSTEM

1. General

- When the headlights are ON, the automatic headlight beam level control system operates the headlight level actuator in accordance with posture of the vehicle.
- The automatic headlight beam level control system mainly consists of an AFS ECU, a front height control sensor LH, a rear height control sensor LH, and two headlight level actuators.
- The AFS ECU calculates changes in the vehicle posture based on the signals from the front height control sensor LH and rear height control sensor LH.
- The AFS ECU then controls the headlight level actuator based on this information, in order to change the headlight reflector angle.



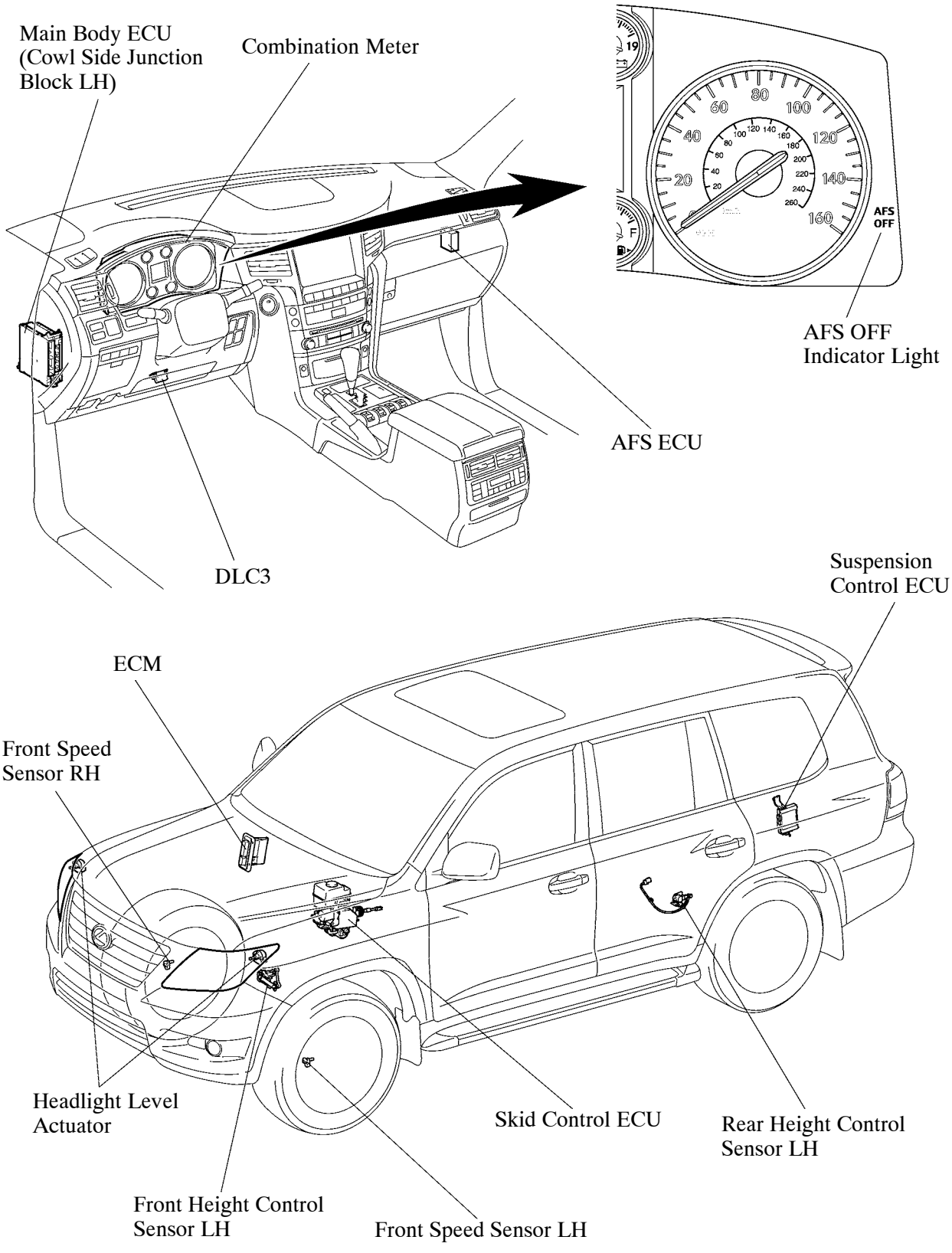
▶ System Diagram ◀



Service Tip

If the AFS ECU is replaced, the AFS ECU must be initialized.
For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

2. Layout of Main Components



LHD Models

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3. Function of Main Components

Component		Outline
AFS ECU		● Calculates changes in the vehicle posture based on the signals from the suspension control ECU and vehicle speed signal. ● Outputs control signal to the headlight level actuators. ● Provides initial set control, fail-safe function and diagnosis function.
Headlight Level Actuator		● Based on the signals received from the AFS ECU, the actuators move the reflectors in the headlights. ● Uses a step motor to precisely regulate the angle of the reflectors.
Height Control Sensor		Detects the height of the vehicle.
Skid Control ECU		Transmits the speed sensor signal to the AFS ECU.
ECM		Transmits the engine running status signal to the AFS ECU.
Main Body ECU		Transmits the headlight status signal.
Suspension Control ECU		Transmits the height of the vehicle detected by the height control sensor to the AFS ECU.
Combination Meter	AFS OFF Indicator Light	When the system malfunctions, the combination meter alerts the driver by flashing the AFS OFF indicator light in accordance with the signal from the AFS ECU.

4. Initial Set Control

When the engine is started, the AFS ECU drives the headlight level actuator, moves the headlight reflector to the lower limit position and returns it to the proper position. The AFS ECU thus assesses the position of the headlight for reference control.

5. Fail-safe

If the AFS ECU detects a malfunction in the automatic headlight beam level control system or intelligent AFS, it will take the actions indicated in the table below.

Trouble Area	Condition (Fail-safe Control for Automatic Headlight Beam Level Control)
Headlight Swivel Actuator Malfunction	Continues to control until a position of 0.7° less than the current position is reached.
Steering Angle Sensor Signal Malfunction	Continues to control.
Speed Sensor Signal Malfunction	● Continues to control using the normal speed sensor signal if one signal fails. ● Judges that the vehicle speed is 0 km/h (0 mph) and continues to control if both speed sensor signals fail.
Height Control Sensor Signal Malfunction	● Stops the operation after returning to initial position (Fail at higher than initial position). ● Stops the operation in current condition (Fail at lower than initial position).
Headlight Level Actuator Malfunction	Normal Side Headlight Level Actuator: ● Stops the operation after returning to initial position (Fail at higher than initial position). ● Stops in current condition (Fail at lower than initial position).
	Abnormal Side Headlight Level Actuator: ● Stops in its current position.
Communication Signal Malfunction	Skid Control ECU: ● Judges that the vehicle speed is 0 km/h (0 mph) and continues to control.
	Steering Angle Sensor: ● Normally controls the system

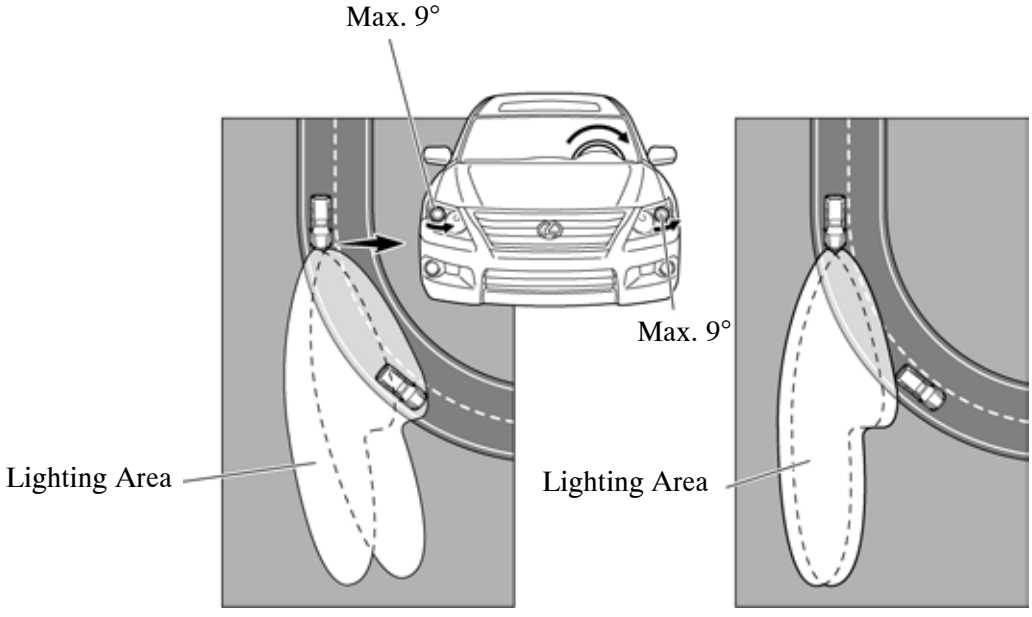
6. Diagnosis

If the AFS ECU detects a malfunction in the automatic headlight beam level control system, the AFS ECU flashes the AFS OFF indicator light. At the same time, the DTCs (Diagnostic Trouble Codes) are stored in memory. The DTC can be read by use of the intelligent tester II. For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

■INTELLIGENT AFS (Adaptive Front-lighting System)

1. General

An intelligent AFS (Adaptive Front-lighting System) is used in order to ensure a wide low beam lighting area and realize excellent visibility during turns by moving the low beam.

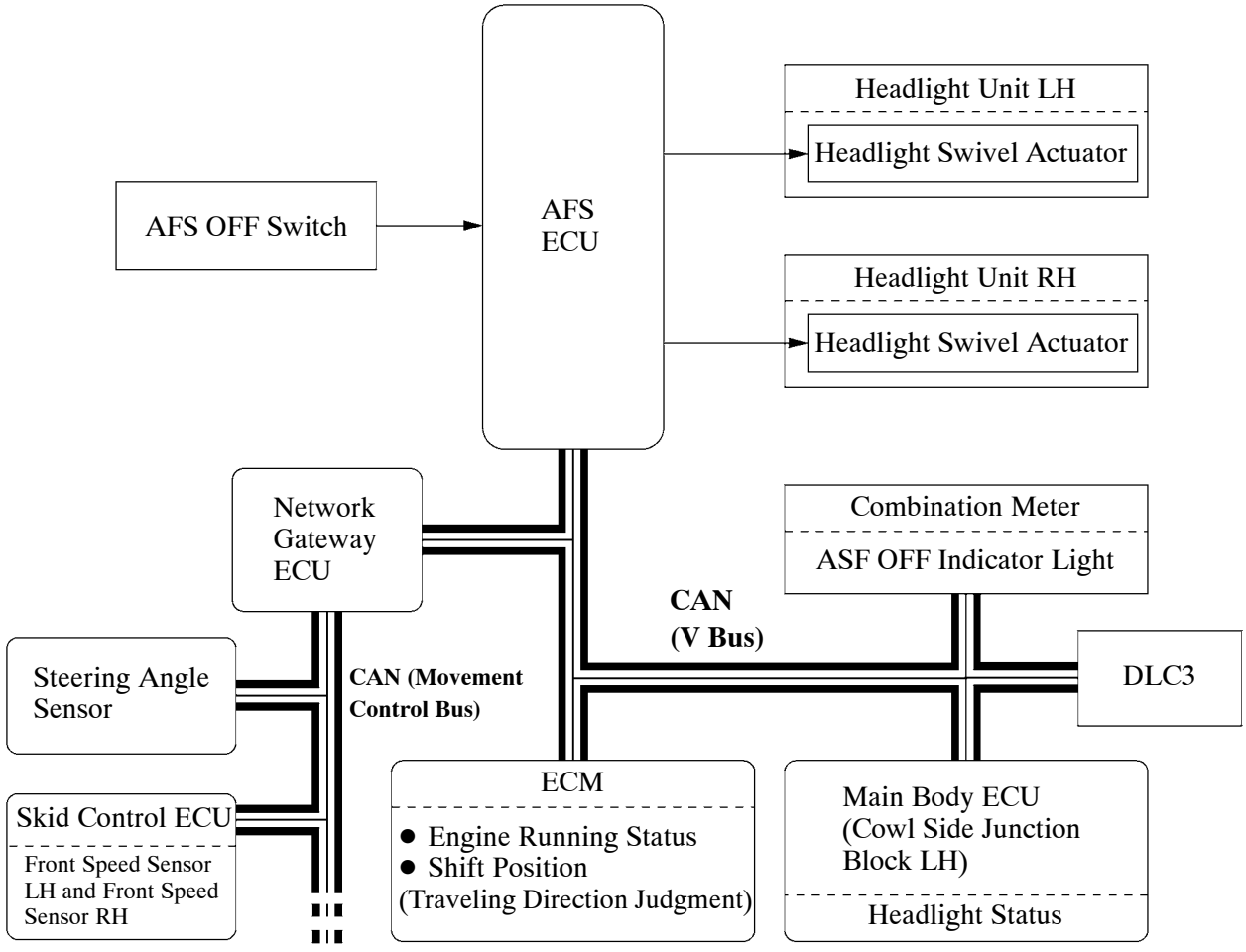


With Intelligent AFS **Without Intelligent AFS**

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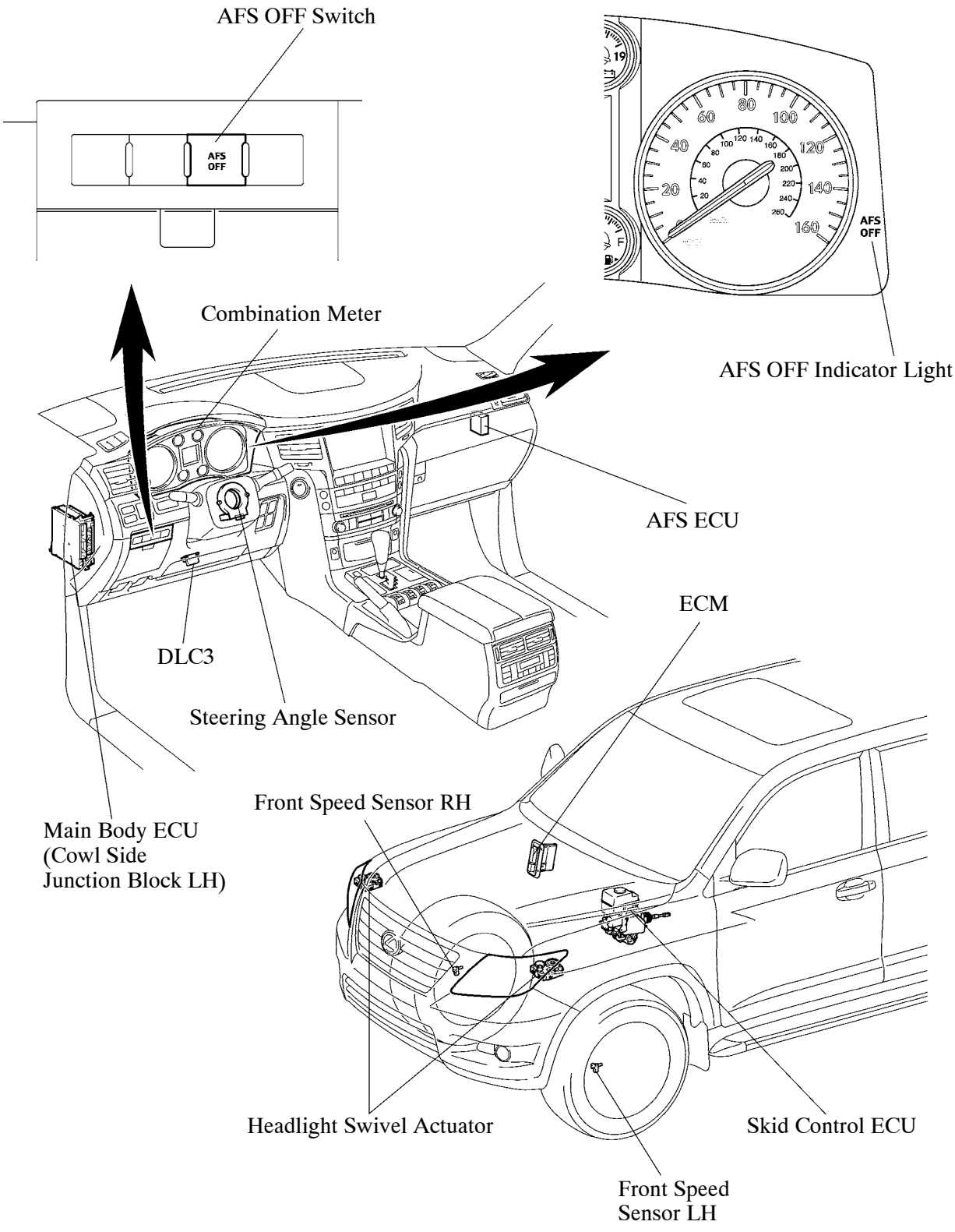
2. System Diagram

- This system consists of two headlight units (for low beam), the AFS ECU, two headlight swivel actuators, the steering angle sensor and the front speed sensors. The AFS ECU controls this system.
- The AFS ECU also controls the automatic headlight beam level control system. For details, see page BE-32.



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3. Layout of Main Components



LHD Models

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4. Function of Main Components

Component		Outline
AFS ECU		Receives various signals, calculates the target lighting angle, and actuates the headlight swivel actuator.
Headlight Swivel Actuator		● Driven by the AFS ECU, the actuator moves the low beam left or right to the angle calculated by the AFS ECU. ● A step motor is used for the headlight swivel actuator. The AFS ECU determines the low beam angle based on the number of steps (position) of the step motor.
Steering Angle Sensor		Detects the steering angle and direction and outputs this signal to the AFS ECU.
AFS OFF Switch		Pressing this switch disables the operation of the intelligent AFS.
Skid Control ECU		Transmits the signal from the front speed sensor LH and front speed sensor RH to the AFS ECU.
ECM		● Transmits the engine running status signal to the AFS ECU. ● Transmits the shift position signal to the AFS ECU. The AFS ECU determines whether the vehicle is moving forward or backward from this signal.
Main Body ECU		Transmits the headlight status signal.
Combination Meter	AFS OFF Indicator Light	● When the system malfunctions, the combination meter flashes the AFS OFF indicator light based on the signal from the AFS ECU to alert the driver. ● When the AFS OFF switch is ON, the AFS ECU illuminates the AFS OFF indicator light to inform the driver that the system does not operate.

5. System Control

General

- The AFS ECU calculates the target lighting angle of the low beam by receiving the steering angle signal and the vehicle speed signal. Then, it actuates the headlight swivel actuator in order to attain the target lighting angle.
- The operation angle of the headlights is detected through the position (number of steps) of the step motor in the headlight swivel actuator.
- The AFS ECU performs the AFS control when all the following conditions are fulfilled.
  - Engine is running.
  - Vehicle is moving forward at a speed of 10 km/h (6.2 mph) or more.
  - Steering angle is more than 7.5°.
  - Headlight low beam is operating.
  - AFS OFF switch is not ON.
- Based on the steering angle and vehicle speed, the AFS ECU calculates the swivel angle of the low beams so that the headlights can illuminate the position the vehicle will reach after 3 seconds, and drives both headlight swivel actuators to illuminate the road ahead during a turn.

▶ Swivel Angle Range ◀

Driving Condition		Headlight Unit	
		Left	Right
LHD Models	Left Turn	0° to 9° to Left	0° to 9° to Left
	Right Turn	0° to 4° to Right	0° to 4° to Right
RHD Models	Left Turn	0° to 4° to Right	0° to 4° to Right
	Right Turn	0° to 9° to Left	0° to 9° to Left

Initial Set Control

When the engine is started, the AFS ECU drives the headlight swivel actuator, moves the projector headlight to the operation limit in the direction toward the vehicle center and returns it to the proper position. The AFS ECU thus assesses the position of the headlight for reference control.

Fail-safe

If the AFS ECU detects a malfunction in the intelligent AFS or automatic headlight beam level control system, it will take the actions indicated in the table below.

Trouble Area	Condition (Fail-safe Control for Intelligent AFS)
Headlight Swivel Actuator Malfunction	Normal Side Headlight Swivel Actuator: ● Stops operating after returning to the initial position.
	Abnormal Side Headlight Swivel Actuator: ● Stops in its current position.
Steering Angle Sensor Signal Malfunction	Stops operating after returning to the initial position.
Speed Sensor Signal Malfunction	Stops operating after returning to the initial position.
Height Control Sensor Signal Malfunction	Stops operating after returning to the initial position.
Headlight Level Actuator Malfunction	Stops operating after returning to the initial position.
Communication Signal Malfunction	Main Body ECU: ● Stops operating after returning to the initial position.
	ECM: ● Stops operating after returning to the initial position.
	Skid Control ECU: ● Stops operating after returning to the initial position.
	Steering Angle Sensor: ● Stops operating after returning to the initial position.

Diagnosis

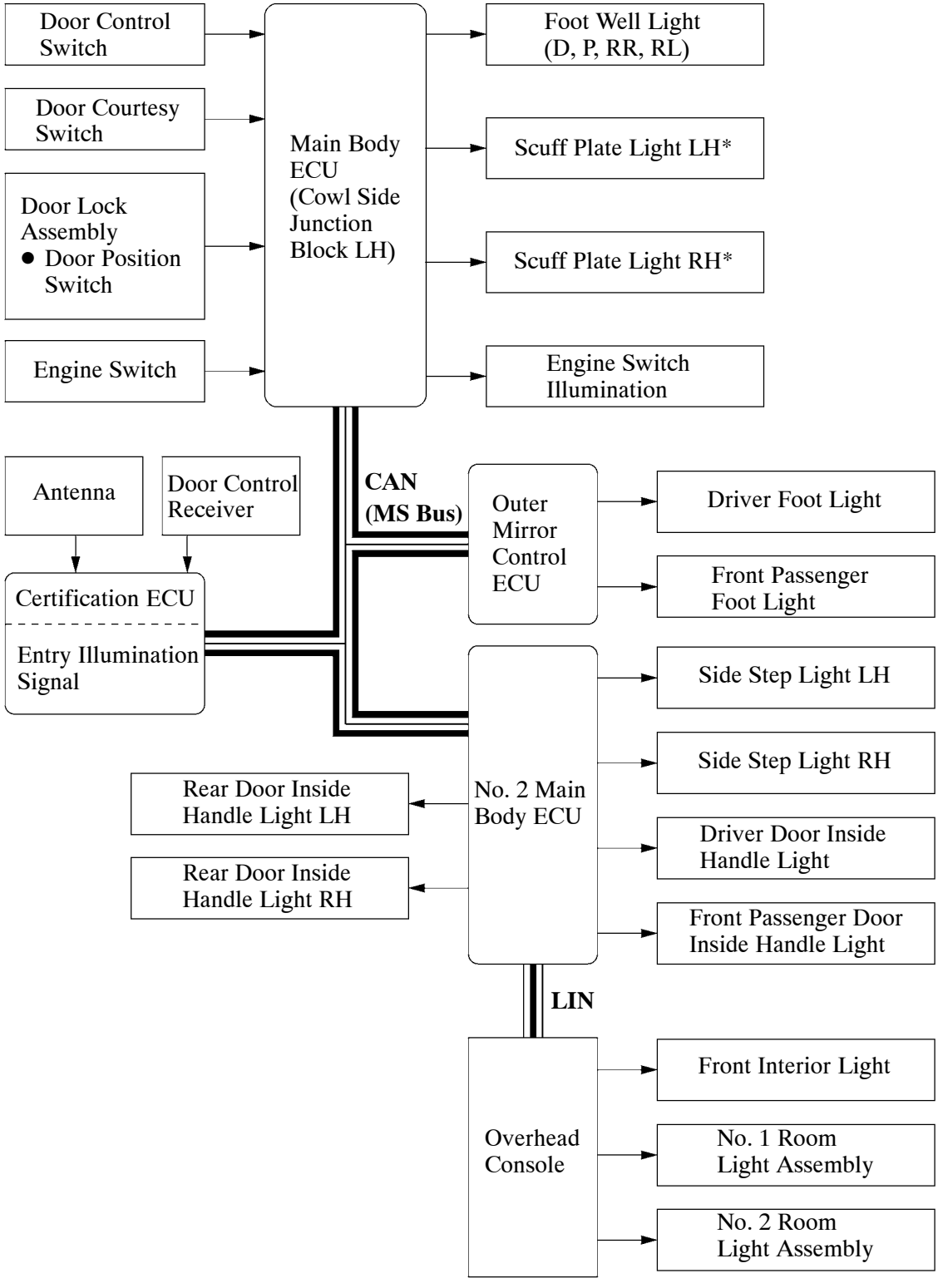
If the AFS ECU detects a malfunction in the intelligent AFS, the AFS ECU flashes the AFS OFF indicator light in order to alert the driver. At the same time, the DTCs (Diagnostic Trouble Codes) are stored in the memory. The DTC can be read by using the intelligent tester II. For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

■ILLUMINATED ENTRY SYSTEM

1. General

- The illuminated entry system of the new LX 570 controls interior light illumination.
- The interior light is operated when the light switch is in the DOOR position.

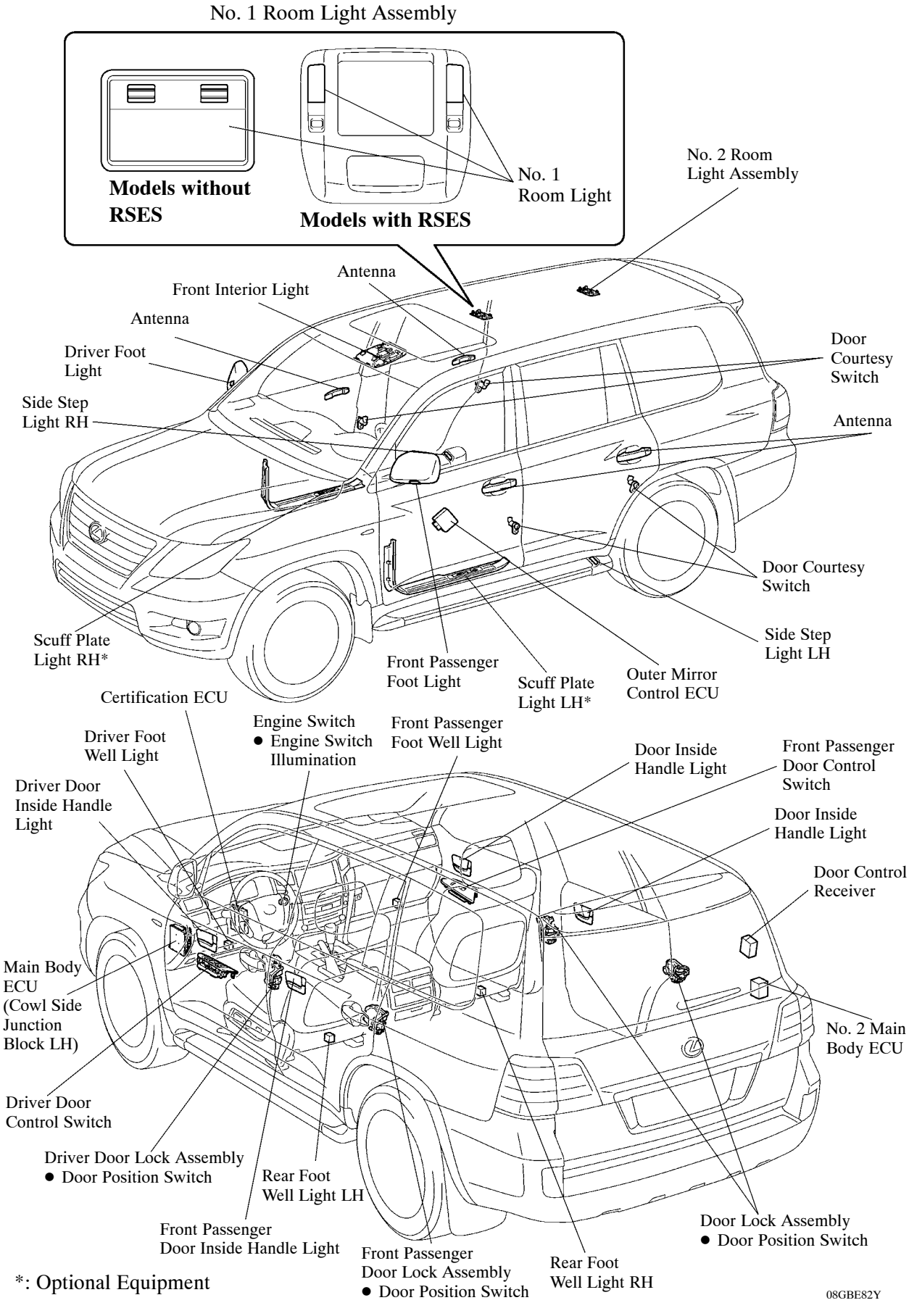
▶ System Diagram ◀



*: Optional Equipment

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2. Layout of Main Components

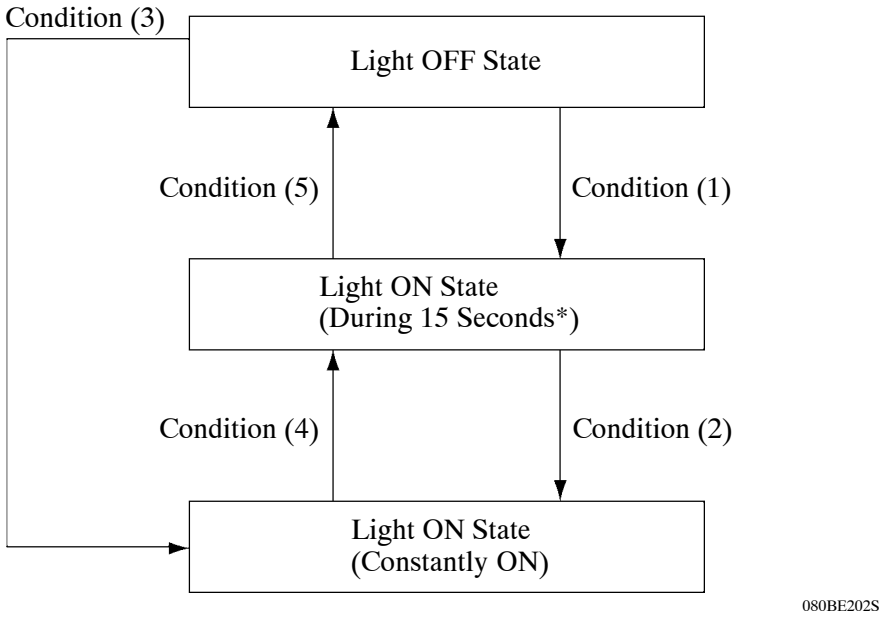


LHD Models

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3. Interior Light Control

- The front interior light, room lights, scuff plate illumination and engine switch illumination consist primarily of the fade-in/fade-out function and timer illumination function.
- The interior light control operates as described in the diagram below when any one of the items for each condition is satisfied.



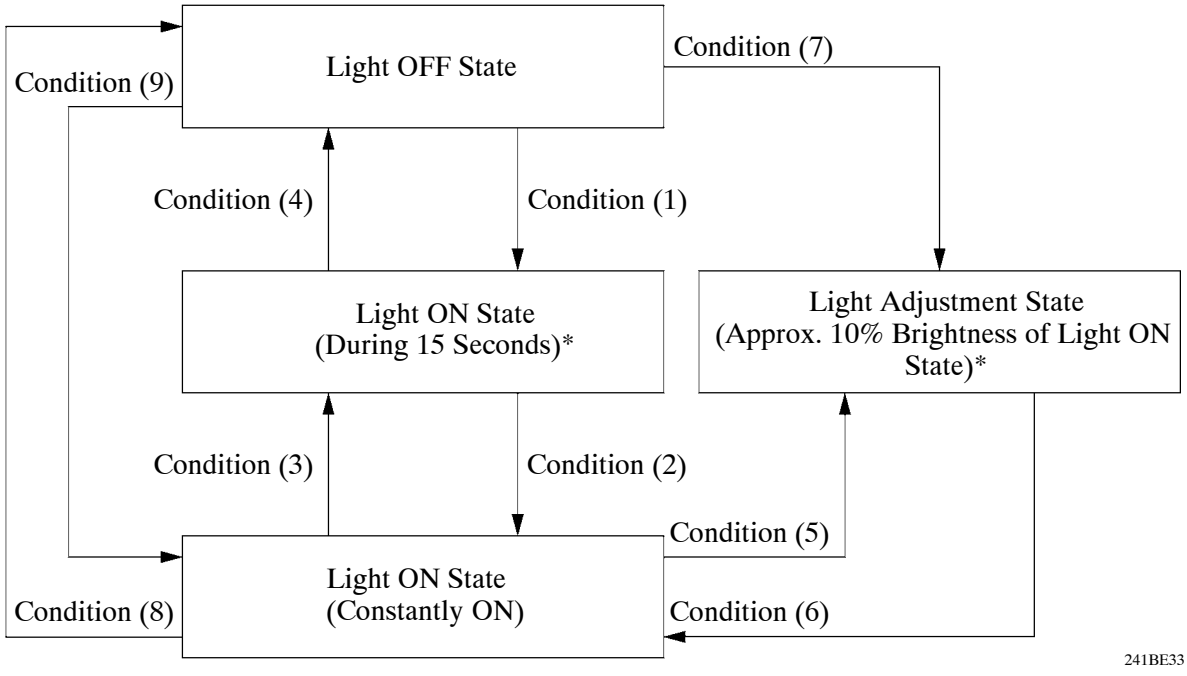
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Condition	Item
Condition (1)	● With engine switch OFF and all doors closed, key enters any actuation area around the doors. ● With engine switch OFF and all doors closed, any door is unlocked. ● Engine switch is turned from ON (ACC), ON (IG) to OFF.
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 in the light ON state (15 seconds duration)*. ● All doors are closed and locked. ● Engine switch is turned from OFF to ON (ACC), ON (IG). ● Key is outside of all actuation areas 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-18.

4. Foot Well Illumination Control and Door Inside Handle Illumination Control

- The foot well illumination control consists primarily of the fade-in/fade-out function and timer illumination function.
- The foot well illumination control operates as described in the diagram below when any one of the items for each condition is satisfied.



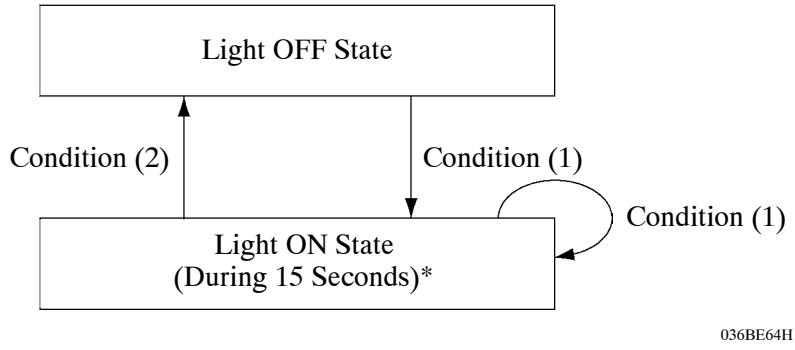
Condition	Item
Condition (1)	● With engine switch OFF and all doors closed, any door is unlocked.
Condition (2)	● Any door is open. ● With shift lever at P position, engine switch is changed from OFF to ON (IG).
Condition (3)	● With engine switch ON (ACC) or OFF, all doors are closed. ● With all doors closed, engine switch is changed from ON (IG) to OFF.
Condition (4)	● More than 15 seconds have elapsed in the light ON state (15 seconds duration)*. ● With engine switch OFF and all doors closed, all doors are locked.
Condition (5)	● Shift lever is put into other than P position with engine switch ON (IG).
Condition (6)	● With engine switch ON (IG), shift lever is put into P position or any door is opened with shift lever in any position except P.
Condition (7)	● With shift lever in other than P position, engine switch is changed from OFF to ON (IG).
Condition (8)	● With engine switch OFF and all doors locked, all doors are closed.
Condition (9)	● Any door is open. ● With shift lever in P position, engine switch is changed from OFF to ON (IG).

*: The function setting can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-18.

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5. Foot Light Control

- The foot light control consists primarily of the fade-in/fade-out function and timer illumination function.
- The foot light control operates as described in the diagram below when any one of the items for each condition is satisfied.

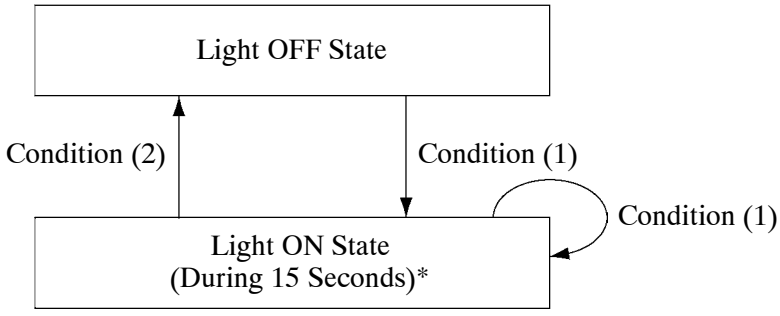


Condition	Item
Condition (1)	● With engine switch OFF and all doors closed, key enters any actuation area around the doors. ● With engine switch OFF, all doors are closed and any door is unlocked. ● With engine switch ON (IG) and shift lever in P position, all doors are unlocked by driver or front passenger door control switch.
Condition (2)	● More than 15 seconds have elapsed in the light ON state (15 seconds duration)*. ● All doors are closed and locked. ● Engine switch is ON (ACC) or ON (IG). ● Key is outside of all actuation area around the doors. ● Shift lever is put into other than P position with engine switch ON (IG).

*: The function setting can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-18.

6. Side Step Illumination Control

- The side step illumination control consists primarily of the fade-in/fade-out function and timer illumination function.
- The side step illumination control operates as described in the diagram below when any one of the items for each condition is satisfied.



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Condition	Item
Condition (1)	● With engine switch OFF and all doors closed, key enters any actuation area around the doors. ● With engine switch OFF, all doors closed and any door is unlocked. ● With engine switch ON (IG) and shift lever in P position, all doors are unlocked by driver or front passenger door control switch. ● A door other than the back door is open.
Condition (2)	● More than 15 seconds have elapsed in the light ON state (15 seconds duration)*. ● All doors are closed and locked. ● Engine switch is ON (ACC) or ON (IG). ● Key is outside of all actuation area around the doors. ● Shift lever is moved to a position other than P position with engine switch ON (IG).

*: The function setting can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-18.

7. Battery Saving Control

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

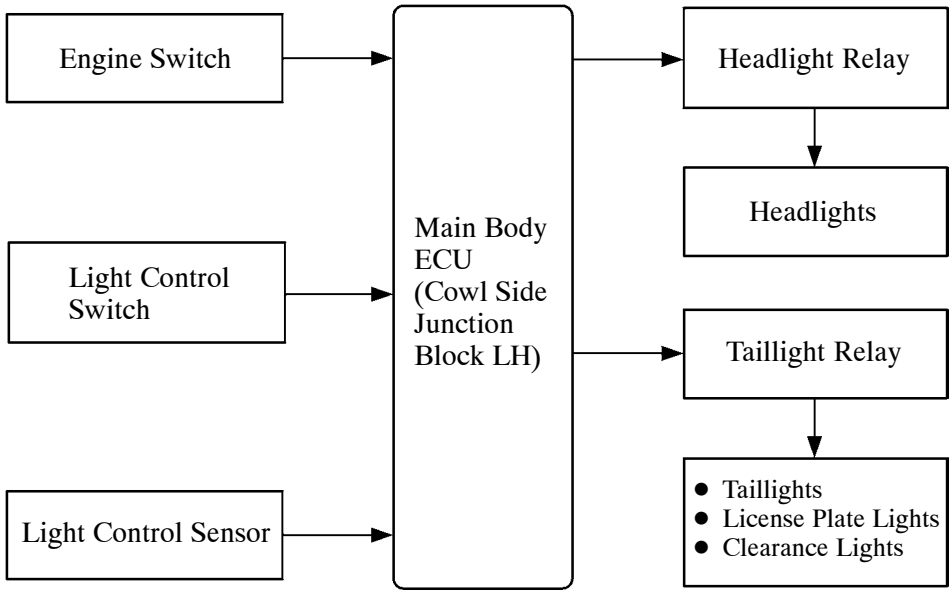
- When any door is open, no door is opened or closed for approximately 20 minutes.*
- Engine switch is turned from ON (ACC), ON (IG) to OFF.

*: In case that No. 2 main body ECU doesn't receive a turn-off request signal from the main body ECU even after a period of 20 minutes, the illuminations (the side step light and door inside handle light) which are controlled by the No. 2 main body ECU are turned OFF after approximately 25 minutes.

■ 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, clearance lights, taillights and license plate lights.
- Outside light levels are detected by the light control sensor that is integrated in the air conditioning system's solar sensor.
- The main body ECU controls this system.

▶ System Diagram ◀



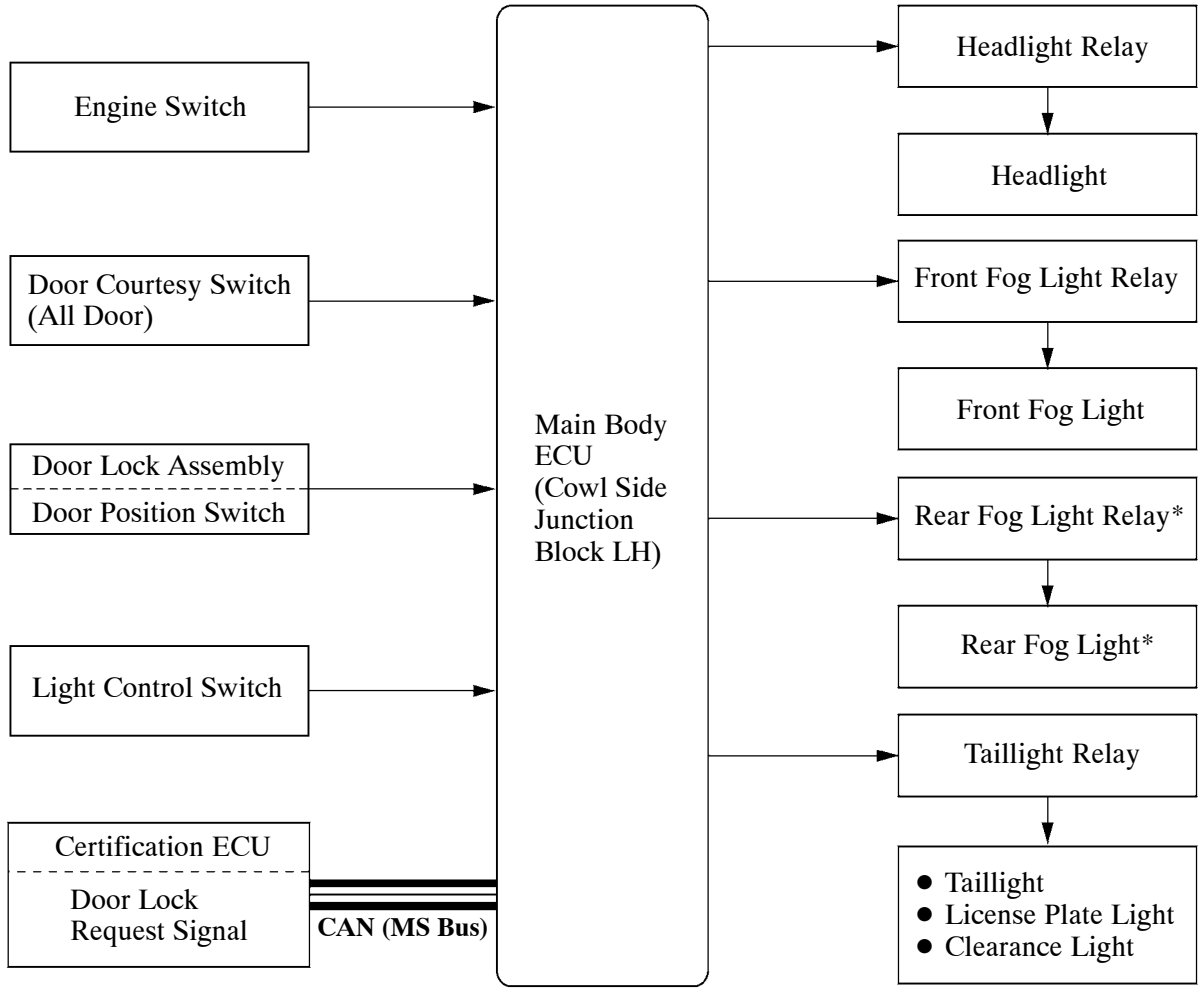
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■ LIGHT TURN-OFF SYSTEM

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.

*: Except G.C.C. Countries Models

▶ System Diagram ◀



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*: Models with Rear Fog Light

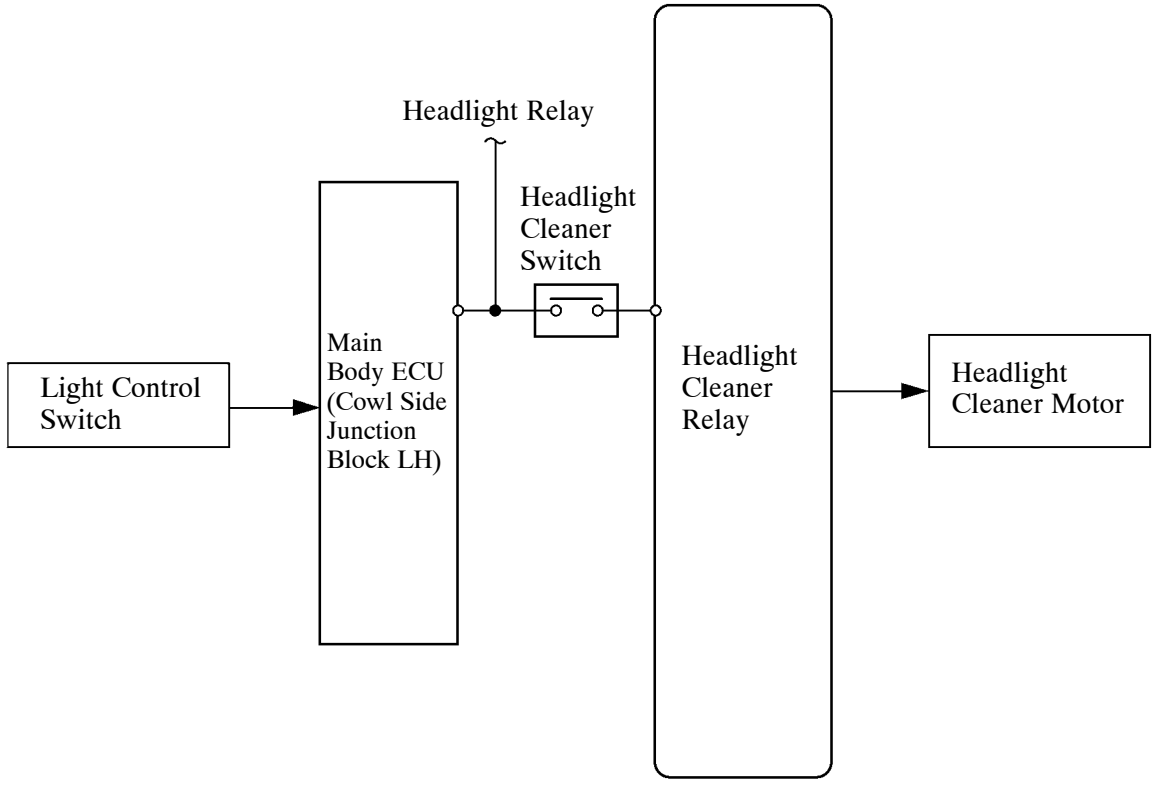
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■ HEADLIGHT CLEANER SYSTEM

1. General

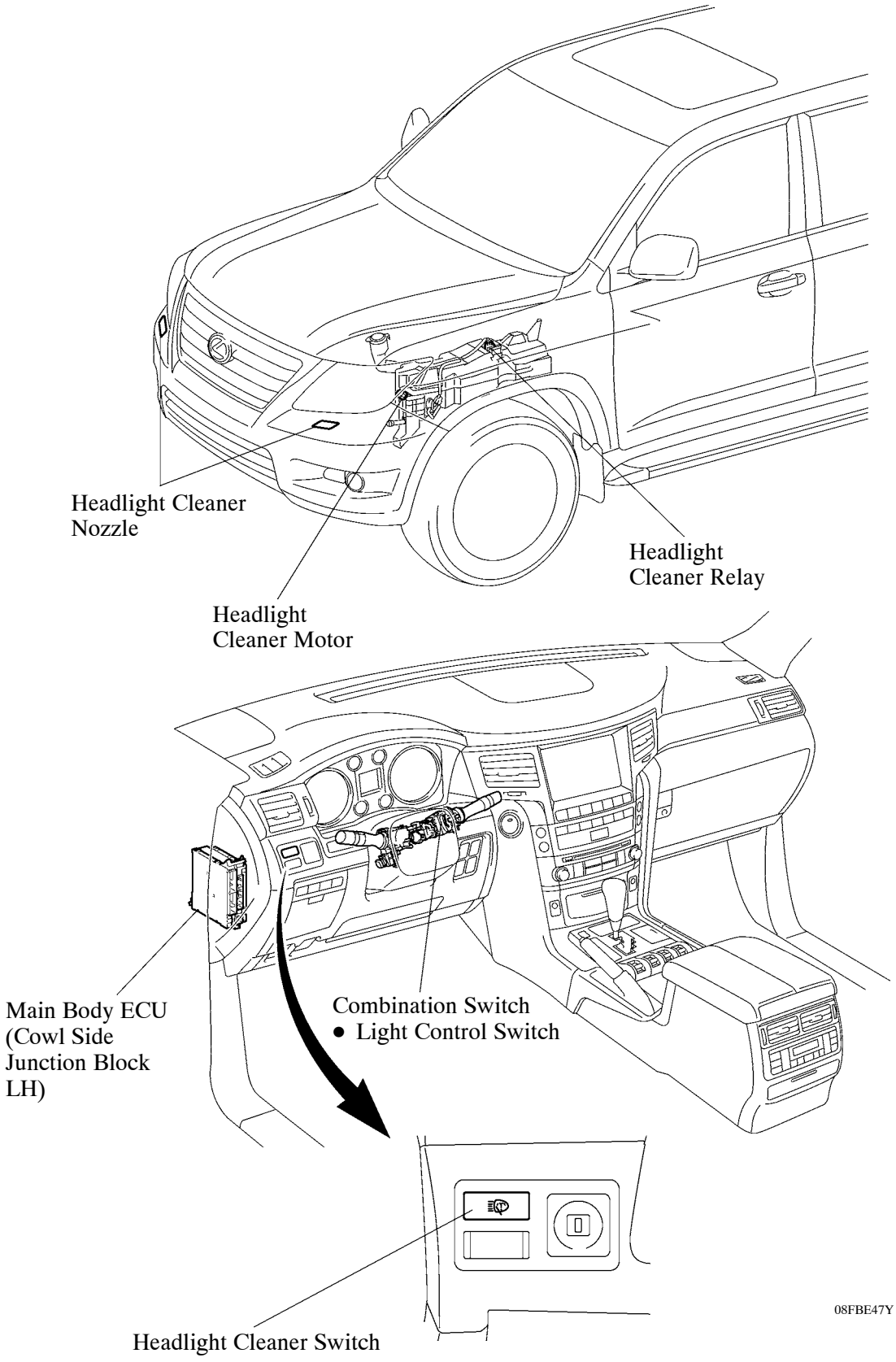
- The headlight cleaner system sprays washer fluid on the headlight lenses to clean them.
- The headlight cleaner relay controls this system.

▶ System Diagram ◀



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2. Layout of Main Components



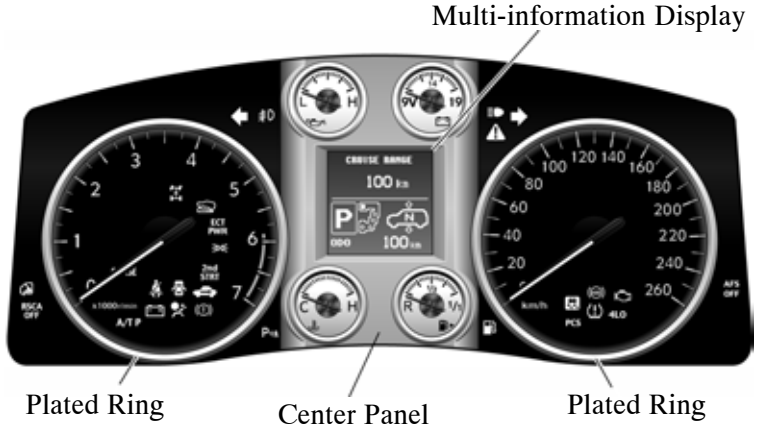
LHD Models

METER

■COMBINATION METER

1. General

- An Optitron display type combination meter is used. 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 indicator and the dial.
- The speedometer and tachometer use a blue gradation illumination.
- This illumination produces the following stage effect. When the engine switch is OFF, only the metallic center panel and the plated ring are visible. When the engine switch is ON (IG), the speedometer and tachometer displays appear on the surface.
- The multi-information display is provided in the center of the combination meter.
- The fuel gauge, coolant temperature gauge, battery voltage gauge, and oil pressure gauge are placed at the four corners of the center panel.
- A meter ECU and a 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 engine switch is turned ON (IG), has been provided.



For Europe Model

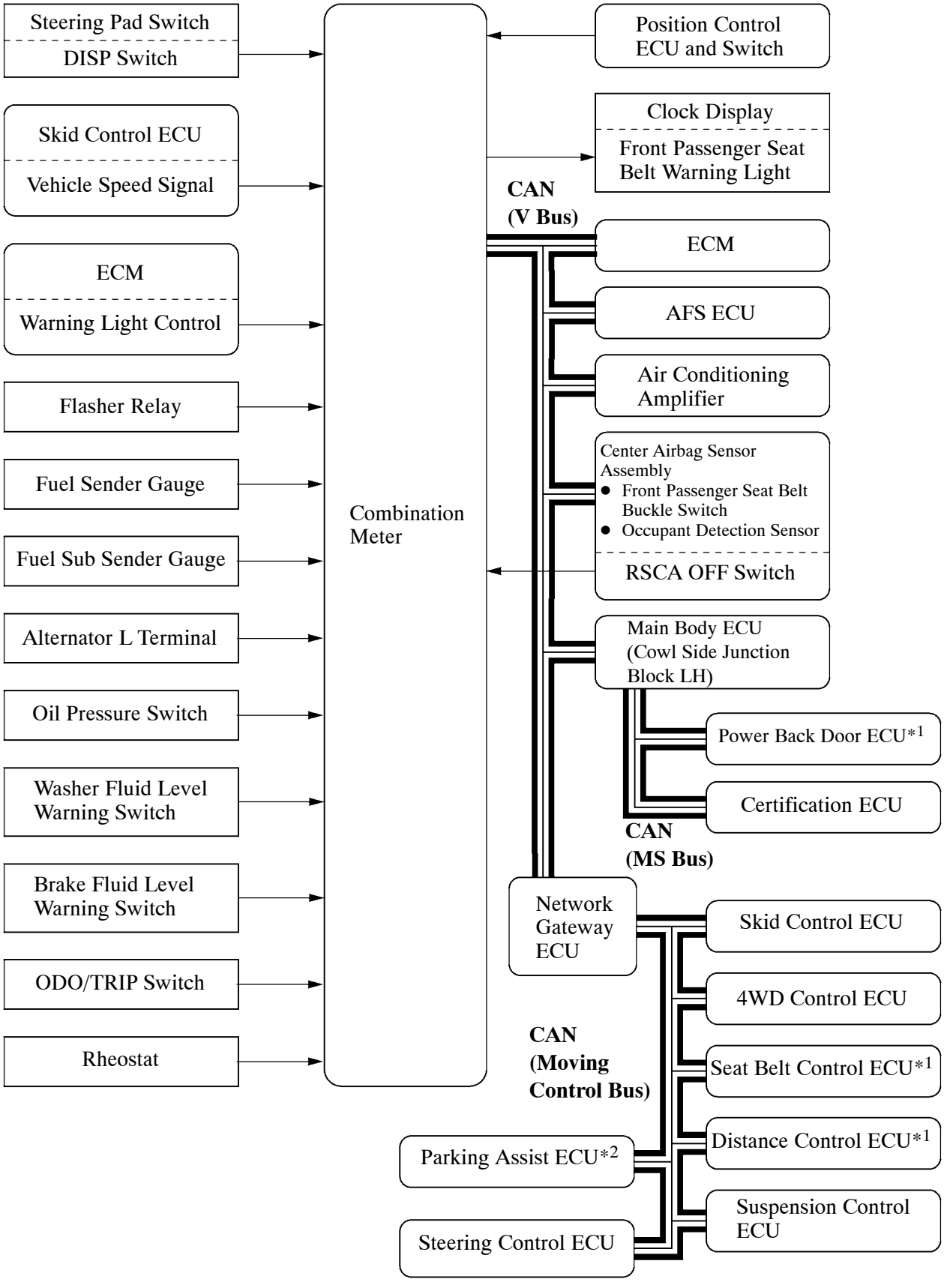


For Australia Model

Service Tip

If the LEDs malfunction, the entire combination meter assembly must be replaced. For details, refer to the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

2. System Diagram



*1: Optional Equipment

*2: Models with LEXUS Parking Assist-sensor System, Parking Assist Monitor System or Wide-view Front & Side Monitor System

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▶ Input and Output Communication Signals of Combination Meter ◀

ECU	Input Signal	Output Signal
ECM	● Engine Speed ● Shift Position ● S Mode Position ● Fuel Injection Volume ● Warning Light Control ● Water Temperature ● Current Range Position ● Buzzer Sounding Request ● Indicator Light Illumination Request ● Warning Message Display Request ● Diagnosis (Cruise)	Vehicle Speed
Air Conditioning Amplifier	● Outside Temperature ● Warning Message Display Request ● Buzzer Sounding Request ● Diagnosis	Vehicle Speed
Center Airbag Sensor Assembly	● Warning Light Illumination Request ● Seat Belt Warning Control (Driver and Front Passenger) ● Diagnosis	Vehicle Speed
Main Body ECU (Cowl Side Junction Block LH)	● 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*	● Warning Message Display Request ● Warning Light Illumination Request ● Buzzer Sounding Request ● Vehicle Speed ● Diagnosis	—
Power Back Door ECU*	● Warning Message Display Request ● Buzzer Sounding Request ● Warning Message Display Request	Vehicle Speed
Certification ECU	● Warning Message Display Request ● Buzzer Sounding Request	—
4WD Control ECU	● Indicator Light Illumination Request ● Buzzer Sounding Request	—

(Continued)

*: Optional Equipment

ECU	Input Signal	Output Signal
AFS ECU	● Indicator Light Illumination Request ● Warning Message Display Request ● Buzzer Sounding Request	Vehicle Speed
Suspension Control ECU	● Indicator Light Illumination Request ● Warning Message Display Request ● Diagnosis	Vehicle Speed
Steering Control ECU	● Warning Message Display Request ● Buzzer Sounding Request ● Diagnosis	Vehicle Speed
Parking Assist ECU*1	● Warning Message Display Request ● Buzzer Sounding Request ● LEXUS Parking Assist-sensor System Status Indication ● Diagnosis	Vehicle Speed
Distance Control ECU*2	● Cruise Control States Indication ● Dynamic Radar Cruise Control Status Indication ● Diagnosis	Vehicle Speed

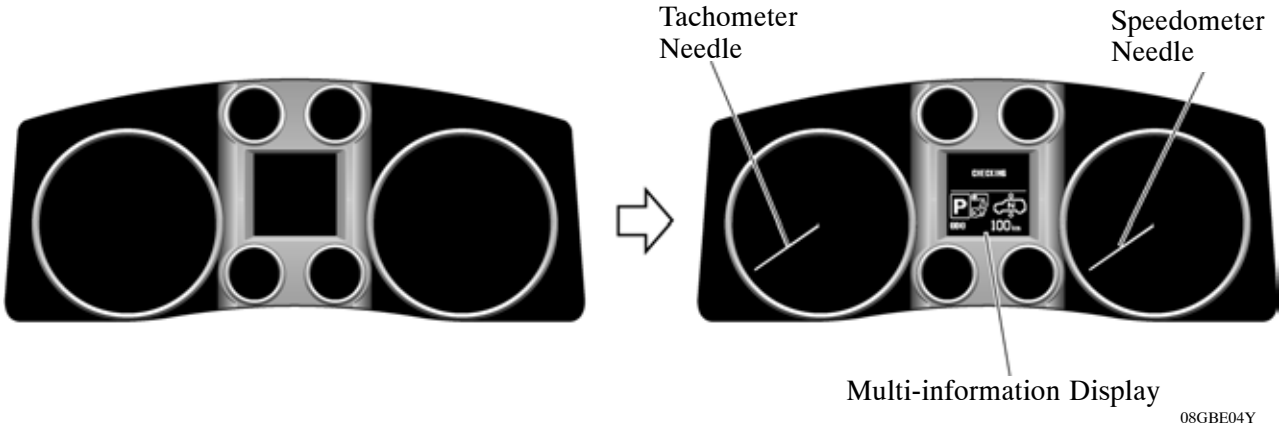
*1: Models with LEXUS Parking Assist-sensor System, Parking Assist Monitor System or Wide-view Front & Side Monitor System

*2: Optional Equipment

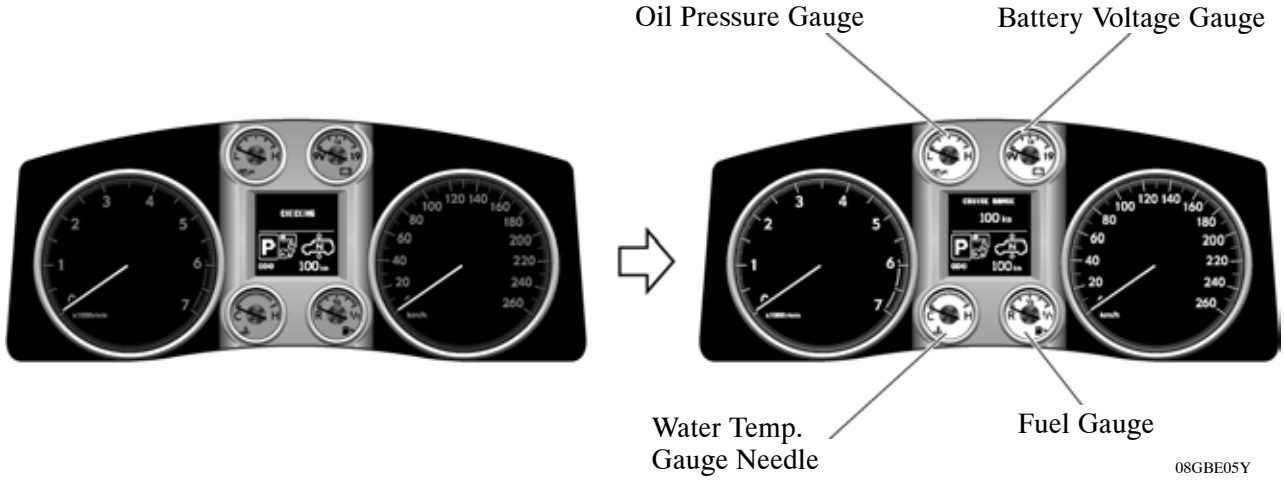
3. Illumination Control

- When the engine switch is turned ON (IG), the illumination control operates as follows (1, 2). However, all illuminations turn OFF while the engine is cranking.
- When the engine switch is turned OFF, the illumination control operates as follows (3).

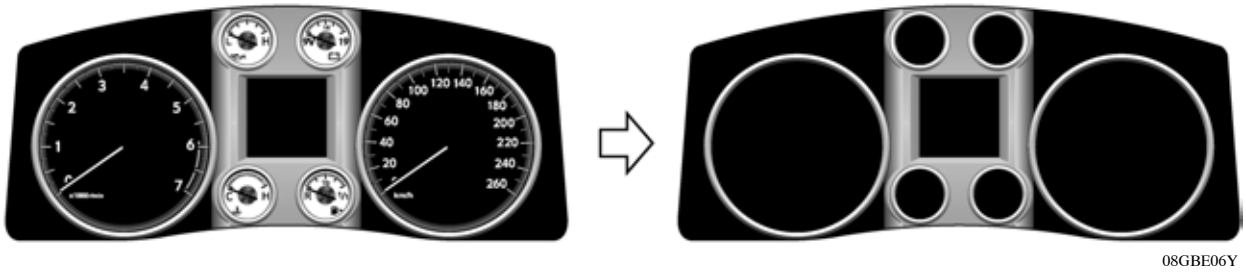
1) The speedometer and tachometer needles are illuminated, and “CHECKING” appears on the multi-information display.



2) After the multi-information display illuminates, the water temperature gauge, fuel gauge, oil pressure gauge, and the battery voltage gauge illuminate successively, together with the speedometer and tachometer.



3) After the multi-information display goes out, all illuminations go out successively.



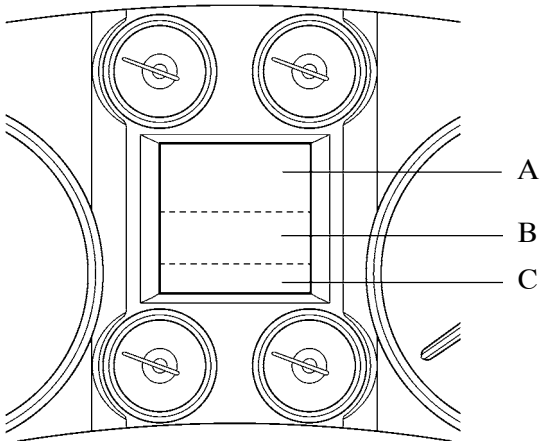
◆: The illustrations above show the transition of the illumination in a simplified way. Therefore, the actual transition of the illumination may be different from the illustrations above.

4. Multi-information Display

General

The new LX 570 multi-information display has three areas depending on the display mode.

▶ Display Areas ◀



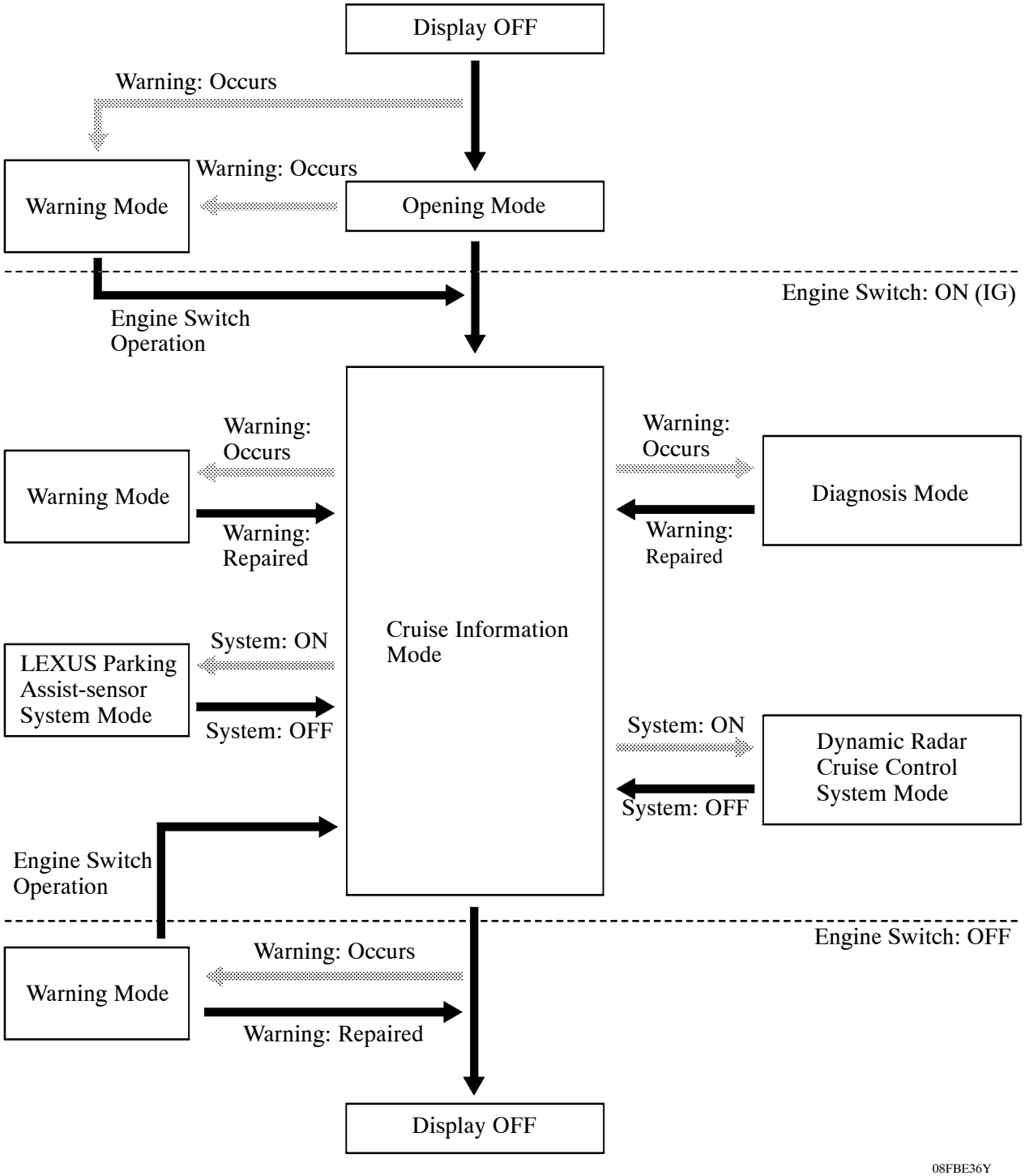
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▶ Displayed Information ◀

Display Areas	Mode	Outline
A	Cruise Information (See page BE-59)	● Five types of information (current fuel consumption, average fuel consumption after refueling, drivable distance, average speed since engine start, distance driven since engine start) can be displayed. ● The display can be switched by using the DISP switch.
	Outside Temperature	Displays the outside temperature in accordance with the ambient temperature sensor signal from the air conditioning amplifier.
	Warning (See page BE-60)	Interrupts the multi-information display immediately when a warning occurs.
	LEXUS Parking Assist-sensor System (See page BE-163)	Displays the location of an obstacle and the approximate distance between the vehicle and the obstacle.
	Dynamic Radar Cruise Control (See page BE-282)	Display the operating condition of the dynamic radar cruise control.
B	Shift Position	Displays the current shift position.
	Active Height Control Suspension and Adaptive Variable Suspension (See page CH-81)	Displays the currently selected vehicle height.
C	ODO/TRIP	Switches the display of the ODO/TRIP and displays the ODO/TRIP.

Flow of Multi-information Display Indication

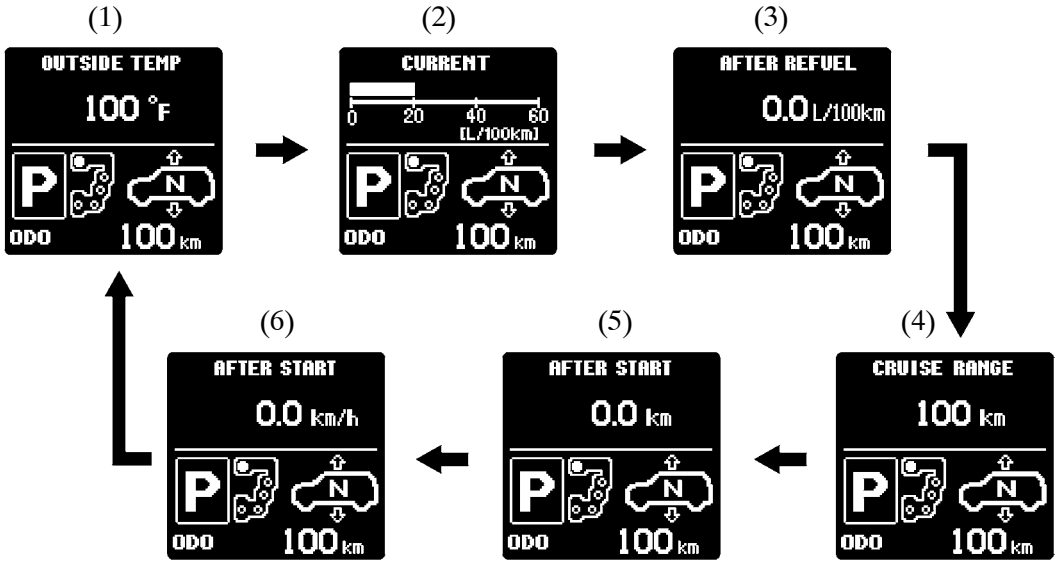
The display mode shown in area A on the multi-information display can be changed as shown in the flow chart below:



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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.

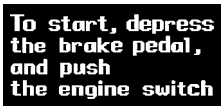
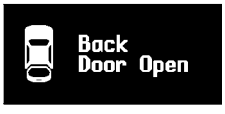


Information	Outline
(1)	Displays the outside temperature in accordance with the ambient temperature sensor signal from the air conditioning amplifier.
(2)	● Displays the value, calculated by the combination meter based on the distance driven and the volume of fuel consumed (fuel injection signals from the No. 1 cylinder). ● Updated every 0.5 seconds.
(3)	● Displays the value, calculated by the combination meter 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.
(4)	● Displays the value that has been calculated by the meter ECU based on the fuel consumption data that the meter ECU continuously monitors and stores in its memory and the residual fuel volume data, provided that the engine switch is turned ON (IG). ● The display updates every 1 km.
(5)	● Displays the value, calculated by the combination meter based on the distance driven since engine start. ● Updated every 10 seconds.
(6)	● 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

1) 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 ON (ACC) twice with the brake pedal released.	 ⚠ : Illuminate Buzzer: Sound 080BE20Y	TRAC and VSC are malfunctioning.
 ⚠ : Illuminate 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

(Continued)

Warning	Detail	Warning	Detail
 : Illuminate 080BE24Y	Ultrasonic sensor for LEXUS parking assist-sensor system is malfunctioning.	 : Illuminate 080BE29Y	Ultrasonic sensor for LEXUS parking assist-sensor system is dirty or covered with ice.
 : Illuminate Buzzer: Sound 080BE25Y	Pre-crash safety system is malfunctioning.	 Buzzer: Sound 080BE30Y	Pre-crash safety system is not currently available.
 : Illuminate Buzzer: Sound 080BE26Y	Engine oil level is low.	 : Illuminate Buzzer: Sound 080BE31Y	Transmission oil temperature exceeds the applicable standards.
 : Illuminate 080BE27Y	Fuel level is low.	 : Illuminate Buzzer: Sound 080BE32Y	Fuel system is malfunctioning.
 : Illuminate 08FBE72Y	Millimeter wave radar sensor is dirty or covered with ice.	 : Illuminate 08FBE73Y	Dynamic radar cruise control system is unable to judge vehicle-to-vehicle distance.
 : Illuminate 08FBE74Y	Dynamic radar cruise control system is malfunctioning.	 08FBE75Y	Washer fluid level is low.

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-60) ● Seat Belt Warning (See page BE-244)
Reminder	Key Reminder (See page BE-209)

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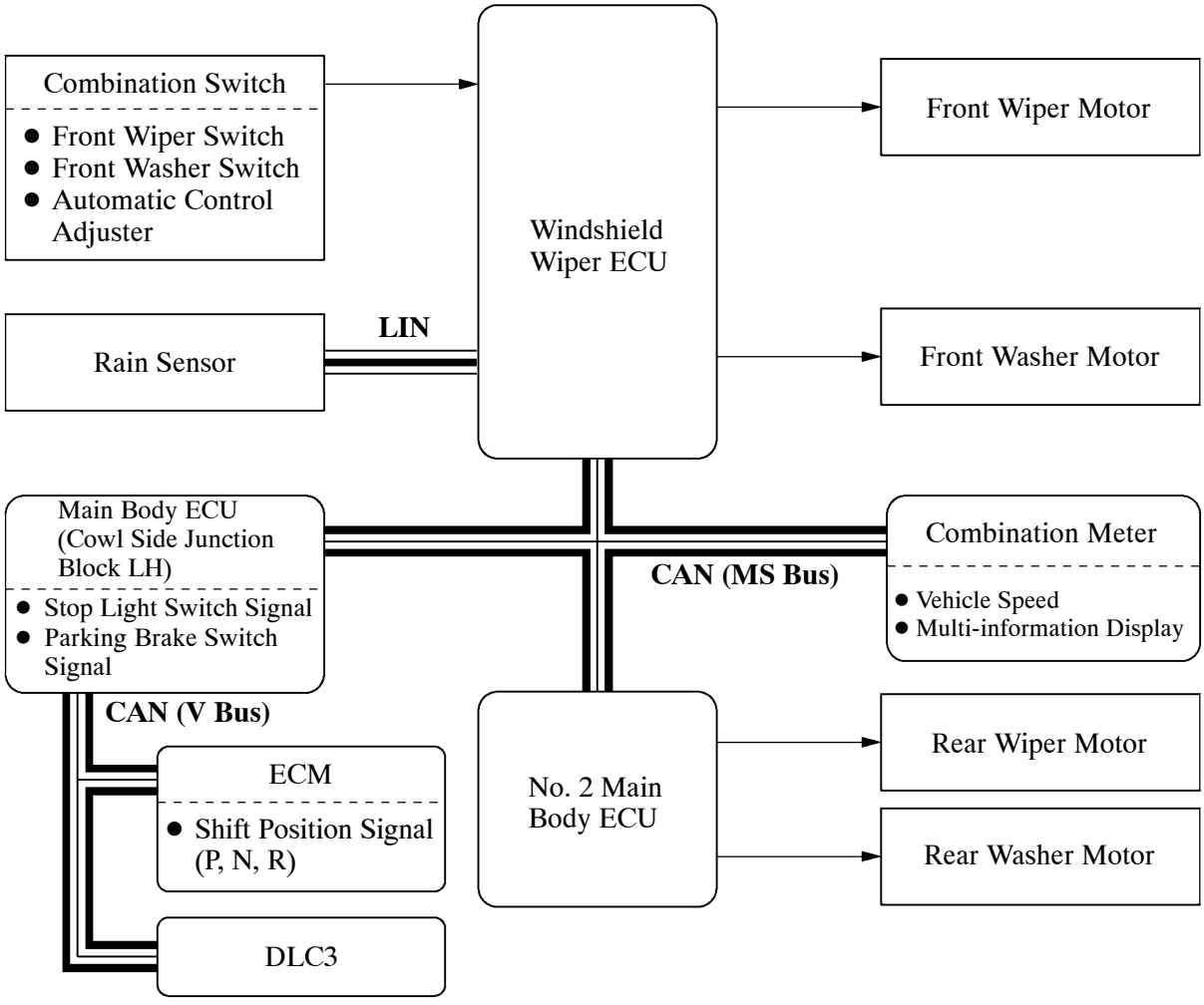
WIPER AND WASHER

■ DESCRIPTION

- A wiper system with a rain sensing function is provided as standard equipment on all models.
- The washer fluid warning function is provided as standard equipment on all models.
- The reverse-linked wiper function is provided as standard equipment on all models.
- This system has the following functions.

Function		Outline
Front Wiper	Vehicle Speed-sensing, Adjustable Interval	Controls the wiper interval time in accordance with the vehicle speed when the front wiper switch is in the AUTO position.
	Vehicle Speed Switching	Automatically selects an intermittent operation when the vehicle is stopped with the front wiper switch in LO position.
	Stopped Vehicle Intermittent Wiper	Automatically selects an intermittent operation when the front 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 front 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.
Rear Wiper	Vehicle Speed Switching	Automatically selects an intermittent operation when the vehicle is stopped with the rear wiper switch in LO position.
	Reverse-linked Wiper	In either of the following conditions, moving the shift lever to the R position activates the LO operation automatically. ● The rear wiper switch is in the OFF or INT position and the front wiper switch is in a position other than the OFF position. ● The rear wiper switch is in the OFF or INT position and it is within 16 seconds after the front wiper motor is turned OFF.
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.

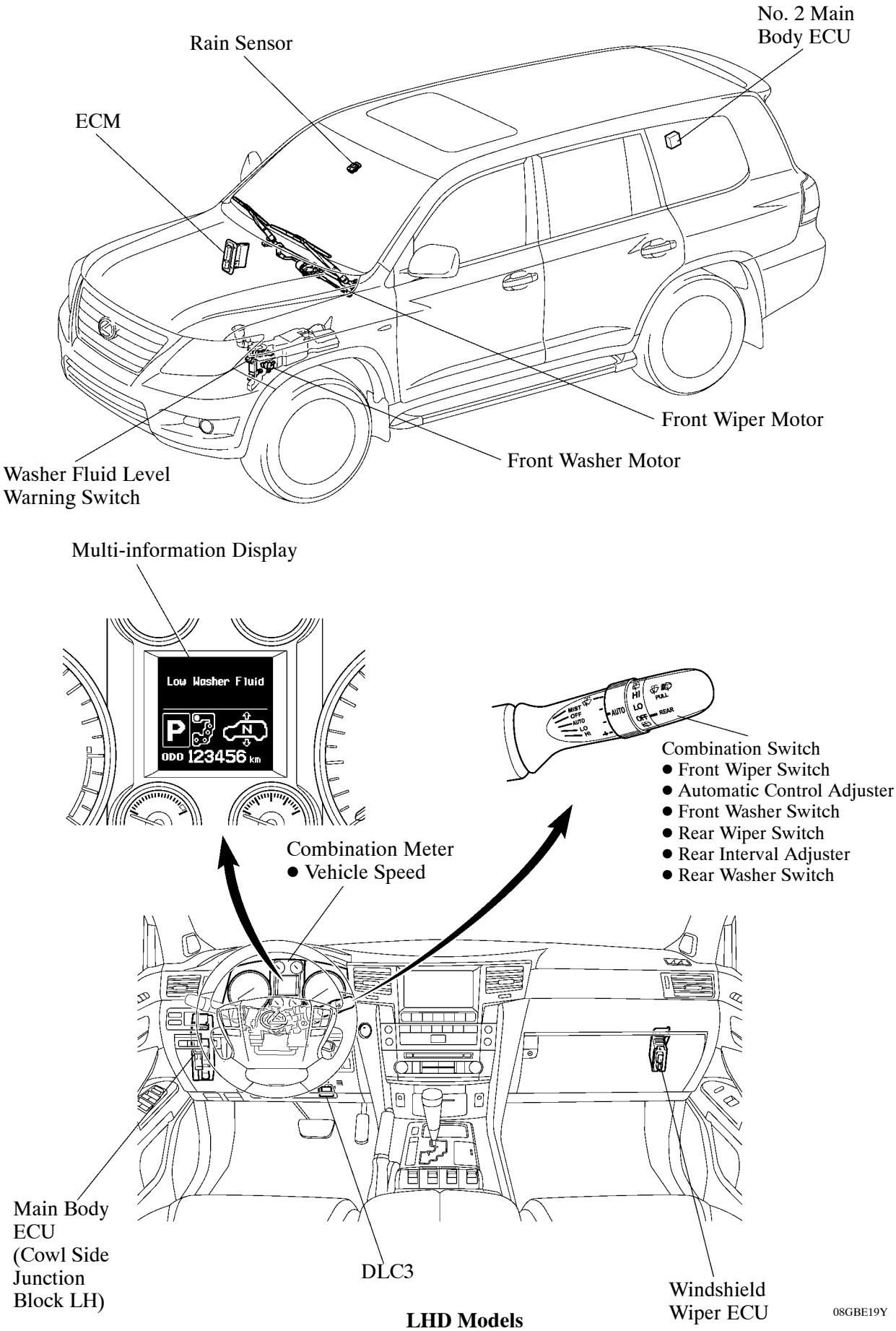
▶ System Diagram ◀



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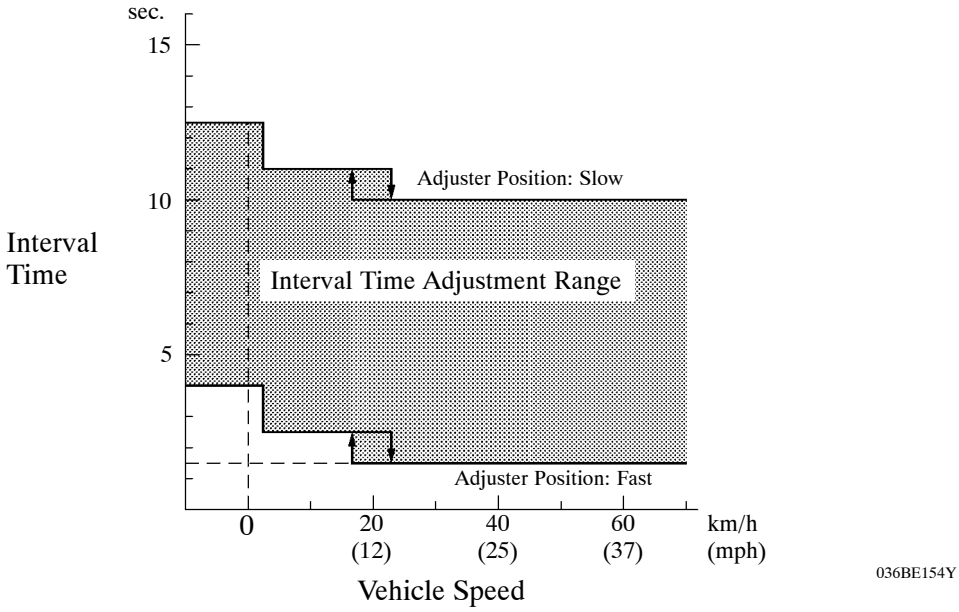
■ LAYOUT OF MAIN COMPONENTS



LHD Models

■VEHICLE SPEED-SENSING, ADJUSTABLE INTERVAL FUNCTION

- When the front wiper switch is in the AUTO position, 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.

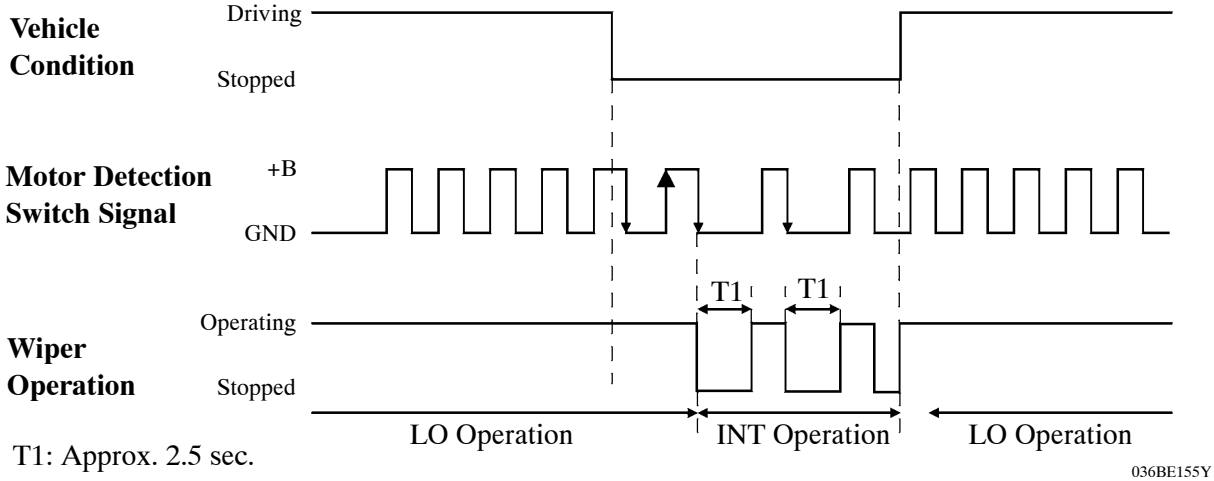


■VEHICLE SPEED SWITCHING FUNCTION (FRONT WIPER)

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

- The windshield wiper ECU judges that the vehicle is being driven if either of the following conditions exists:
  - The vehicle speed is more than 0 km/h (0 mph).
  - The stop light switch and the parking brake switch are OFF and the shift lever is in a position other than P or N.
- If other conditions exist, the windshield wiper ECU 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 front 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 ◀



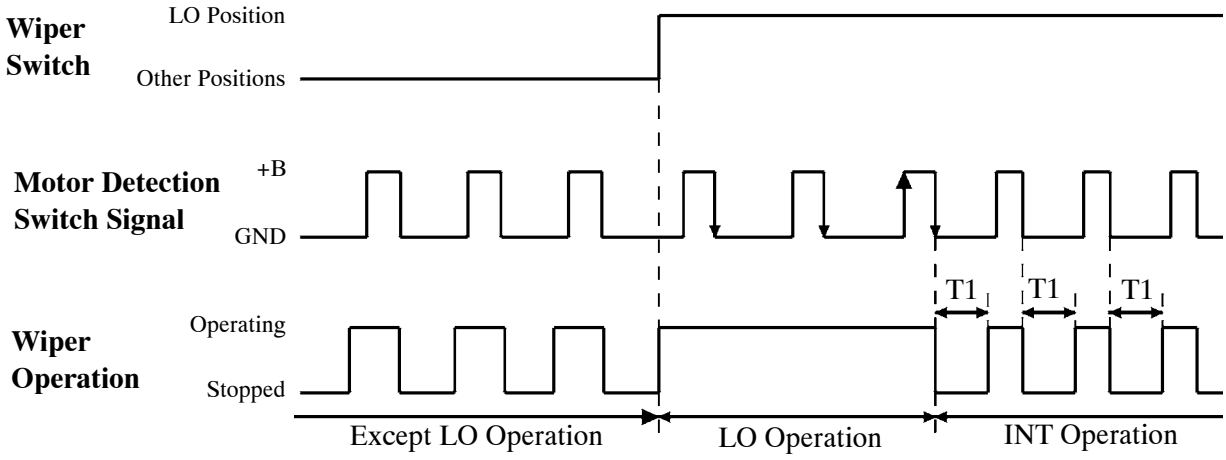
T1: Approx. 2.5 sec.

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■ STOPPED VEHICLE INTERMITTENT WIPER FUNCTION

- When the front 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 while the vehicle is stopped, the wiper operates in LO.

▶ Timing Chart ◀



T1: Approx. 2.5 sec.

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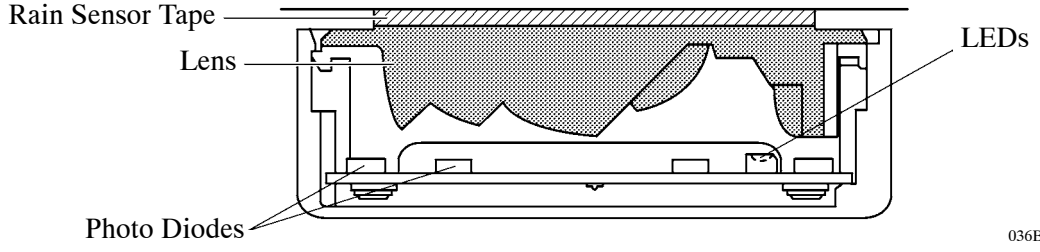
■ RAIN SENSING FUNCTION

1. General

- The rain sensing function controls the wiper timing in accordance with the amount of raindrops that strike the windshield when the front 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

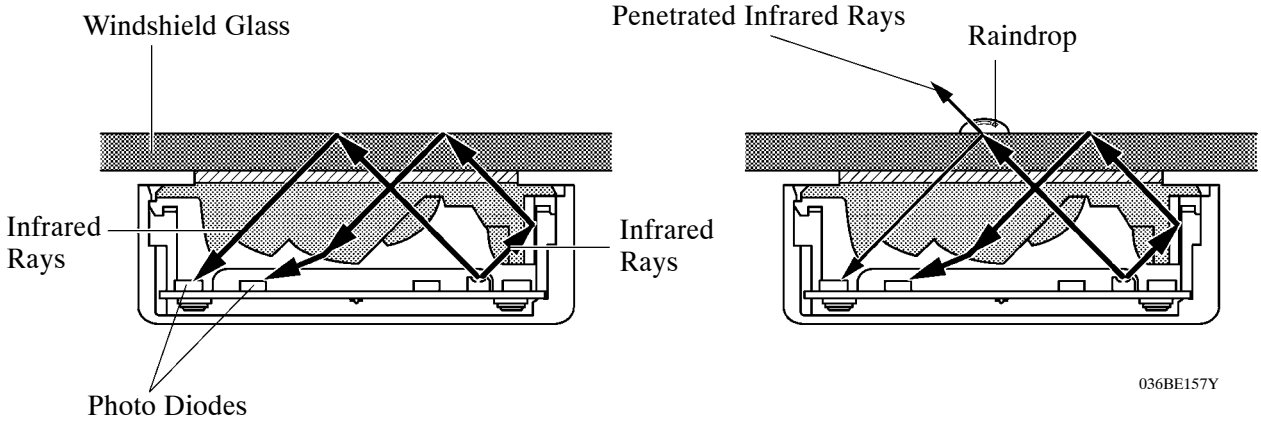
The rain sensor consists of two LEDs (Light Emitting Diodes) that emit infrared rays, 3 photo diodes that can receive those rays, a lens and rain sensor tape.



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 raindrops 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 raindrops are present in the detection area, a portion of the emitted infrared rays penetrates 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 raindrops. 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 raindrops. Thus, this function selects the INT, LO, and HI wiper operation in order to operate the wipers at an optimal speed and timing.

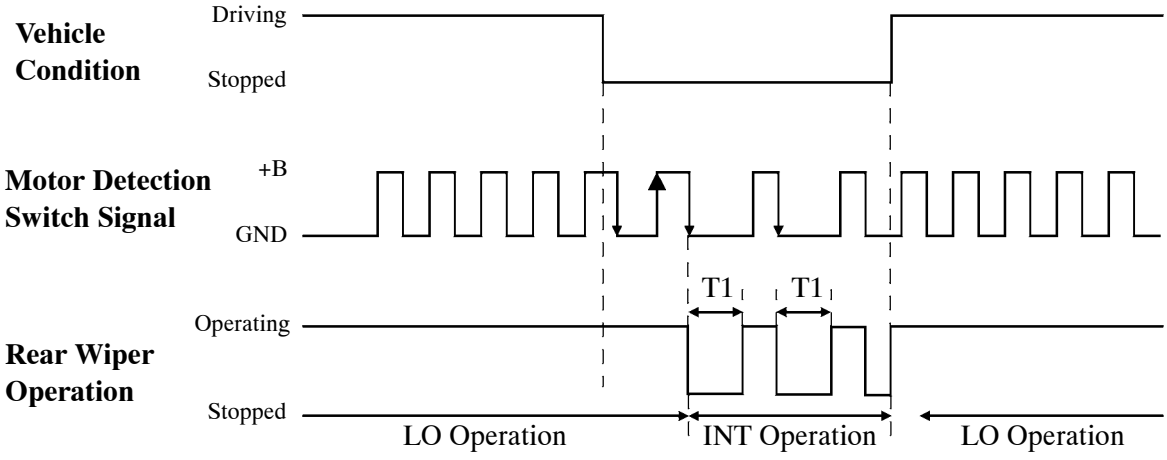


■VEHICLE SPEED SWITCHING FUNCTION (REAR WIPER)

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

- The No. 2 main body ECU judges that the vehicle is being driven if either of the following conditions exists:
  - The vehicle speed is more than 0 km/h (0 mph).
- If other conditions exist, the No. 2 main body ECU judges that the vehicle is stopped. It controls the rear wiper as shown in the timing chart below.
- When the vehicle stops running while driving and the rear 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 12 seconds. If the vehicle starts running during this intermittent wiper operation, the wiper returns automatically to LO operation.

▶ Timing Chart ◀



T1: Approx. 12 sec.

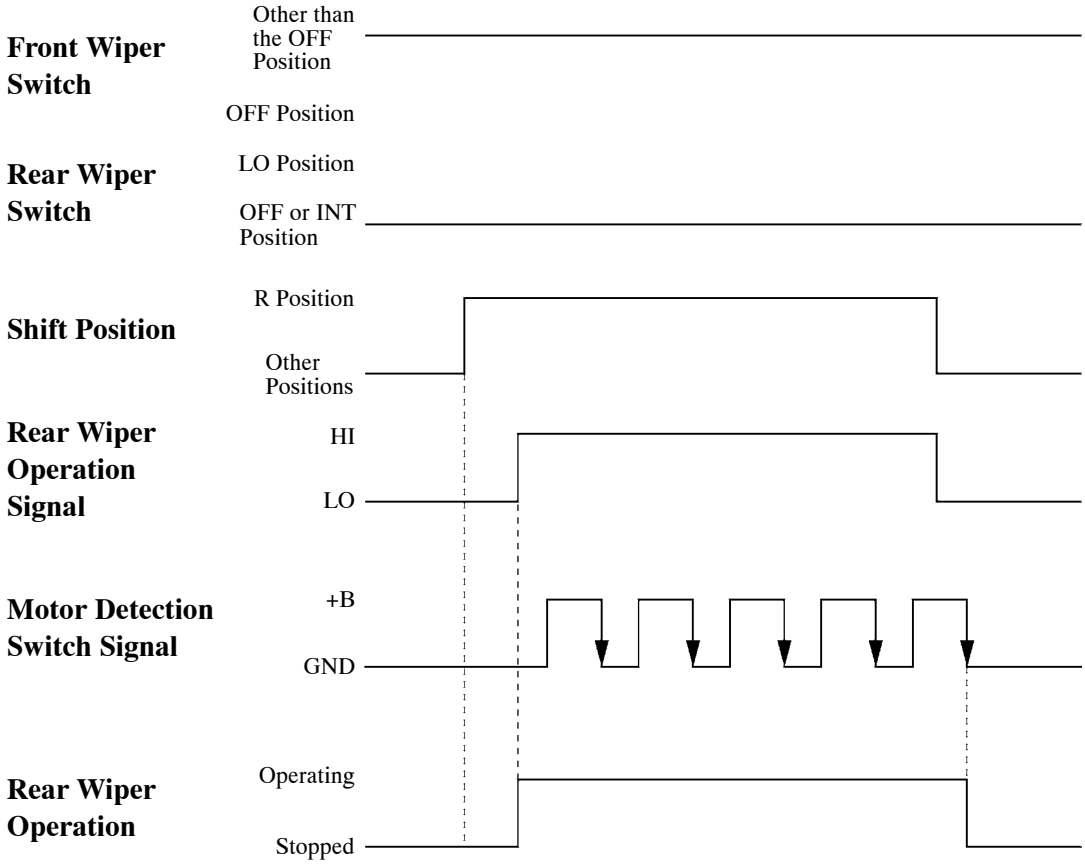
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■ REVERSE-LINKED WIPER FUNCTION

In either of the following conditions, moving the shift lever to the R position activates the LO operation automatically.

- The rear wiper switch is in the OFF or INT position and the front wiper switch is in a position other than the OFF position.
- The rear wiper switch is in the OFF or INT position and it is within 16 seconds after the front wiper motor is turned OFF.

▶ Timing Chart ◀



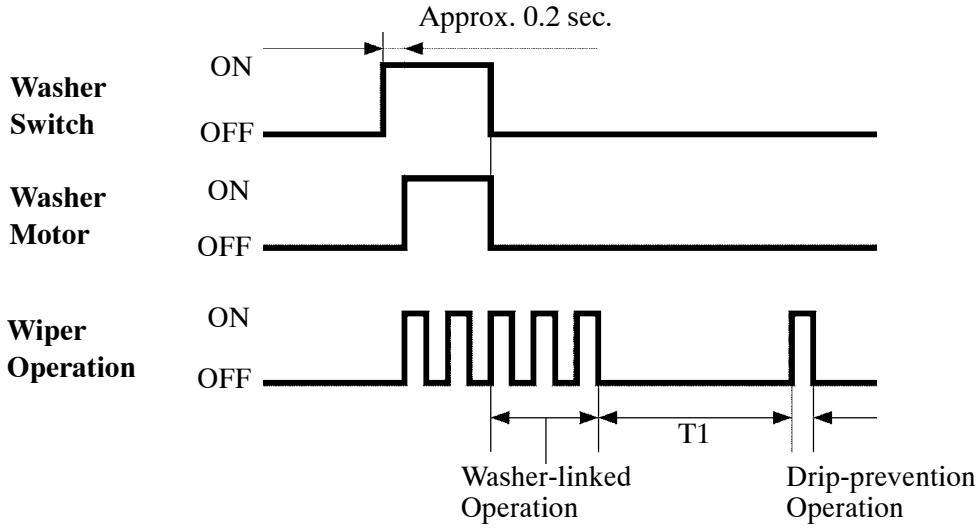
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■ WASHER-LINKED WIPER WITH DRIP-PREVENTION FUNCTION

- When the front wiper switch is set to OFF or AUTO and the washer switch is turned ON for approximately 0.2 seconds or more, the wipers start in LO at the same time as the washer fluid is sprayed.
- The wipers operate three times in 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 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.
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 engine switch is turned from OFF to ON (IG) when the front wiper switch is in AUTO position or the front wiper switch is turned from OFF to ON.
	Front wiper switch: Continuously performs 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

- The automatic air conditioning using multi-zone automatic climate control and neural network control is standard equipment.
- A multi-zone automatic climate control independently regulates the outlet air temperatures for the following four zones: the driver seat, the front passenger seat, the right side of the rear No. 1 and No. 2 seats, and the left side of the rear No. 1 and No. 2 seats. This offers comfortable space for all occupants.
- For further comfort enhancement for rear passengers, the rear air conditioning unit is provided.
- The air conditioning system used on the new LX 570 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 cooling performance. ● 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 radiator to ensure proper heater performance. ● A pollen removal filter, which removes pollen, is used as the clean air filter. ● Pollen removal mode control is used to remove pollen in the area around the upper part of the bodies of the driver and front passenger. ● The blower control has 7 levels in manual mode and 31 levels in auto mode for more precise control. ● Automatic recirculation control is used to help prevent harmful elements such as CO, HC, and NOx from entering the cabin. Automatic recirculation control is provided on the Europe, Australia and China models.
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 servomotors are used.
Compact	● A rotary compact air mix control door requiring less operational space is mounted in the front air conditioning unit. ● A blower motor with a built-in blower motor controller is used in a compact construction.
Others	The following parts are used to ensure high cooling performance while realizing a compact and lightweight construction. ● Semi-center location front air conditioning unit ● RS (Revolutionary super-slim Structure) evaporator ● SFA (Straight Flow Aluminum)-II heater radiator ● MF (Multi-Flow)-IV sub-cool condenser ● Fixed displacement swash plate 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	5500
	Air Flow Volume	m^3/h	600
	Power Consumption	W	300

▶ Rear Air Conditioning Unit ◀

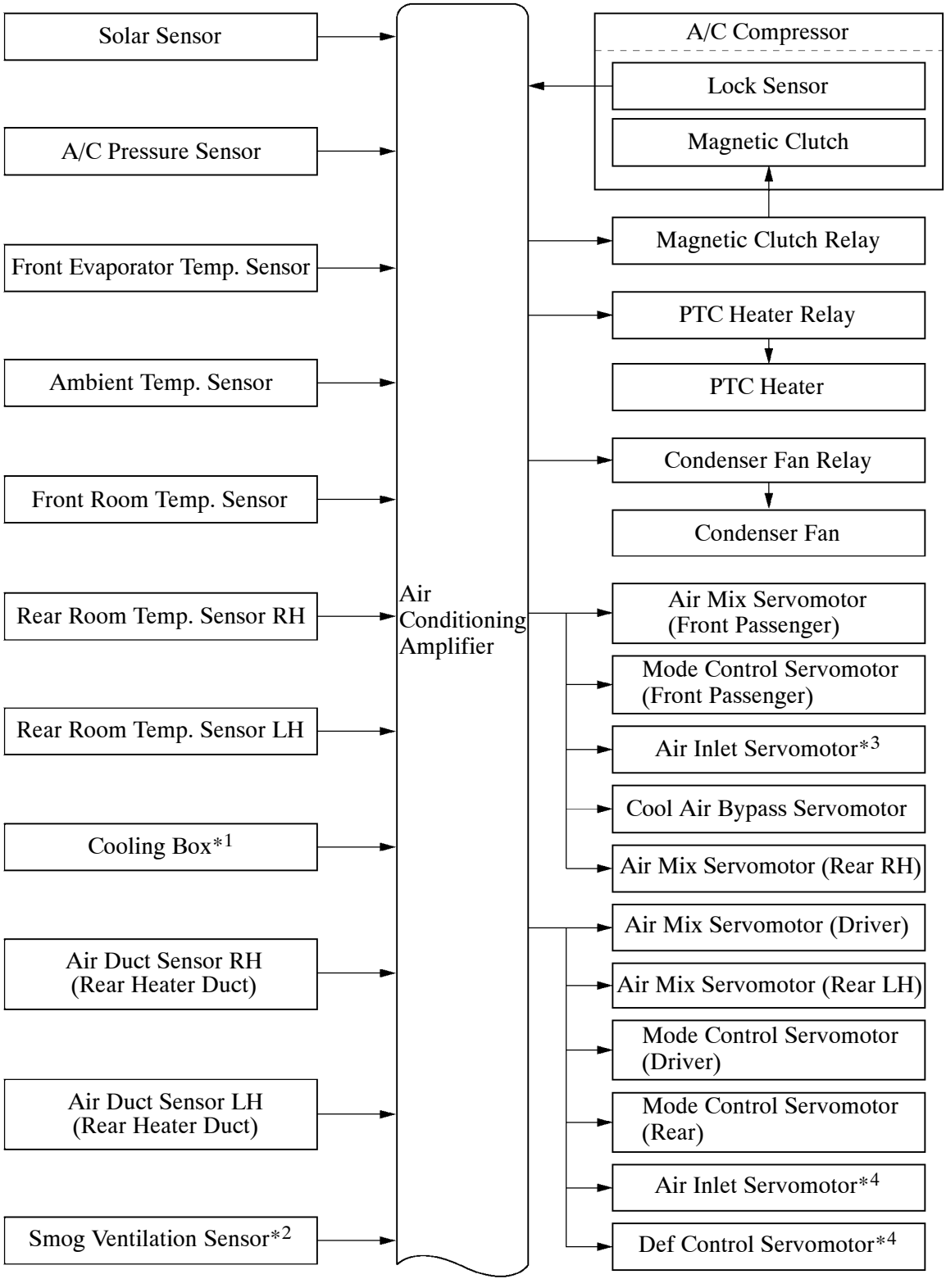
Heater	Heat Output	W	3750
	Air Flow Volume	m^3/h	240
	Power Consumption	W	180
Air Conditioning	Cooling Capacity	W	3300
	Air Flow Volume	m^3/h	320
	Power Consumption	W	200

2. Specification

Ventilation and Heater Radiator	Heater Radiator	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 × 130 × 21 (7.5 × 5.1 × 0.8)
			Fin Pitch mm (in.)	1.8 (0.07)
	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)
				626 × 524 × 22*1 (24.6 × 20.6 × 0.9)
			Fin Pitch mm (in.)	3.15 (0.12)
				3.1 (0.12)*1
	Evaporator	Front	Type	RS (Revolutionary super-slim Structure)
			Size W × H × L mm (in.)	293 × 235 × 50 (11.5 × 9.3 × 2.0)
			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 × 2.0)
			Fin Pitch mm (in.)	3.4 (0.13)
	Compressor		Type	10SR19
			Pulley	Steel with Magnetic Clutch
	Refrigerant		Type	HFC 134a
			Charge Volume g	970 ± 30*2/920 ± 30*3
				1010 ± 30*1*2/970 ± 30*1*3

*1: G.C.C. Countries Models
*2: Models with Cooling Box
*3: Models without Cooling Box

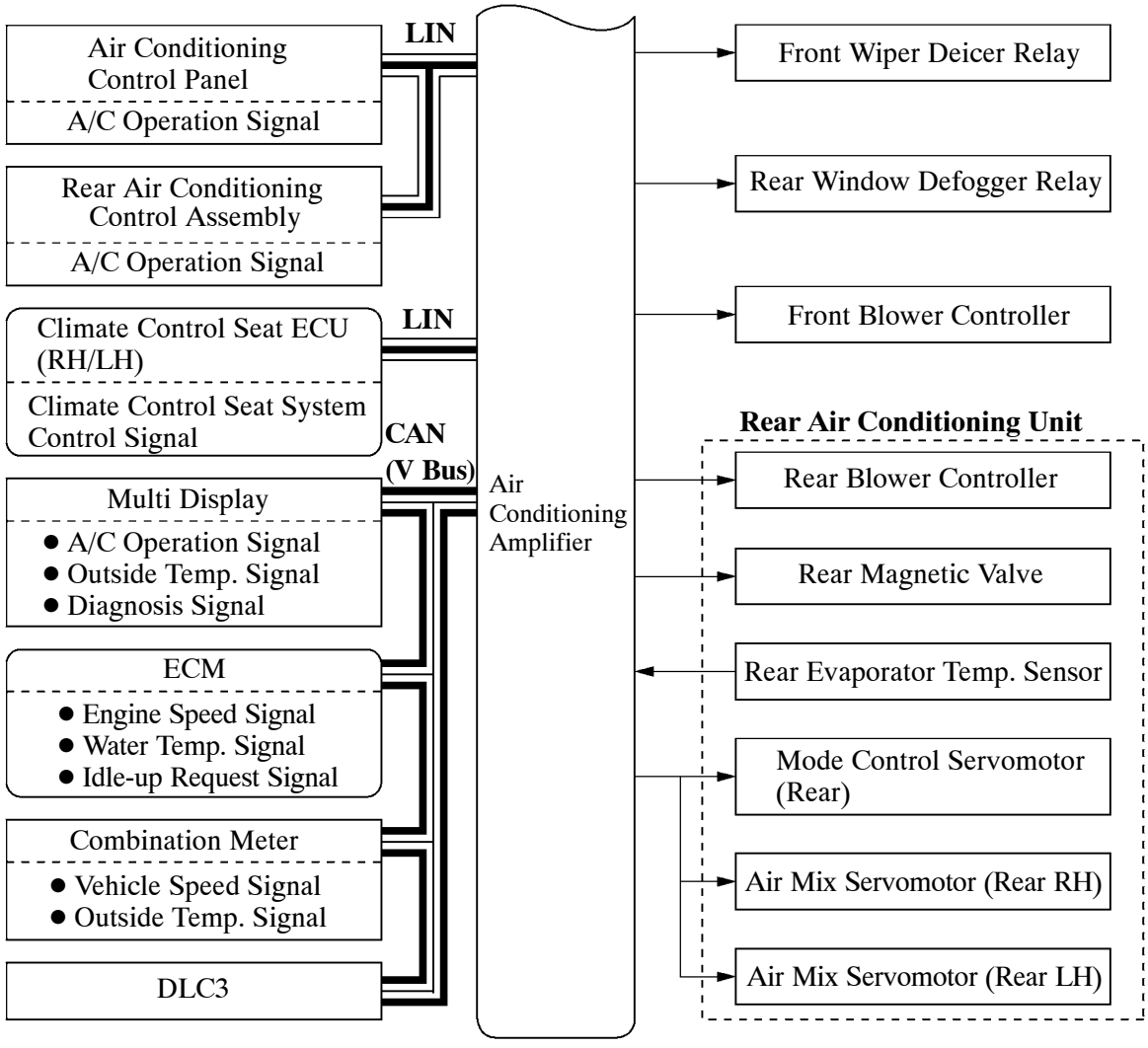
■SYSTEM DIAGRAM



*1: Models with Cooling Box
*2: Except for G.C.C. Countries
*3: LHD Model
*4: RHD Model

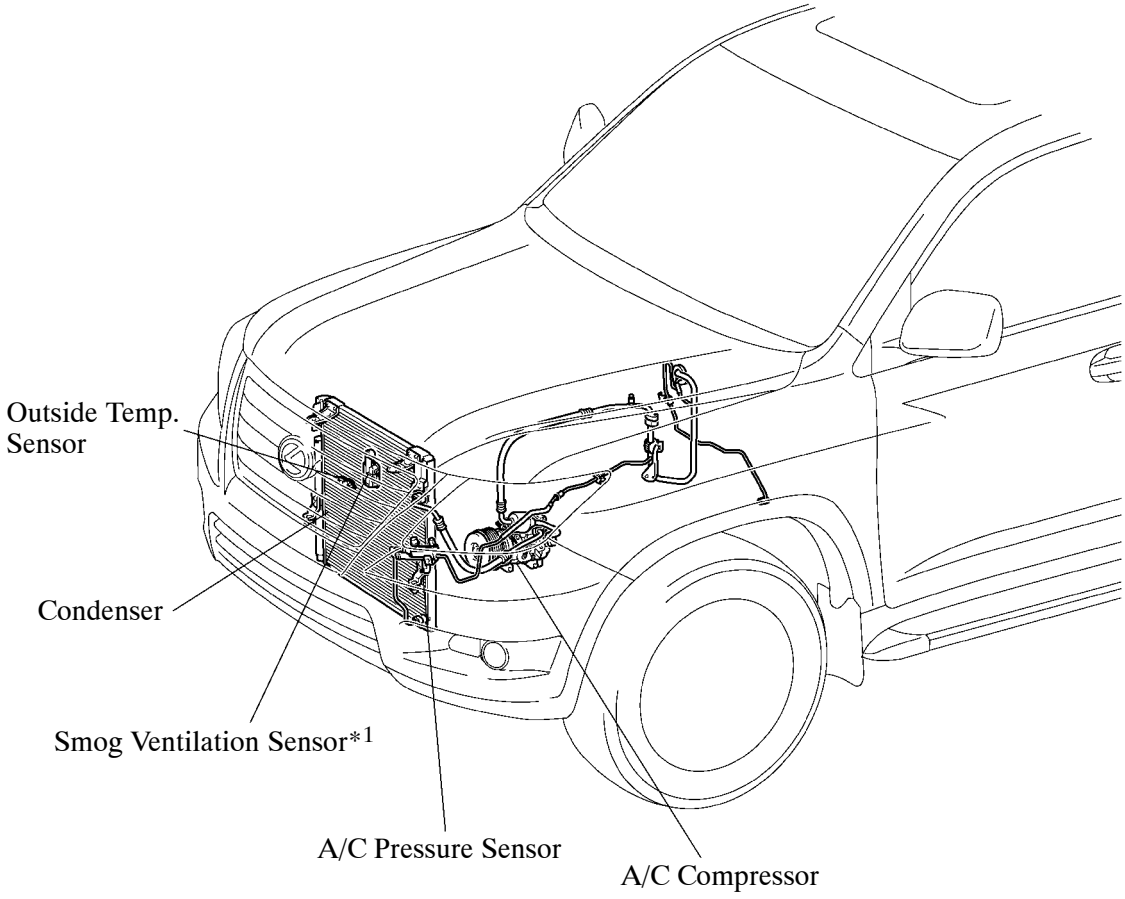
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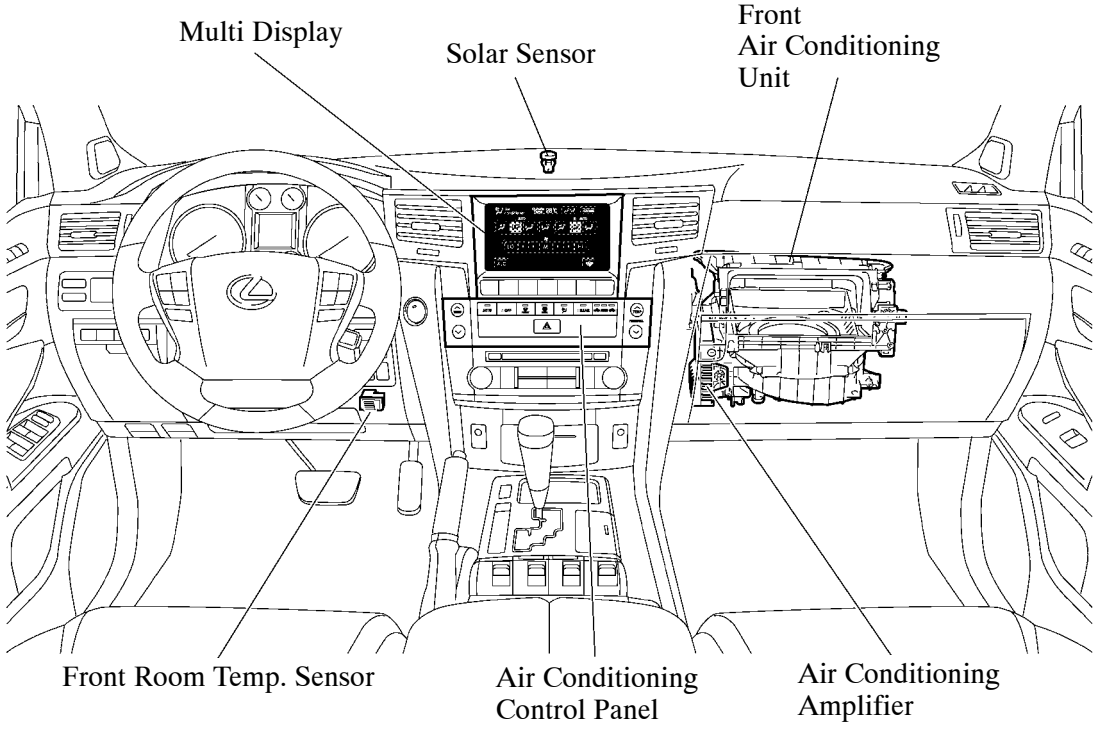
(Continued)


Air Conditioning Control Panel
A/C Operation Signal
LIN
Rear Air Conditioning Control Assembly
A/C Operation Signal
Climate Control Seat ECU (RH/LH)
Climate Control Seat System Control Signal
LIN
CAN (V Bus)
Multi Display
● A/C Operation Signal
● Outside Temp. Signal
● Diagnosis Signal
ECM
● Engine Speed Signal
● Water Temp. Signal
● Idle-up Request Signal
Combination Meter
● Vehicle Speed Signal
● Outside Temp. Signal
DLC3
Air Conditioning Amplifier
Front Wiper Deicer Relay
Rear Window Defogger Relay
Front Blower Controller
Rear Air Conditioning Unit
Rear Blower Controller
Rear Magnetic Valve
Rear Evaporator Temp. Sensor
Mode Control Servomotor (Rear)
Air Mix Servomotor (Rear RH)
Air Mix Servomotor (Rear LH)

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■ LAYOUT OF MAIN COMPONENTS



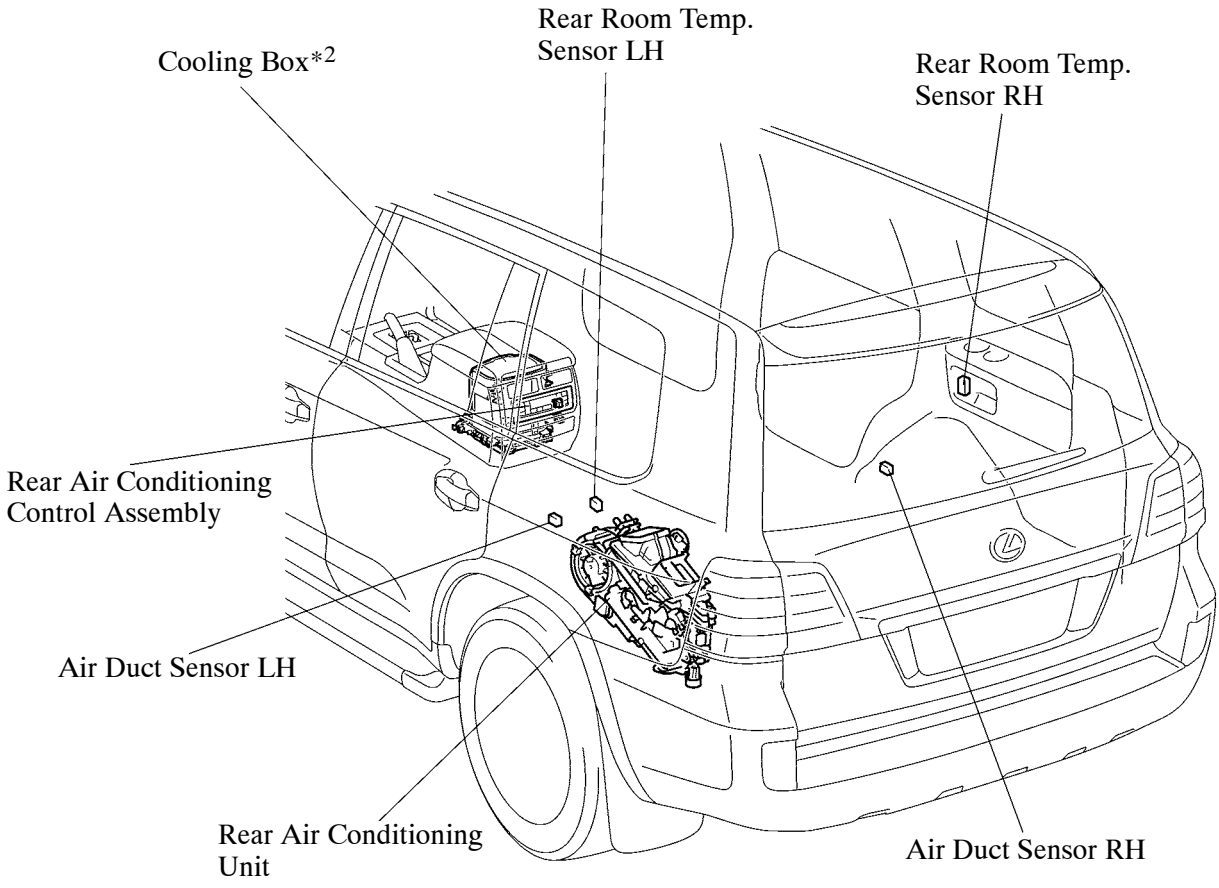


*1: Except for G.C.C. Countries

LHD Model

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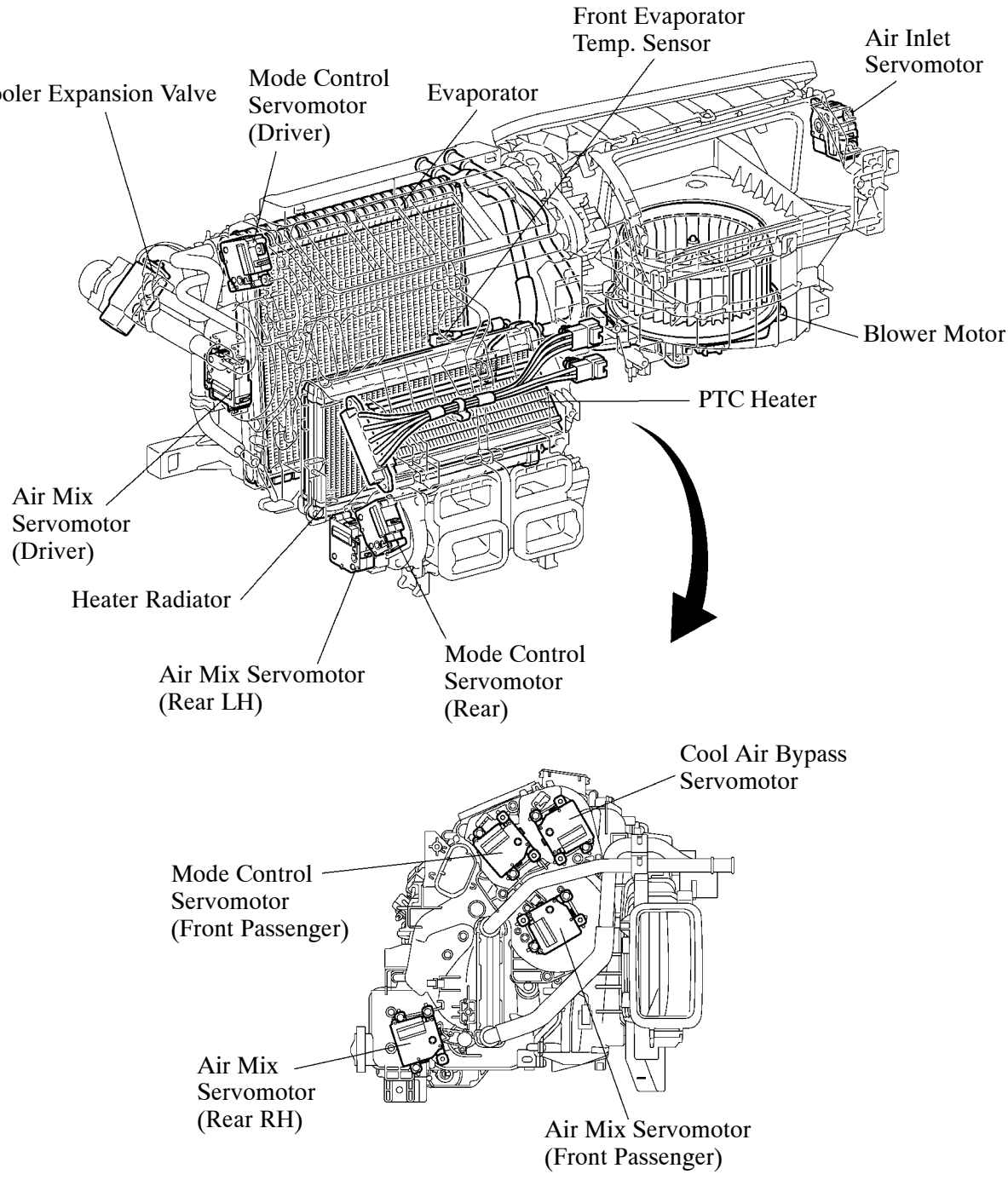
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*2: Models with Cooling Box

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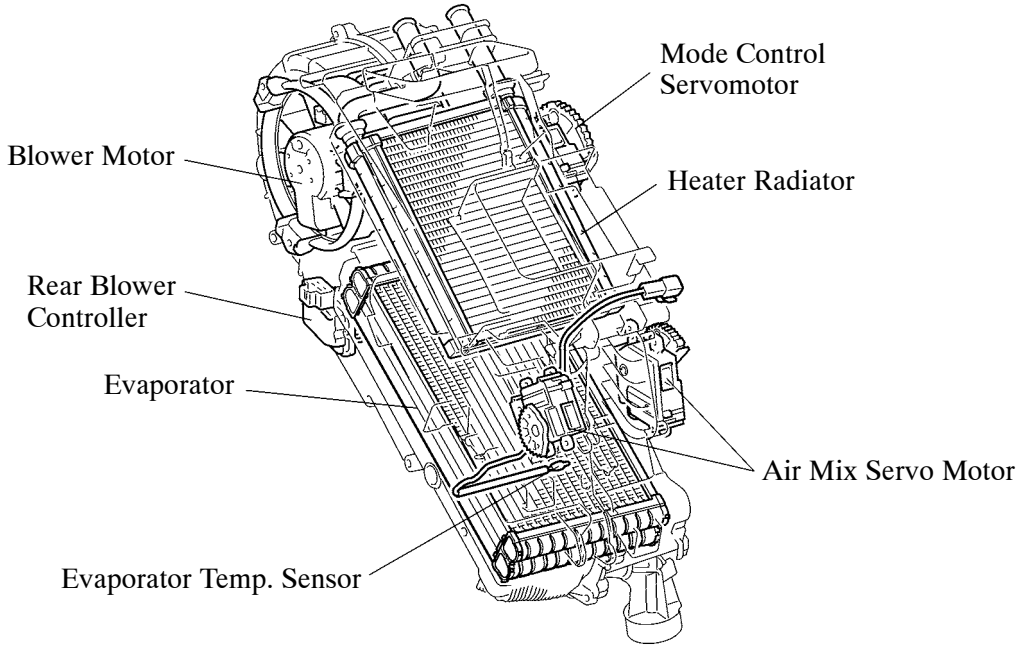
LHD Model



Front Air Conditioning Unit (LHD Model)

080BE40H

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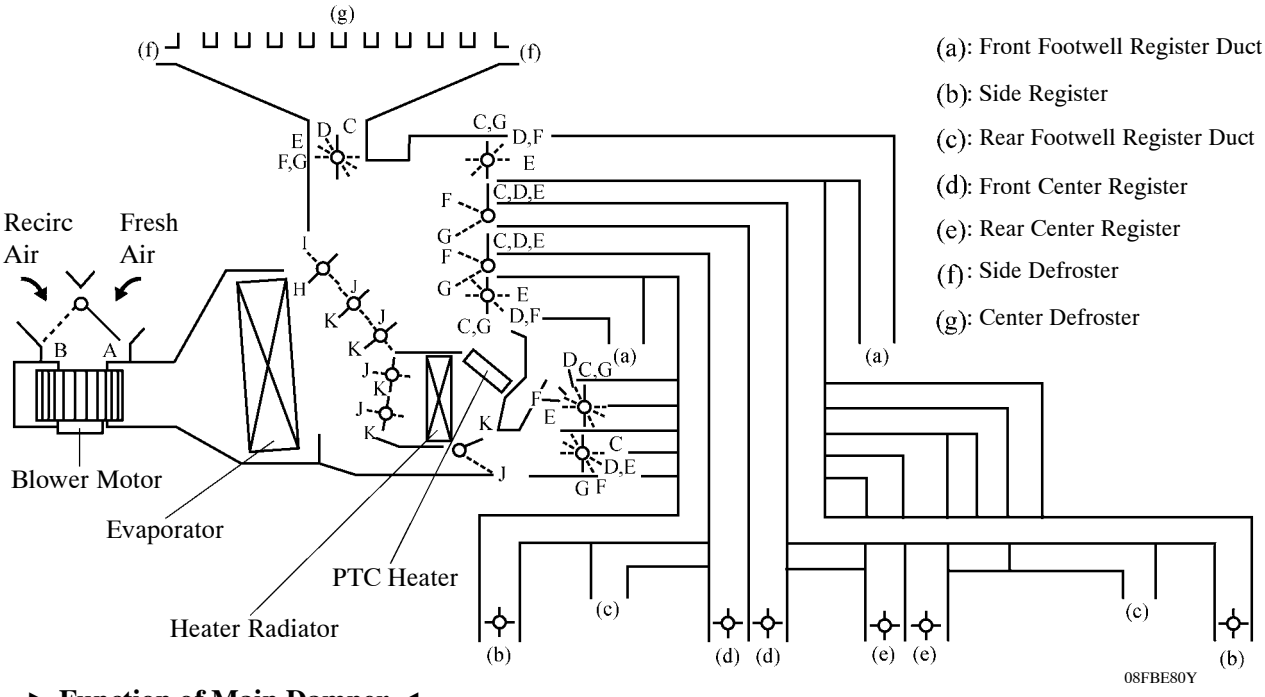


Rear Air Conditioning Unit

080BE38H

■ MODE POSITION AND DAMPER OPERATION

▶ Front Air Conditioning ◀

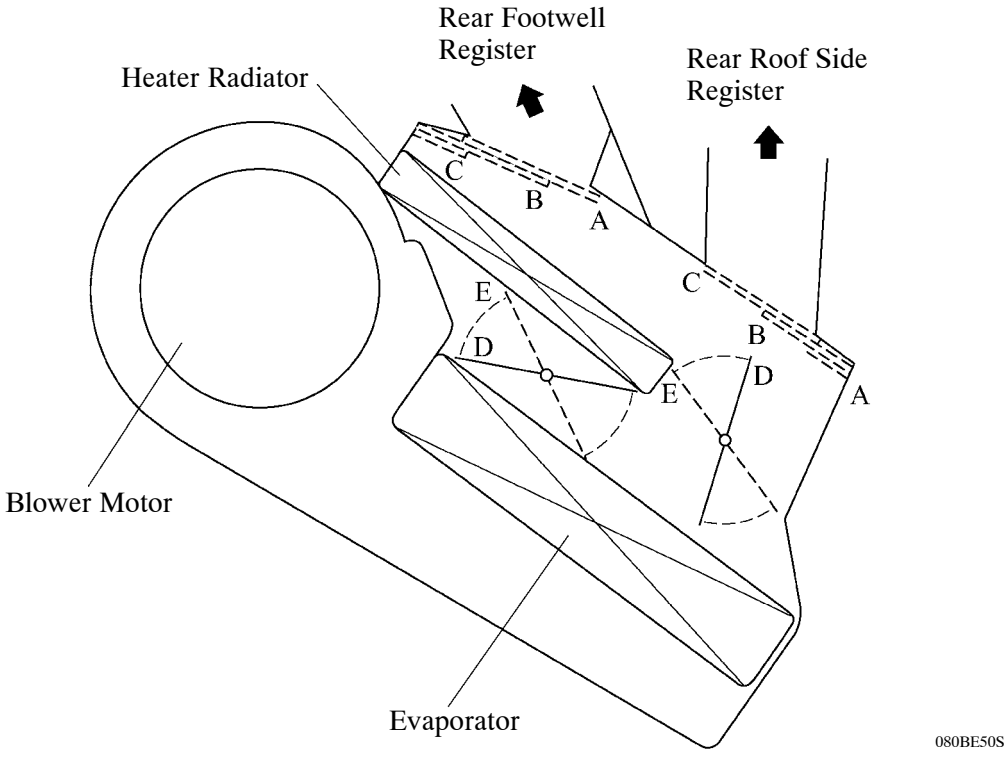


▶ Function of Main Damper ◀

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	J-K	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	Open to Close	H-I	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 and 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 footwell register duct, front and rear center register and side register. In addition, air blows out slightly from the center defroster and side defroster.
	 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.

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▶ Rear Air Conditioning ◀

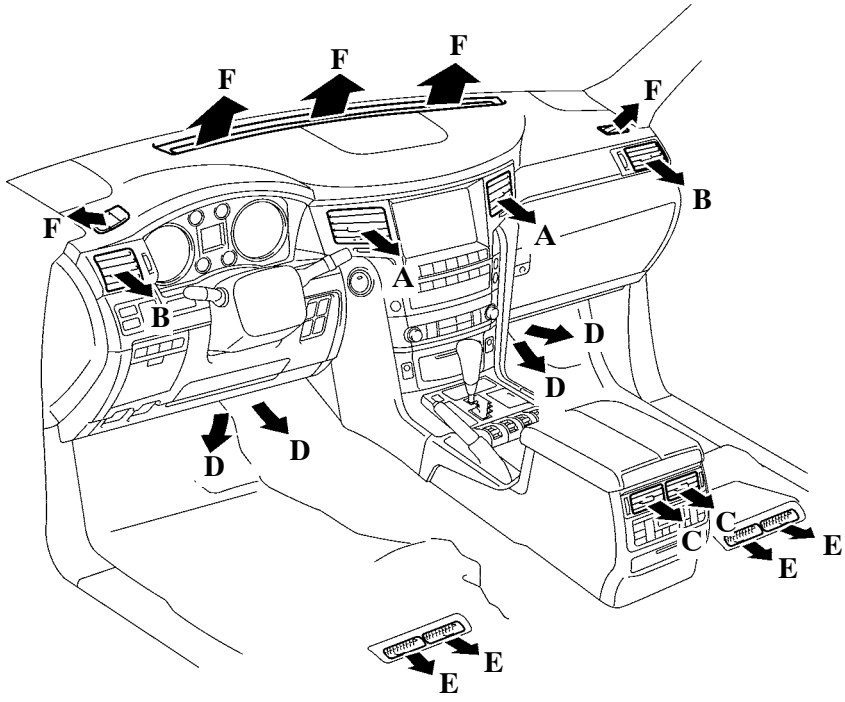


▶ Function of Main Damper ◀

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



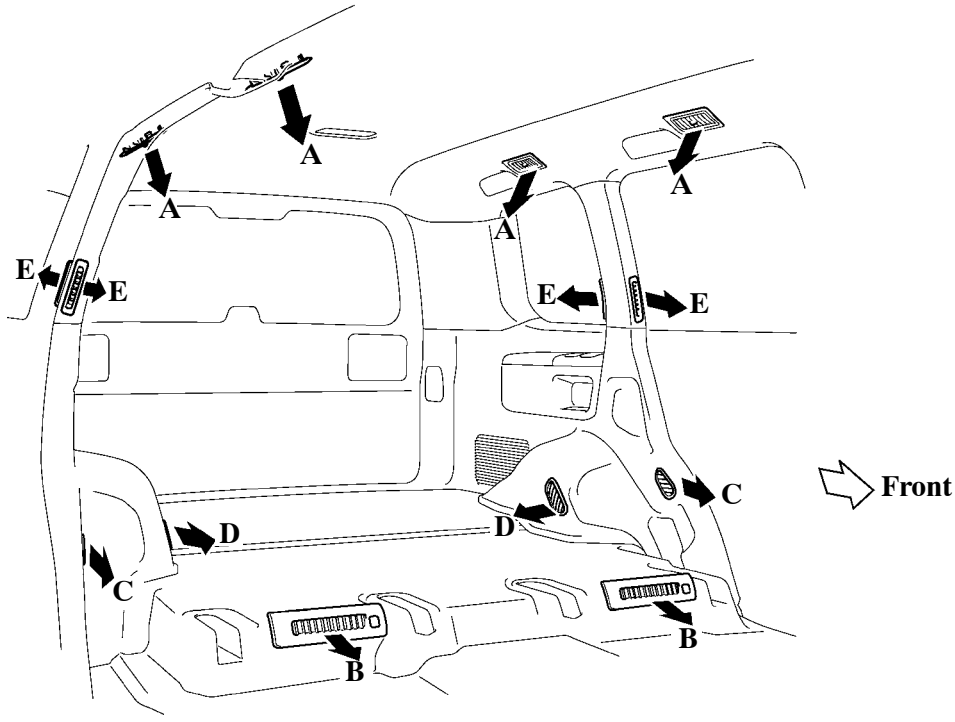
LHD Model

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

The size of the circle ○ indicates the proportion of airflow volume. 08FBE81Y

*1: Compared to the FACE-1 mode, the air flows from the FR FOOT.
*2: Greater airflow volume at the upper area.
*3: Greater airflow volume at the lower area.
*4: Greater airflow volume at the front.
*5: Compared to the FOOT-F mode, the airflow volume of the RR FOOT is greater.
*6: Compared to the FOOT-R mode, the airflow volume of the DEF is greater.

2. Rear Registers



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

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

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■CONSTRUCTION AND OPERATION

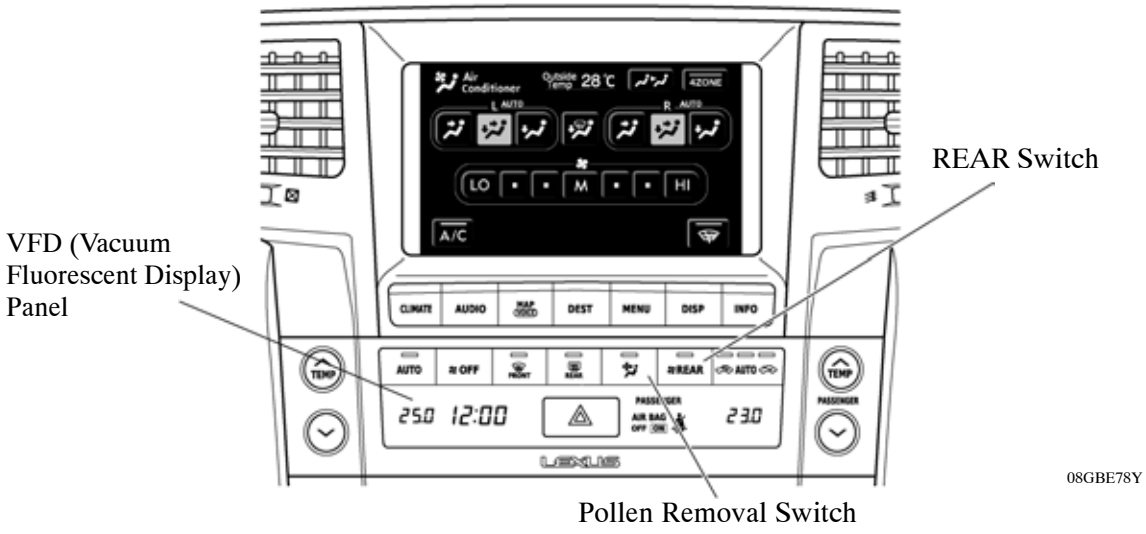
1. Air Conditioning Control Panel

General

- A push-button type air conditioning control panel is used.
- The rear air conditioning control assembly is located behind the center console.

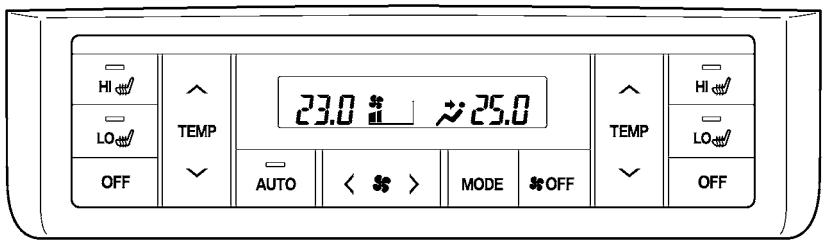
Air Conditioning Control Panel

- The set temperatures for the driver seat and front passenger seat and outside 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.
- Along with the adoption of the pollen removal mode, a pollen removal switch is provided.
- The rear air conditioning can turn ON or OFF by pressing the REAR switch on the air conditioning control panel.



Rear 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 rear 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) rear air conditioning control assembly.

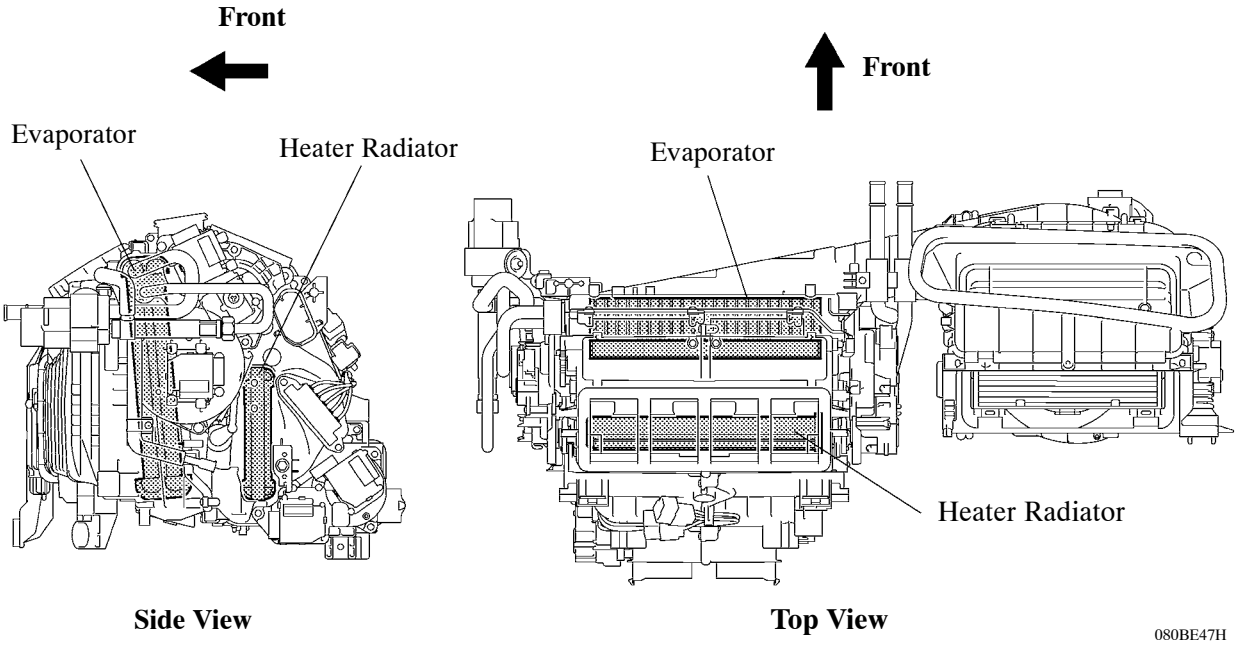


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2. Air Conditioning Unit

Front Air Conditioning Unit

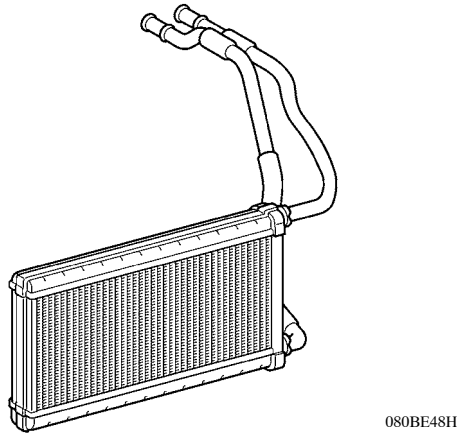
A semi-center location air conditioning unit, in which the evaporator and heater radiator are placed in the vehicle's longitudinal direction, is used. As a result, the air conditioning unit has been made compact and lightweight.



LHD Model

Heater Radiator

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



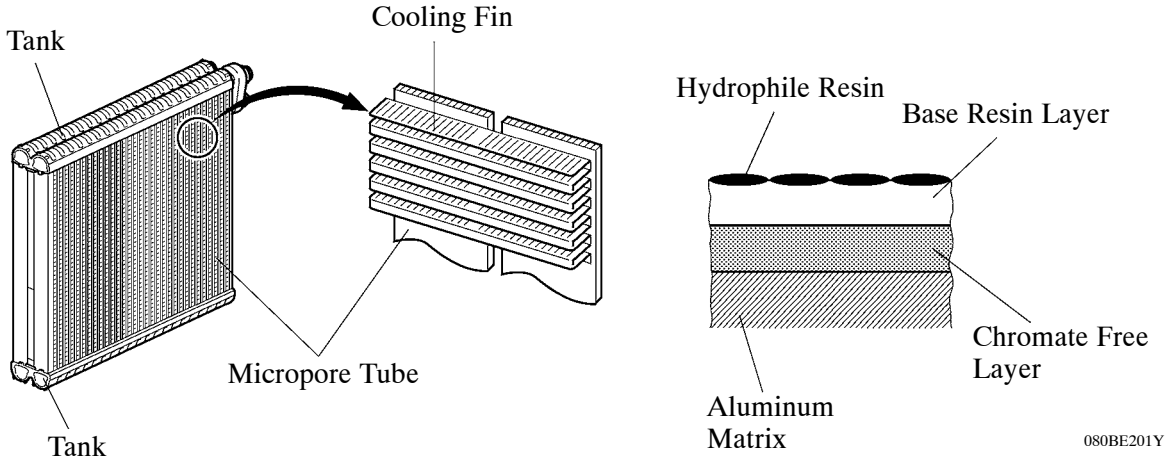
Evaporator

- An RS (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 to reduce foul order caused by the propagation of bacteria and odor on the evaporator surface. The substrate below this coating consists of a chromate-free layer to help protect the environment.



Evaporator Temperature Sensor

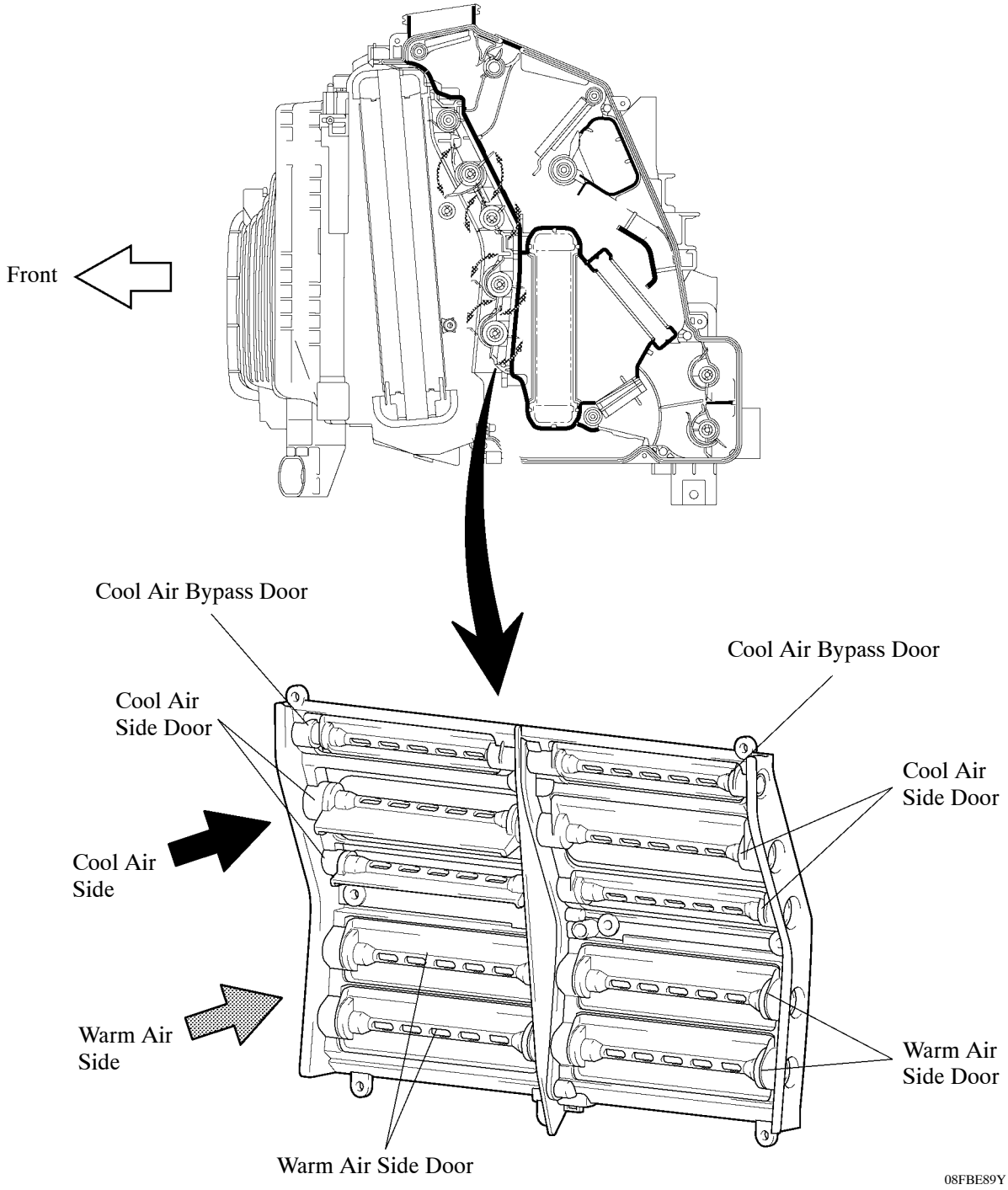
The evaporator temperature sensor detects the temperature of the cooling fin immediately past the evaporator in the form of resistance changes, and outputs it to the air conditioning amplifier.

Blower Motor

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

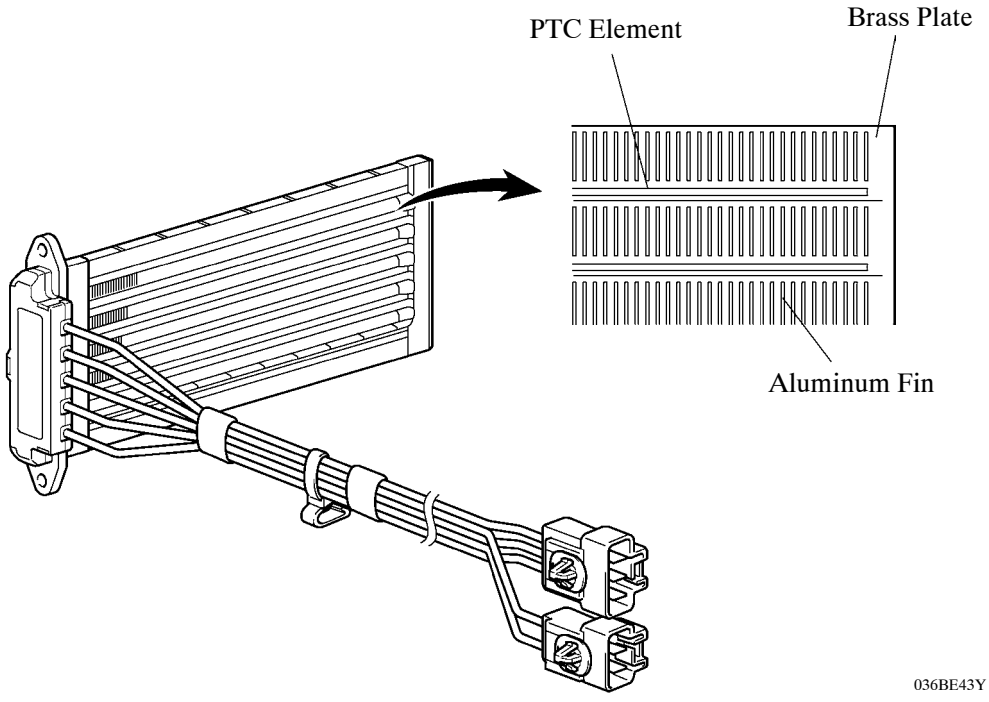
Air Mix Control Door

- A compact rotary air mix control 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.



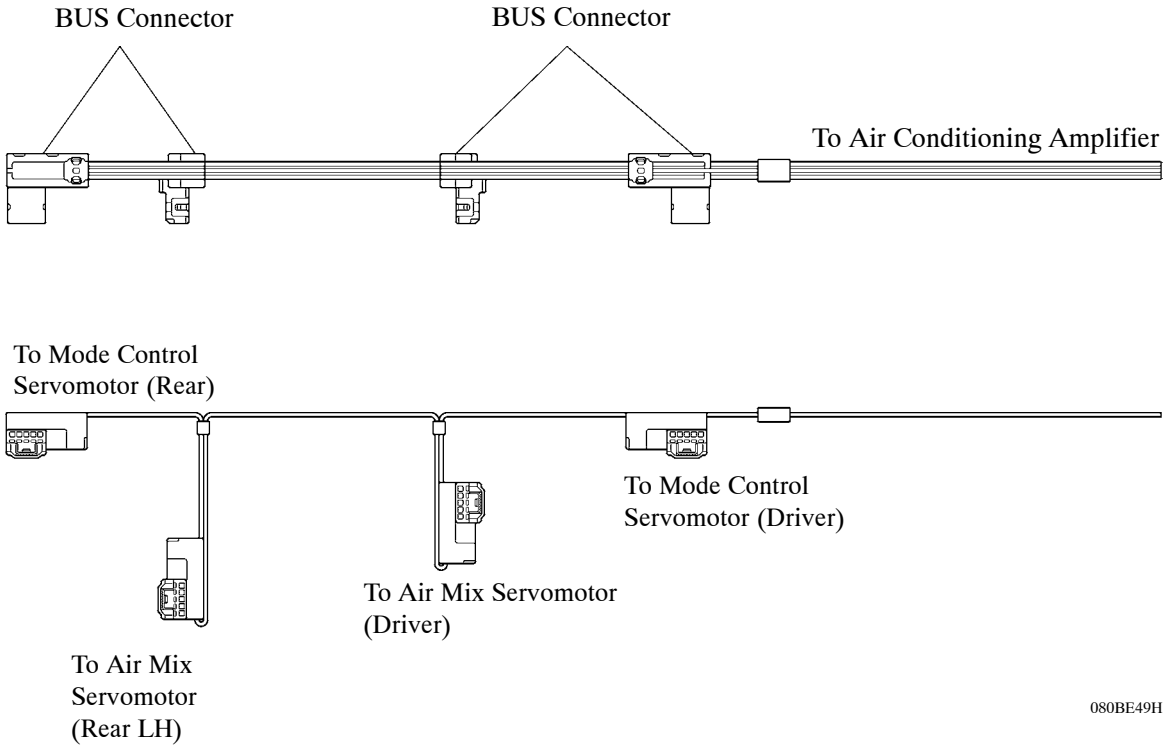
PTC Heater

- The PTC heater is located above the heater core in the air conditioning unit.
- The PTC heater consists of a PTC element, aluminum fin, and brass plate. When current is applied to the PTC element, it generates heat to warm the air that passes through the unit. For details of the PTC heater control see page BE-101.

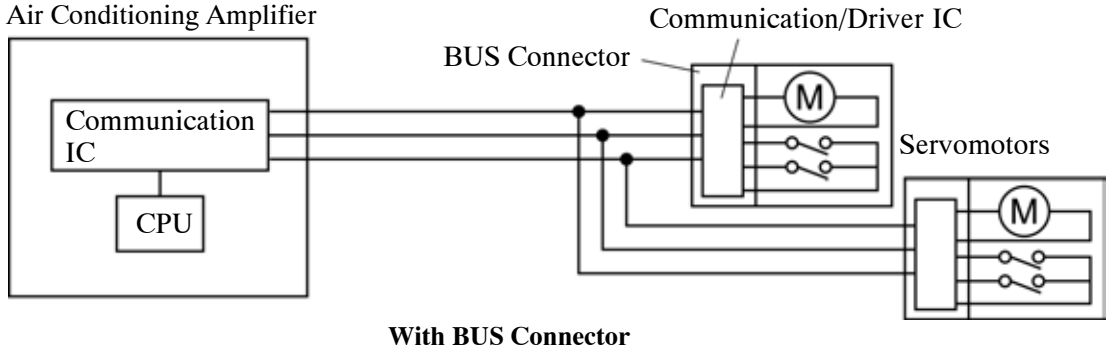


BUS Connector

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

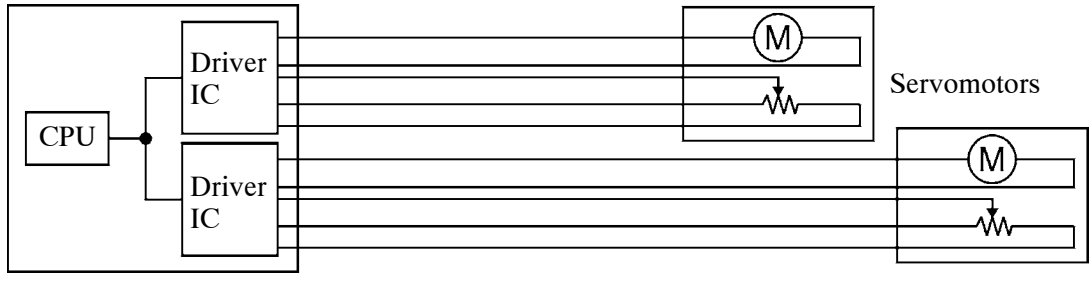


- The BUS connector has a built-in communication/driver IC which communicates with each servomotor connector, actuates the servomotor, and has a position detection function. This enables bus communication for the servomotor wire harness to realize a more lightweight construction and a reduced number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



With BUS Connector

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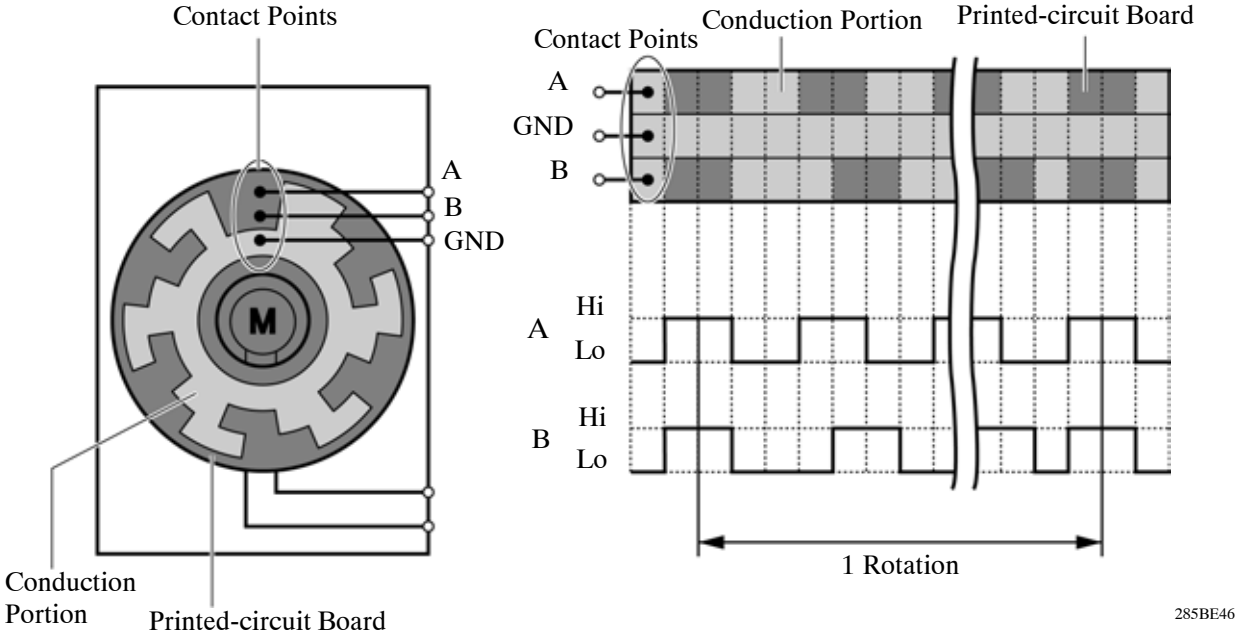


Without BUS Connector

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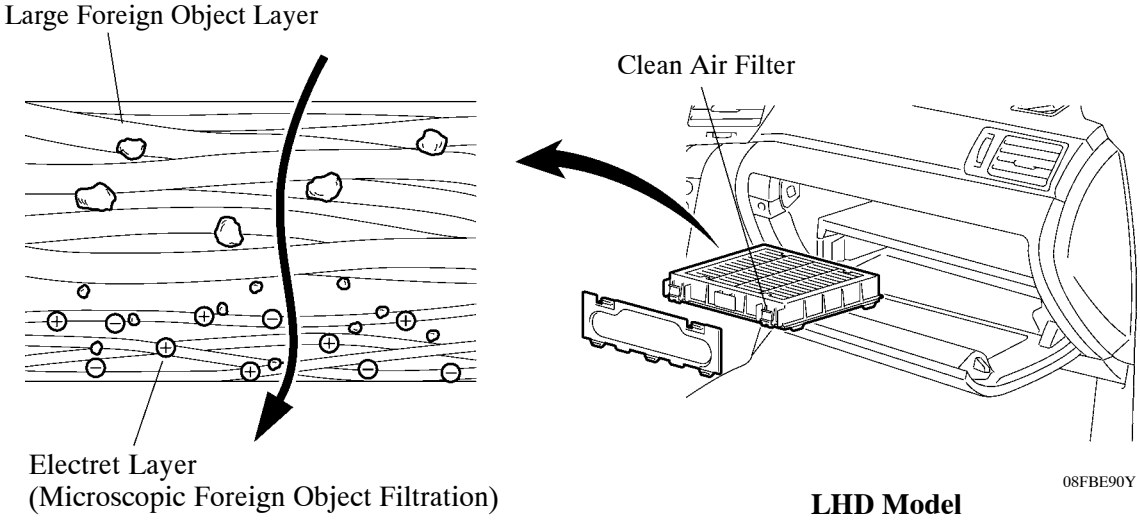
Servomotor

The pulse pattern type servomotor consists of a printed circuit board and servomotor. The printed circuit board has three contact points, and transmits to the air conditioning amplifier two ON-OFF signals for the difference of the pulse phase. The BUS connector detects the damper position and movement direction with this signal.



Clean Air Filter

A clean air filter (pollen removal type) 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, which is a feature that is provided in consideration of the environment.



LHD Model

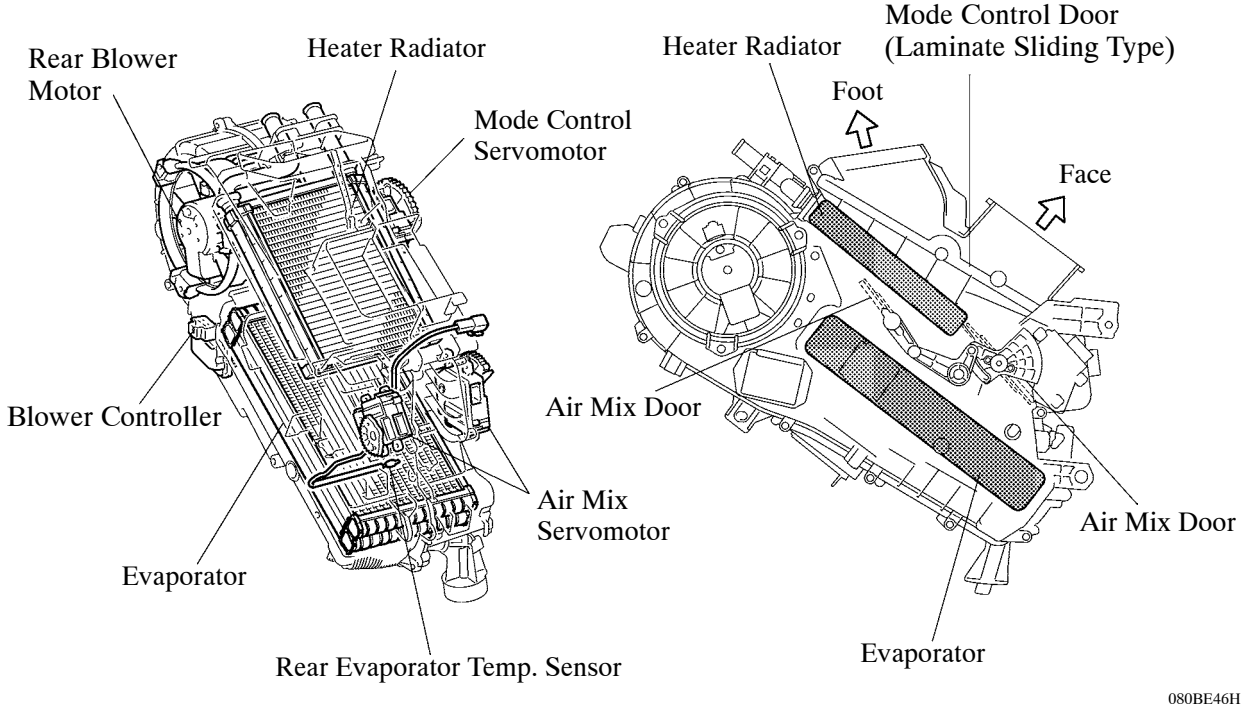
Service Tip

The filter should be changed at 30,000 km (18,000 miles) under normal conditions [cleaning interval: 10,000 km (6,000 miles)*]. Under dusty conditions, the filter should be changed at 15,000 km (9,000 miles) [cleaning interval: 5,000 km (3,000 miles)].
However, observation of these guidelines should depend on the usage conditions (or environment).
*: 15,000 km/h (9,000 miles) for New Zealand package models

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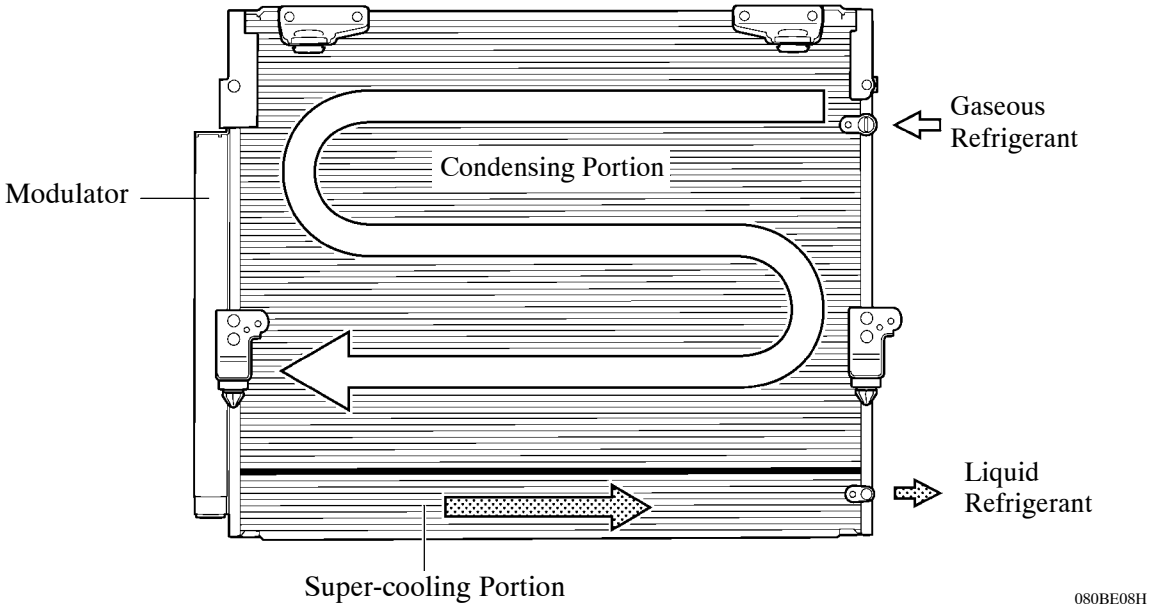
3. Rear Air Conditioning Unit

- The rear air conditioning unit is located in the left quarter trim.
- The rear air conditioning unit consists of the evaporator, heater radiator, air mix servomotor, mode control servomotor, evaporator temperature sensor, rear blower controller and rear blower motor.
- The evaporator and heater radiator are arranged horizontally to allow the airflow to be directed smoothly upward.
- The mode control servomotor operates the laminate sliding type mode control door, and the air mix servomotor controls the full air mix type air mix doors.
- The evaporator has the same RS (Revolutionary super-slim Structure) as the front evaporator. For details regarding the evaporator, refer to page BE-87.
- The heater radiator is the same SFA (Straight Flow Aluminum)-II type as the front heater radiator. For details regarding the heater radiator, refer to page BE-86.
- The 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.
- As in the front air conditioning unit, the servomotor fitted to the rear air conditioning unit is connected to the air conditioning amplifier with the BUS connector due to the lightweight construction and a reduced number of wires. Furthermore, the pulse pattern type is used for both the front and rear air conditioning units. For details regarding the servomotor, refer to page BE-91.
- 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 two layers. The inner polyethyleneterephtalate layer absorbs noises produced by the air conditioning unit and the outer felt holds the duct shape.



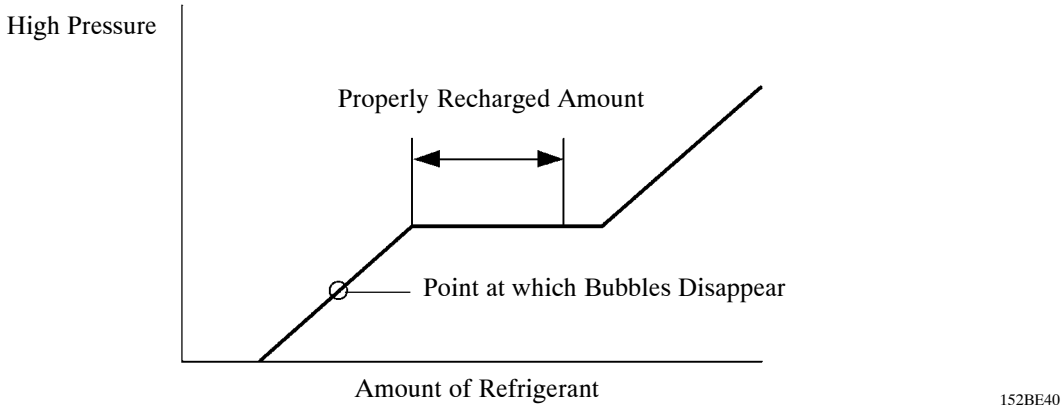
4. Condenser

- An MF (Multi-Flow) type condenser is used. This is a multi-flow condenser consisting of three portions: a condensing portion, a super-cooling portion and a gas-liquid separator (modulator) all integrated together. This condenser uses a sub-cool cycle for its cooling cycle system to improve heat-exchanging efficiency.
- 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 sent to the modulator. In the modulator, the gaseous refrigerant is separated from the liquid refrigerant. Then, the gaseous refrigerant is cooled again in the super-cooling portion. Thus, the refrigerant is sent to the evaporator in an almost completely liquefied state.



Service Tip

The point at which the air bubbles disappear in the refrigerant of the sub-cool cycle is lower than the proper amount of refrigerant with which the system must be filled. Therefore, if the system is recharged with refrigerant based on the point at which the air bubbles disappear, the amount of refrigerant would be insufficient. As a result, the cooling performance of the system will be affected. If the system is overcharged with refrigerant, this will also lead to a reduced performance.
For the proper method of verifying the amount of the refrigerant and for instructions on how to recharge the system with refrigerant, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

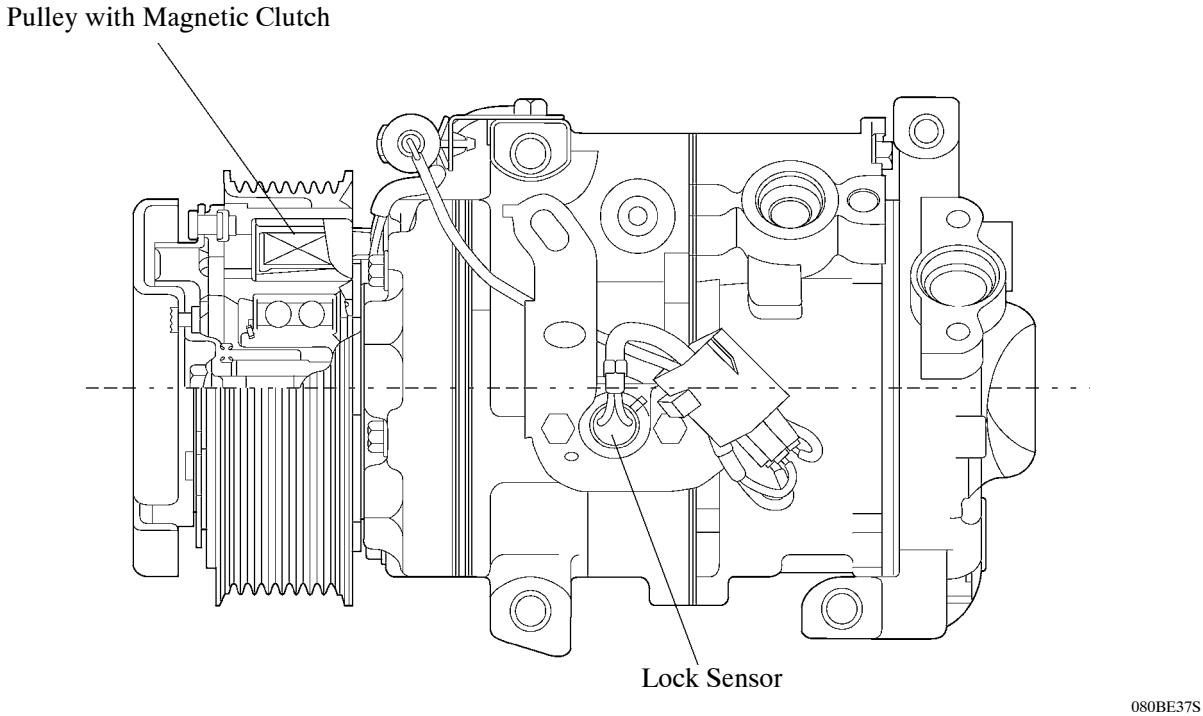


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5. A/C Compressor

General

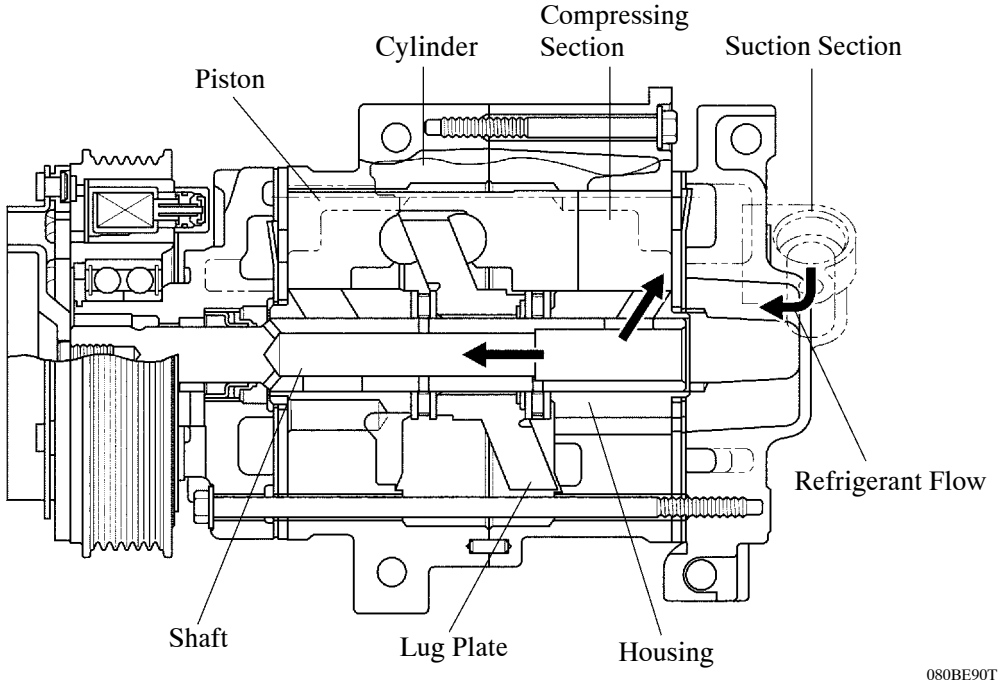
- A 10SR19 A/C compressor has been provided, which features a compact, lightweight and low-noise swash plate design.
- The A/C compressor consists of the A/C pulley, shaft, lug plate, swash plate, piston, shoe, crank chamber, cylinder, and lock sensor.
- The lock sensor sends an A/C compressor speed signal to the air conditioning amplifier. The air conditioning amplifier compares this signal with an engine speed signal sent from the crankshaft position sensor. If the air conditioning amplifier determines that the A/C pulley has locked, the air conditioning amplifier turns the magnetic clutch off.
- A rotary valve capable of directing suction refrigerant into the cylinder has been provided.



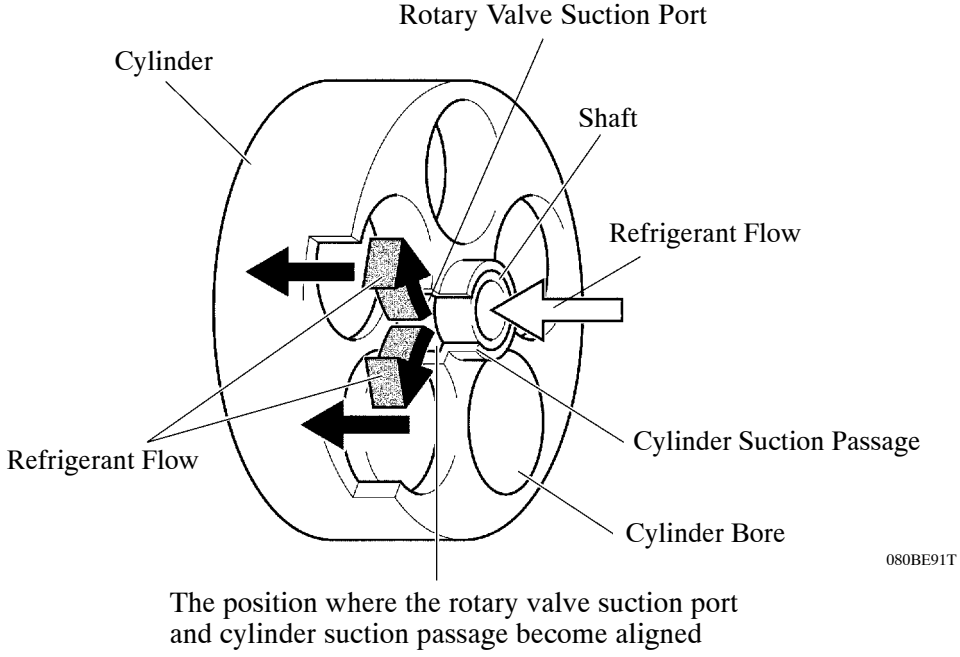
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Rotary Valve

- In order to eliminate suction loss, the rotary valve has been replaced with a conventional suction valve.
- A hollow shaft is used in the valve so as to allow refrigerant to be sucked into the compressing section of the cylinder through the hollow section. Holes individually arranged on the shaft and cylinder are designed to align during the rotation of the shaft. When the holes are aligned, refrigerant is sucked into the compressing section.



▶ Image of Valve Operational Behavior During Suction ◀

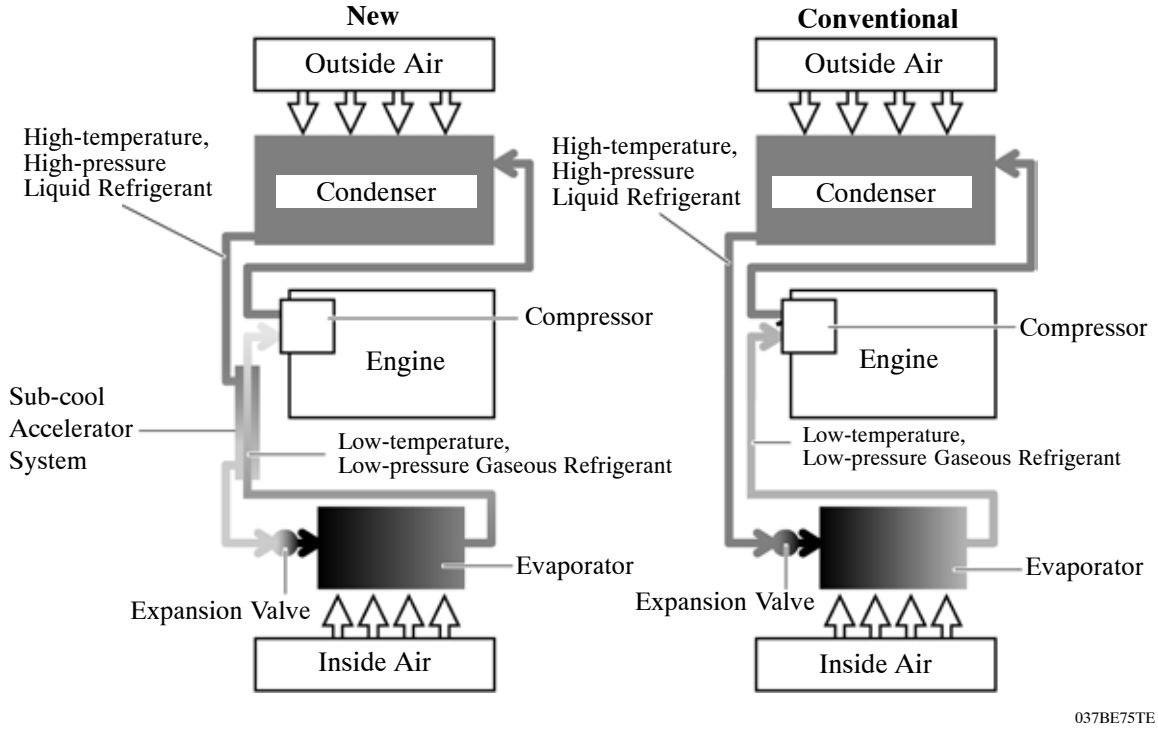


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6. Sub-cool Accelerator (Double-pipe Internal Heat Exchanger) System

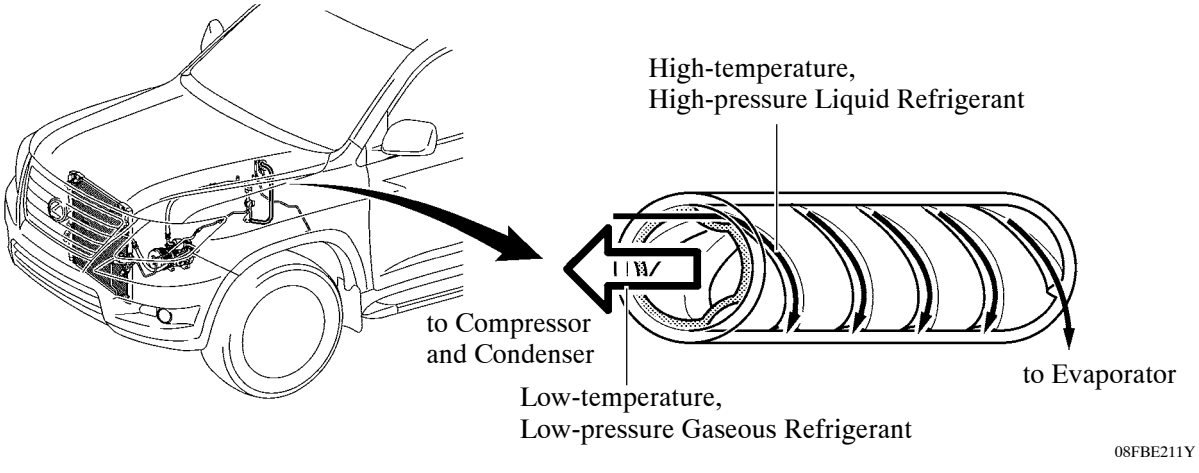
General

- A sub-cool accelerator (double-pipe internal heat exchanger) system has been provided. This system consists of an inner pipe and an outer pipe which are changed from the 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.



Refrigerant Pipe

The refrigerant pipe consists of inner and outer pipes, and thus heat exchange can occur by utilizing the temperature difference between low-temperature, low-pressure gaseous refrigerant flowing inside the inner pipe and high-temperature, 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.

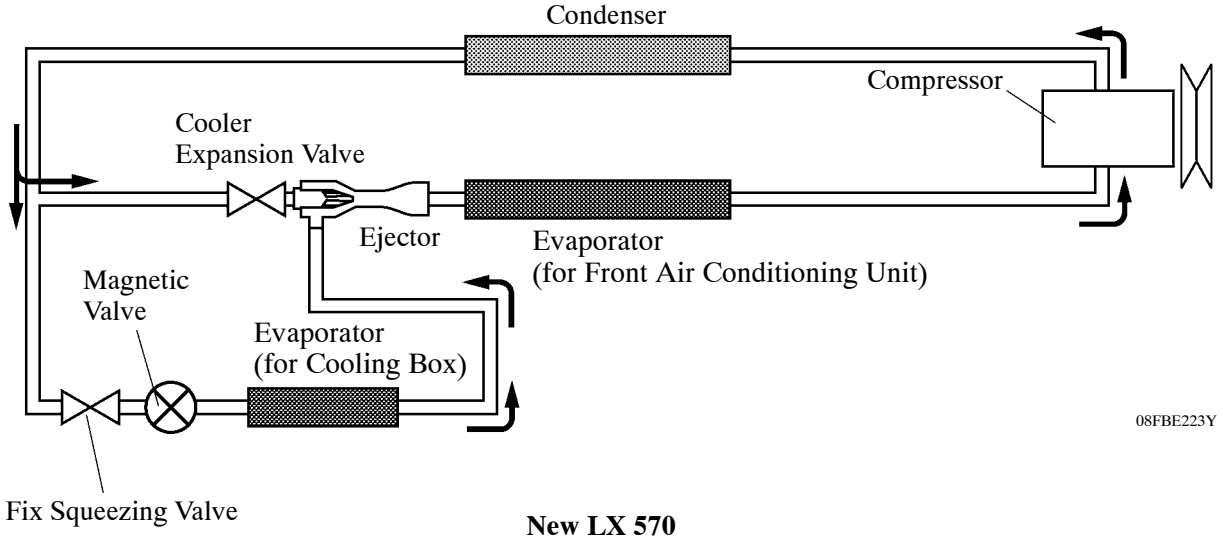


7. Cooling Box

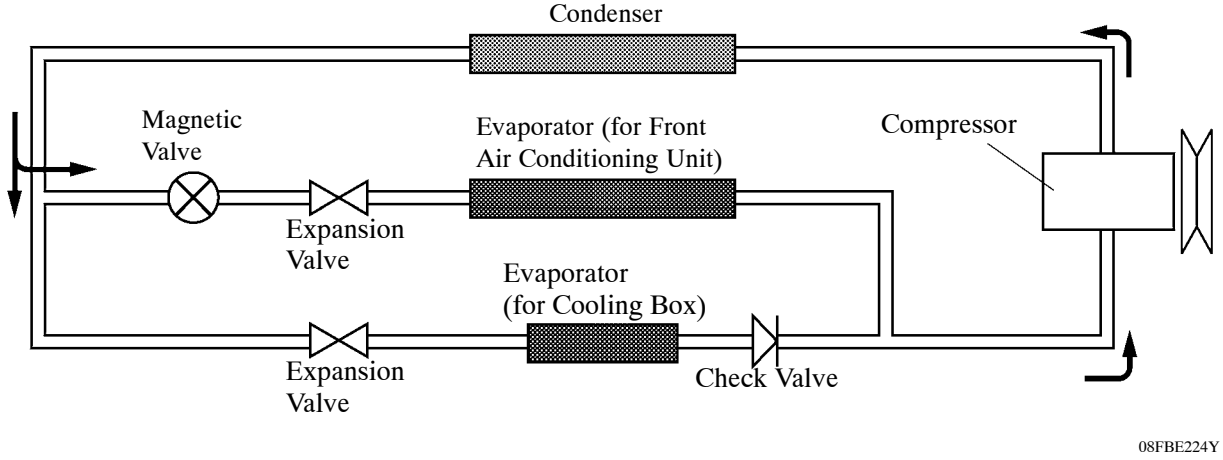
General

- The cooling box is available in the center console box as an option.
- On the previous LX 470, 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 LX 570, 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 LX 570

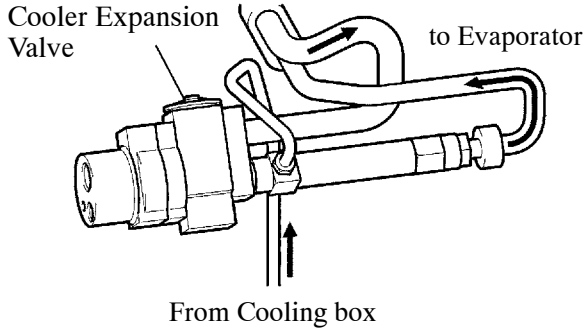


Previous LX 470

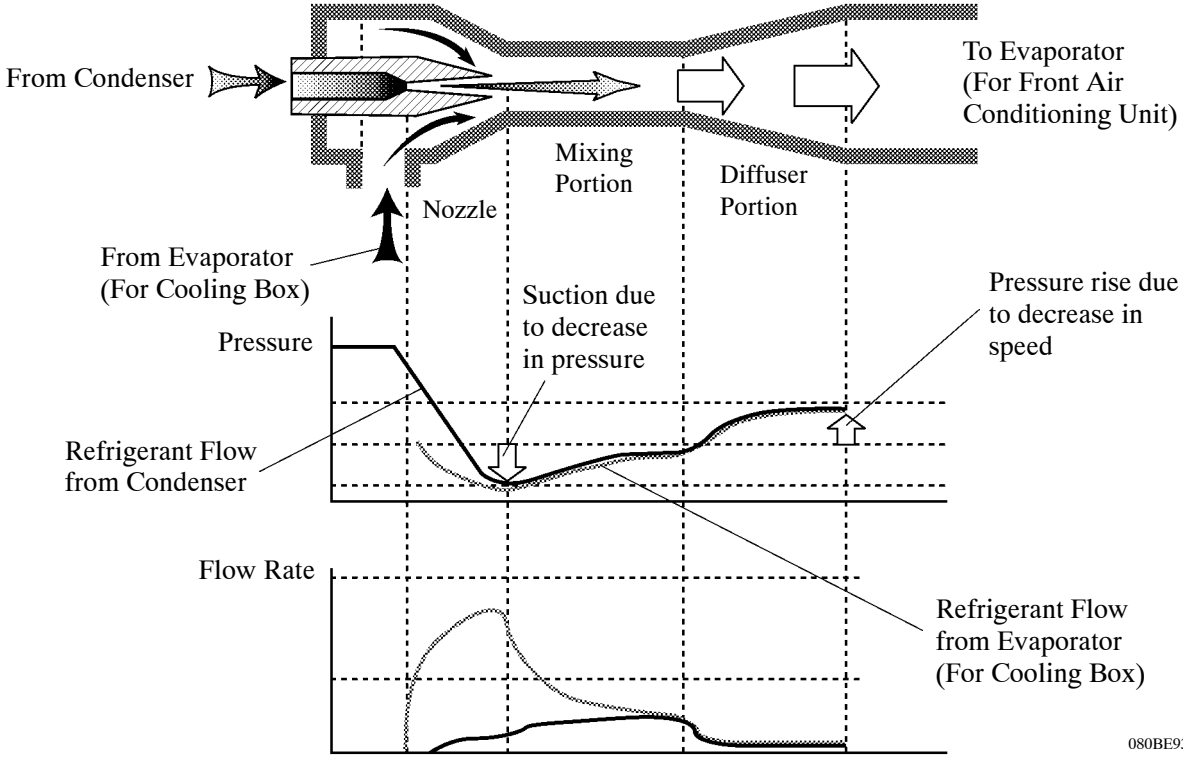
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Ejector

- 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 around the nozzle to decrease while guiding a low temperature, low pressure gaseous refrigerant into the nozzle portion from the evaporator (for cooling box). Thus, refrigerant from the condenser and the evaporator 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 ◀



8. A/C Pressure Sensor

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

9. Room Temperature Sensor and Ambient Temperature Sensor

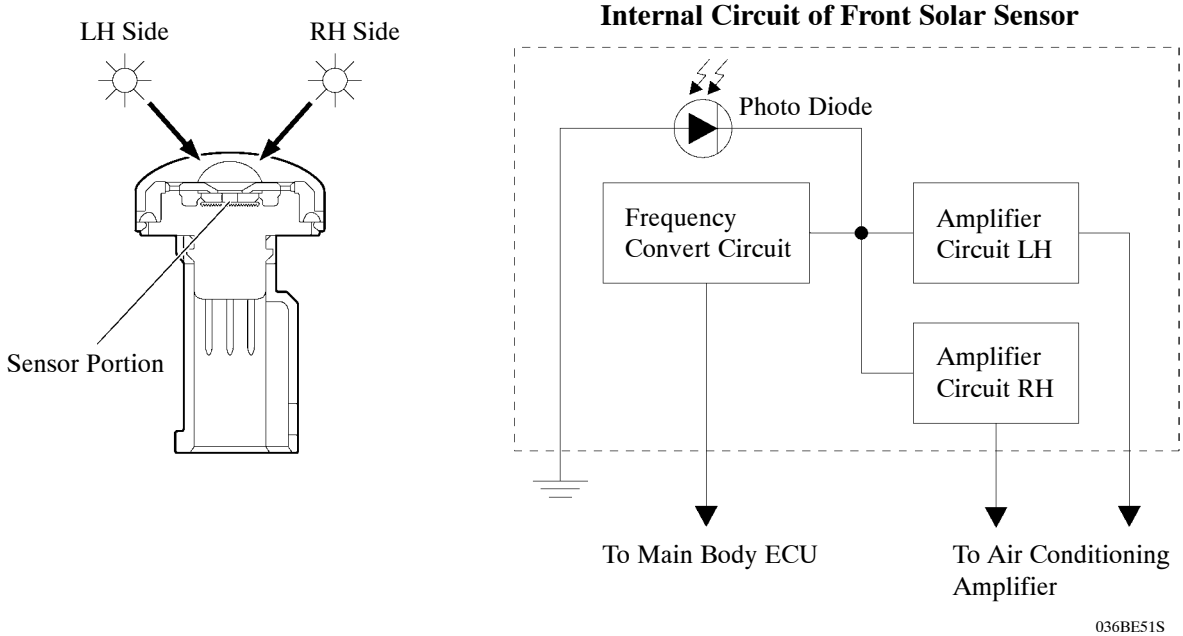
- A room temperature sensor is installed on the instrument panel and right and left quarter trims.
- The room temperature sensor detects the room temperature based on changes in the resistance of its built-in thermistor and sends a signal to the air conditioning amplifier.
- An ambient temperature sensor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

10. 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.

11. Solar Sensor

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



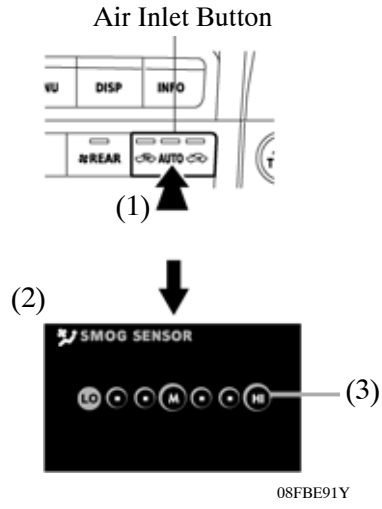
12. Smog Ventilation Sensor

- The smog ventilation sensor is standard equipment except for the G.C.C. countries.
- The smog ventilation sensor detects harmful elements such as CO, HC, and NOx, which are present in the air outside of the vehicle. The sensor outputs it to the air conditioning amplifier.
- The sensitivity of the smog ventilation sensor can be adjusted. Adjustment can be performed on the multi display.

Service Tip

Sensitivity Adjustment Method of Smog Ventilation Sensor

(1) Press and hold the air inlet button for 2 seconds or more.
(2) The sensitivity level adjustment screen appears on the multi display.
(3) The sensitivity level can be adjusted to seven different levels from HI to LO by touching the screen.
(4) Pressing another switch ends the sensitivity adjustment mode.



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■SYSTEM CONTROL

1. General

The air conditioning system has the following controls.

Control	Outline
Neural Network Control [See page BE-102]	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.
Automatic Recirculation Control*1 [See page BE-103]	Automatically changes the air inlet mode to fresh air or recirculation air mode in accordance with the level of harmful elements in the outside air, the room temperature, and outside temperature.
Pollen Removal Mode Control [See page BE-104]	Activated by the pollen removal 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 room 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 water 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 required outlet air temperature which is calculated. *1
	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 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 determines that the A/C pulley is locked, it turns OFF the magnetic clutch and blinks the indicator light in the A/C switch simultaneously, thus alerting the driver.
PTC Heater Control*2	When the engine switch is ON (IG) and the blower motor is turned ON, the air conditioning amplifier turns ON the PTC heater if the conditions listed below are met. ● Water temperature is below specified temperature. ● Outside temperature is below specified temperature. ● Tentative air mix damper opening angle is above the specified value (MAX HOT).

*1: Except for G.C.C. Countries Models

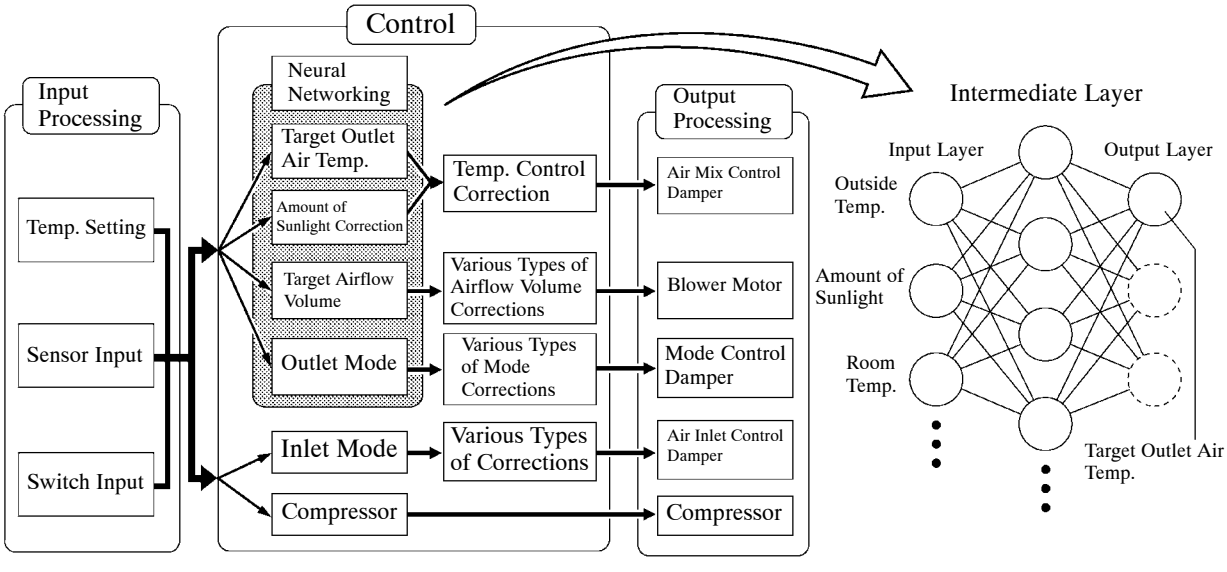
*2: Except for Australia and G.C.C. Countries Models

(Continued)

Control	Outline
Rear Window Defogger Control [See page BE-330]	● Switches the rear window defogger and outside rear view mirror heaters ON for 15 minutes when the rear window defogger button is pressed. Switches them OFF if the button is pressed again while they are operating. ● 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 temperature is –3°C (26.6°F) or below. – The vehicle speed is 50 km/h (30 mph) or more.
Outside Temperature Indication Control	Calculates the outside temperature using signals transmitted by the ambient temperature sensor. Calculated values are corrected by the air conditioning amplifier and then indicated on the multi-information display and the air conditioning control panel.
Self-Diagnosis [See page BE-105]	A DTC (Diagnostic Trouble Code) is stored in the memory when the air conditioning amplifier detects a problem with the air conditioning system.

2. Neural Network Control

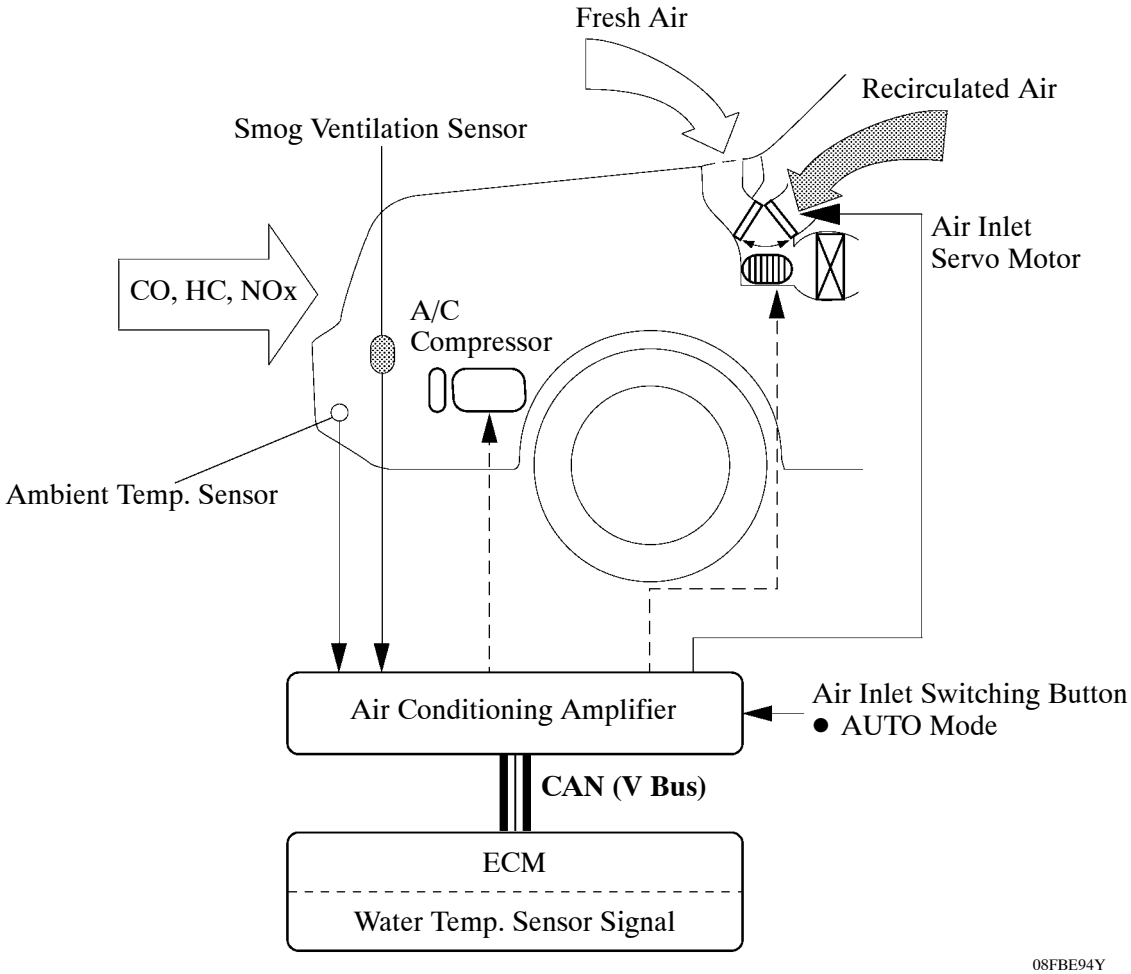
- In previous automatic air conditioning systems, the air conditioning amplifier determined the required outlet air temperature and blower air volume in accordance with the calculation formula that has been obtained based on information received from the sensors. However, because the senses of a person 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. The air conditioning amplifier 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 outside 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 controls the servomotors and blower motor in accordance with the control volumes that have been calculated by the neural network control.



3. Automatic Recirculation Control

The automatic recirculation control is provided for the Europe, Australia and China models. When the automatic recirculation control is operating, the air conditioning amplifier automatically changes the air inlet mode to the fresh air or recirculate air mode based on signals from the smog ventilation sensor, ambient temperature sensor, and ECM when the AUTO air inlet mode is selected.

- The air conditioning amplifier detects harmful elements (CO, HC, and NOx) based on smog ventilation sensor signals and automatically switches the air inlet mode to the recirculate air mode to prevent such harmful elements from entering the cabin.
- The air conditioning amplifier detects water temperature and automatically switches the air inlet mode to the recirculate air mode to prevent the water temperature from becoming too high.
- The air conditioning amplifier detects the outside temperature based on an ambient temperature sensor signal and automatically switches the air inlet mode to the fresh air mode to prevent the windshield from fogging up.



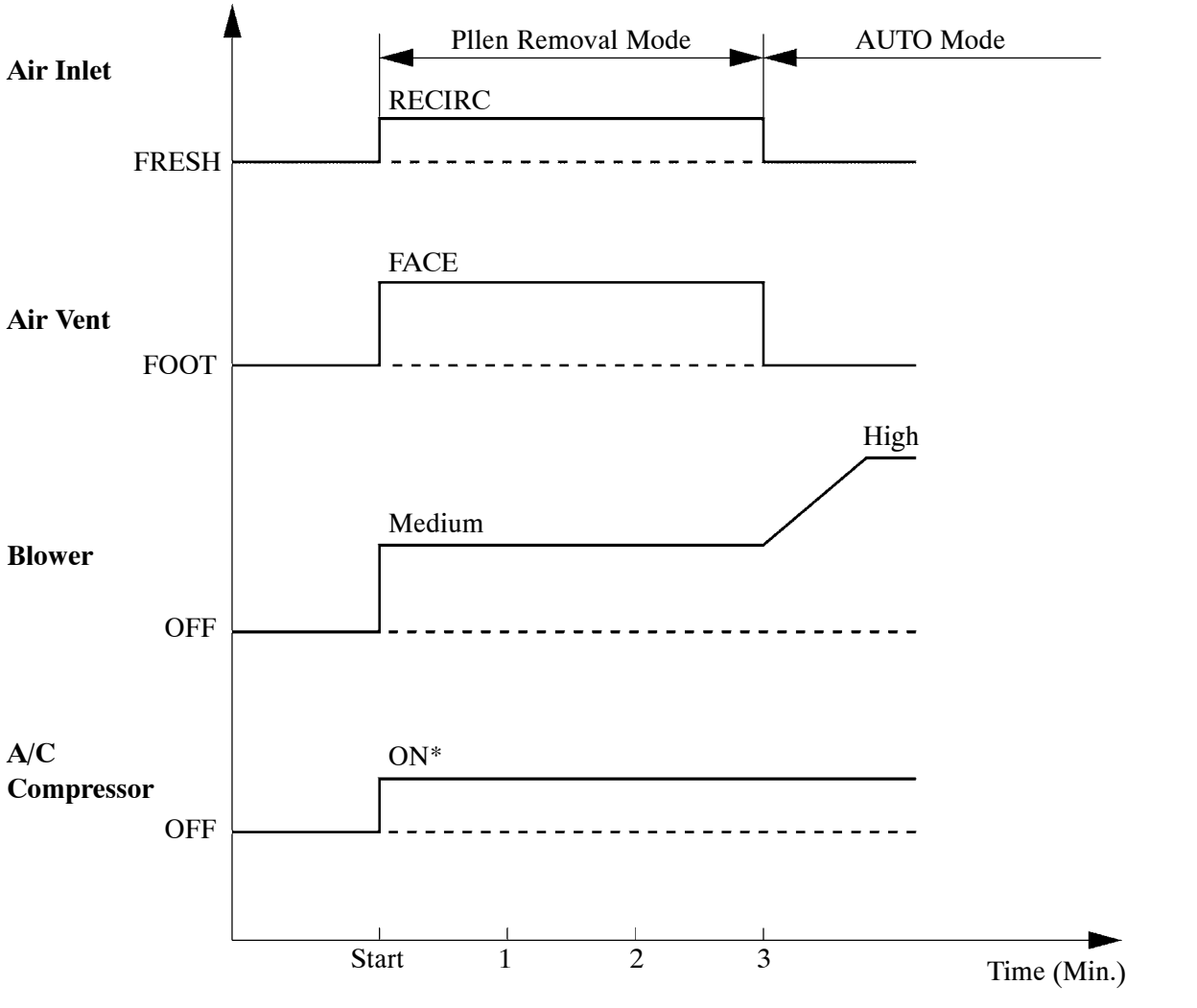
NOTE:
The smog ventilation sensor cannot detect elements such as the smoke from a bonfire or factory exhaust, foul or animal odors, and dirt or dust particles. Therefore, the air inlet modes are not switched in accordance with those elements.

4. Pollen Removal Mode Control

When the pollen removal switch is pressed, the pollen removal mode 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 pollen removal switch signal is input to the air conditioning amplifier, the air conditioning amplifier controls the A/C compressor, air inlet servomotor, air vent servomotor and blower motor as shown in the timing chart below.
- The pollen removal mode control usually operates for approximately 3 minutes. However, when the outside temperature is low (5°C maximum), it will operate for approximately 1 minute.
- After the pollen removal mode control stops operating, the air conditioning amplifier controls the air conditioning system using the AUTO mode (when the AUTO mode was previously selected before the pollen removal mode).

▶ Sample Timing Chart ◀



0140BE63C

*: The A/C compressor turns ON only when the outside temperature is low. The A/C compressor remains ON after the pollen removal mode has been canceled.

5. Self-Diagnosis

- The air conditioning amplifier 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 DTC. One is to use an intelligent tester II, and the other is to read DTC indicated on the multi display.
- For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

MULTI DISPLAY

■ DESCRIPTION

- A multi display has been provided on the center cluster panel as standard 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 navigation system is provided as standard equipment for the Europe, Australia, and China models, and is available as optional equipment for the G.C.C. countries models.
- On the Europe model, the language of the voice recognition function can be selected from English, German and French.
- On the Europe models, the language of the pop-up messages and voice guidance function can be selected as follows:

Destination	Selectable Language
Europe	English, German, French, Dutch, Italian, Danish, Swedish, Spanish, Portuguese, Norwegian

- A hands-free function for a Bluetooth-compatible cellular telephone is used.

Bluetooth® 001S50Y

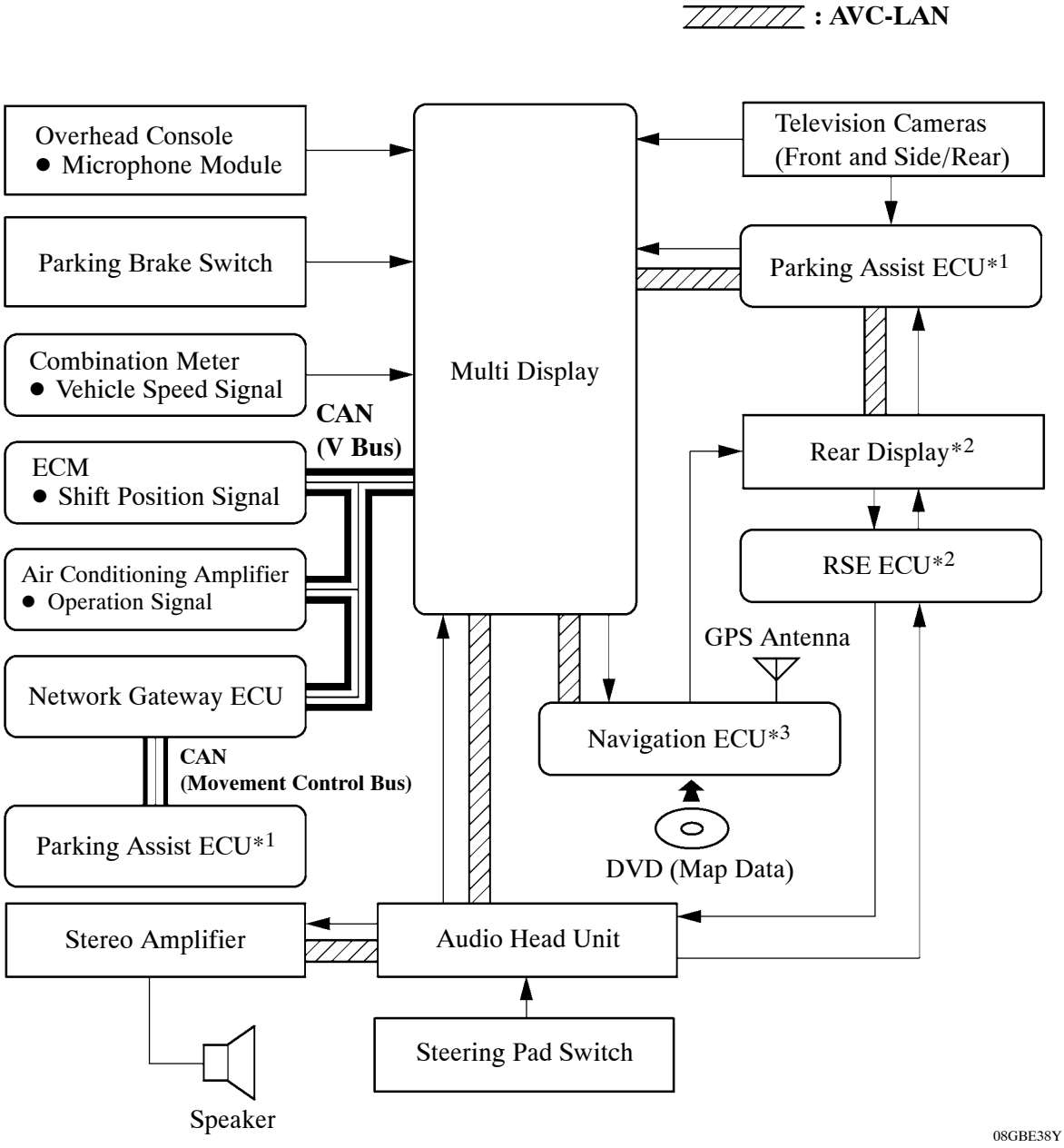
Bluetooth is a trademark owned by Bluetooth SIG, Inc.

▶ Specification ◀

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

*: Models with Navigation System

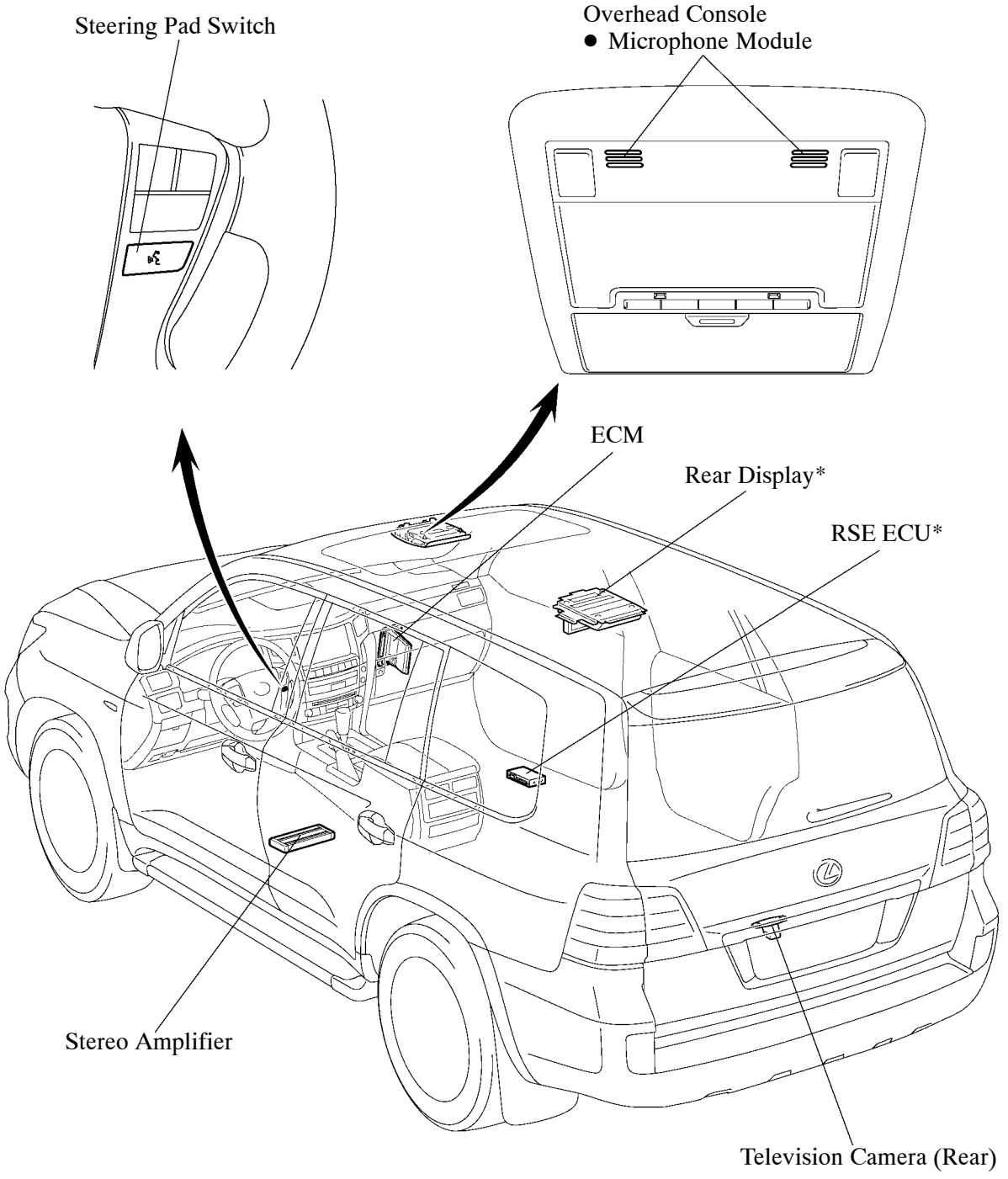
■SYSTEM DIAGRAM



*1: Models with Parking Assist Monitor System, LEXUS Parking Assist-sensor System or Wide-view Front & Side Monitor System
*2: Models with Rear Seat Entertainment System
*3: Models with Navigation System

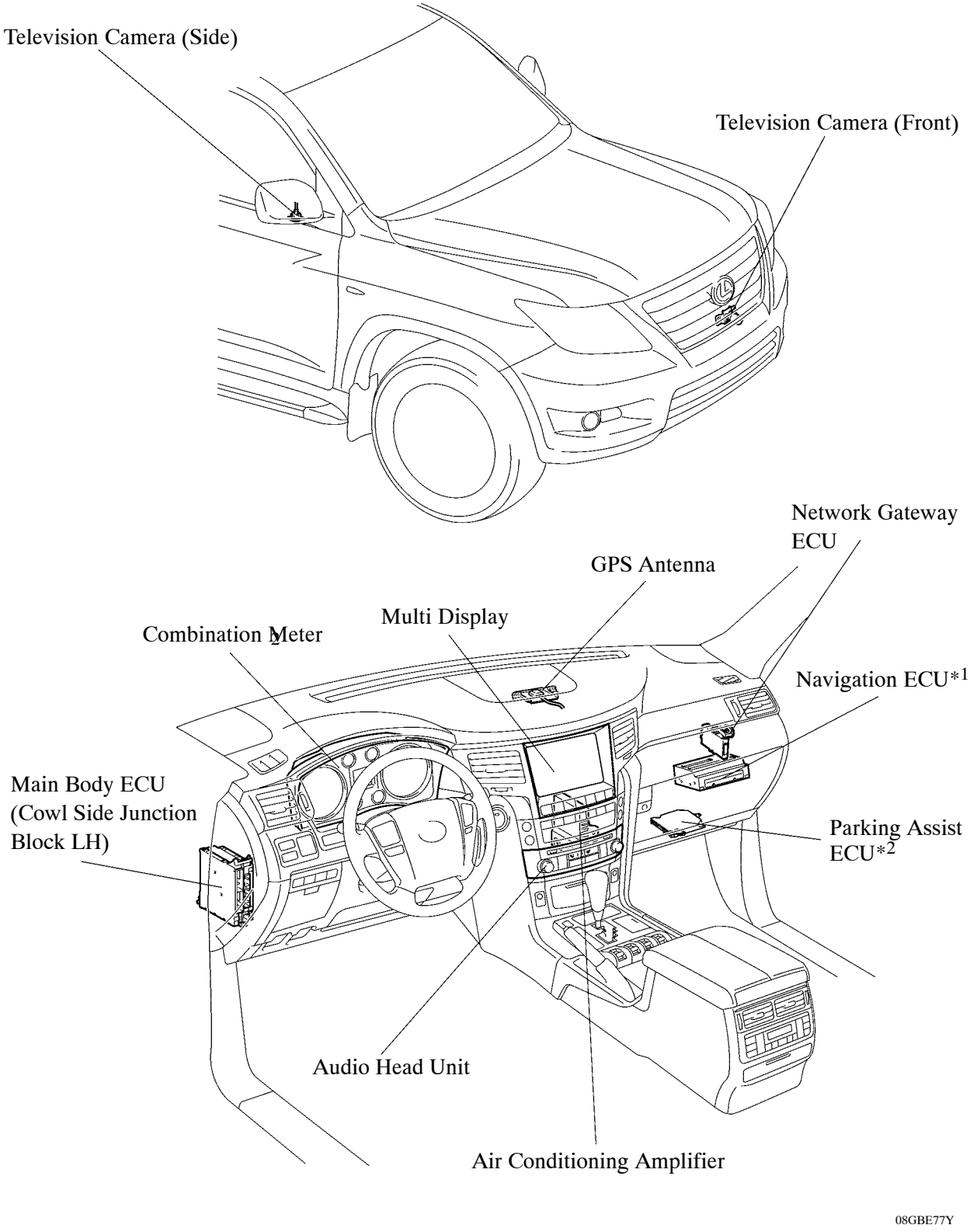
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■LAYOUT OF MAIN COMPONENTS



LHD Model 08GBE76Y

*: Models with Rear Seat Entertainment System



LHD Model

*1: Models with Navigation System
*2: Models with Parking Assist Monitor System, LEXUS Parking Assist-sensor System or Wide-view Front & Side Monitor System

■FUNCTION

1. General

The main functions of the multi display are shown below.

Main Function		Outline
Navigation Screen*1 [See page BE-112]		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 operations: ● Radio operation ● DVD changer operation
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.
Wide View Front & Side Monitor System*1 [See page BE-120]		Displays the front and side views of the vehicle captured by the television camera mounted on the radiator grille and front passenger's side outside rear view mirror when the wide view front and side monitor system operates.
Rear View Monitor System*1 [See page BE-134] or Parking Assist Monitor System*1 [See page BE-138]		Displays the rear view of the vehicle captured by the television camera mounted on the back door when the shift lever is moved to the R position.
LEXUS Parking Assist-sensor System* [See page BE-156]		Detects obstacles and displays the information on the multi display to inform the driver.
Others	Hands-free [See page BE-115]	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*1	Operates the navigation, audio, and air conditioning systems based on voice commands.

*: The provision of this function varies by the model.

(Continued)

Main Function		Outline
Others	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.
	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*2	The language used for the touch-screen buttons, pop-up messages and voice guidance can be changed.
	Delete Personal Data	The following personal data can be deleted or returned to their default settings: ● Maintenance conditions ● Maintenance information “OFF” setting ● Memory points*3 ● Areas to avoid*3 ● Previous points*3 ● Route trace*3 ● User selection settings ● Phonebook data ● Dialed numbers and received calls ● Speed dial ● Bluetooth phone data ● Security code
Diagnosis [See page BE-114]		This contains the following items: ● Service check menu ● Display check ● Navigation check*3 ● Camera check ● Bluetooth TEL check

*2: Europe Models
*3: Models with Navigation System

BE

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.

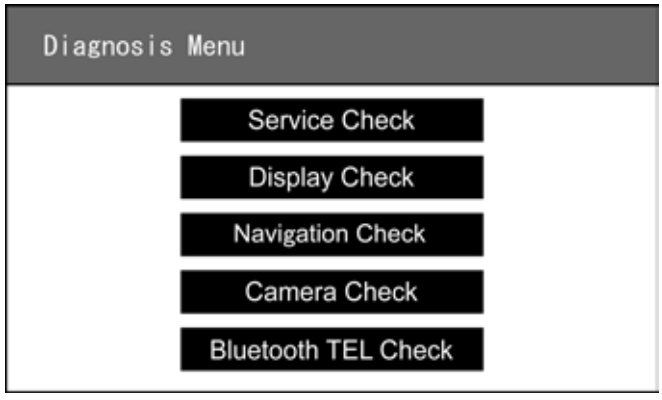
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Item		Function
Destination Search	Intersection Search	By specifying two streets, the point at which they intersect is set as the destination point.
	Motorway Entrance or Exit Search	Searches for the destination by the name of the street that connects 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.
	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.

*: Europe and China Models

3. Diagnosis

The following check menus are included in the diagnosis screen.



0150BE91C

Check Mode	Detail
Service Check Menu	Performs a system check and gathers DTCs (Diagnostic Trouble Codes) in memory. Based on the 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.

*: Models with Navigation System

For details on the procedure required to enter the diagnosis menu screen, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

BLUETOOTH® HANDS-FREE SYSTEM

■ DESCRIPTION

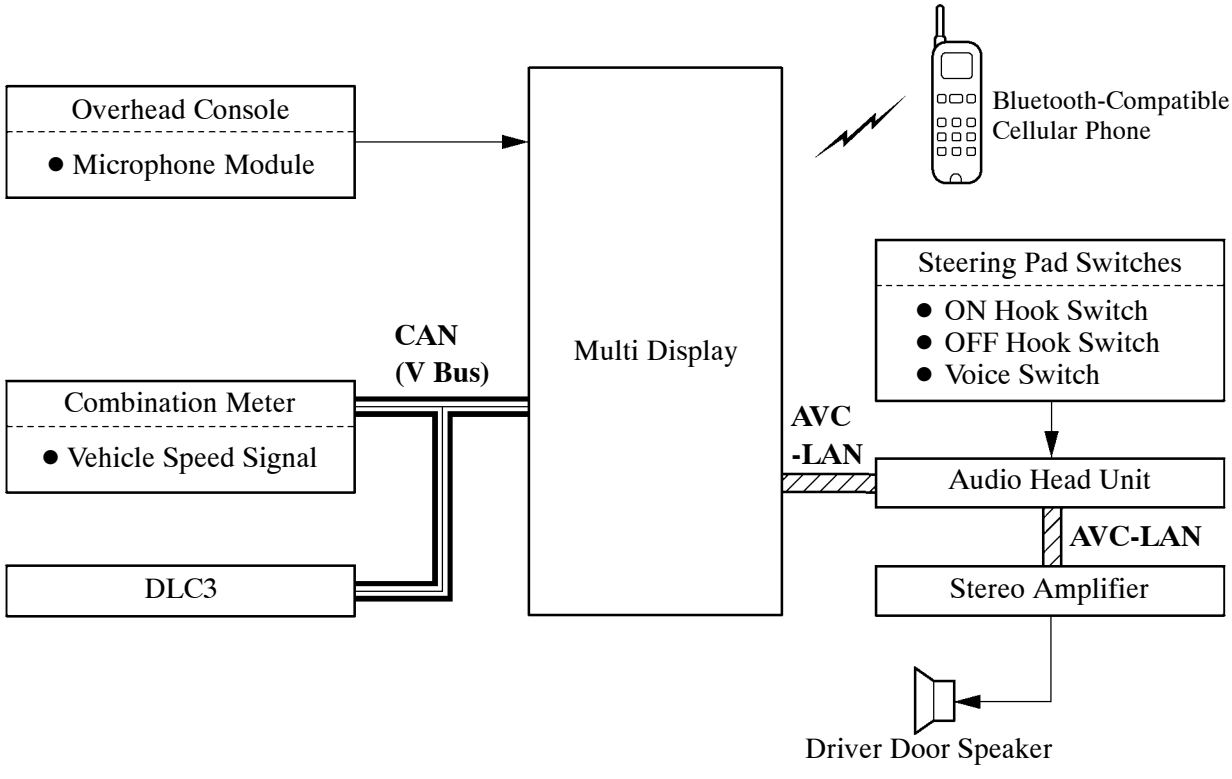
- The Bluetooth hands-free system is provided as standard equipment for the Europe, Australia, and China models, and is available as optional equipment for the G.C.C. countries models.
- The Bluetooth hands-free system is a short-distance, high-speed wireless data communication system that uses the 2.4 GHz frequency band prescribed by the Bluetooth SIG (Special Interest Group).
- The Bluetooth hands-free system enables drivers to place or receive phone calls using a cellular phone without releasing their hands from the steering wheel.
- The Bluetooth hands-free system can be operated by touching icons indicated on the multi display.

— REFERENCE —

Bluetooth® 001SI50Y

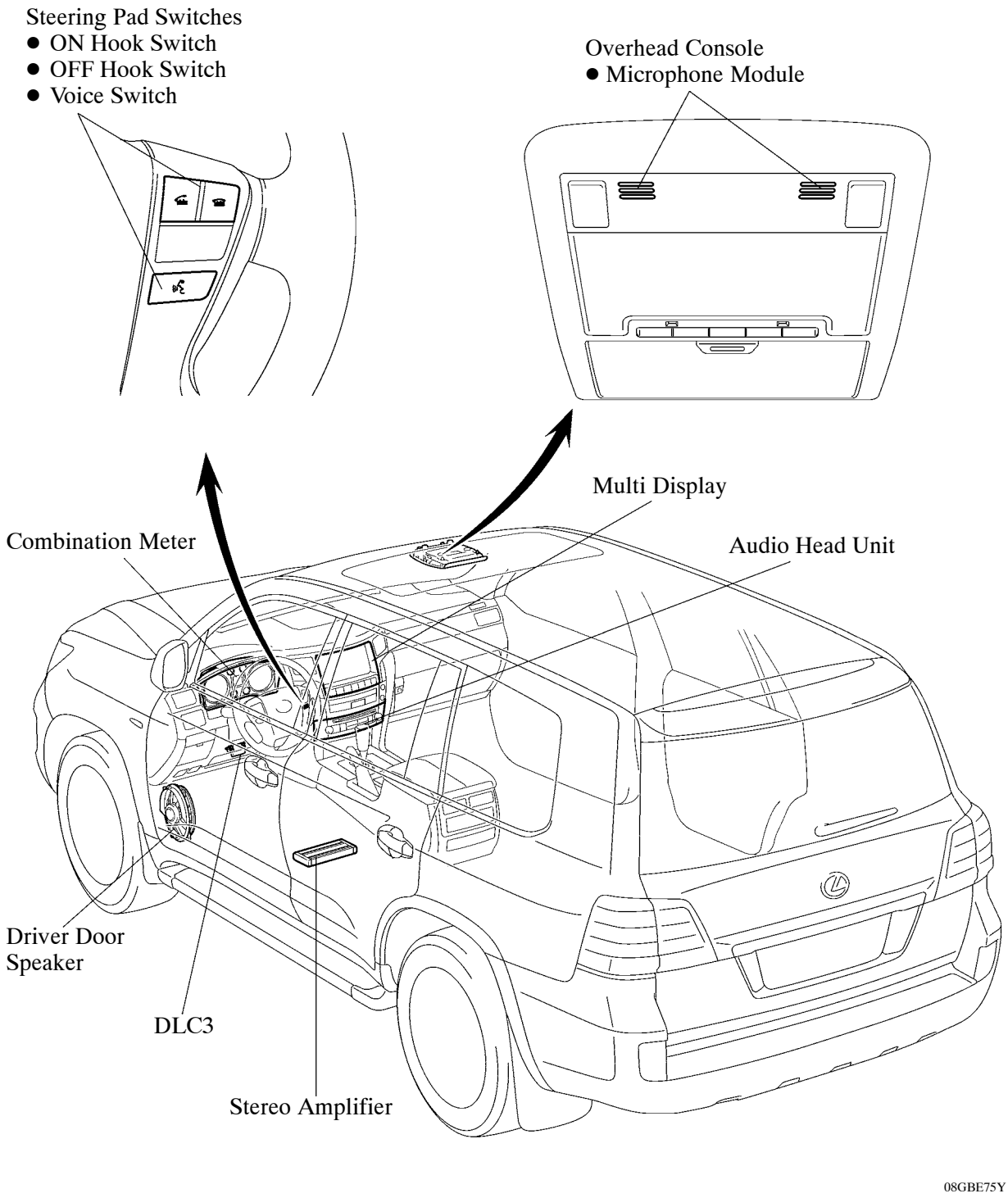
Bluetooth is a trademark owned by Bluetooth SIG (Special Interest Group). Bluetooth is a high-speed wireless data communication function that uses the 2.4 GHz frequency band prescribed by the Bluetooth SIG, with communication at a speed of 1 Mbps.

▶ System Diagram ◀



BE

■ LAYOUT OF MAIN COMPONENTS



LHD Model

■ HANDS-FREE FUNCTIONS

The Bluetooth hands-free system 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 5 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 5 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	The user can call by giving a name registered in the phonebook.
	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 vehicle 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 engine switch to ON (ACC) or ON (IG) 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 cellular 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.
	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 the vehicle 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)

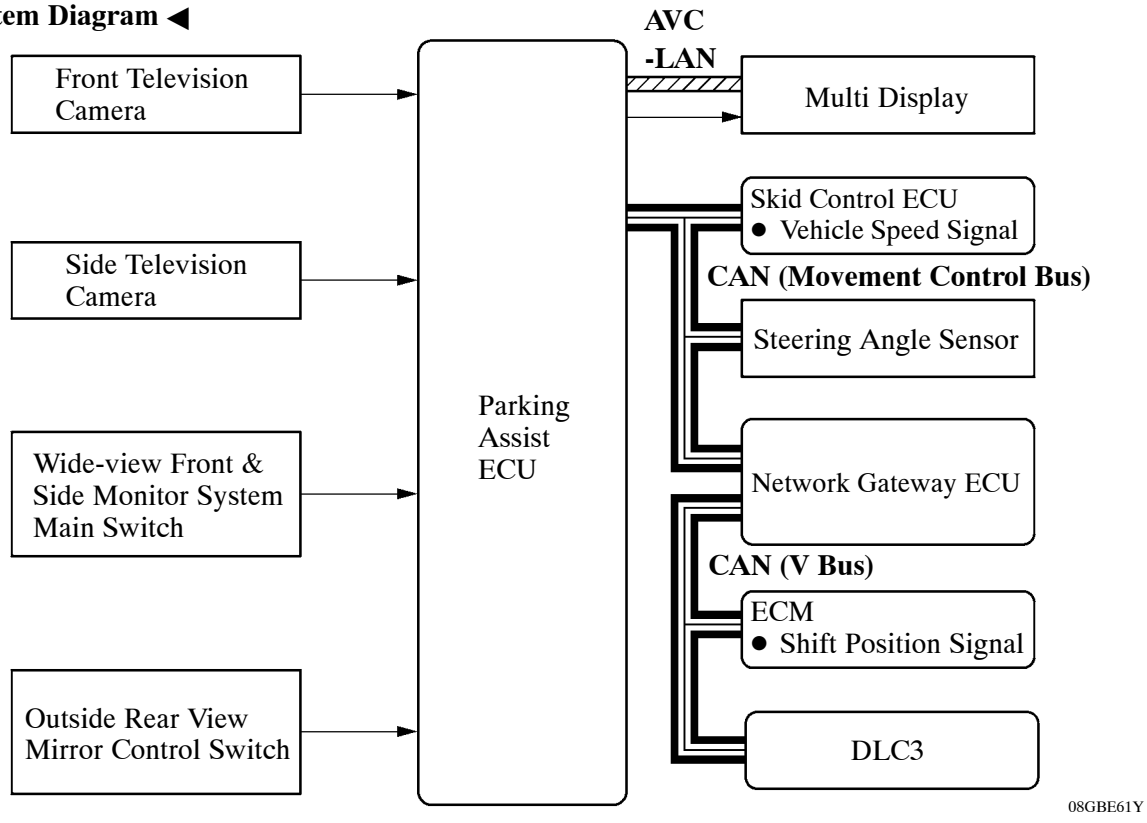
Function		Outline
Set a Bluetooth phone	Enter the Bluetooth phone	In order to use hands-free function of a Bluetooth phone, it is necessary to register it in the multi display. Once a phone is registered, the hands-free function becomes available automatically. The user can register up to 6 phones.
	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 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 to be deleted by the user	The user can display the information of the Bluetooth phone before the user deletes it and he/she can ensure that the telephone that he/she will delete is correct one.

WIDE-VIEW FRONT & SIDE MONITOR SYSTEM

■ DESCRIPTION

- The wide-view front & side monitor system is optional equipment. The wide-view front & side monitor system is controlled by the parking assist ECU.
- The wide-view front & side monitor system allows the driver to monitor on the multi display, a wide area in front of the vehicle and the road conditions on the front passenger side. The wide-view front & side monitor system captures the images of the areas that would not be normally possible for the driver to view directly. Thus, it supports the driver by reducing blind spots.
- The wide-view front & side monitor system displays the vehicle width parallel line, the predicted path line, and the vehicle front end line. This helps avoid an object when the vehicle is turning in the direction of the front passenger, and rubbing against an object when the vehicle is pulling over to the side.
- This system consists of the following components: front television camera, side television camera, parking assist ECU, multi display, wide-view front & side monitor system main switch, park/neutral position switch, and outside rear view mirror control switch.
- The front television camera is placed inside the radiator grille and the side television camera is placed below the front passenger's side outside rear view mirror. The images captured by these cameras can be displayed simultaneously on the multi display. The side television camera can capture images even when the outside rear view mirror is retracted.
- The wide-view front & side monitor system can be operated simultaneously with the LEXUS parking assist-sensor system. In this case, the information of both systems will appear on the multi display. For details on the LEXUS parking assist-sensor system, see page BE-156.

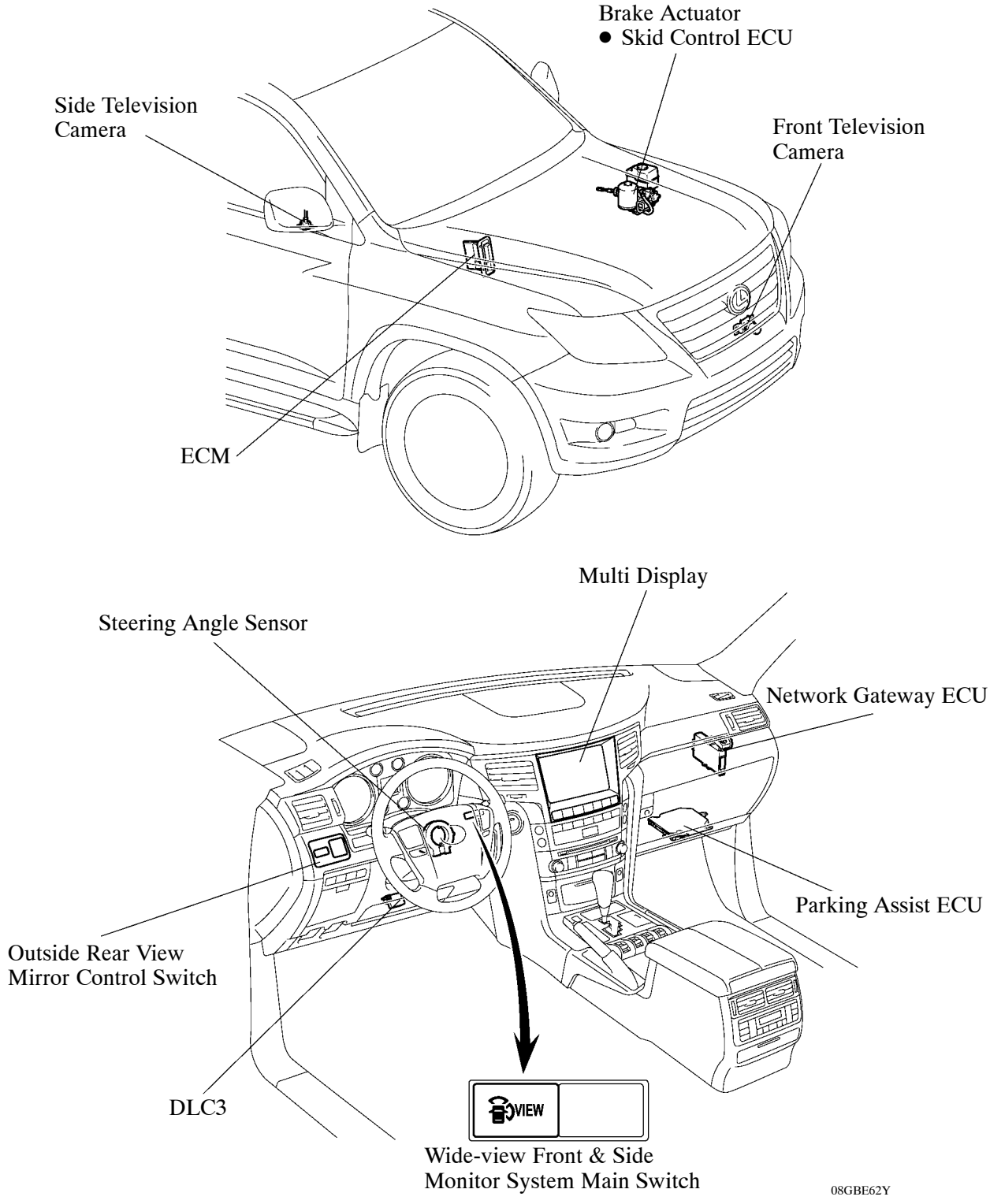
▶ System Diagram ◀



CAUTION

- Do not rely entirely on the wide-view front & side monitor system. Pay attention to your surroundings while driving.
- Never drive the vehicle by looking at the screen alone. The image on the screen may differ from the actual conditions. If you drive while looking only at the screen, you may hit an object or have an accident. When using the wide-view front & side monitor system, check the surrounding conditions and other vehicles directly.

■ LAYOUT OF MAIN COMPONENTS



LHD Model

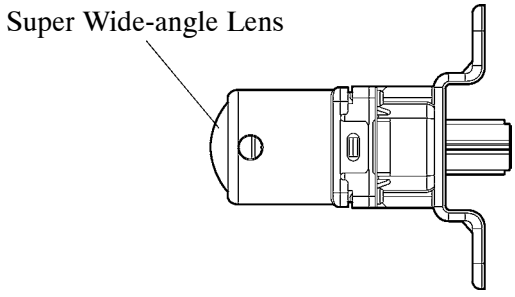
■ FUNCTION OF MAIN COMPONENTS

Component	Function
Front Television Camera	Captures images of a wide area in front of the vehicle and outputs visual signals to the parking assist ECU.
Side Television Camera	Captures images of the road on the front passenger's side and outputs visual signals to the parking assist ECU.
Parking Assist ECU	● Turns the wide-view front & side monitor system ON/OFF in accordance with the signals input from the ECUs and switches. ● Outputs visual signals from the front television camera and the side television camera to the multi display.
Wide-view Front & Side Monitor System Main Switch	Switches the wide-view front & side monitor system ON and OFF.
Multi Display	Displays the images of the front and side television cameras in accordance with the signals from the parking assist ECU.
Skid Control ECU	Outputs vehicle speed signals to the parking assist ECU.
Steering Angle Sensor	Detects the angle of the steering wheel, and transmits the signal to the parking assist ECU.
ECM	Outputs shift position signals to the parking assist ECU.
Outside Rear View Mirror Control Switch	Outputs the retracting or opening position signal of the outside rear view mirror to the parking assist ECU.

■ CONSTRUCTION AND OPERATION

1. Front Television Camera

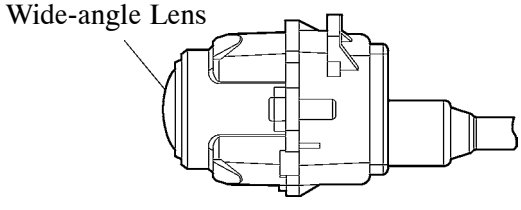
The front television camera, which is placed in the radiator grille, consists of a super wide-angle lens and a CCD (Charge Coupled Device). The use of the super wide-angle lens enables the system to capture the images of a wide area in front of the vehicle. The images captured by the front television camera pass through the parking assist ECU. Then, they are transmitted to the multi display and appear on the screen.



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2. Side Television Camera

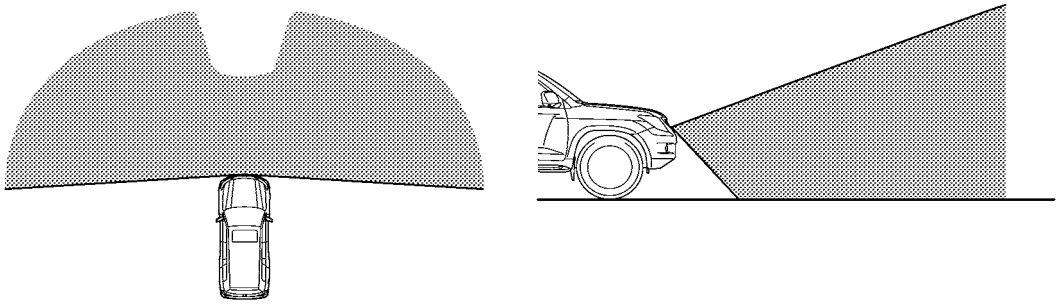
The side television camera, which is placed below the front passenger's side outside rear view mirror, consists of a wide-angle lens and a CCD (Charge Coupled Device). The images captured by the side television camera pass through the parking assist ECU. Then, they are transmitted to the multi display and appear on the screen.



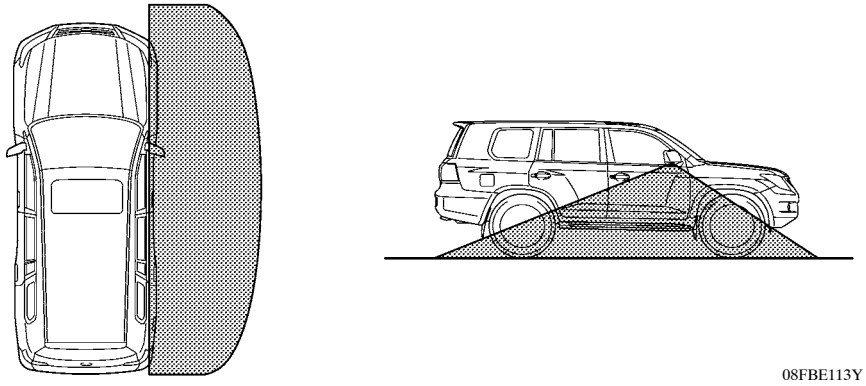
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■AREA DISPLAYED ON SCREEN

The front and side television cameras can capture images within the area shown below. However, the display area may differ, depending on the conditions of the vehicle or the road.

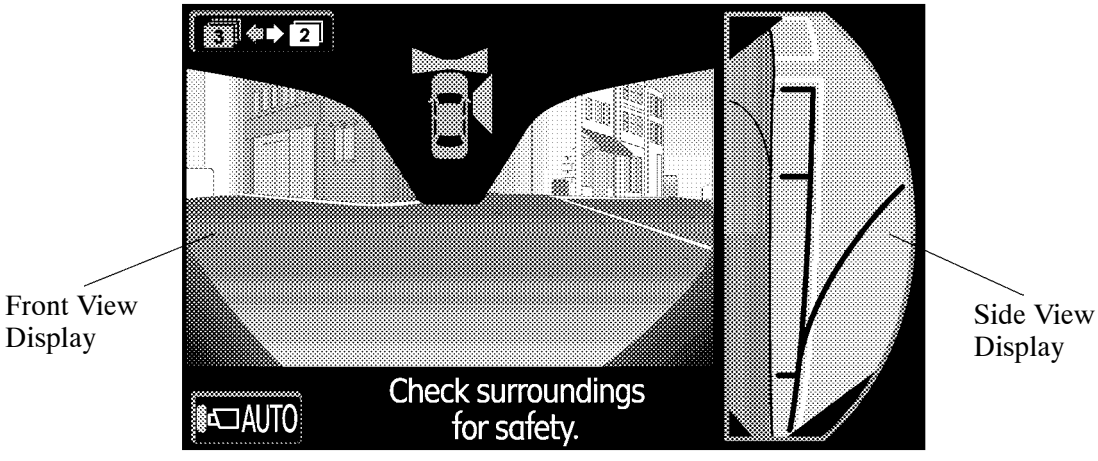


Front Television Camera Capture Range



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Side Television Camera Capture Range



Display Status

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LHD Model

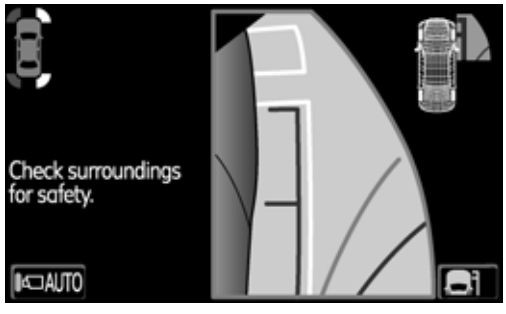
■DESCRIPTION OF DISPLAY

1. General

- In the wide-view front & side monitor system, the driver can turn the AUTO mode ON/OFF by pressing the AUTO mode switch. Also, the driver can select between the two and three display modes by pressing the display mode switch. When this system is operating simultaneously with the LEXUS parking assist-sensor system, the screen will simultaneously display the LEXUS parking assist-sensor system.
- In the three-display mode, the driver can select the front and side view mode, front view mode, and side view mode by pressing the wide-view front & side monitor system main switch.
- The front view and side view mode supports the driver by monitoring both the areas in front of the vehicle and the side of the vehicle on the front passenger side.
- The front view mode displays the conditions in front of the vehicle.
- The side view mode displays a zoom-in view of the front portion of the area that can be captured.
- On the Australia models, the front view display is on the right side and the side view display is on the left side on the screen.
- On the China models, the messages displayed on the screen are written in Chinese.



Front and Side View Mode 08GBE64Y



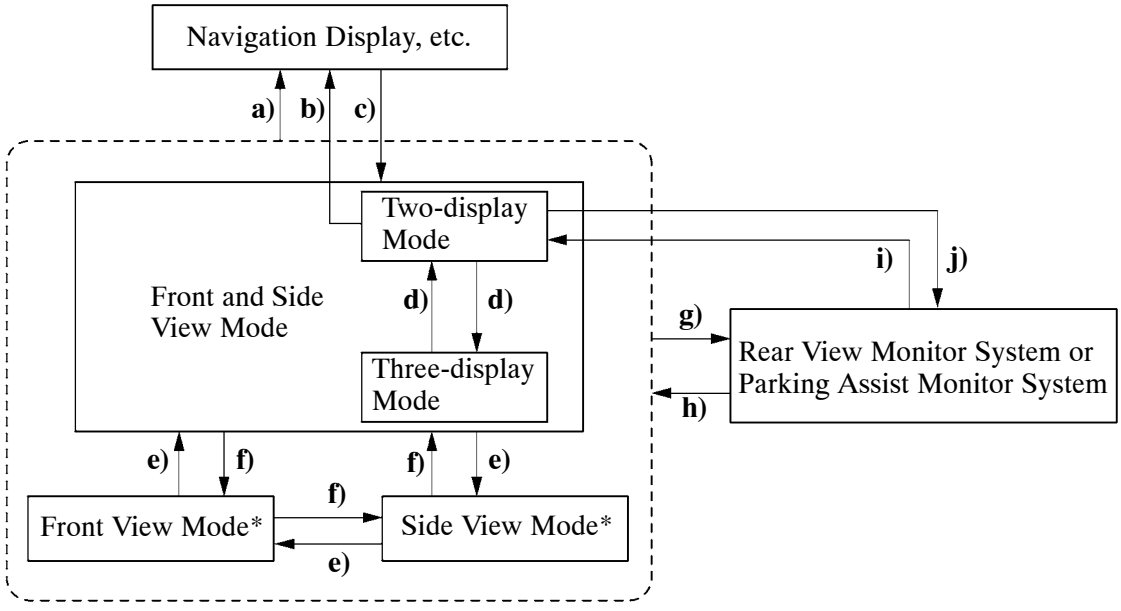
Side View Mode 08GBE65Y



Front View Mode 08FBE216Y

2. Display Transition

The display of the wide-view front & side monitor system makes the following transitions.



Wide-view Front & Side Monitor System

*: Only in three-display mode

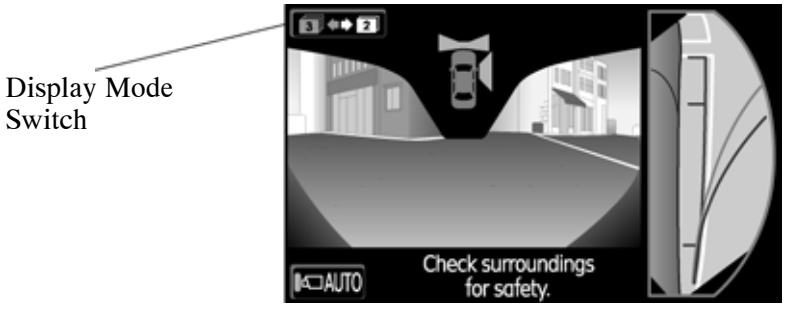
Item	Transition Condition
a)	● The vehicle speed has reached approximately 12 km/h (7.2 mph) or more. ● A switch is pressed to request the display of another screen (for example, the INFO switch is pressed on the center cluster).
b)	The wide-view front & side monitor system main switch is pressed. (Only in the two-display mode)
c)	● The wide-view front & side monitor system main switch is pressed when the vehicle speed is approximately 10 km/h (6.0 mph) or less. ● The wide-view front & side monitor system is ON, the AUTO mode is ON, and the following conditions are applicable: – The vehicle speed has reached approximately 10 km/h (6.0 mph) or less. – The switch-operated screen display has ended. ● When the wide-view front & side monitor system is started, or resumed automatically from another display, the screen will invariably display in the front and side view mode.
d)	The display mode switch is pressed.
e)	The wide-view front & side monitor system main switch is pressed under the following conditions: – The three-display mode is selected. – The wide-view front & side monitor system ended in the side view mode in the previous operation. (The screen will not change to another display such as the navigation display. The screen will change between the front and side view mode, side view mode, and front view mode.)

(Continued)

f)	The wide-view front & side monitor system main switch is pressed under the following conditions: – The three-display mode is selected. – The wide-view front & side monitor system ended in the side view mode in the previous operation. (The screen will not change to another display such as the navigation display. The screen will change between the front and side view mode, side view mode, and front view mode.)
g)	The shift lever is moved to the R position.
h)	The shift lever is moved from R to N, D, or S when the AUTO mode is ON.
i)	The wide-view front & side monitor system main switch is pressed. (The transition condition b) and d) are not available.
j)	After the transition condition i) is satisfied, the wide-view front & side monitor system main switch is pressed again.

Display Mode

- In the wide-view front & side monitor system, the driver can select between the two- and three-display modes. The display modes switch alternately when the driver presses the display mode switch on the multi display. The display mode operation is possible only in the front and side view mode.
- In the two-display mode, the screen in the front and side view mode switches alternately to a different display (such as the navigation display) by pressing the wide-view front & side monitor system main switch.
- In the three-display mode, the screen makes the following transitions by pressing the wide-view front & side monitor system main switch.
  Front and side view mode → front view mode (or side view mode) → side view mode (or front view mode) → front and side view mode (Subsequently, the screen transition will be repeated in the same order.)
- In the three-display mode, if the wide-view front & side monitor system resumes automatically as a result of the AUTO mode, the screen will display the front and side view mode regardless of the previously displayed mode. At this time, if the driver operates the wide-view front & side monitor system main switch to change the display, the views will appear in the following order: the front view mode will appear first if the front view mode was displayed previously, and the side view mode will appear first if the side view mode was displayed previously.



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AUTO Mode

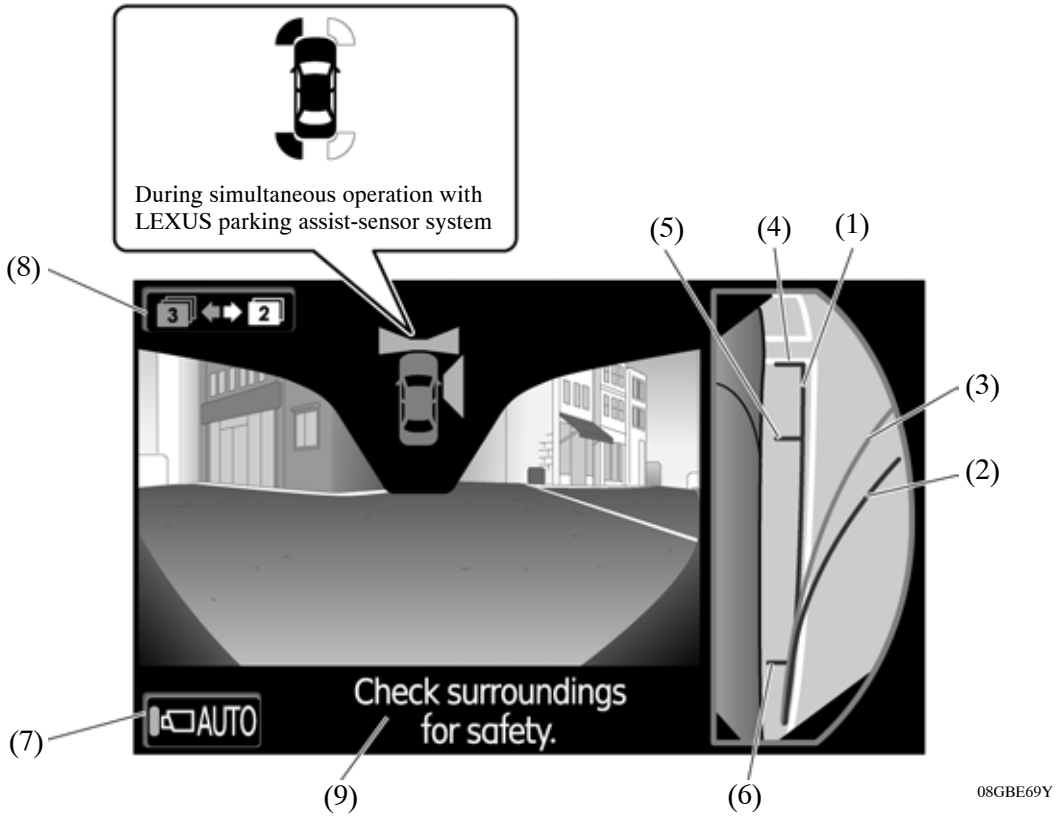
- In the wide-view front & side monitor system, the AUTO mode can be turned ON/OFF by pressing the AUTO mode switch on the multi display. When the AUTO mode is ON, the AUTO mode switch illuminates yellow.
- When the wide-view front & side monitor system is ON and the AUTO mode is ON, even if the screen changes to a different display (such as the navigation display) in accordance with the transition conditions, the screen will resume automatically to the wide-view front & side monitor system display, provided that the resumption conditions are met.



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3. Front and Side View Mode

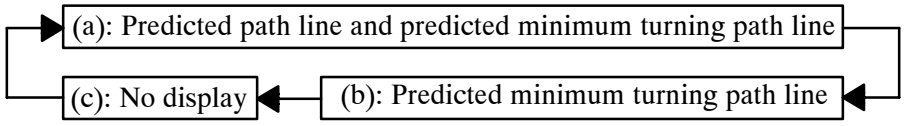
- In the front and side view mode, the screen will simultaneously display the front view and the side view. When the wide-view front & side monitor system is started, it will invariably display in the front and side view mode.
- In the front and side view mode, the driver can operate both the AUTO mode switch and the display mode switch.
- In the front and side view mode, the screen displays as shown in the illustration below.



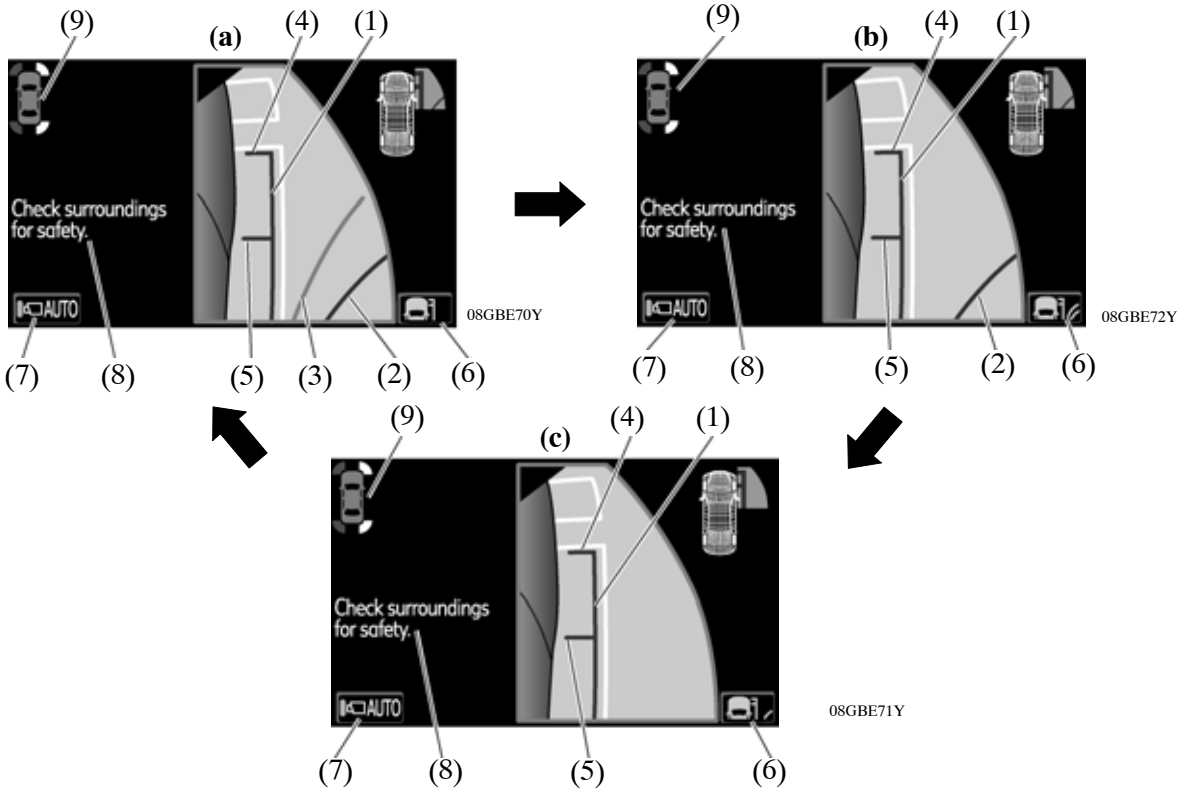
Item		Description of Display
(1)	Vehicle Width Parallel Line (Green)	Displays a parallel line approximately 0.35 m (13.8 in.) from the side of the vehicle body.
(2)	Predicted Minimum Turning Path Line (Green)	Displays an approximate path of the vehicle when the steering wheel is turned all the way to the front passenger's side.
(3)	Predicted Path Line (Yellow)	Displays an approximate path of the vehicle depending on the steering maneuver.
(4)	Vehicle Front End Line	Displays a line approximately 0.1 m (3.9 in.) from the front end of the vehicle.
(5)	Front Wheel Ground Contact Line	Displays a position of the front wheel.
(6)	Rear Wheel Ground Contact Line	Displays a position of the rear wheel.
(7)	AUTO Mode Switch	Turns the AUTO mode ON and OFF.
(8)	Display Mode Switch	Switches the display mode.
(9)	Warning Message Display Area	Displays a warning message.

4. Side View Mode

- The side view mode, which can be displayed in the three-display mode, shows the conditions on the front passenger side of the vehicle. The side view mode displays a zoom-in view of the front portion of the area that can be captured, enabling the driver to check the images easily. Also, the AUTO mode switch can be operated in this mode.
- In the side view mode, images can be displayed even when the outside rear view mirror is retracted.
- In the side view mode, the display mode of a predicted path line can be changed by pressing the predicted path line display mode select switch.



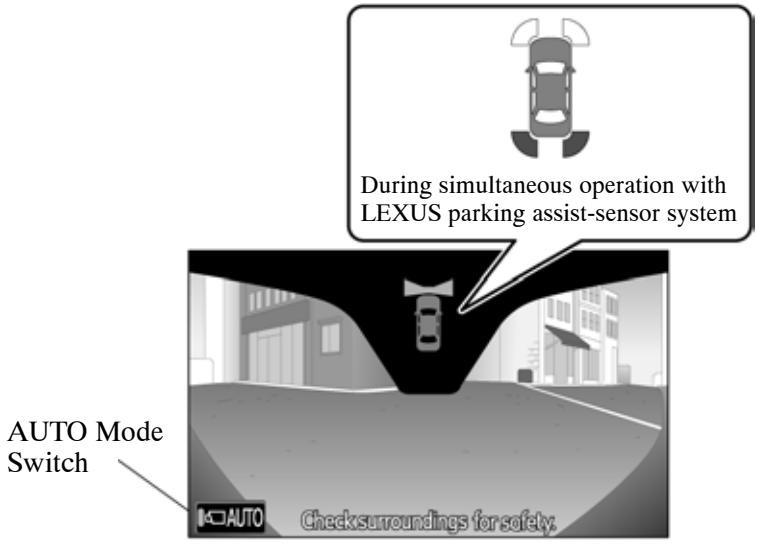
- In the side view mode, the screen displays as shown in the illustration below.



Item		Description of Display
(1)	Vehicle Width Parallel Line (Green)	Displays a parallel line approximately 0.35 m (13.8 in.) from the side of the vehicle body.
(2)	Predicted Minimum Turning Path Line (Green)	Displays an approximate path of the vehicle when the steering wheel is turned all the way to the front passenger's side.
(3)	Predicted Path Line (Yellow)	Displays an approximate path of the vehicle depending on the steering maneuver.
(4)	Vehicle Front End Line	Displays a line approximately 0.1 m (3.9 in.) from the front end of the vehicle.
(5)	Front Wheel Ground Contact Line	Displays a position of the front wheel.
(6)	Predicted Path Line Display Mode Select Switch	Changes the display mode of a predicted path line. Pressing this switch once changes to the next display mode.
(7)	AUTO Mode Switch	Turns the AUTO mode ON and OFF.
(8)	Warning Message Display Area	Displays a warning message.
(9)	LEXUS Parking Assist-sensor System Indication	Displays during simultaneous operation with the LEXUS parking assist-sensor system.

5. Front View Mode

The front view mode, which can be displayed in the three-display mode, shows the conditions in front of the vehicle. Also, the AUTO mode switch can be operated in this mode.



6. Warning Message

A warning message appears at the bottom, side or center of the screen under the conditions listed below. The warning message appears in the same language that has been selected by the language selector of the navigation screen display.

▶ Messages Appearing at Bottom or Side of Screen ◀

Warning Message	Outline
Check 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 an error in the steering angle sensor occurs.

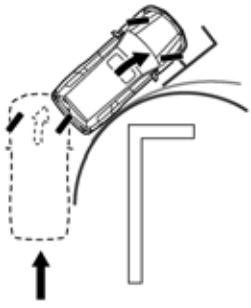
▶ Messages Appearing at Center of Screen ◀

Warning Message	Outline
System not ready	This message appears if the system is not initialized.

■SYSTEM OPERATION

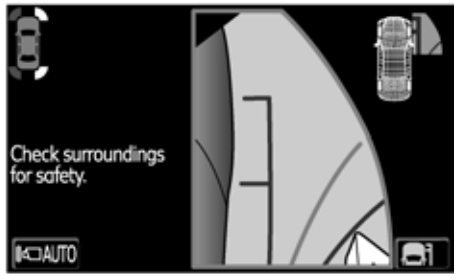
1. Avoiding Hitting Object during Turn

To avoid hitting an object during a turn, the driver should operate the steering wheel preventing the predicted path line and the predicted minimum turning path line from overlapping with an object. Thus, the driver can pass by the object without hitting it.





Front and Side View Mode

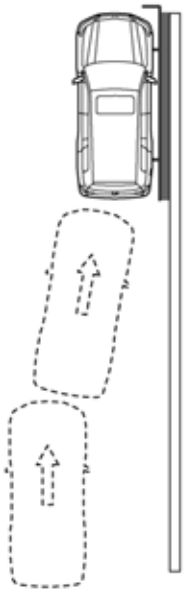


Side View Mode

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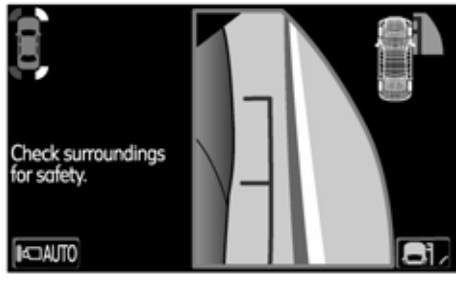
2. Pulling over to Side

To pull over to the side, the driver should operate the steering wheel preventing the vehicle width parallel line from overlapping with white lines or curbs on a road. Thus, the driver can pull over to the side smoothly.





Front and Side View Mode



Side View Mode

08GBE74Y

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 angle 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 engine switch ON (IG) 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 for 200 m (656 ft.) or more on a road with a minimal number of curves.

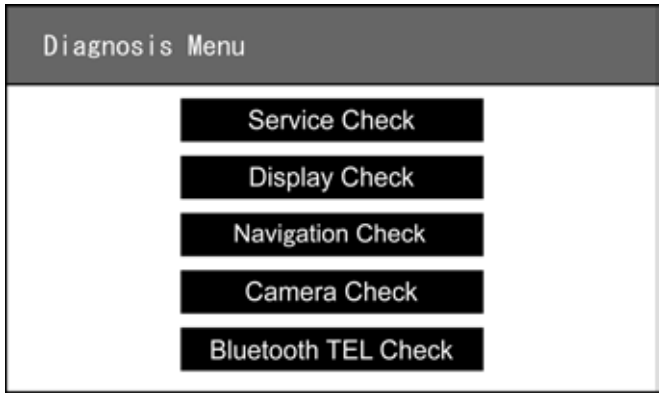
■INITIALIZE FUNCTION DURING PART REPLACEMENT

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	● Camera position has shifted. ● Removal and reassembly ● Replacement ● Deformation due to the mount area having been struck.	Camera position adjustment – 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 – Roll angle, pan angle, tilt angle
Steering Angle 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 LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).



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■FAIL-SAFE FUNCTION

The table below indicates the conditions of detecting malfunctions in the components in this system.

Malfunction Parts	Detection Item	Function
Steering Angle Sensor	● Transmission of sensor malfunction signal ● Open circuit in sensor signal ● Communication malfunction between the steering angle sensor and parking assist ECU	Displays “Guidance Unavailable”
	Transmission of signal to indicate that neutral steering point correction is incomplete	Displays “System initializing”
Television Camera	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

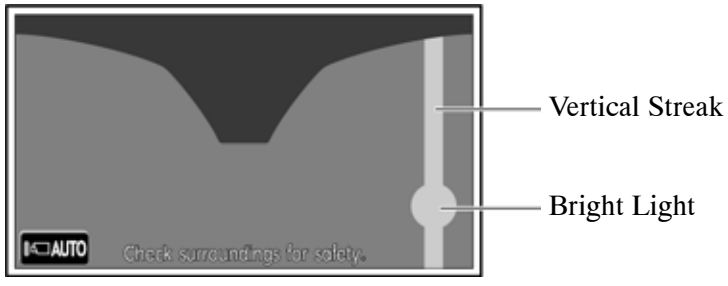
■DIAGNOSIS

The wide-view front & side monitor system is equipped with a diagnosis function which can display the diagnosis menus. The method for entering the diagnosis menu screen is the same as the method used for the multi display. For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

■PRECAUTION FOR WIDE-VIEW FRONT & SIDE MONITOR SYSTEM

BE

- 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 a foreign matter (for example, mud or salt) is present on the television camera lens
  - – When the sun or the beam of headlights shines 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*, a phenomenon experienced by a CCD camera, may occur.



Smear Effect

08FBE206Y

—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.

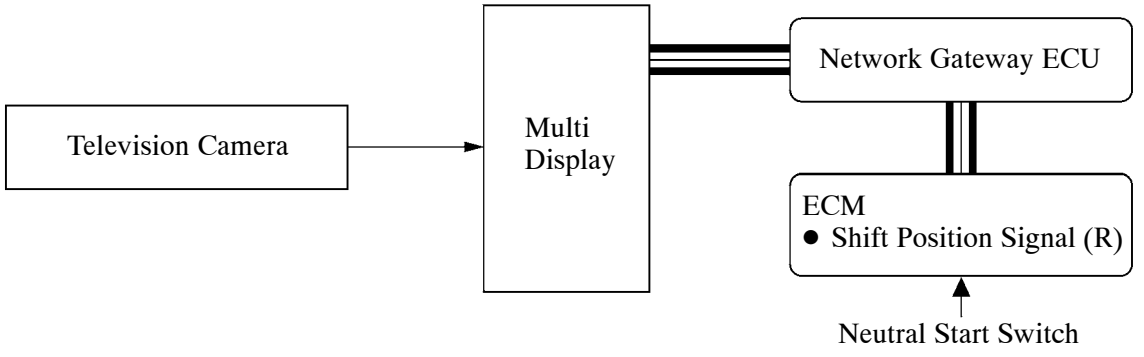
REAR VIEW MONITOR SYSTEM

■ DESCRIPTION

To assist the driver in parking the vehicle by monitoring the rear view, the rear view 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.

- The rear view monitor system is provided as standard equipment for the G.C.C. countries models, and is available as optional equipment for the Europe and Australia models.
- The rear view monitor system consists of the television camera, neutral start switch, ECM, multi display and parking assist ECU.
- The rear view monitor system operates when all the conditions given below have been met.
  - The engine switch is ON (IG).
  - The shift lever is shifted to R.
- If the driver moves the shift lever to a position other than R, or switches the modes on the multi display, the rear view display will stop and change to the display of another mode.

▶ System Diagram ◀

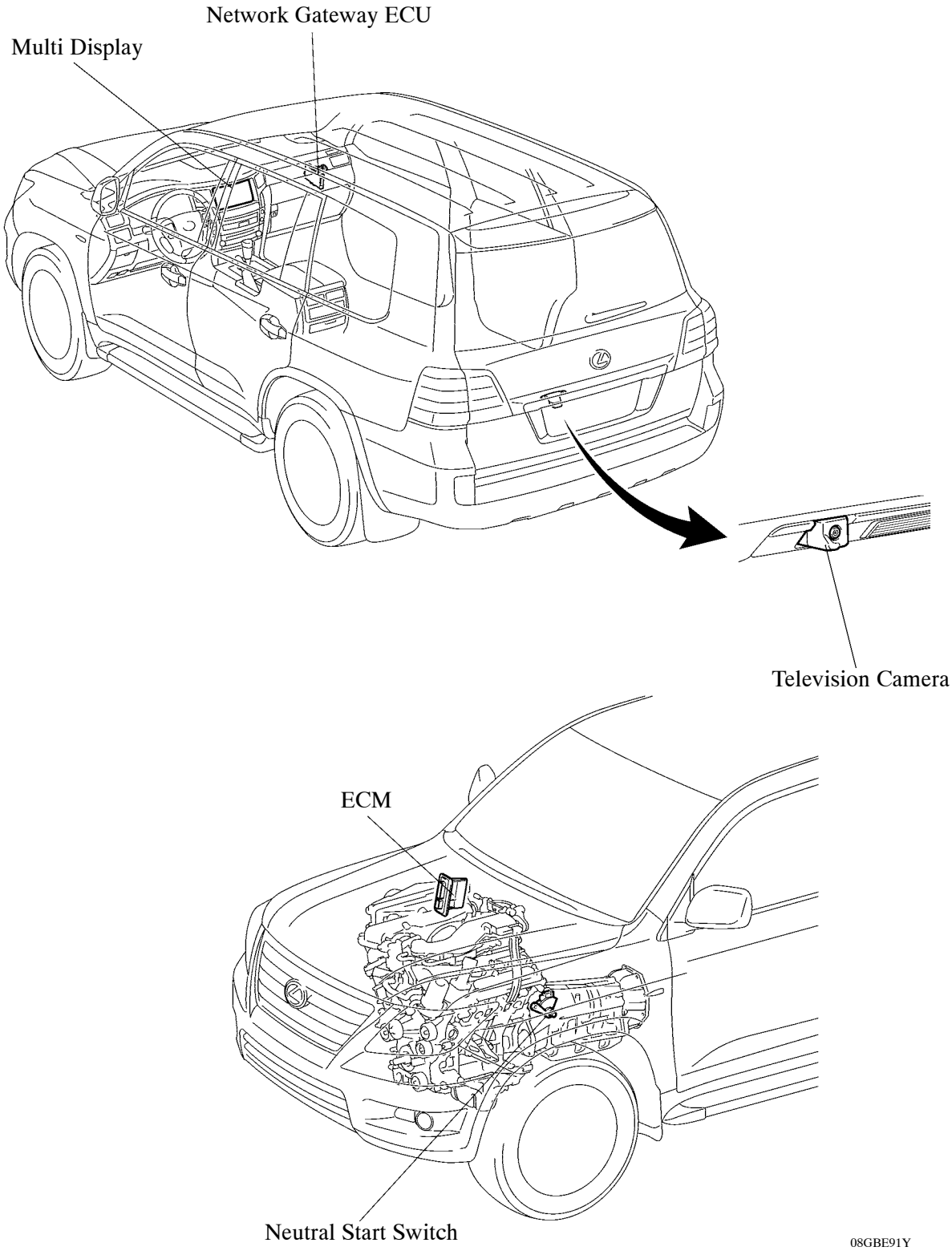


08FBE122Y

CAUTION

- Do not rely entirely on the rear view 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 the 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 proceeding.

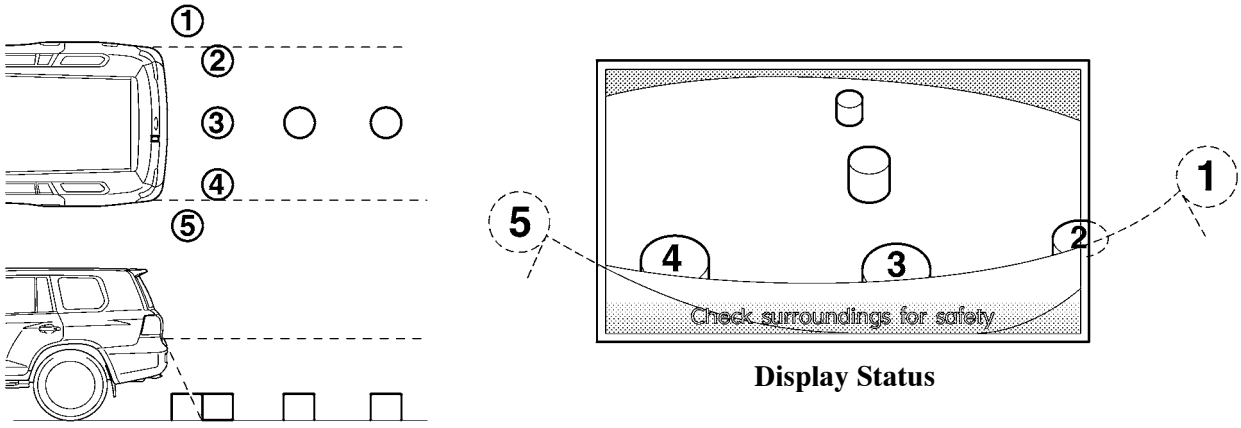
■ LAYOUT OF MAIN COMPONENTS



LHD Model

■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 differs from the actual distance.



Display Status

08FBE123Y

NOTE:

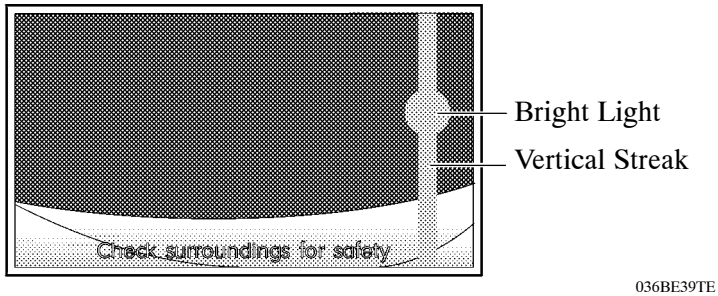
- The area displayed on screen may vary according to vehicle status or road conditions.
- The area covered by the television camera is limited. The television camera does not show objects close to either corner of the bumper or the area under the bumper.

■DIAGNOSIS

The rear view monitor system is equipped with a diagnosis function which can display the diagnosis menus. The method for entering the diagnosis menu screen is the same as the method used for the multi display. For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

■ PRECAUTION FOR REAR VIEW 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

—REFERENCE—

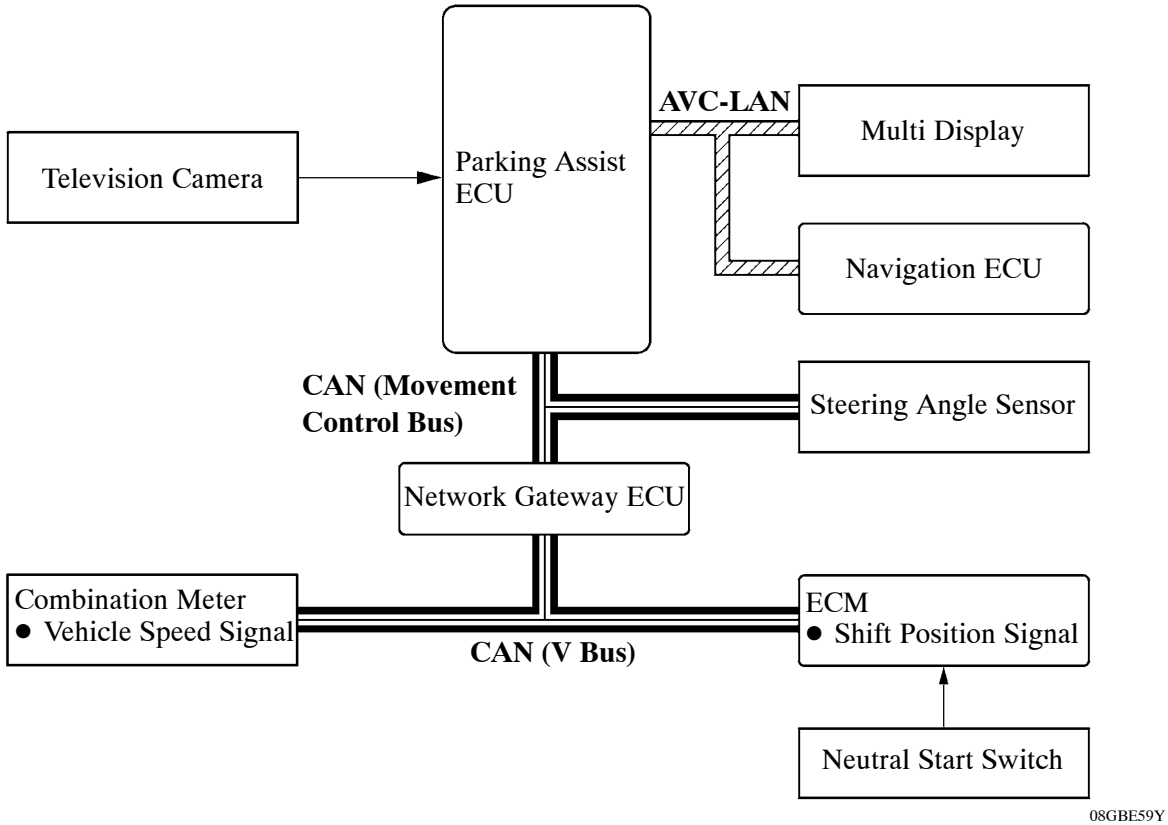
**: Smear effect*
A phenomenon that occurs when a bright light is received up by the television camera; and transmitted to the screen, the light source will appear to have a vertical streak above and below it.

PARKING ASSIST MONITOR SYSTEM

■ DESCRIPTION

- The parking assist monitor system is provided as standard equipment for the Europe, Australia, and China models, and is available as optional equipment for the G.C.C. countries models.
- 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, parking assist ECU, multi display, steering angle sensor, navigation ECU, combination meter and ECM.
- This system operates when all the conditions given below have been met:
  - Engine switch is ON (IG).
  - The shift lever is shifted to R.
- If the driver moves the shift lever to a position other than P, or switches the modes on the multi display, the rear view display will stop and change to the display of another mode.

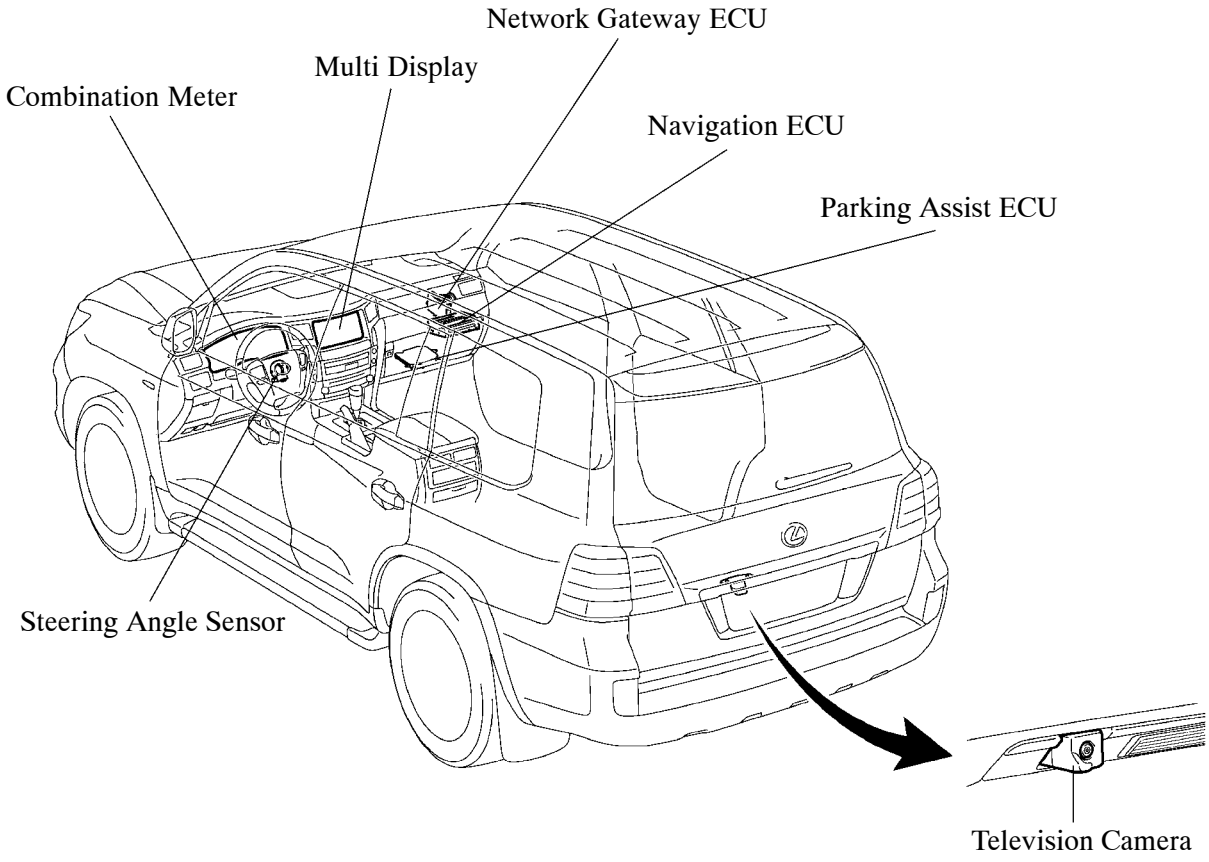
▶ System Diagram ◀

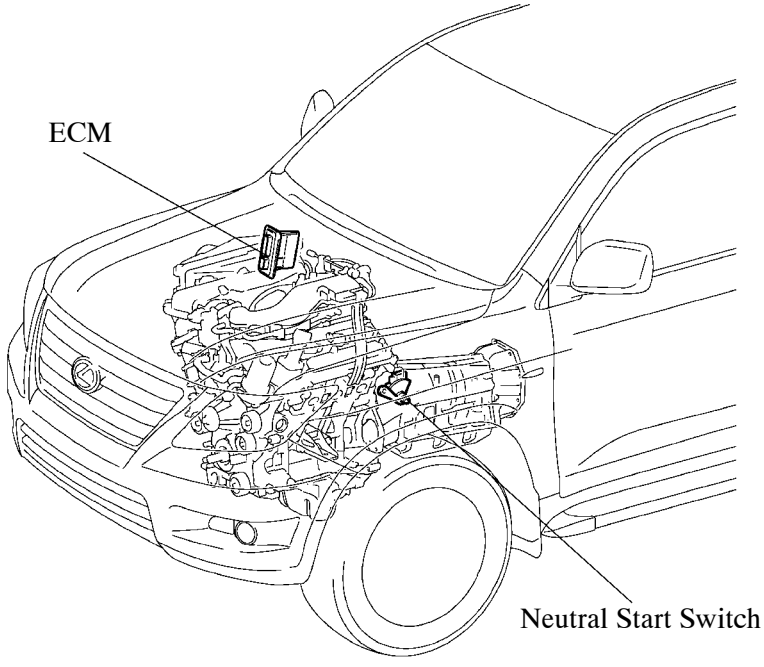


CAUTION

- 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 COMPONENTS





LHD Model

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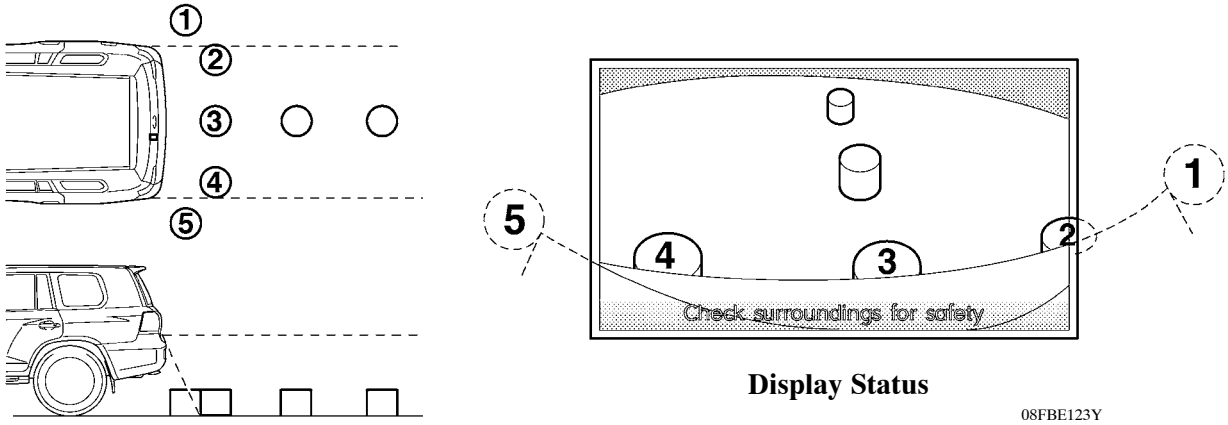
BE

■ FUNCTION OF MAIN COMPONENTS

Component	Function
Television Camera	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	● Uses the yaw rate detected by the gyro sensor that is built into the navigation ECU to transmit 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 Angle Sensor	Detects the angle of the steering wheel, and transmits the signal to the parking assist ECU.
Combination Meter	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 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

08FBE123Y

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.

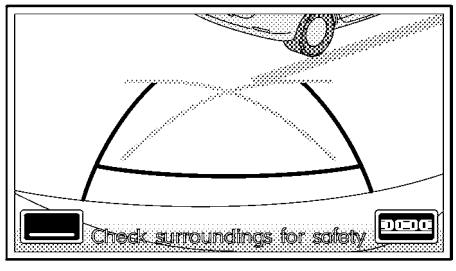
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■DESCRIPTION OF DISPLAY

1. General

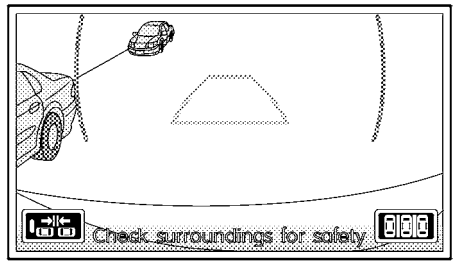
- The parking assist monitor system displays in the manual assist and the parallel parking assist:
  - The manual assist used for parking the vehicle in a garage or parking space.
  - The parallel parking assist should be used for parallel parking the vehicle.

  These assists can be changed by pressing the touch switch. The initial (default) setting is set to parallel parking assist.
- On the China models, the messages displayed on the screen are written in Chinese.



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Manual Assist



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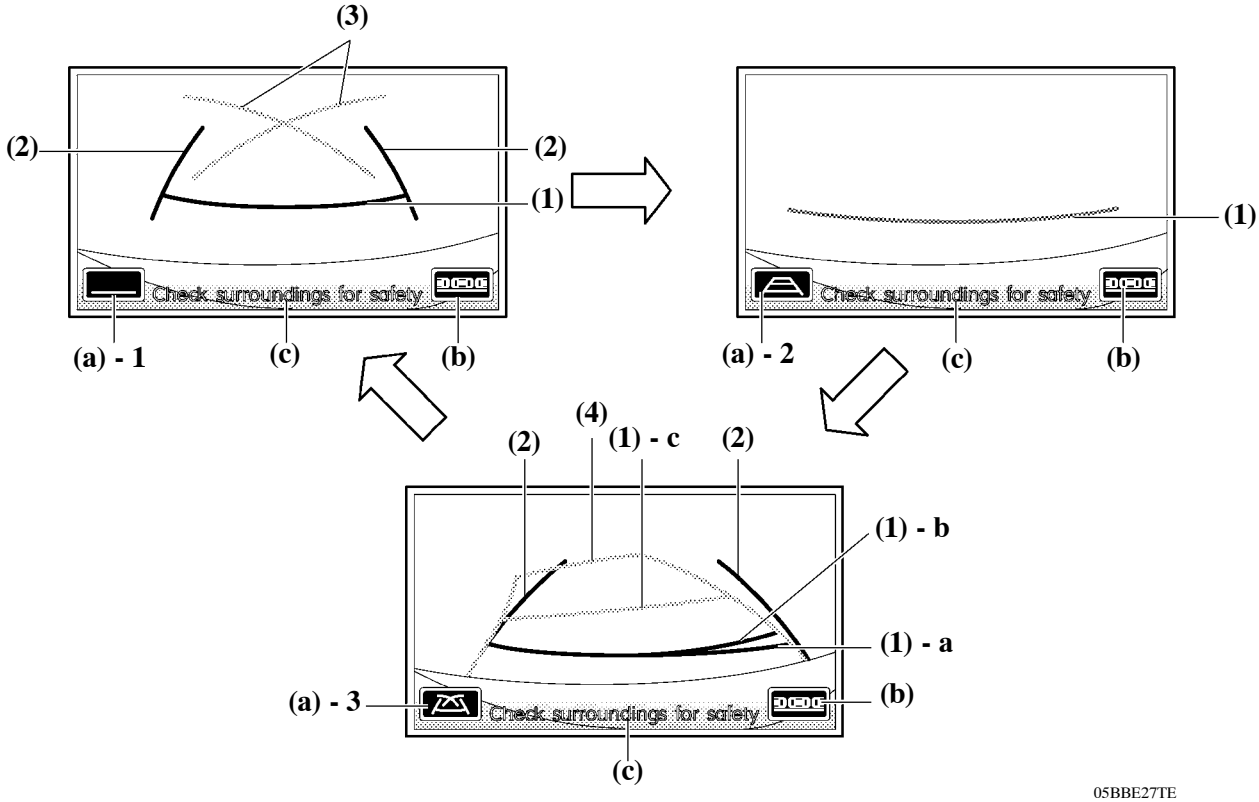
Parallel Parking Assist

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

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.

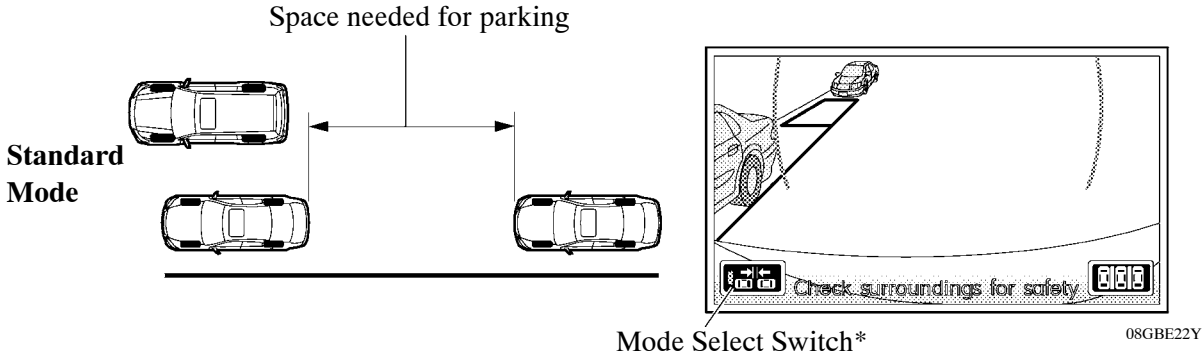
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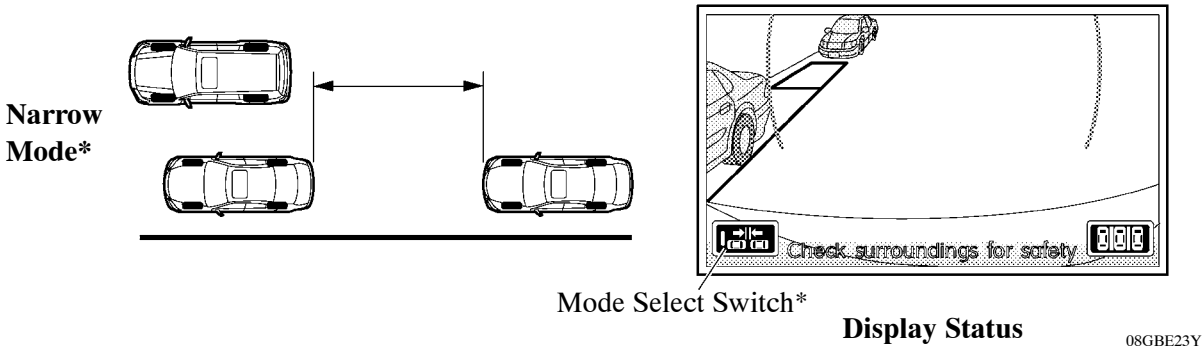
Item		Mode			Outline
		A	B	C	
(3)	Parking Assist Guide Line	○	—	—	These guide lines indicate the points at which driver should turn the steering wheel fully.
(4)	Estimated Guide Line	—	—	○	These guide lines indicate the estimated course in which the vehicle moves backward. The guide lines move in sync 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*.

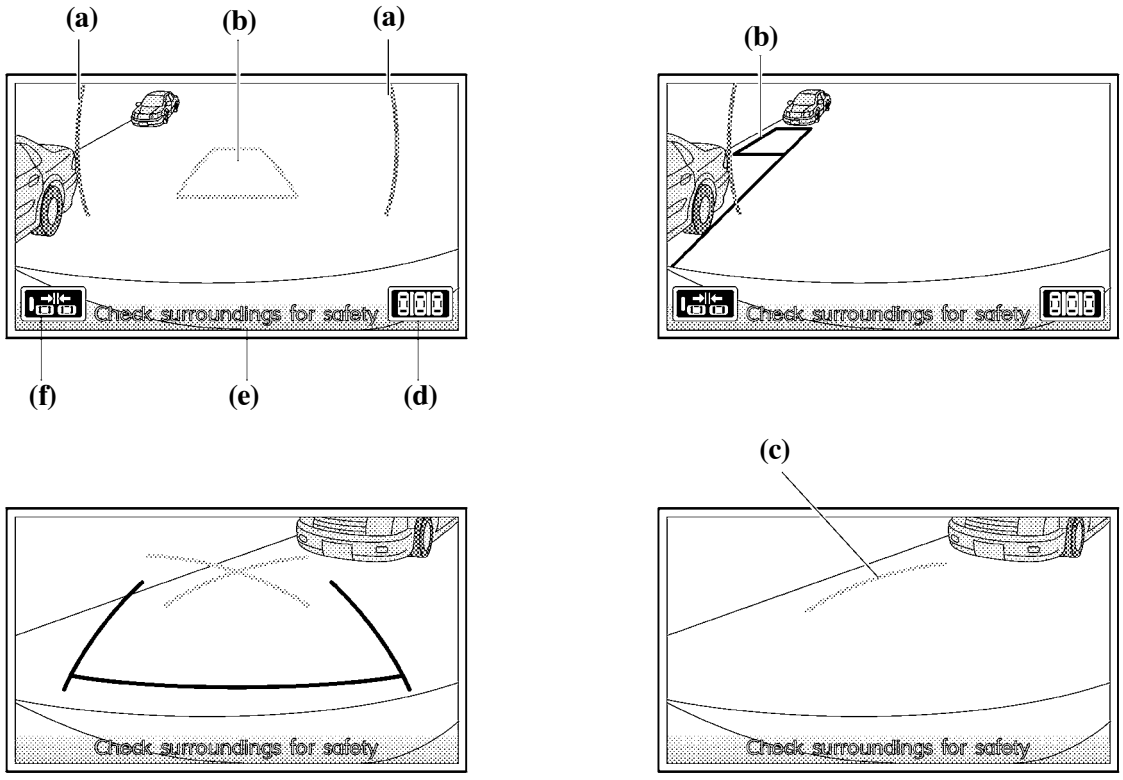
- The mode can be changed by touching the button located at the lower-left corner of the screen.
- The narrow mode* is designed for situations in which the parking space is narrower than the standard mode.
- The initial (default) parallel parking assist is the standard mode.





*: Europe and Australia 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

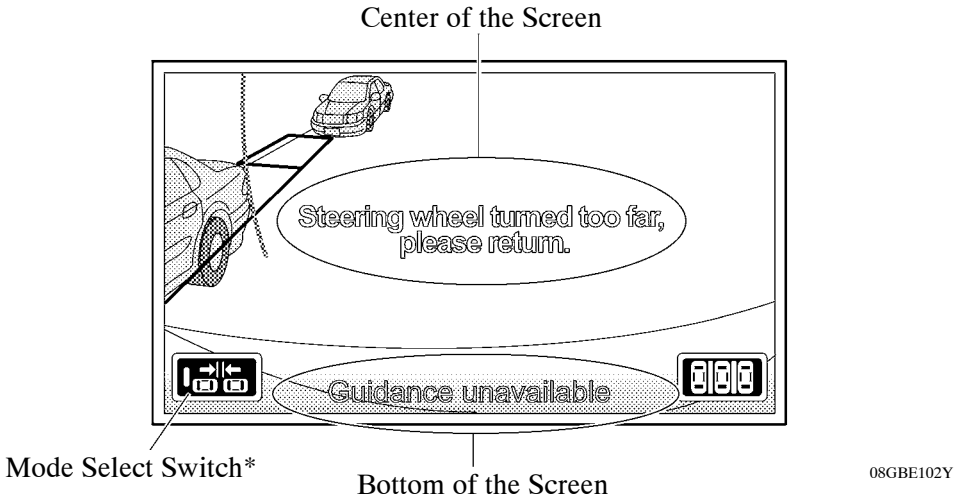
037BE41TE

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.

*: Europe and Australia 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.



*: Europe and Australia Models

▶ 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
Check 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 appears when the vehicle backs up even after the message of “Steering wheel turned too far, please return.” appears in the display. In this case, the system judges that the assist operation is impossible. ● This message is displayed when an error in the steering sensor or a gyro signal error of the navigation ECU occurs.

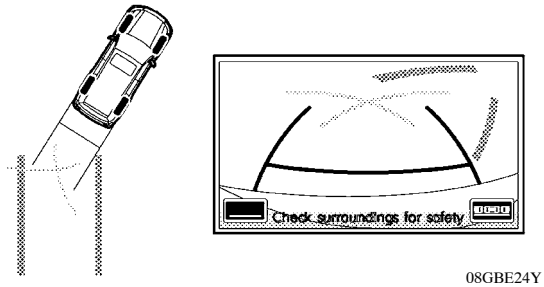
■SYSTEM OPERATION

1. Manual Assist

Parking Guide Line Mode

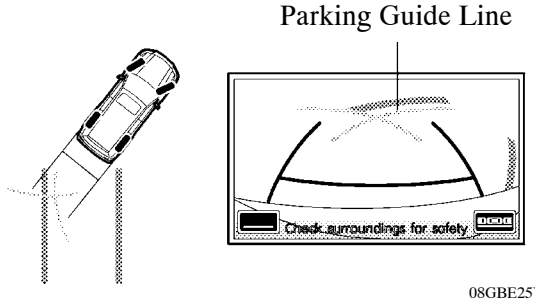
To use the parking guide line mode for manual assist to park the vehicle in the parking space illustrated below, perform the following procedure:

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



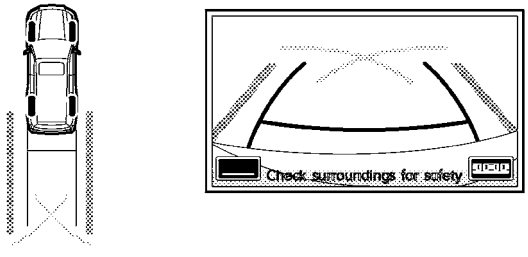
08GBE24Y

- 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.



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- 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.



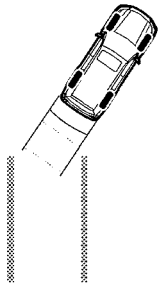
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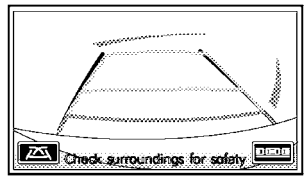
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Estimated Guide Line Mode

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

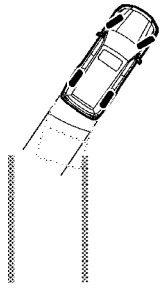
- Move the shift lever to reverse.
- The manual assist mode is selected.
- The estimated guide line mode is selected.
- An image appears on the display panel as illustrated on the right.

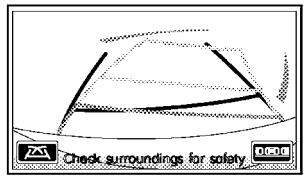




08GBE27Y

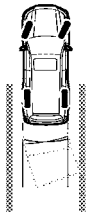
- Turn the steering wheel so that the estimated guide lines are within the parking space, and back up carefully.

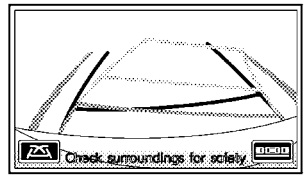




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- When the rear of the vehicle is within the parking space, turn the steering wheel in order to equalize the left and right intervals between the vehicle width extension lines and the parking space sidelines
- When the vehicle width extension guide 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.



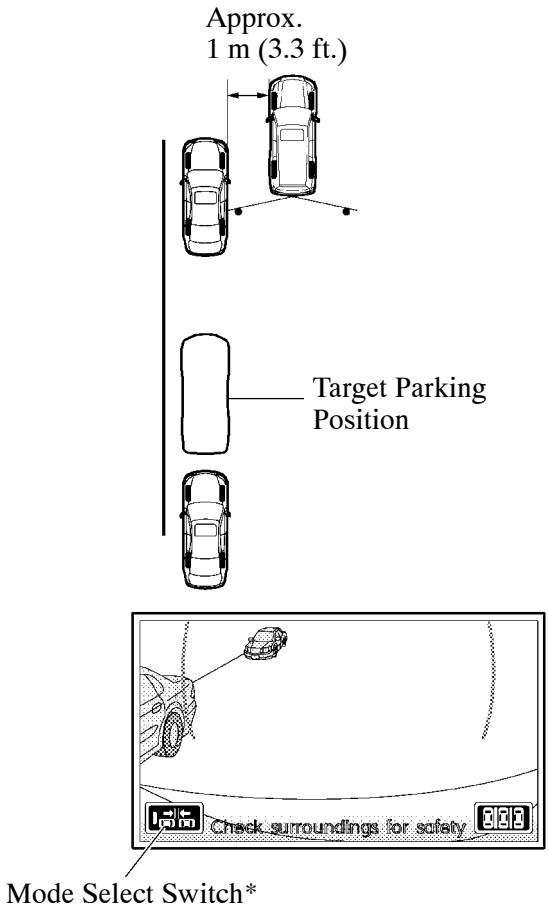


08GBE29Y

2. Parallel Parking Assist Mode

To use the parallel parking assist mode to park the vehicle in the parking space illustrated below, 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.

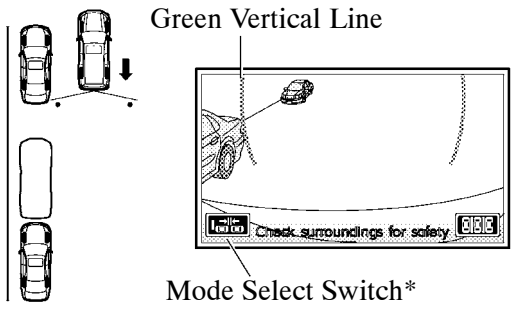


- Aim the steering wheel straight ahead and move the shift lever to reverse.
- The parallel parking assist mode is selected.
- An image shows on the display panel as illustrated on the right.

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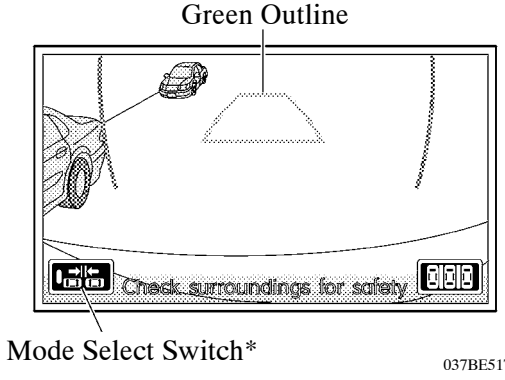
*: Europe and Australia Models

- 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.



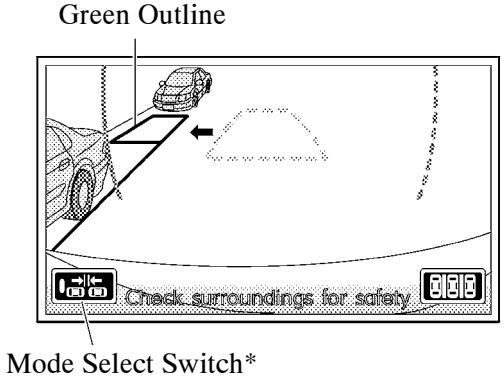
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- When the steering wheel is turned, the green outline will appear.



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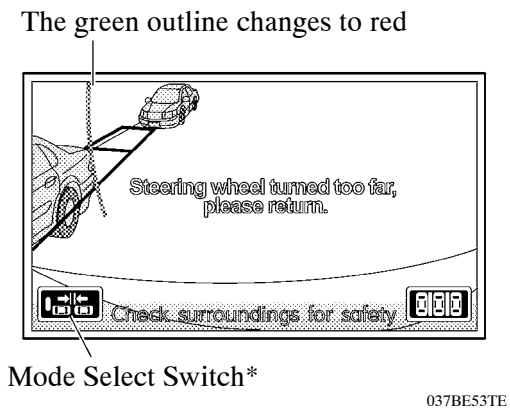
- Continue turning the steering wheel, and the green outline will move in the direction of the target parking position, while the outline changes into a shape as illustrated on the right. Keep turning the steering wheel until the green outline reaches the target parking position.
  At this time, the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



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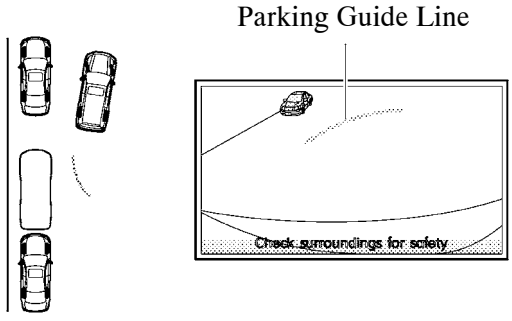
*: Europe and Australia Models

- 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.



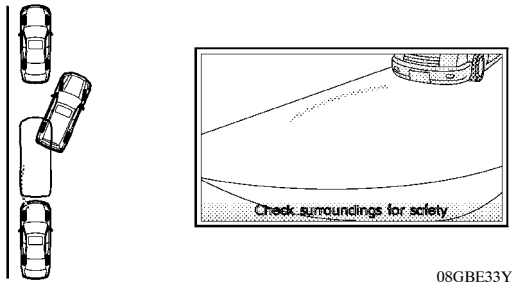
037BE53TE

- 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.



08GBE32Y

- 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.

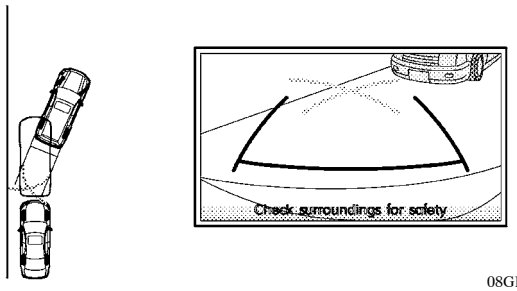


08GBE33Y

*: Europe and Australia Models

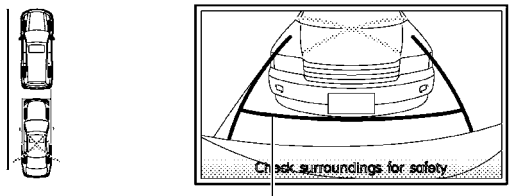
BE

- 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.



08GBE34Y

- 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.



08GBE35Y

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:

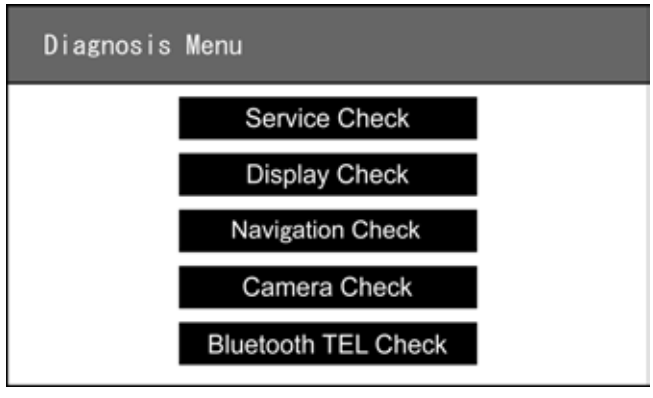
- With the engine switch ON (IG) and the vehicle at a standstill, fully turn the steering wheel to the right, then fully turn it to the left (this procedure can be started either with a right or left turn).
- Drive the vehicle at a speed of approximately 20 km/h (12 mph) for 5 minutes or more, on a road 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	● 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 LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).



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■ FAIL-SAFE

The table below indicates the conditions of detecting malfunctions in the components in this system.

Malfunction Parts	Detection Item	Assist	
		Manual Assist	Parallel Parking Assist
Steering Angle 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	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*2	● No response from navigation ECU ● Transmission of navigation ECU malfunction signal	—	Displays “Guidance Unavailable”

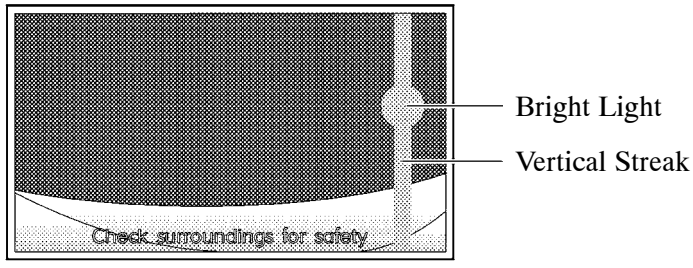
*: Only during estimated guide line mode

■ DIAGNOSIS

The parking assist monitor system is equipped with a diagnosis function which can display the diagnosis menus. The method for entering the diagnosis menu screen is the same as the method used for the multi display. For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

■ 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.

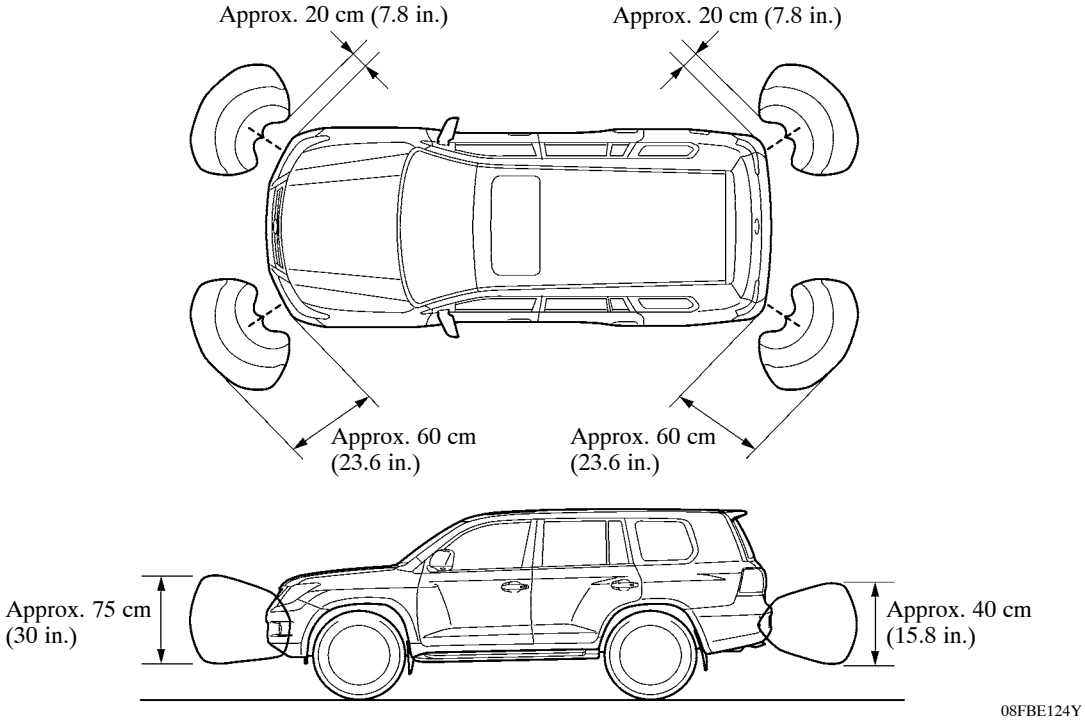
LEXUS PARKING ASSIST-SENSOR SYSTEM

■ DESCRIPTION

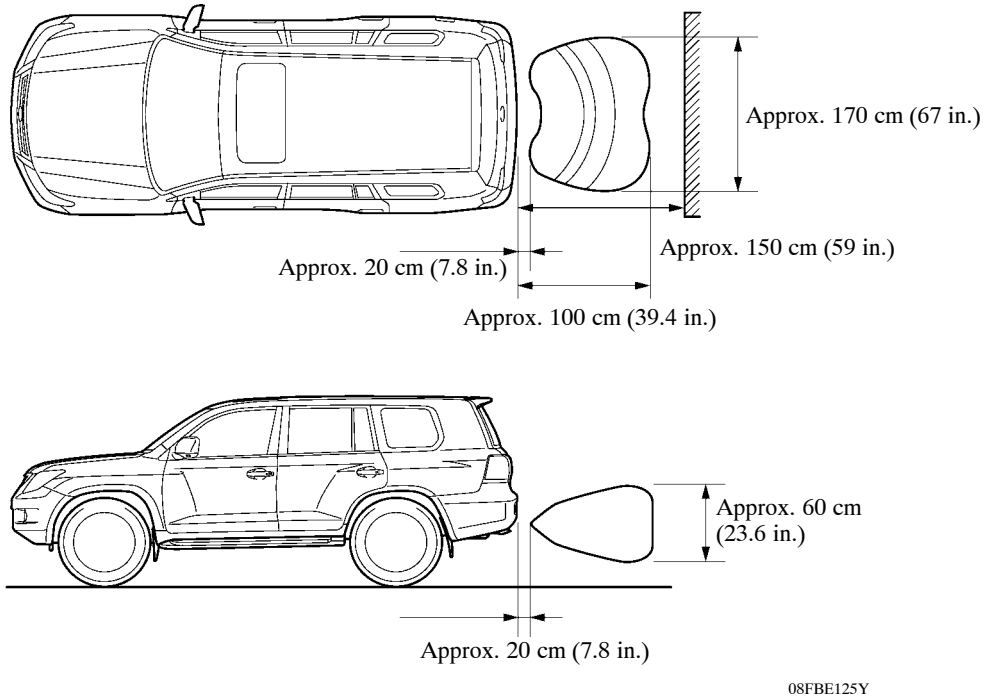
- The LEXUS parking assist-sensor system is provided as standard equipment for the Australia and China models, and is available as optional equipment for the Europe and G.C.C. countries models. The LEXUS parking assist-sensor system uses ultrasonic sensors to detect any obstacles at the corners or the rear of the vehicle.
- The LEXUS parking assist-sensor 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 and the multi display, and by sounding a clearance warning buzzer.
- The LEXUS parking assist-sensor system is controlled by the clearance warning ECU. The LEXUS parking assist-sensor system can be activated in conjunction with the wide-view front & side monitor system.
- The operating condition of each LEXUS parking assist-sensor system differs according to its installed position as shown in the table below:

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

■DETECTION AREA



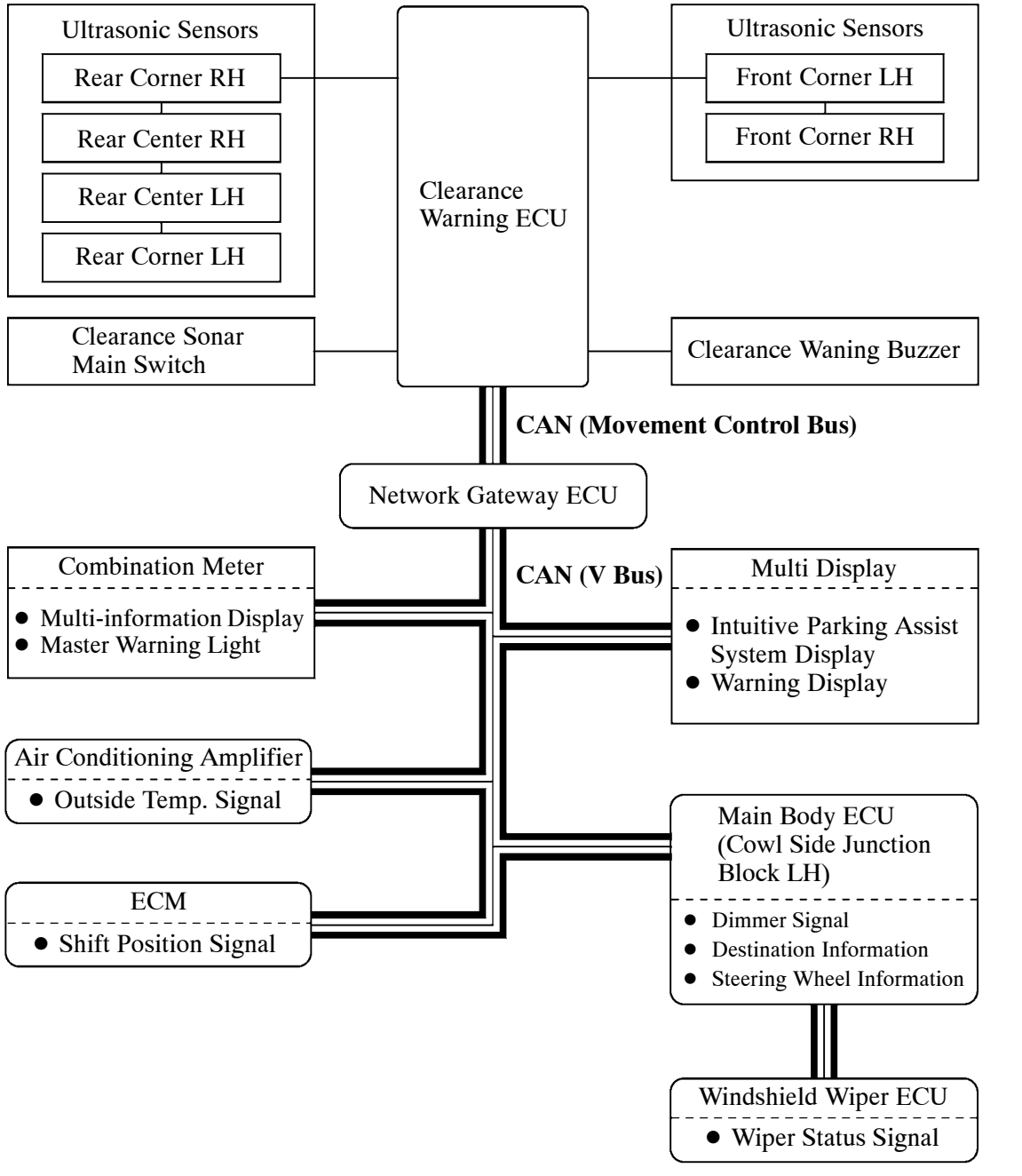
Corner Area



Rear Center Area

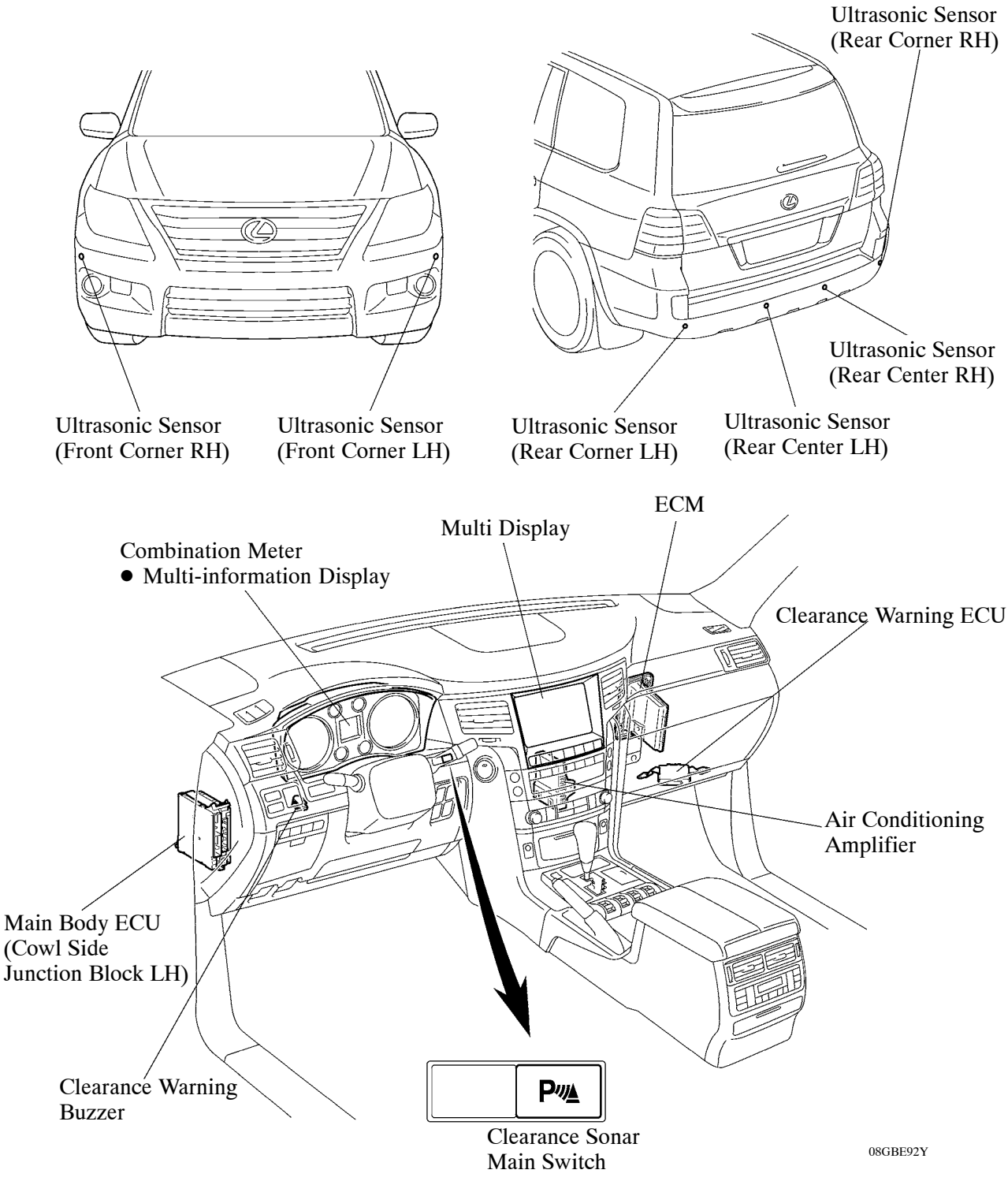
◆: These detection ranges are applicable when a 60 mm (0.2 ft.) diameter pole is positioned parallel or perpendicular to the ground. The ranges vary depending on the measuring method and type of obstacle.

■SYSTEM DIAGRAM



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■ LAYOUT OF MAIN COMPONENTS



LHD Model

■ FUNCTION OF MAIN COMPONENTS

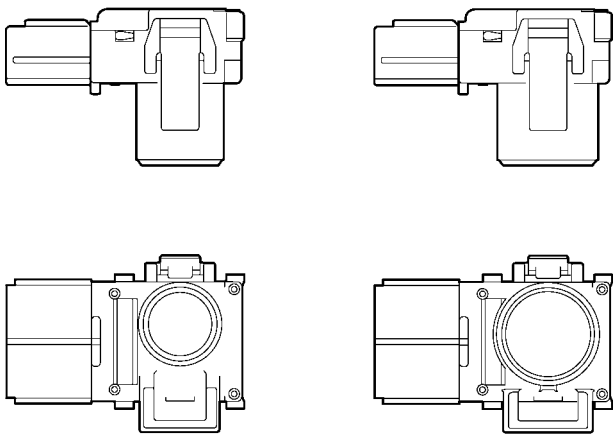
Component		Function
Ultrasonic Sensor		Detects the distance between the vehicle and the obstacle.
Clearance Warning Buzzer		Sounds a buzzer to inform the driver according to the distance to the obstacle.
Combination Meter		Transmits the vehicle speed signal to the clearance warning ECU.
	Multi-information 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 LEXUS parking assist-sensor system. ● Informs the driver that ultrasonic sensors malfunction, or that they freeze or become.
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 multi display.
ECM		Transmits the shift position signal to the clearance warning ECU.
Air Conditioning Amplifier		Transmits the outside temperature to the clearance warning ECU.
Main Body ECU		Transmits the dimmer signals, destination information and steering wheel information to the clearance warning ECU.
Wiper ECU		Transmits the wiper status signals to the clearance warning ECU.
Clearance Sonar Main Switch		Operating this switch allows operation of the LEXUS parking assist-sensor system to be enabled or disabled.

■CONSTRUCTION AND OPERATION

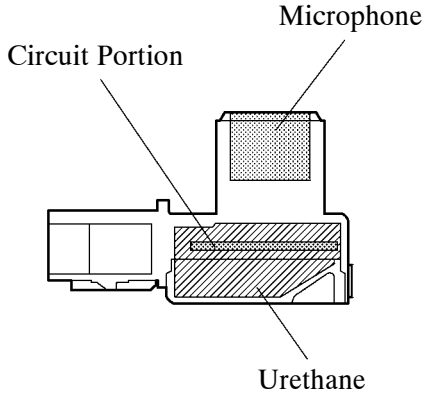
1. Ultrasonic Sensor

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

▶ Ultrasonic Sensor ◀

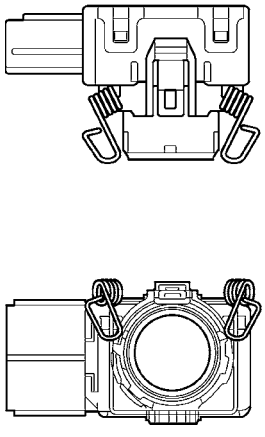


Front Corner RH/LH **Rear Corner RH/LH**

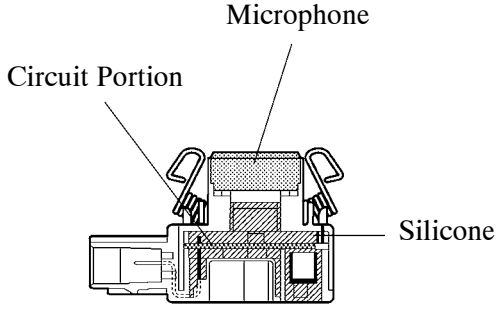


Cross Section

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Rear Center RH/LH



Cross Section

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.

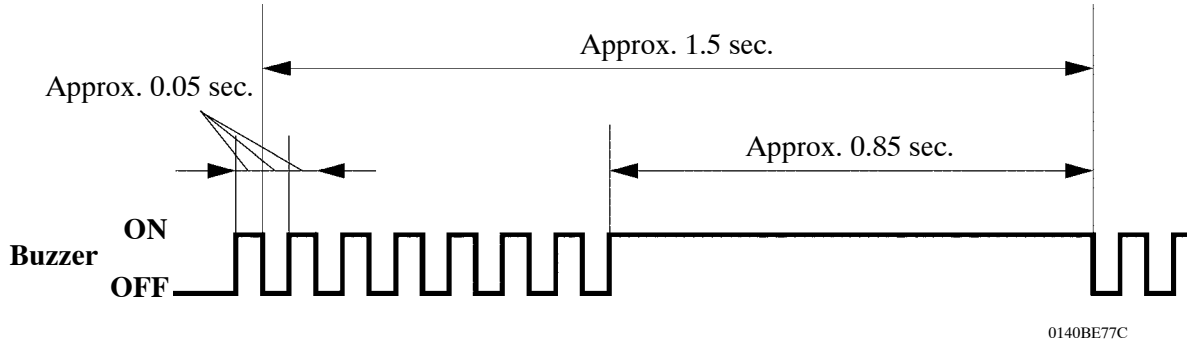
Detection Area	Detection Distance	cm (in.)	Buzzer Sound Pattern ON/OFF Time (msec.)
Front Corner	Long	60 ± 6 to 47.5 ± 5 (23.6 ± 2.4 to 18.7 ± 2)	150/150
	Middle	47.5 ± 5 to 35 ± 4 (18.7 ± 2 to 13.8 ± 1.6)	75/75
	Short	35 ± 4 or less (13.8 ± 1.6 or less)	Continuous Sound
Rear Corner	Long	60 ± 6 to 37.5 ± 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.)

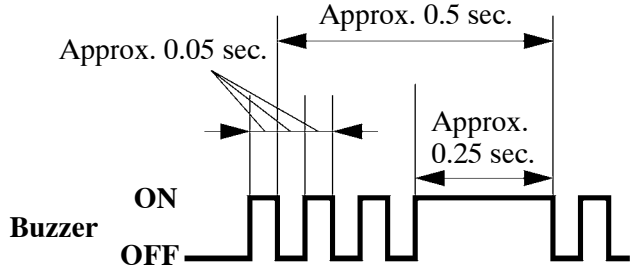
Rear \ Front	Short	Middle	Long	Not Detected
Short	Buzzer Timing 2	Buzzer Timing 1	Buzzer Timing 1	Continues Sound
Middle	Buzzer Timing 1	75/75	75/75	75/75
Long	Buzzer Timing 1	75/75	150/150	150/150
Longest	Buzzer Timing 1	75/75	150/150	150/650
Not Detected	Continues Sound	75/75	150/150	None

▶ Buzzer Timing 1 ◀



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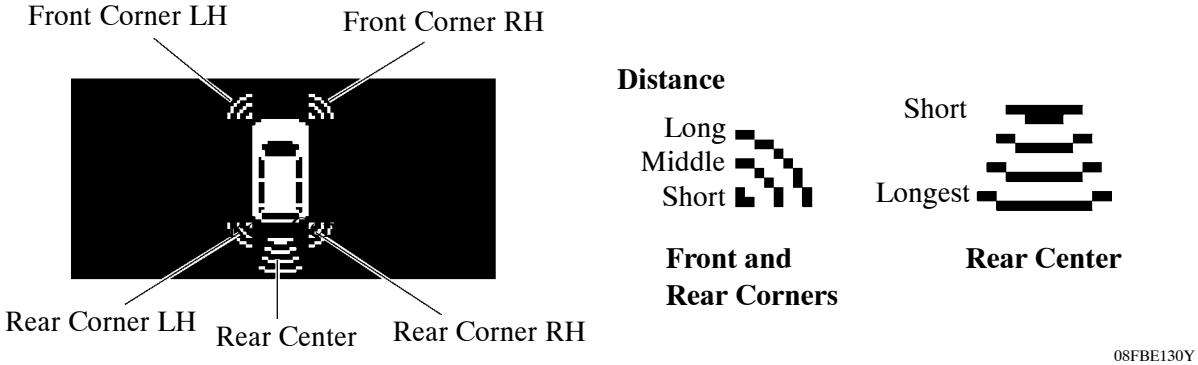
▶ Buzzer Timing 2 ◀



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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.



08FBE130Y

▶ Warning Message ◀



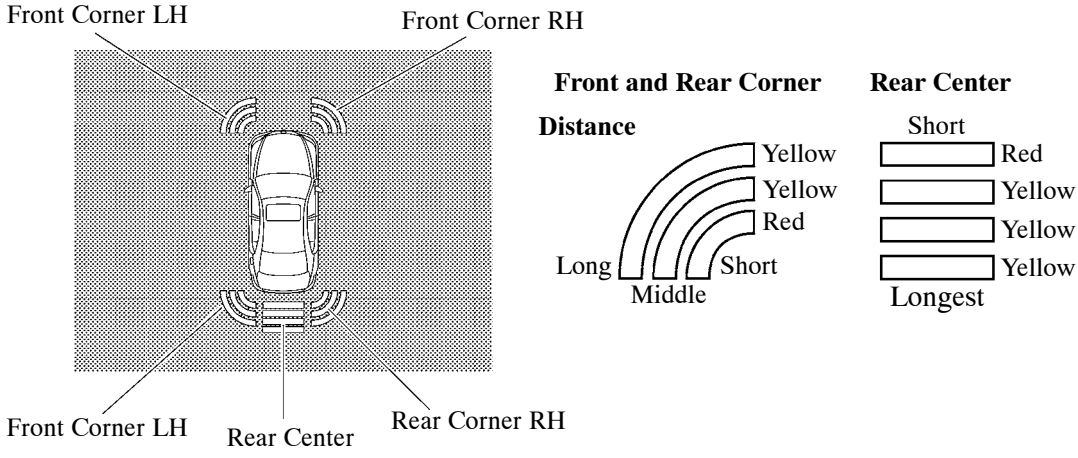
Ultrasonic Sensor Malfunction Warning* **Ultrasonic Sensor Freeze/Contamination Warning***

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.

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.

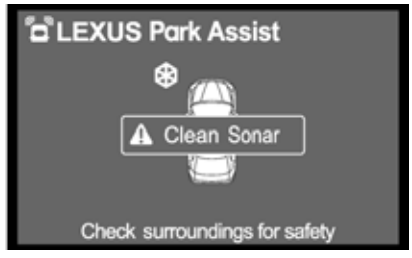


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▶ Warning Message ◀



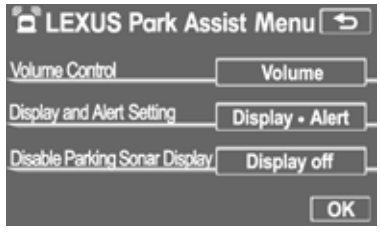
Ultrasonic Sensor Malfunction Warning



08FBE204Y

Ultrasonic Sensor Freeze/Contamination Warning

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



08FBE205Y

POWER WINDOW SYSTEM

■ DESCRIPTION

- The power window system is provided as standard equipment on all models.
- The power window regulator motor assembly of the new LX 570 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 power window one touch auto up operation or manual up operation.
Remote Control (All Doors)	The power window master switch 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. The power window operation also stops immediately if the window is currently being operated when the 43 seconds have elapsed.
Key-linked Up-and-down*	When a lock/unlock signal is transmitted by the 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 is not in the interior detection area, the driver door is locked, and the 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 mechanical key is turned. Similarly, when the driver door is unlocked, turning and maintaining the 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.

(Continued)

*: The setting function can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-18.

Function	Outline
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.
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.

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 motor assembly. When necessary, perform the initialization as follows:

Initialization after Reinstallation of Power Window Regulator Motor Assembly

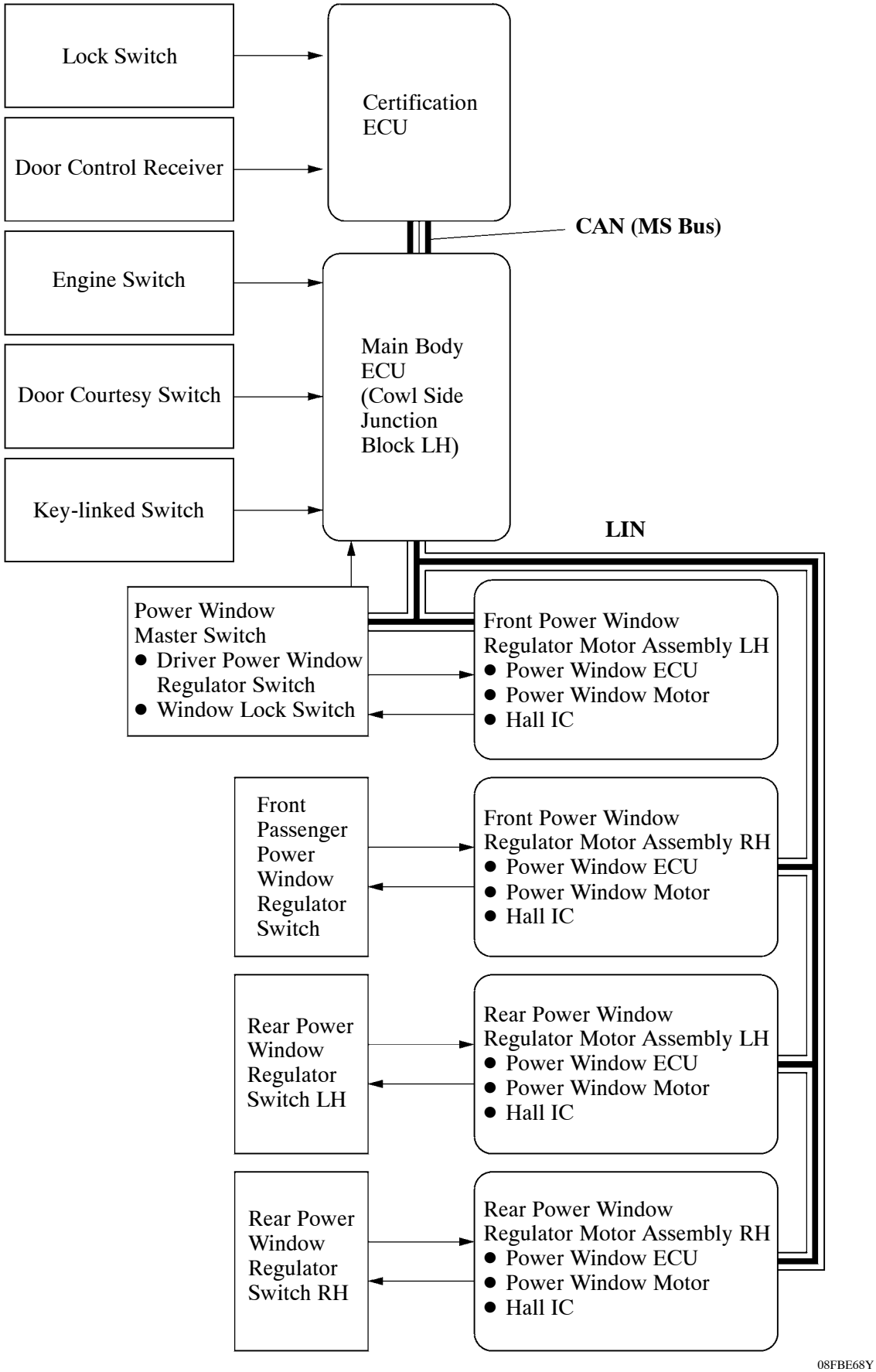
- Connect the battery and turn the engine switch ON (IG).
- Pull up the power window regulator switch to the AUTO UP position and hold it until the window is fully closed.
- Hold the power window regulator switch in the AUTO UP position for at least 6 seconds after the window is fully closed.
- Push 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 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 engine switch is turned ON (IG).
- 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 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.

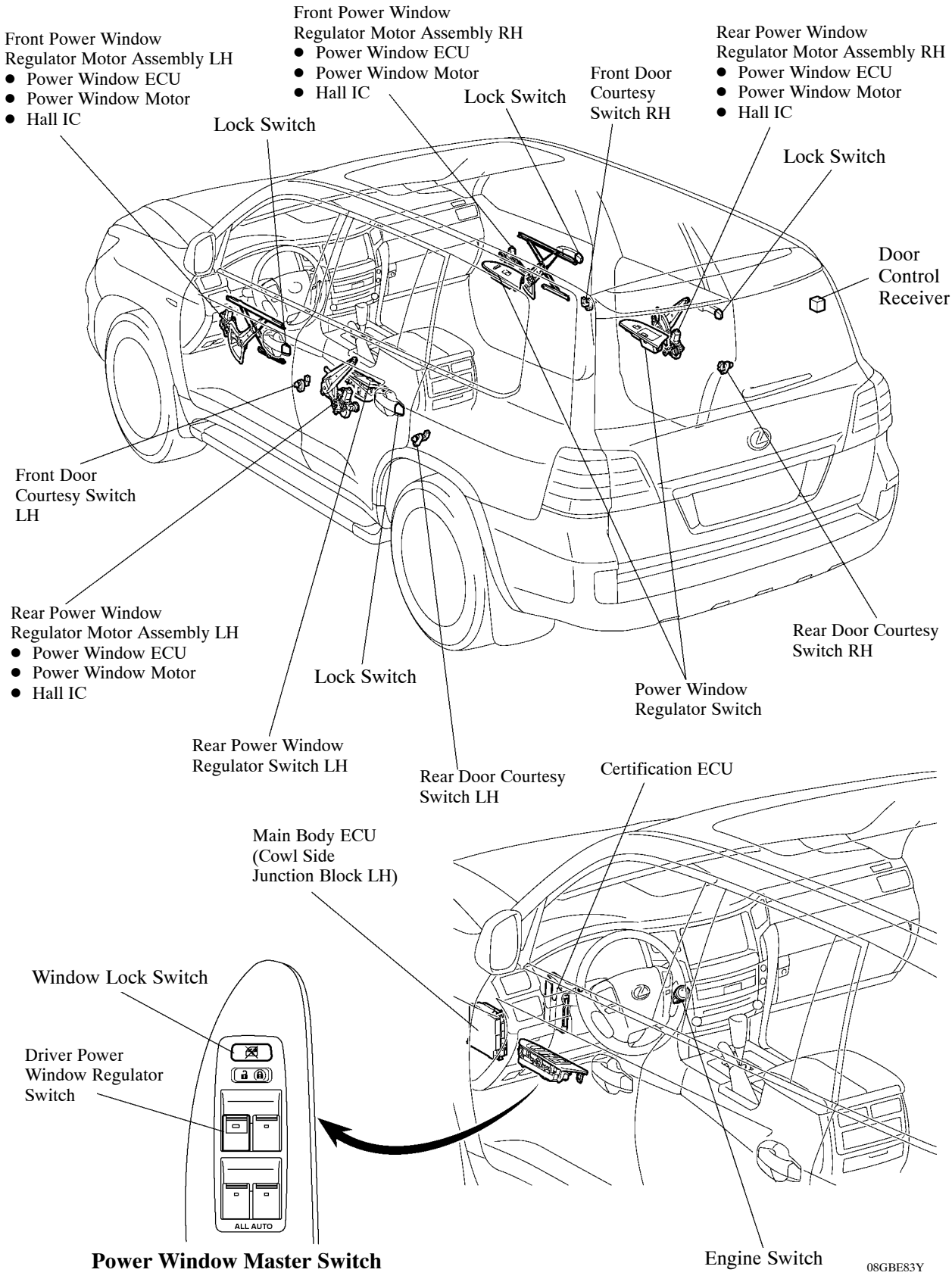
For details, see the LX 570 Repair Manual (Pub. No. RM08G0E).

▶ System Diagram ◀



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■ LAYOUT OF MAIN COMPONENTS

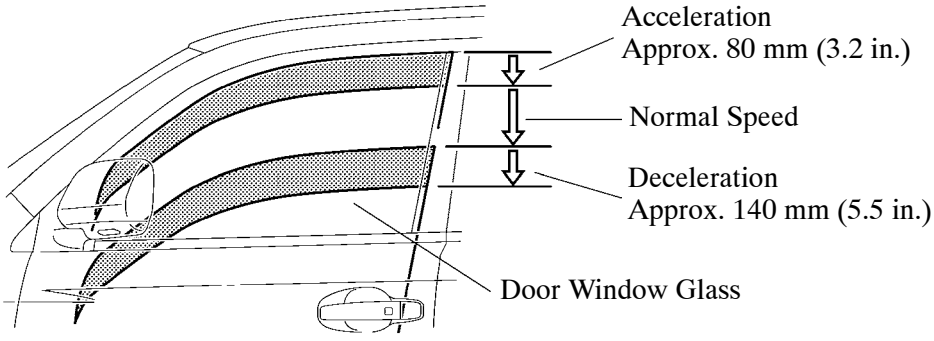


LHD Models

■VARIABLE SPEED CONTROL

1. Opening Power Window

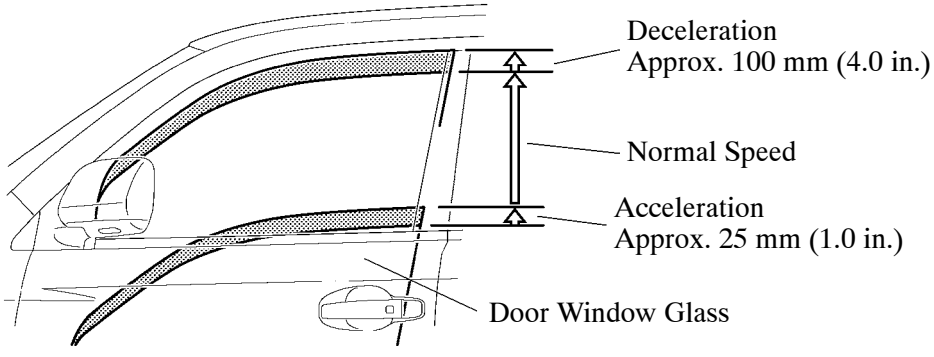
- In order to minimize the noise when the power window open function starts operating, the power window ECU accelerates the window opening speed within approximately 80 mm (3.2 in.) of the window fully closed position.
- In order to minimize the noise when the power window is opened fully, the power 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 (4.0 in.) of the window fully closed position.

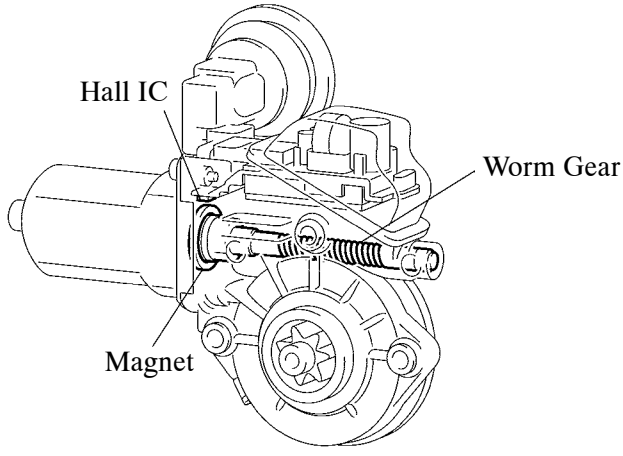


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■ JAM PROTECTION FUNCTION

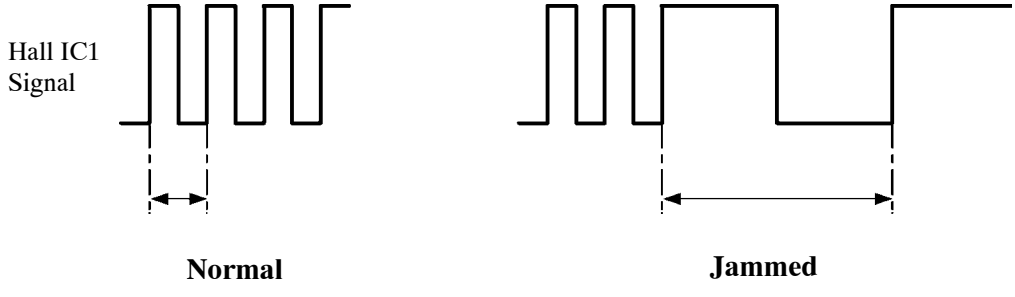
- The jam protection function automatically stops the power window and moves it downward if a foreign object gets jammed in the window during power window one touch auto up operation or manual up operation.
- The reverse-direction conditions and amount of down movement after jam detection are as follows:
  - The jam protection function operates and lowers the window approximately 125 mm (4.9 in.) or until 2.5 seconds 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.



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- 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 ◀



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DOOR LOCK CONTROL SYSTEM

■ DESCRIPTION

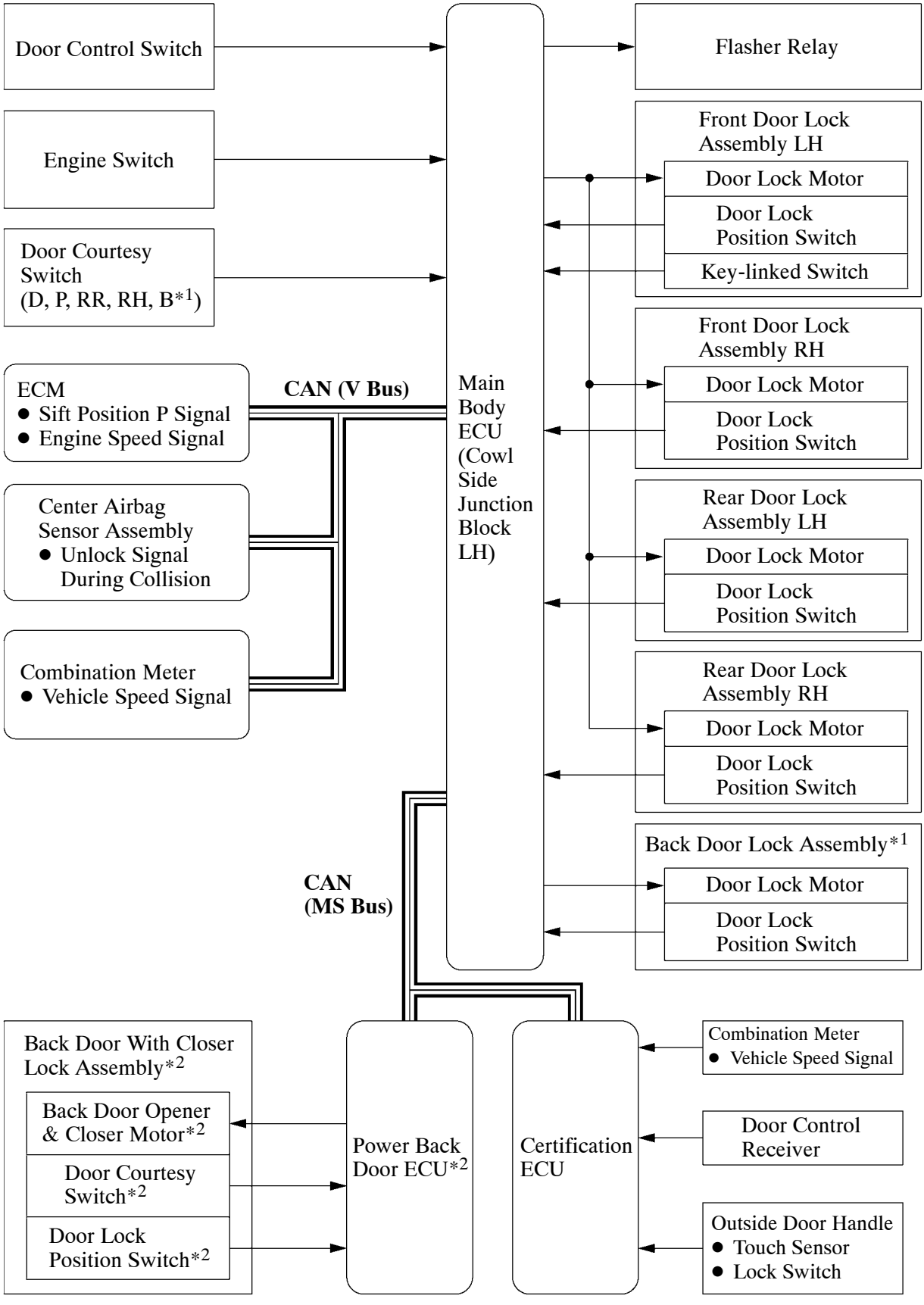
- The door lock control system consists of the main body ECU, door control switches, key-linked switch, door lock assemblies and courtesy switches, and is predominantly controlled by the main body ECU.
- The door lock control system has the following functions:

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 driver door control switch 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 mechanical key.
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*	● When the 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 button of the key is pressed once, the driver door is unlocked. Then, the button is pressed again, the rest of the doors are unlocked.
Shift Linked Automatic Door Lock*	When the conditions listed below are met, this function causes all the doors to be automatically locked. ● The engine is running. ● All of the doors are closed. ● The shift lever is moved to any position other than P. ● Any of the doors are unlocked.
Speed Sensitive Automatic Door Lock*	After the engine switch was turned ON (IG) with any of the doors unlocked, this function causes all doors to be automatically locked once the vehicle speed reaches approximately 20 km/h (13 mph) or more. After this function has operated, it will not operate again until either of the following conditions is met: ● Any of the doors is opened after the vehicle has stopped. ● The engine switch is turned OFF after the vehicle has stopped.
Shift-linked Automatic Door Unlock*	When the engine switch is ON (IG) and the shift lever is moved to P from a position other than P, all of the doors will be automatically unlocked.
Opening Driver's Door-linked Automatic Door Unlock*	All doors are unlocked automatically when the driver's door is opened within 10 seconds after the engine switch is changed from ON (IG) to the ON (ACC) or OFF.
Collision Door Lock Release	If the SRS airbag system has been deployed, and the main body ECU has detected the signal that is output by the center airbag sensor assembly, the main body ECU unlocks all the doors.

*: The setting function can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-18.

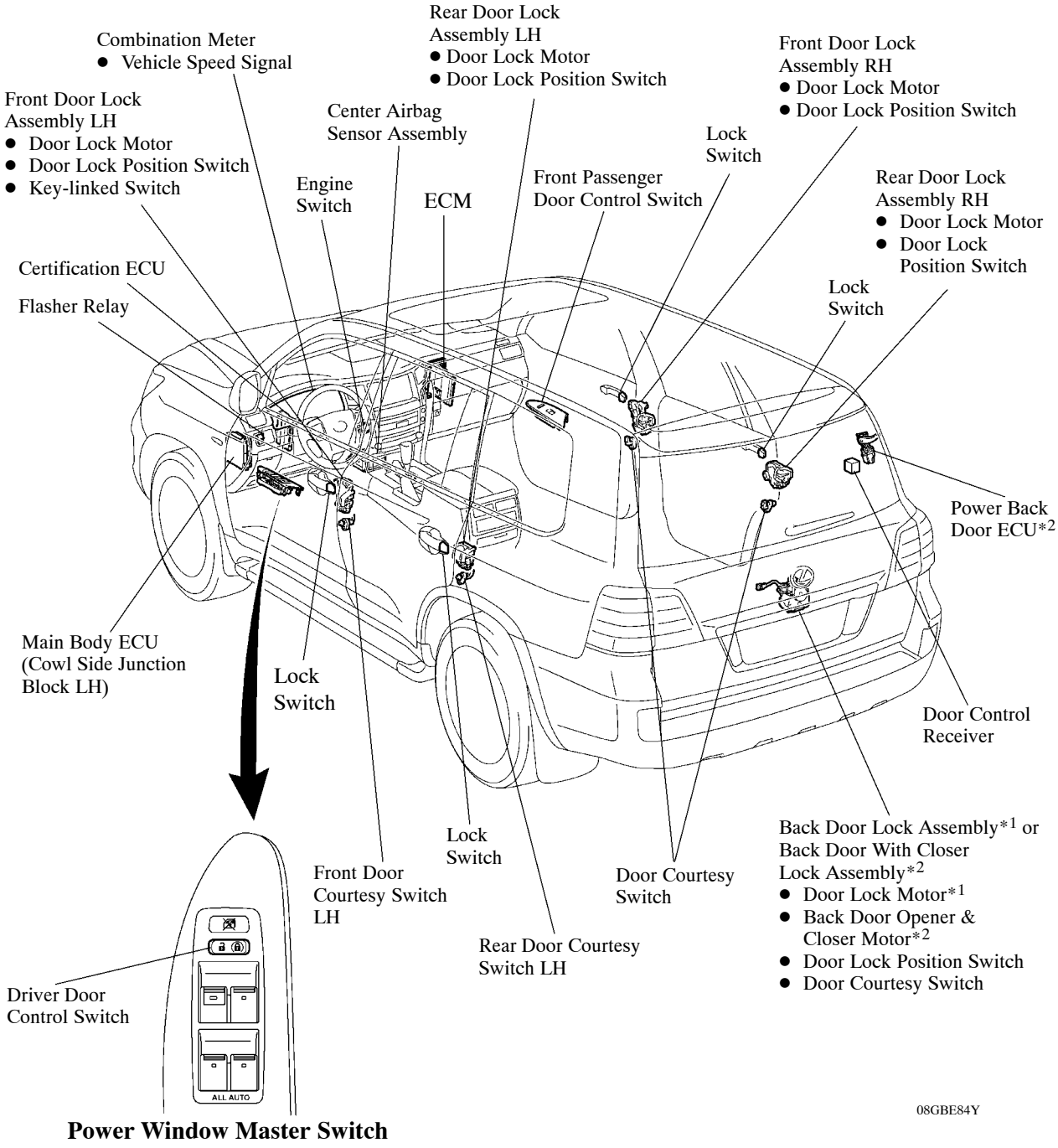
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▶ System Diagram ◀



*1: Models without Power Back Door System
*2: Models with Power Back Door System

■ LAYOUT OF MAIN COMPONENTS



Power Window Master Switch

LHD Models

*1: Models without Power Back Door System
*2: Models with Power Back Door System

BE

ENTRY & START SYSTEM

■ DESCRIPTION

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

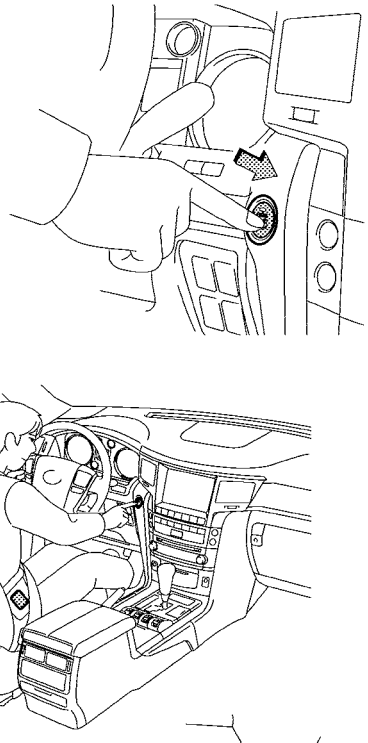
- Door unlock/lock (entry unlock/entry lock functions)
- The engine can be started by simply pressing the engine switch while depressing the brake pedal (start function)
- The back door can be opened (back door open function)
- Wireless door lock control function (except card key)

The entry & start system is standard equipment.

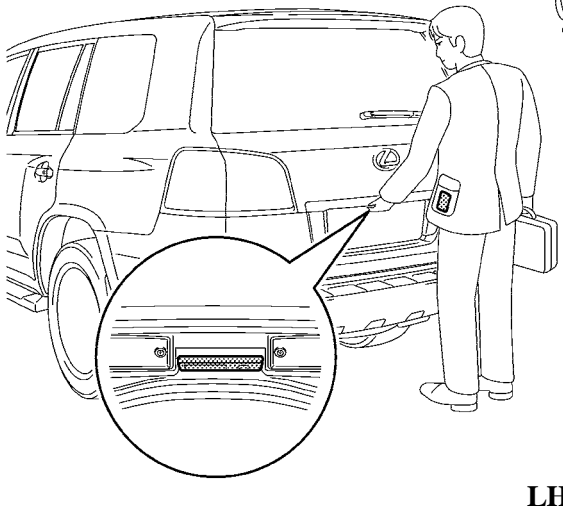
Entry Lock/Unlock Function



Start Function



Back Door Open Function



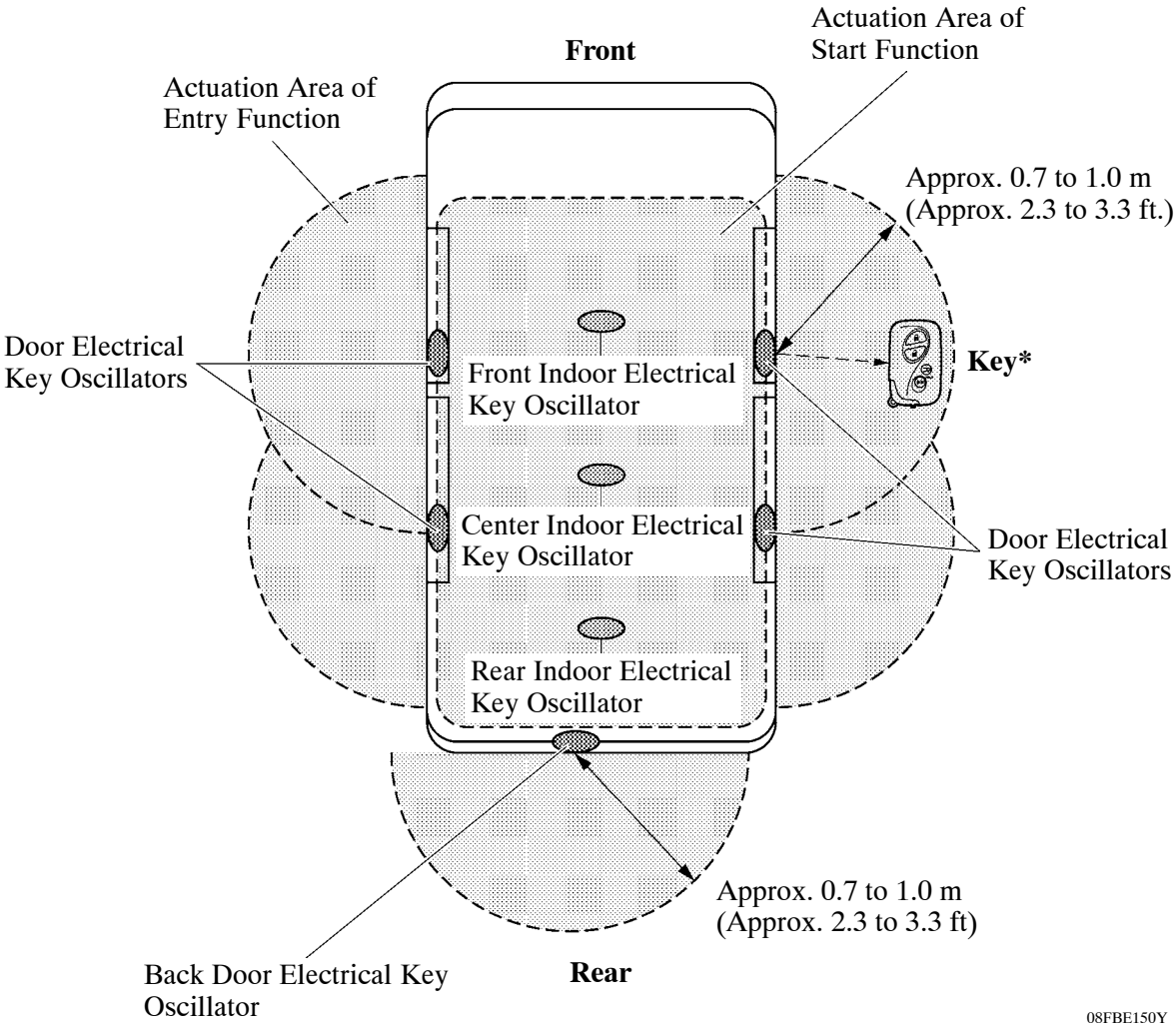
LHD Model

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■ACTUATION AREA

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

- The front, center and rear indoor electrical key oscillators form the actuation area of the start function.
- The four door electrical key oscillators and back door electrical oscillator form the actuation area of the entry function.



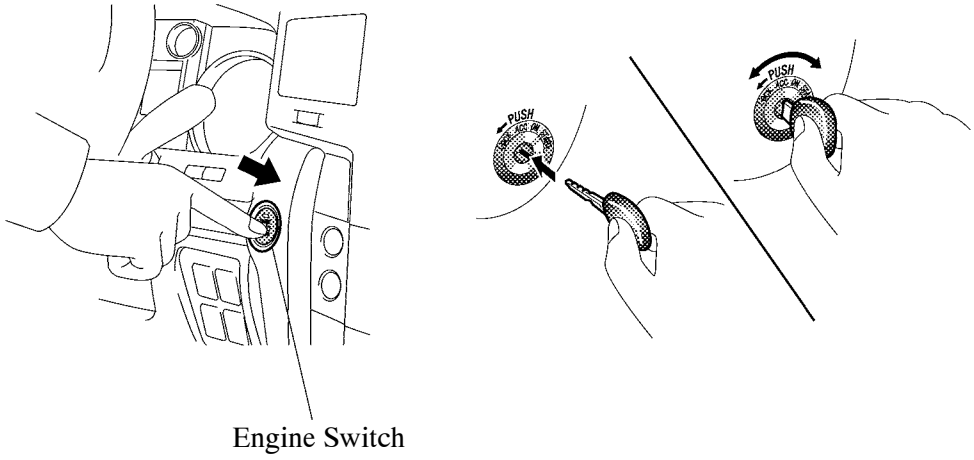
*: Models with Power Back Door System and Panic Function

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■START FUNCTION

1. General

- The new LX 570 uses the entry & 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-183.
- Along with the adoption of the start function, an engine cranking hold function is used. For details, see page EG-85.

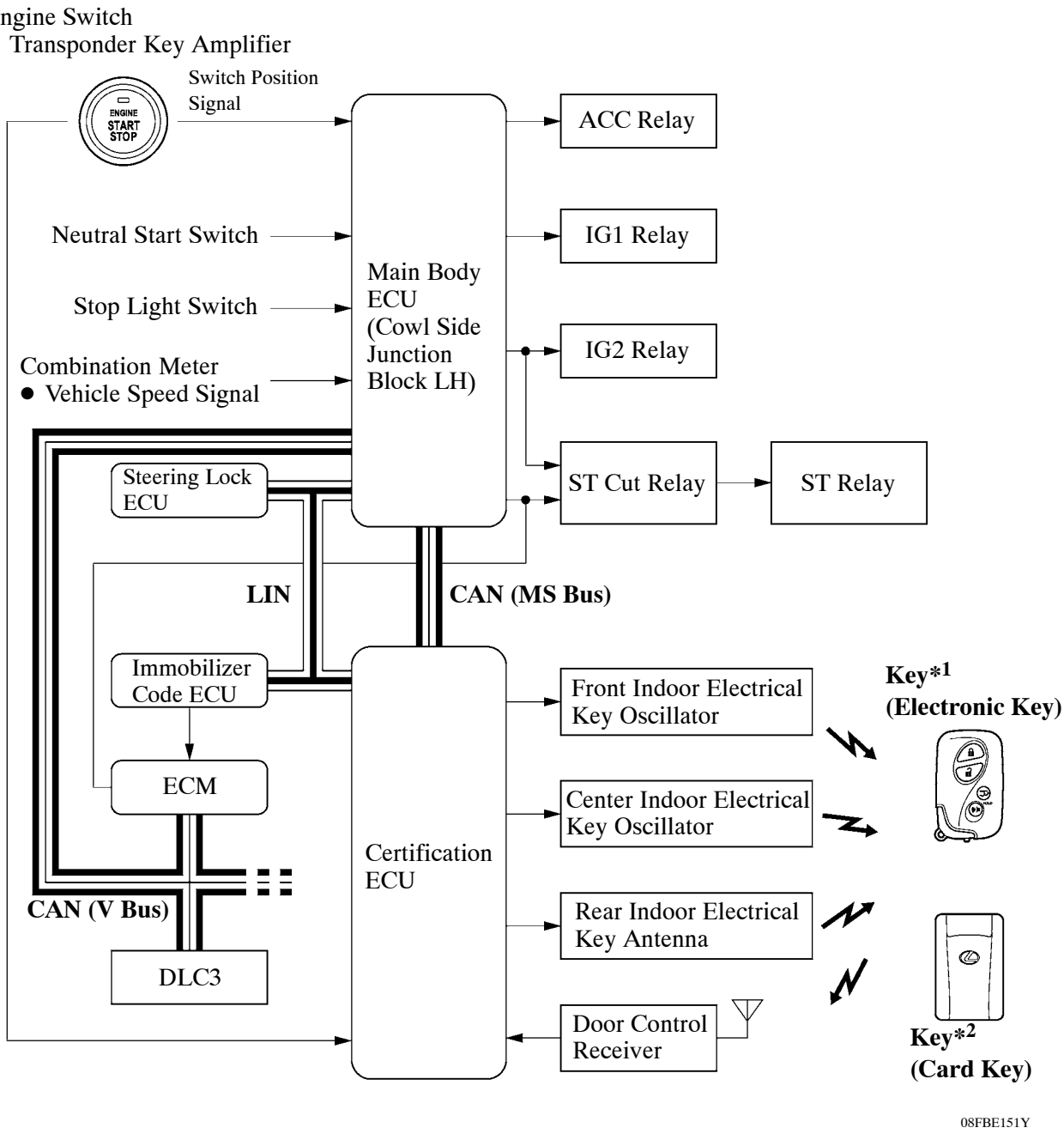


New **Previous**

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2. System Diagram

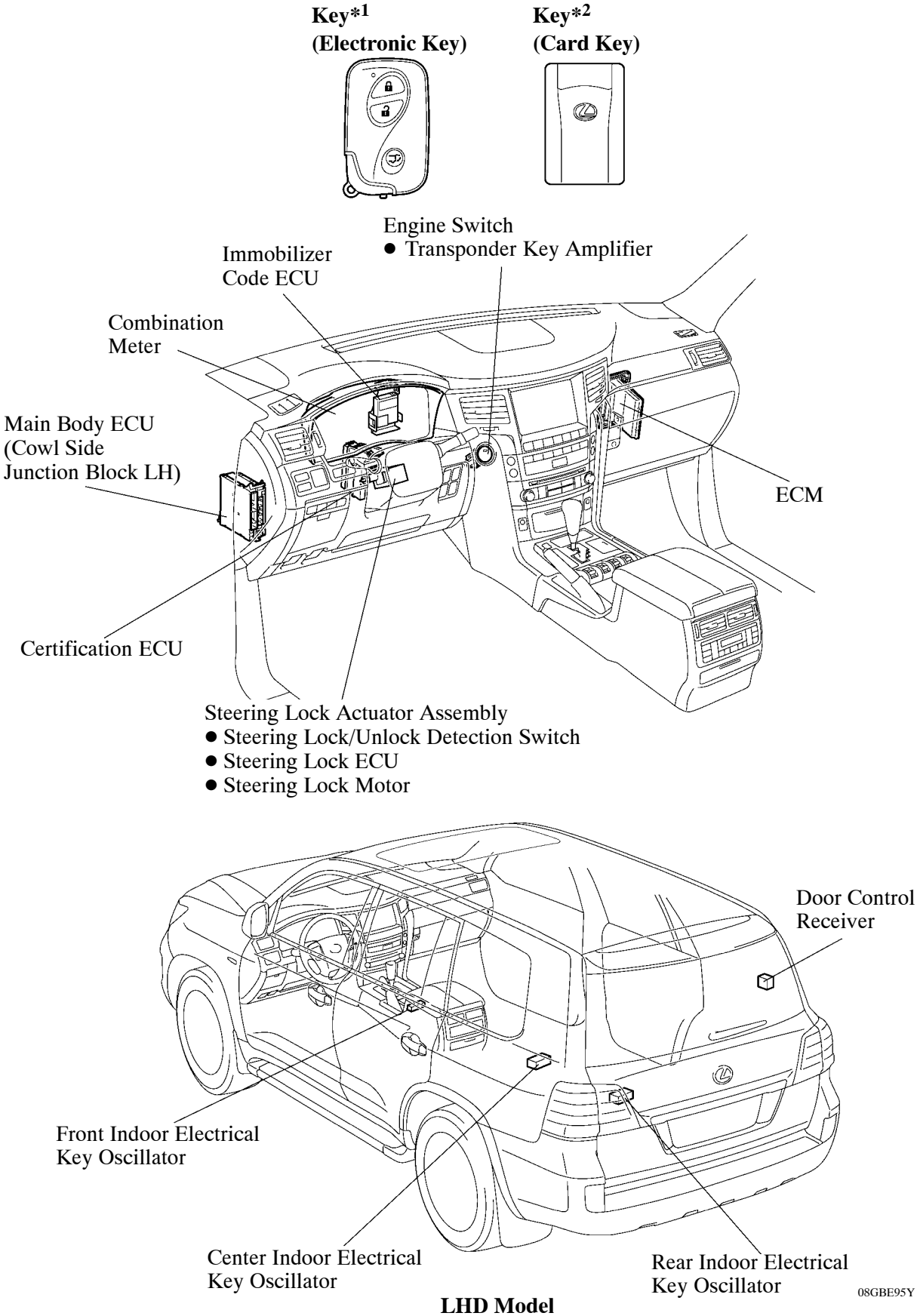
The main body ECU controls the start function. The system diagram below shows the components that relate to this function.



*1: Models with Power Back Door System and Panic Function
*2: Option

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3. Layout of Main Components



LHD Model

*1: Models with Power Back Door System and Panic Function

*2: Option

4. Function of Main Components

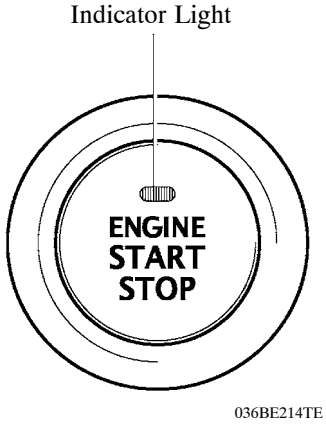
Component		Function
Engine Switch ● Transponder Key Amplifier		● Transmits the engine switch signal to the main body ECU. ● Informs the driver of any power source mode or system abnormality through the illumination stage of the indicator light. ● Receives the ID code and transmits it to the certification ECU when the key battery is too weak to respond to the door control receiver based on the indoor electrical key oscillators.
Key		Receives the signals from the indoor electrical key oscillators and returns the ID code to the door control receiver. For details, see page BE-196.
Indoor Electrical Key Oscillator ● Front, Center and Rear		Receives a request signal from the certification ECU and forms the actuation area in the vehicle interior.
Door Control Receiver		Receives the ID code from the key and transmits it to certification ECU.
Main Body ECU		● Switches the power source mode among four modes (OFF, ON [ACC], ON [IG], START) in accordance with the shift position and the state of the stop light switch. ● Controls the start system in accordance with the signals received from the switches and each ECU.
Certification ECU		Certifies the ID code received from the door control receiver and transmits the certification results to the immobilizer code ECU and steering lock ECU.
Stop Light Switch		Outputs the state of the brake pedal to main body ECU.
Immobilizer 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 immobilizer disengage/engage signal from the immobilizer code ECU, and disengages or engages the engine immobilizer.
Combination Meter	Multi-information Display	Informs the driver of malfunctions in the entry & start system.
	Master Warning Light	Illuminates simultaneously with a buzzer sound to inform the driver of malfunctions in the entry & start system.

5. Construction and Operation

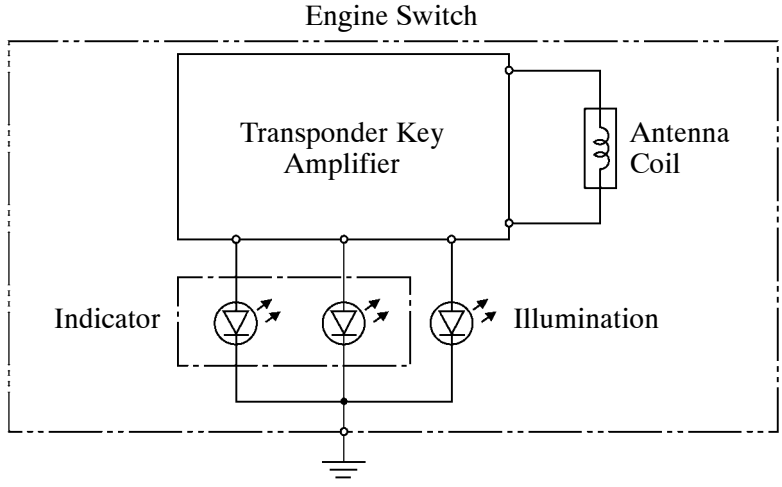
Engine Switch

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 mode 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 in the entry & 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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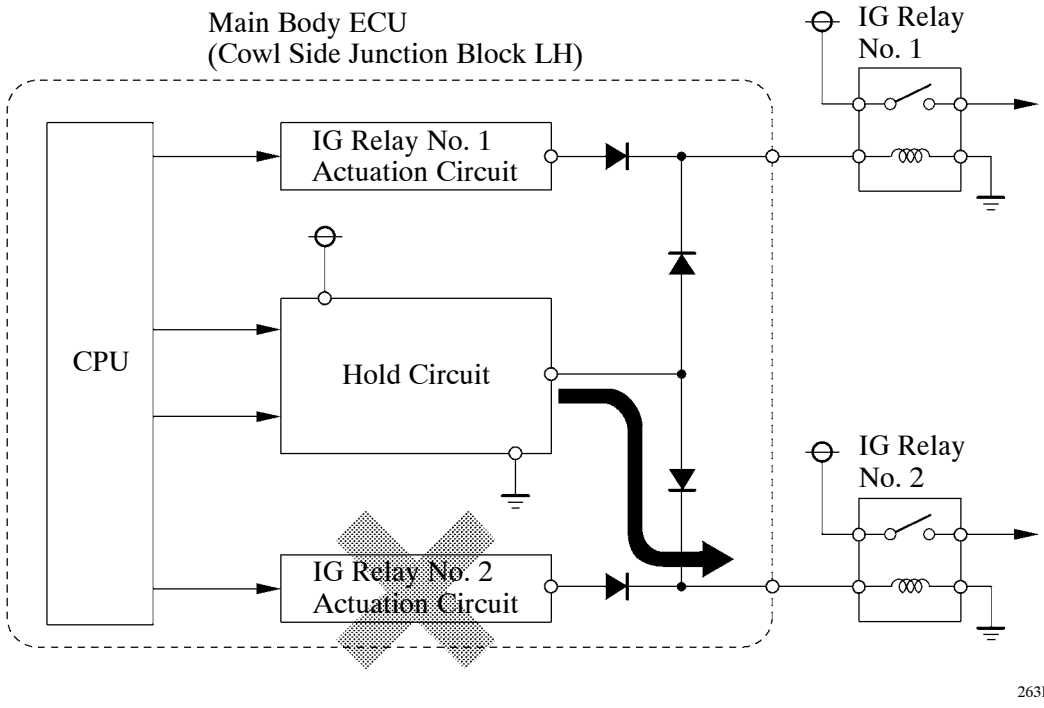
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▶ Indicator Light Condition ◀

Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal not depressed	Brake pedal depressed with shift lever in “P” or “N”.
OFF	OFF	ON (Green)
ON (ACC), ON (IG)	ON (Amber)	ON (Green)
START	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 30 seconds	Flashes (Green) for 30 seconds
Entry & Start System Malfunction	Flashes (Amber) for 15 seconds	Flashes (Amber) for 15 seconds

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 and/or No. 2 actuation circuits while driving.



Service Tip

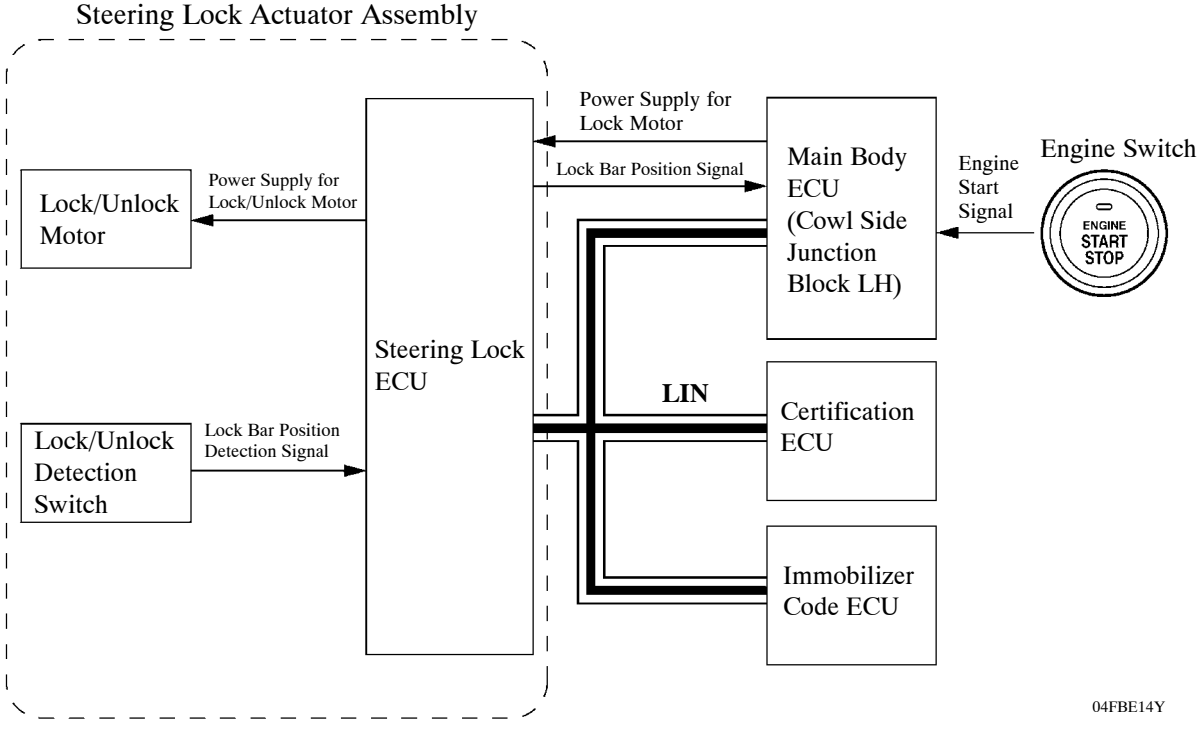
The main body ECU constantly stores the present power source mode in its memory. Therefore, if the power to main body ECU is interrupted due to the removal of the battery, the main body ECU restores the power source mode after the battery is reconnected.
For this reason, if the battery is removed when the engine switch is 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 engine switch OFF.

Steering Lock System

Along with the use of the entry & start system, a steering lock system which uses a lock/unlock motor to lock and unlock the steering wheel is used. The steering lock system mainly consists of the steering lock assembly, main body ECU, certification ECU and immobilizer 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 actuator assembly through the control of 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 wheel based on communication with the main body ECU. Then, the certification ECU sends the lock or unlock command signal to the steering lock ECU through the immobilizer code ECU. Upon receiving the signal, the steering lock ECU operates the lock/unlock motor to lock or unlock the steering wheel.

▶ System Diagram ◀



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.

Service Tip

After a depleted battery is recharged, the engine may not start at first because the steering lock ECU does not correctly detect the lock bar position.
When this happens, turn OFF all vehicle power supplies (ACC=OFF, IG=OFF), open and close the doors, and then start the engine again.

6. Start Function Operation

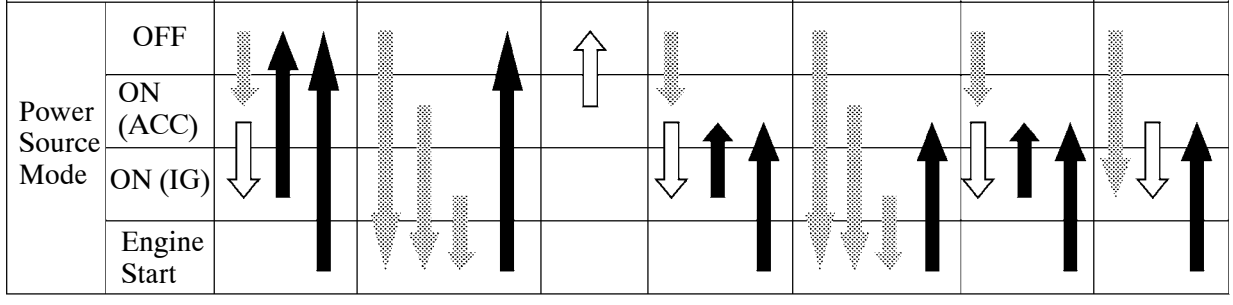
General

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

Pattern	Brake Pedal	Shift Lever	Power Source Mode Pattern
A	Depressed	P or N Position	When the engine switch is pushed once. ● OFF → Engine Start
B	Not Depressed	P Position	The power source mode changes repeatedly in the following sequence when the engine switch is pushed. ● OFF → ON (ACC) → ON (IG) → OFF
C		Except P Position	The power source mode changes repeatedly in the following sequence when the engine switch is pushed. ● OFF → ON (ACC) → ON (IG) → ON (ACC)
D	—	P Position	When the engine switch is pushed in the ON (IG) condition. ● ON (IG) or Engine Start → OFF
E	—	Except P Position	When the engine switch is pushed in the ON (IG) condition. ● ON (IG) or Engine Start → ON (ACC)

▶ Transition of Power Source Mode ◀

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		—	Depressed	—	—	Depressed	—	Depressed
Time		—	—	After 1 hour	—	—	—	—
Power Source Mode	OFF							
	ON (ACC)							
	ON (IG)							
	Engine Start							



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

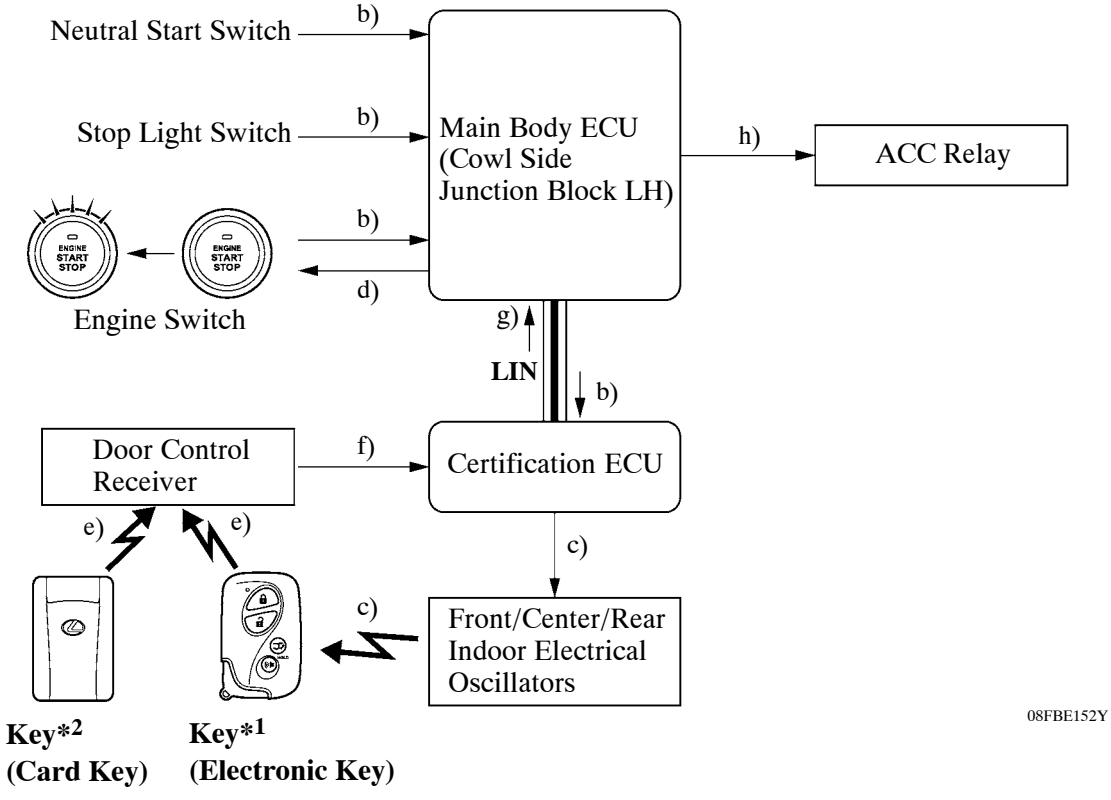
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NOTE:

- 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 mode from ON (IG) to ON (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 mode from OFF to ON (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 → Engine Start

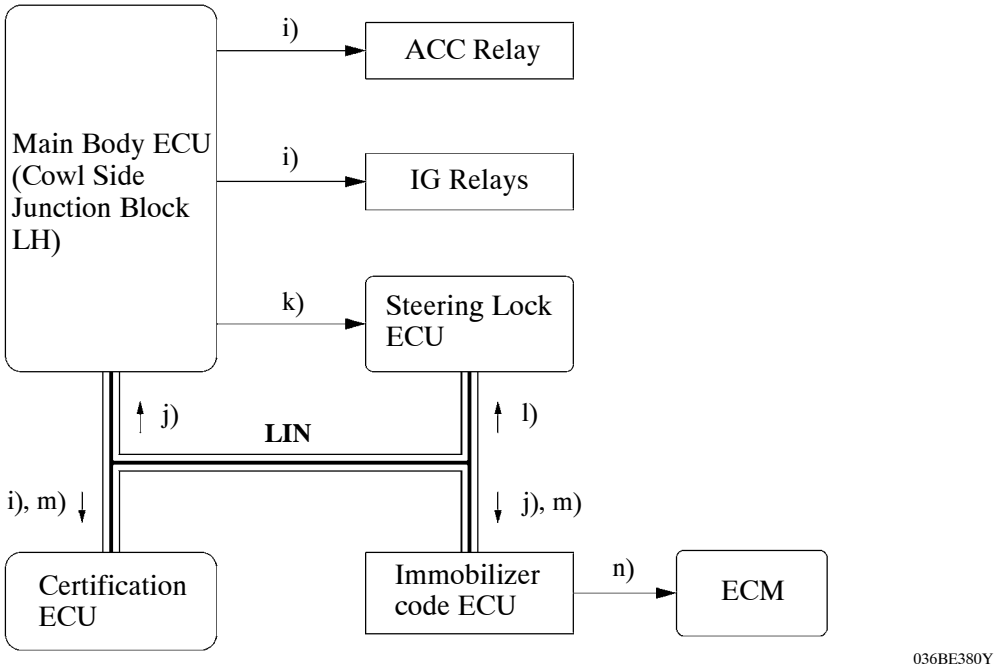
Step	System Operation
a)	The driver holds the key and enters the vehicle.
b)	When the driver presses the engine switch once with the following conditions satisfied, the main body ECU recognizes the engine switch signal and transmits the key certification request to the certification ECU. ● Shift position is “P” or “N”. ● Brake pedal is depressed. ● Power source mode is at “OFF”.
c)	The certification ECU receives the certification request and transmits a request signal to the indoor electrical key oscillators. These oscillators then transmit the request signal.
d)	The brake pedal is depressed, so the main body ECU turns ON the green indicator light of the engine switch.
e)	The moment the key receives the request signal, it transmits its ID code to the door control receiver. The signal includes the response code.
f)	The door control receiver 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 Power Back Door System and Panic Function
*2: Option

(Continued)

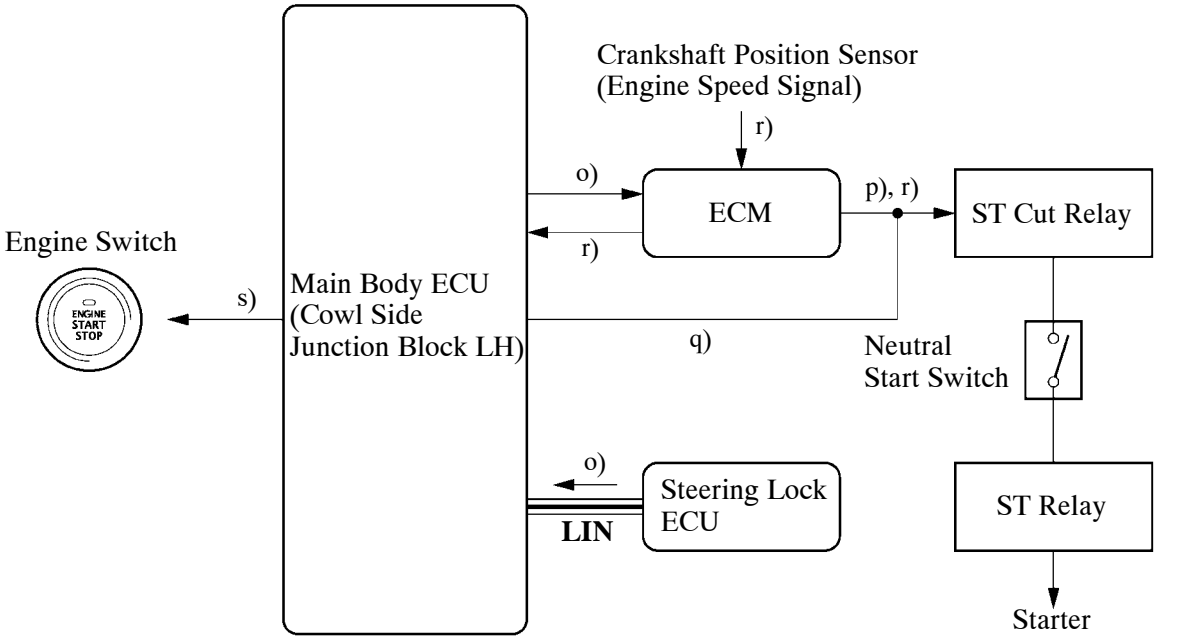
Step	System Operation
i)	The main body ECU turns ON the ACC relay, and then turns ON the IG relays.
j)	The certification ECU checks that the power source mode has switched from OFF to ON (IG), and transmits a steering unlock signal to the main body ECU and immobilizer code ECU.
k)	The main body ECU receives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



(Continued)

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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 ST relay (STAR) signal, and actuates the starter. (For details, see the cranking hold function on page EG-85.)
q)	The ECM and main body ECU both output the ST relay (STAR) 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 ST 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.



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Pattern B: OFF → ON (ACC) → ON (IG) → OFF

1) OFF → ON (ACC)

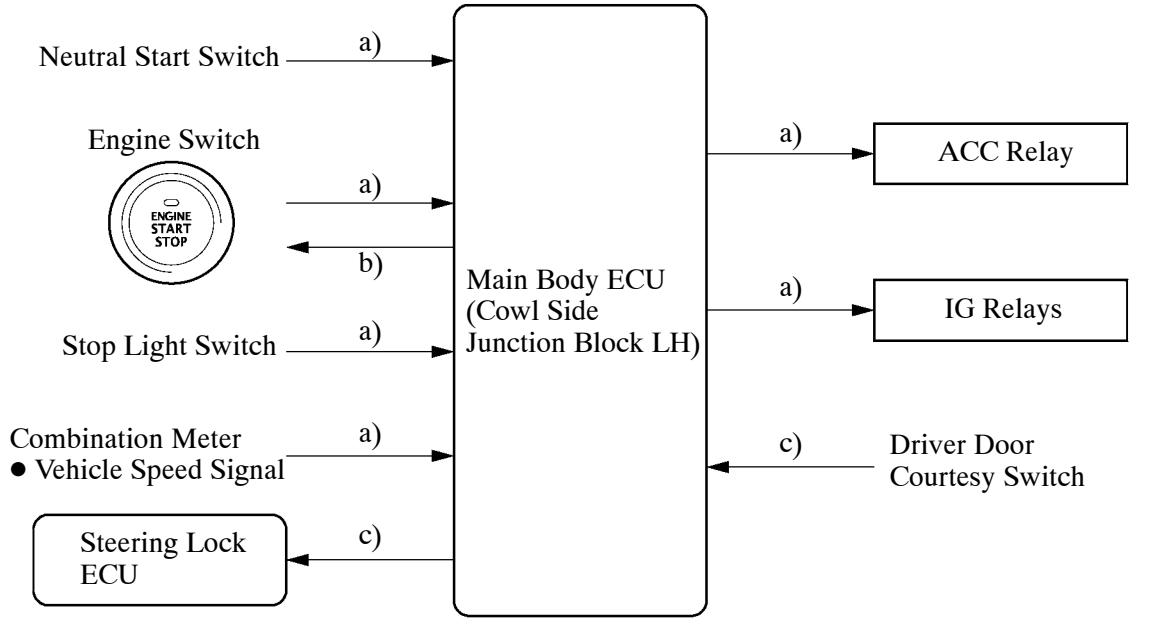
Step	System Operation
a)	The driver enters the vehicle carrying the key.
b)	When the driver presses the engine switch once with the following conditions satisfied, the main body ECU recognizes the engine switch signal and transmits the key certification request to the certification ECU. ● Shift position is “P”. ● Brake pedal is not depressed. ● Power source mode is “OFF”.
c)	Due to the brake pedal not being depressed, the main body ECU will turn ON the amber indicator light of 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-184.

2) ON (ACC) → ON (IG)

Step	System Operation
a)	When the power source mode is at “ON (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-185.

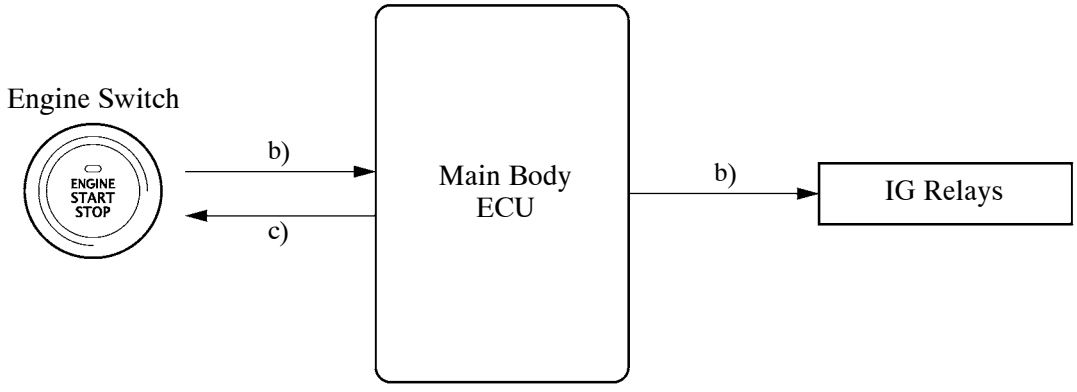
3) ON (IG) → OFF

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 and IG relays. ● Shift position is "P". ● Brake pedal is not depressed. ● Vehicle speed is 0 km/h (0 mph). ● Power source mode is in "ON (IG)".
b)	When the power source mode is switched from ON (IG) to OFF, the main body ECU will turn OFF the indicator light of the engine switch.
c)	If the driver door is opened, the main body ECU receives a signal from the driver door courtesy switch. Then, the power supply to the steering lock ECU stops in order to lock the steering.



Pattern C: OFF → ON (ACC) → ON (IG) → ON (ACC)

Step	System Operation
a)	The system operations for the power source mode "OFF → ON (ACC) → ON (IG)" are the same as those in pattern "B". For details, see page BE-187.
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). ● Power source mode is in "ON (IG)".
c)	Even after the power source mode switches from ON (IG) to ON (ACC), the indicator light of the engine switch will remain illuminated in amber.



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Pattern D: ON (IG) → OFF

This system operation is the same as "ON (IG) → OFF" for pattern "B". For detail, see page BE-187.

Pattern E: ON (IG) → ON (ACC)

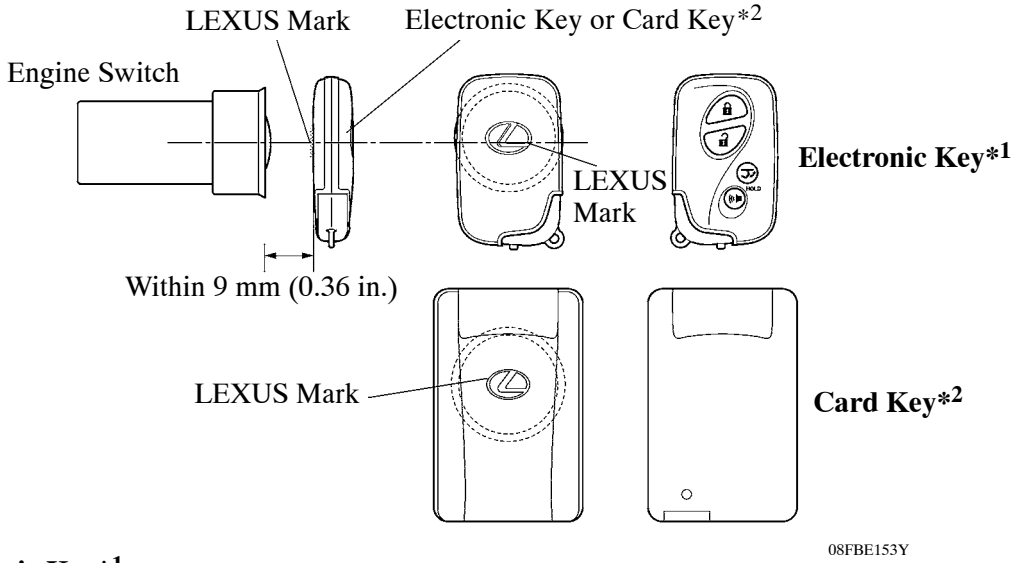
This system operation is the same as pattern "C" on this page. However, the indicator light of the engine switch will illuminate as follows:

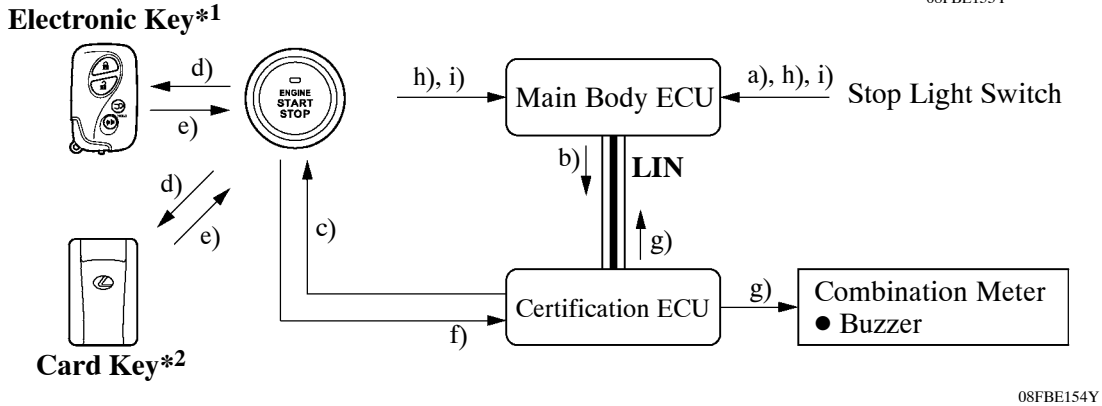
- When the power source mode is switched from ON (IG) to ON (ACC), the main body ECU makes the amber indicator light of the engine switch continue to illuminate.
- When the power source mode is switched from engine running to OFF, the main body ECU turns OFF the indicator light of the engine switch.

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When key battery is low

Step	System Operation
a)	To operate the entry & 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 immobilizer 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 sounds at the same time.
h)	After the buzzer sounds, if the engine switch is pressed within 10 seconds while the brake pedal is depressed, the power source mode switches to START in the normal condition.
i)	After the buzzer sounds, if the engine switch is pressed within 10 seconds while the brake pedal is not depressed, the power source mode will be switched to ON (ACC) or ON (IG) as in the normal condition.





*1: Models with Power Back Door System and Panic Function
*2: Option

7. Diagnosis

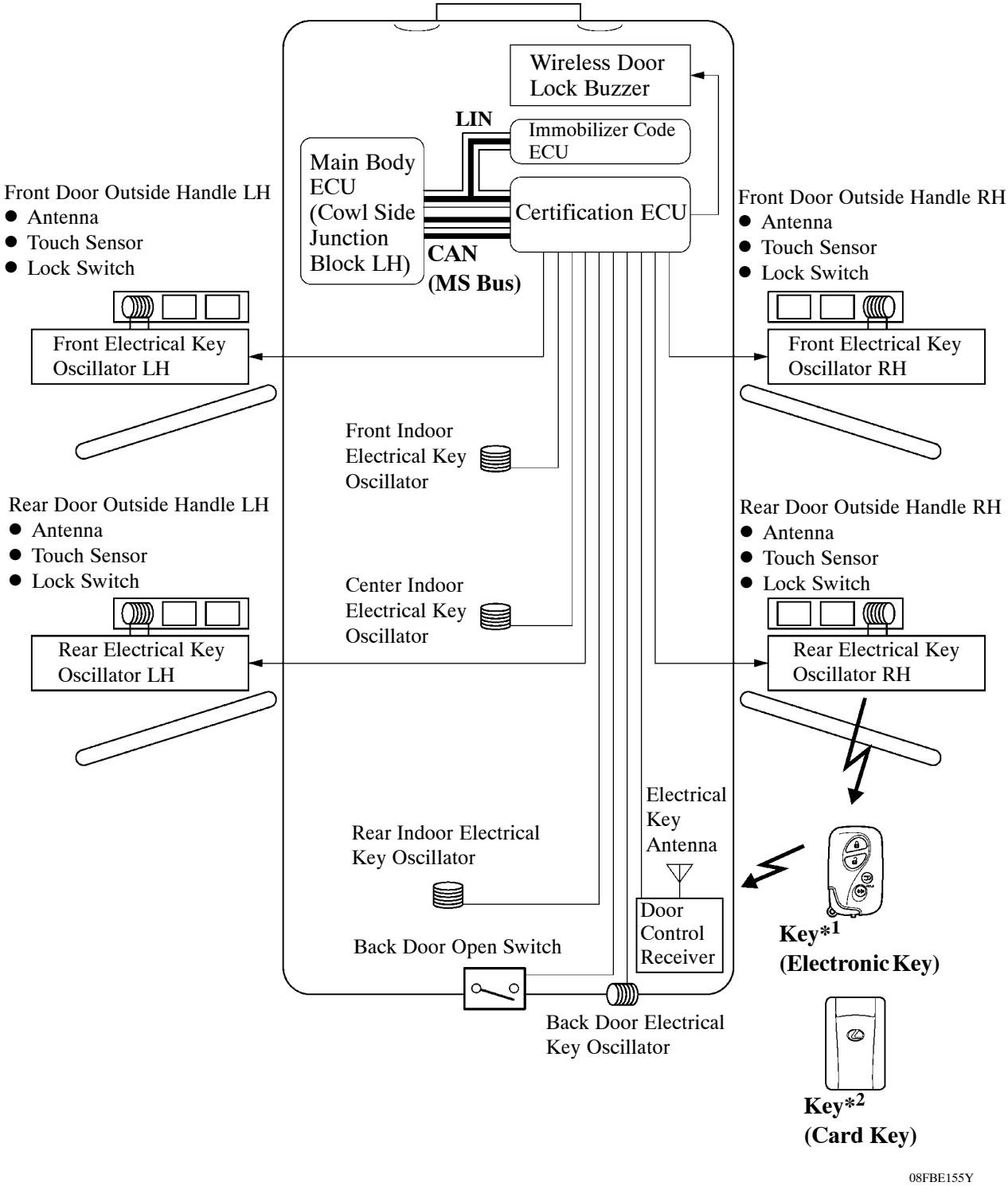
The main body ECU and certification ECU can detect malfunctions in the entry & start system when the power source mode is ON (IG).
When the ECUs detect a malfunction, the amber indicator light of the engine switch flashes to warn the driver. At the same time, the ECUs store 5-digit DTC (Diagnostic Trouble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

- The indicator light warning continues for 15 seconds even after the power source mode is switched to OFF.
- The DTC can be read by connecting intelligent tester II to the DLC3. For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).
- The entry & start system may not operate successfully if a malfunction occurs.

■ ENTRY FUNCTION

1. System Diagram

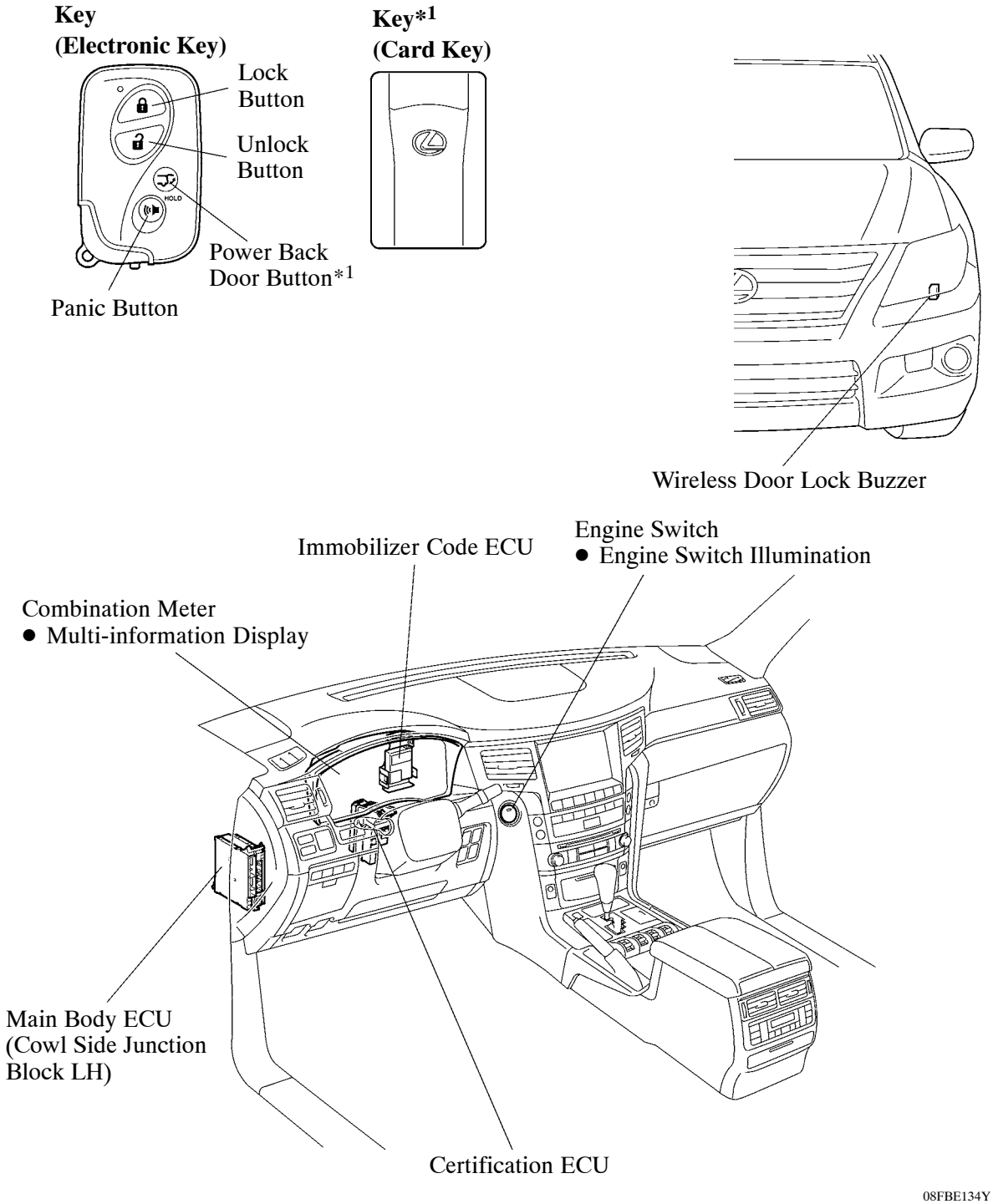
The certification ECU controls the entry function. The system diagram below shows the main components that relate to the function.



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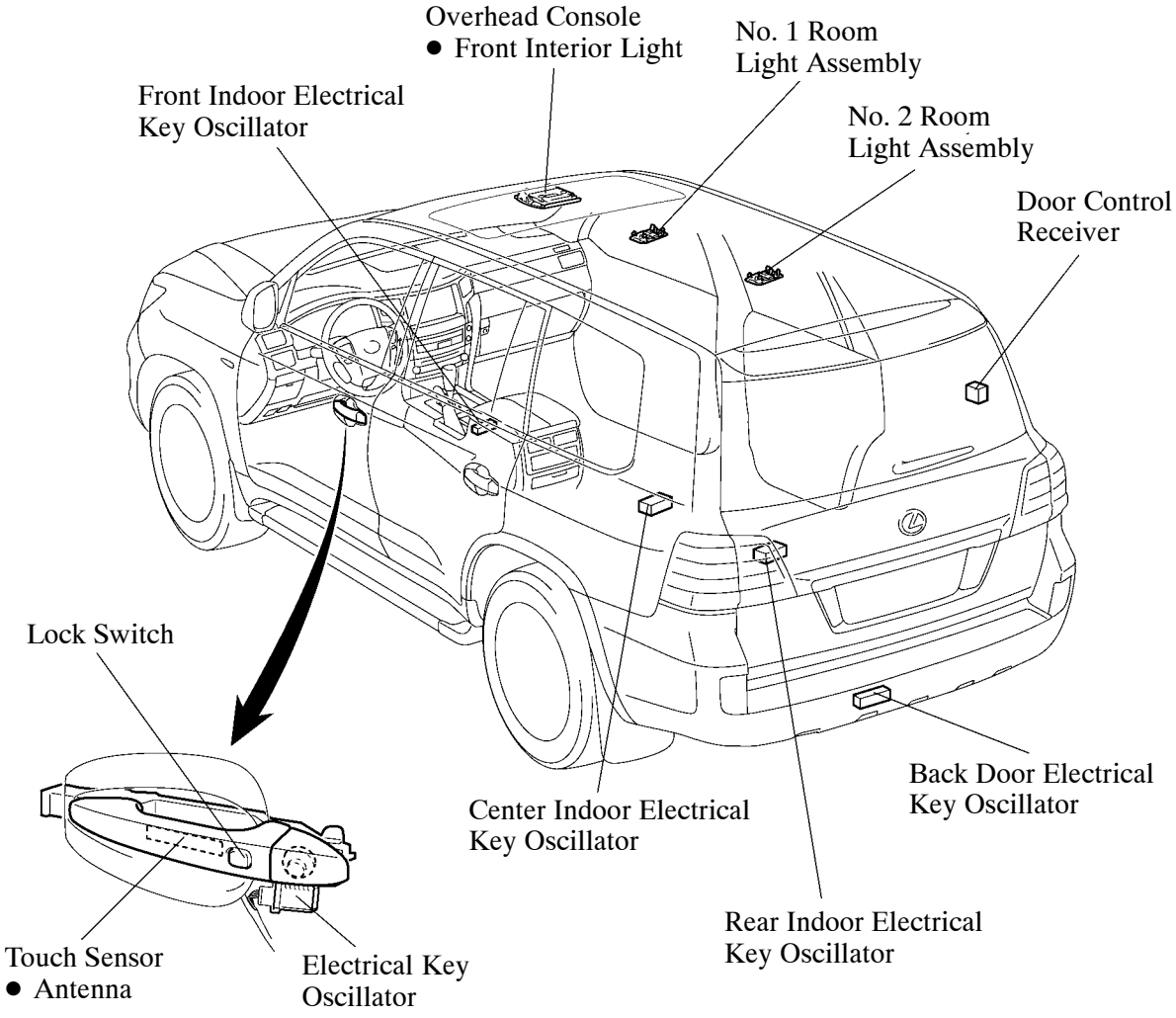
*1: Models with Power Back Door System and Panic Function
*2: Option

2. Layout of Main Components

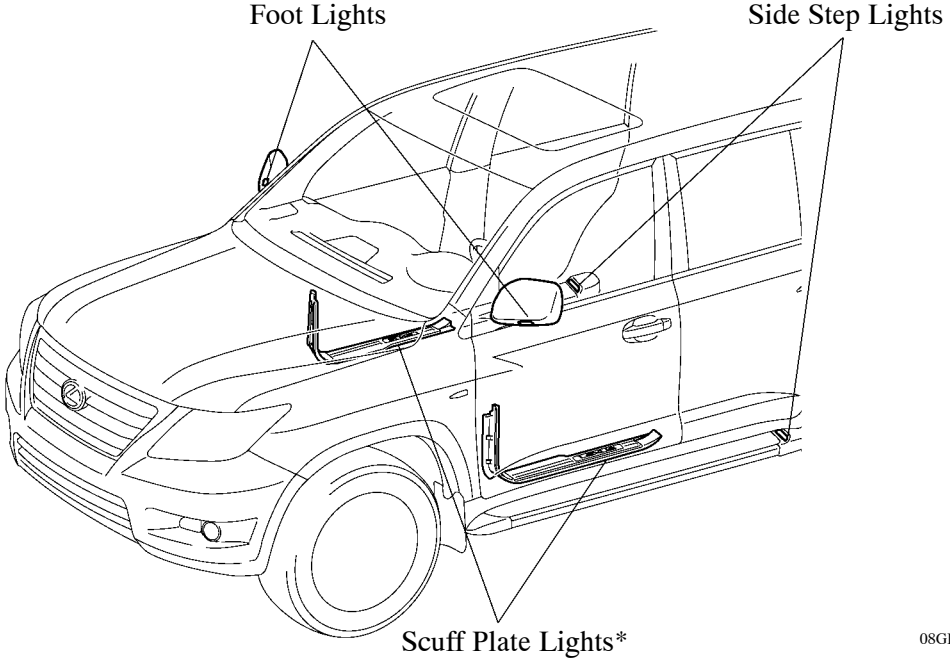


*1: Option
*2: Models with Power Back Door System
*3: Models with Panic Function

BE



Outside Door Handle Assembly



LHD MODEL

*: Option

3. Function of Main Components

Component		Function
Key		Two types of keys are used: electronic key and card key*1. The electronic key consists of a mechanical key, the transmitter for the wireless door lock control, the transceiver for the entry & start system and a transponder chip for the engine immobilizer control. The card key*1 consists of a mechanical key, the transceiver for the entry & start system and a transponder chip for the engine immobilizer control.
Certification ECU		Controls the entry & start system in accordance with the signals from each oscillator, various switches, ECUs and the key. ● Judges and certifies the ID code from the door control receiver. ● Transmits the engine immobilizer deactivation signal to the immobilizer code ECU. ● Transmits steering unlock signals to the steering lock ECU.
Main Body ECU		Controls the entry & start system in accordance with the signals from the various switches, ECUs and combination meter. ● Transmits the key certification request signal to the certification ECU in accordance with the engine switch signal, and turns the relays ON and OFF. ● Receives the request signal from the certification ECU and actuates the door lock motor to unlock or lock the door. ● Transmits the condition of each door to the certification ECU.
Immobilizer Code ECU		Receives and certifies the engine immobilizer deactivation signal transmitted from the certification ECU, and sends it to the ECM.
Outside Door Handle Assembly	Antenna	Transmits the request signals.
	Touch Sensor	Detects when a person touches the inside of an outside door handle assembly.
	Lock Switch	Transmits door lock request signals to the certification ECU.
	Electrical Key Oscillator ● All Doors	Receives the request signal from the certification ECU, and creates an actuation area around front door.
Indoor Electrical Key Oscillator ● Front/Center/Rear		Receives the request signal from the certification ECU, and forms the actuation area in the vehicle interior.
Back Door Electrical Key Oscillator		Receives the request signals from the certification ECU, and forms an actuation area around the back door.
Door Control Receiver		● Receives the ID code from the key in the actuation area and transmits it to the certification ECU. ● Receives the ID code from the key in the cabin and transmits it to the certification ECU.
Back Door Open Switch		Transmits a back door open request signal to the certification ECU.
Wireless Door Lock Buzzer		Sounds as an answerback for entry lock or unlock to inform the driver.*2
Combination Meter	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, and by illuminating a warning on the multi-information display and the master warning light, in accordance with the request signal from the certification ECU.
	Master Warning Light	
	Buzzer	

*1: Option

*2: Except for Europe and China Models

BE

4. Construction and Operation

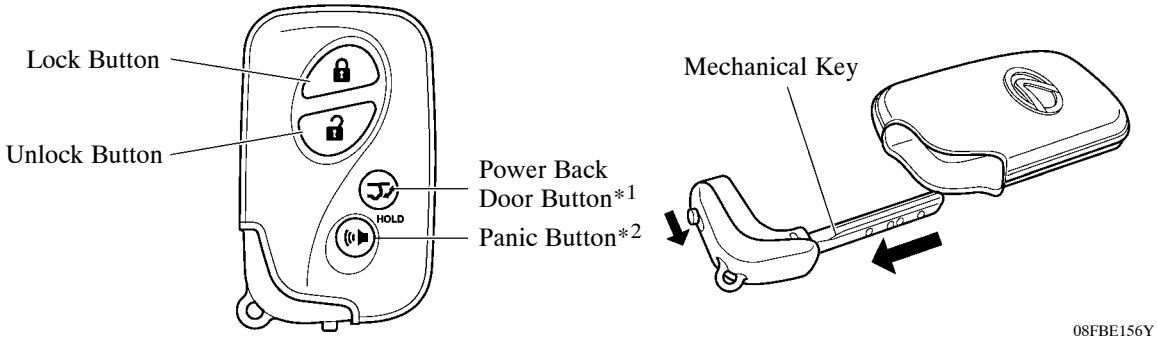
Key (Mechanical Key)

Two types of keys are used: electronic key and card key. The electronic key is available as standard and the card key is available as an option.
A total of four keys can be registered. For details, see the new LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

1) Electronic Key (Mechanical Key)

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

- The transceiver function of the key receives the signals from the oscillators and returns the ID code to the tuner.
- The transmitter function for the wireless door lock control has a lock button, unlock button, power back door button*1 and panic button*2.
- The transponder chip in the key for the engine immobilizer control returns a signal to the engine switch as a response to the radio wave 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 of the driver door lock cylinder must be removed.

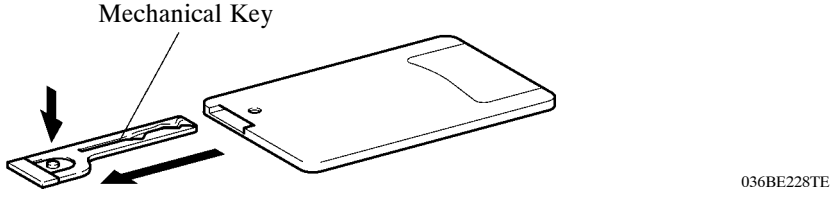


*1: Models with Power Back Door System
*2: Models with Panic Function

2) Card Key (Mechanical Key)

The card key consists of a mechanical key, a transceiver for the entry & start system, and a transponder chip for the engine immobilizer control.

- The transceiver function of the key receives the signals from the oscillators and returns the ID code to the tuner.
- The transponder chip in the key for the engine immobilizer control returns a signal to the engine switch as a response to the radio wave 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 of the driver door lock cylinder must be removed.



Electrical Key Oscillator (Door, Front, Center and Rear Indoor, and Back Door)

Each electrical key 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 areas formed by the door, front, center and rear indoor, and back door electrical key oscillators are approximately 0.7 to 1.0 m (2.3 to 3.3 ft.) from the outside door handle assemblies 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 the door is locked using the lock switch of the outside door handle assembly, the actuation area is formed when the lock switch is pressed.
- The actuation area of the back door electrical key oscillator 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 front, center and rear indoor electrical key oscillators is formed when the driver door is opened or closed, when the engine switch 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-196]	The operation is the same as a usual mechanical key.
Wireless Door Lock Control [See page BE-199]	This function is a convenient system for locking and unlocking all the doors or back door, at a distance. The operation is the same as wireless door lock control system.
Entry Illumination [See page BE-42]	When a key enters the actuation area of the entry function, the front interior light, room lights, engine switch illumination, foot lights, scuff plate lights and side step lights illuminate.
Entry Unlock [See page BE-200]	When a key is located in the actuation area of the entry function, the door will unlock after the inside of an outside door handle assembly is touched.
Entry Unlock Mode Switching [See page BE-201]	Allows selection of one of two modes that can be operated with the entry unlock function. ● Driver Door Mode ● All Door Mode
Entry Lock [See page BE-202]	When a key is located in the actuation area of the entry function and the power source mode is OFF, the door can be locked by merely pressing the lock switch on the outside door handle assembly.
Back Door Open [See page BE-203]	When a key is in the actuation area of the back door electrical key oscillator, the back door can be opened by merely pressing the back door open switch.
Window and Sliding Roof Close [See page BE-204]	With the key in the actuation area of the entry function, all open windows and sliding roof are closed when the lock switch on the outside door handle assembly is pressed for 3 seconds or more.
Memory Call [See page BE-205]	This function operates the driving position memory system in accordance with key ID.
Prevention of Key Confinement [See page BE-209]	Prevents the key from being confined in the vehicle when a door is locked with the outside door handle assembly while the key is still inside the vehicle.
Warning [See page BE-210]	When any of the situations below occurs, the entry & start system causes the certification ECU to sound the buzzer in the combination meter and the wireless door lock buzzer*, and to indicate a warning on the multi-information display in order to alert the driver.
Battery Saving [See page BE-220]	When the vehicle remains parked for a long time, this function extends the signal transmission (between the system and key) interval or automatically deactivates the entry & start system. This prevents the vehicle battery and key battery from being depleted.
Key Cancel [See page BE-221]	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-221]	A total of 4 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 China Models

Wireless Door Lock Control Function

The wireless door lock control function has the following functions:

Function	Outline
All Doors Lock	Pressing the lock button on the key locks all doors.
All Doors Unlock*1	Pressing the unlock button on the key unlocks all doors.
All Doors Unlock*1 (2-step Unlock)	Pressing the unlock button on the key once unlocks the driver door, and pressing it again within 3 seconds unlocks all the doors.
Back Door Open/Close*2 [See page BE-338]	Pressing the power back door button on the key for 1 second or more opens or closes the back door.
All Windows Open/Close [See page BE-165]	Pressing the lock/unlock button on the key for 3 seconds or more opens or closes all windows.
Answer Back*1	The hazard lights flash once when locking, and flash twice when unlocking, to indicate that the operation has been completed.
	The wireless door lock buzzer sounds once when locking, and the wireless door lock buzzer sounds twice when unlocking, to inform that the operation has been completed.*3
Panic Alarm*4	Keeping the panic button on the key pressed for longer than 0.8 seconds causes the following alarm functions to be activated. ● Sounds the horn and security horn. ● Flashes the hazard lights, headlights, and taillights. ● Illuminates the front and rear interior lights (if the interior light switch is in the DOOR position).
Automatic Lock*1	If none of the doors are opened within 30 seconds after being unlocked by the wireless door lock control, all the doors will be locked again automatically.
Door Ajar Warning*5	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 front interior light, room lights, engine switch illumination, foot lights, scuff plate lights and side step lights to illuminate simultaneously with the unlock operation.
Security	Sends an operation signal as a rolling code.

*1: The function setting can be changed using the customized body electronics system. For details, refer to "Customized Body Electronics System" section on page BE-18.
*2: Models with Power Back Door System
*3: Australia, G.C.C. Countries and Taiwanese Package Models
*4: Models with Panic Function
*5: Except for China Models

Entry Unlock Function

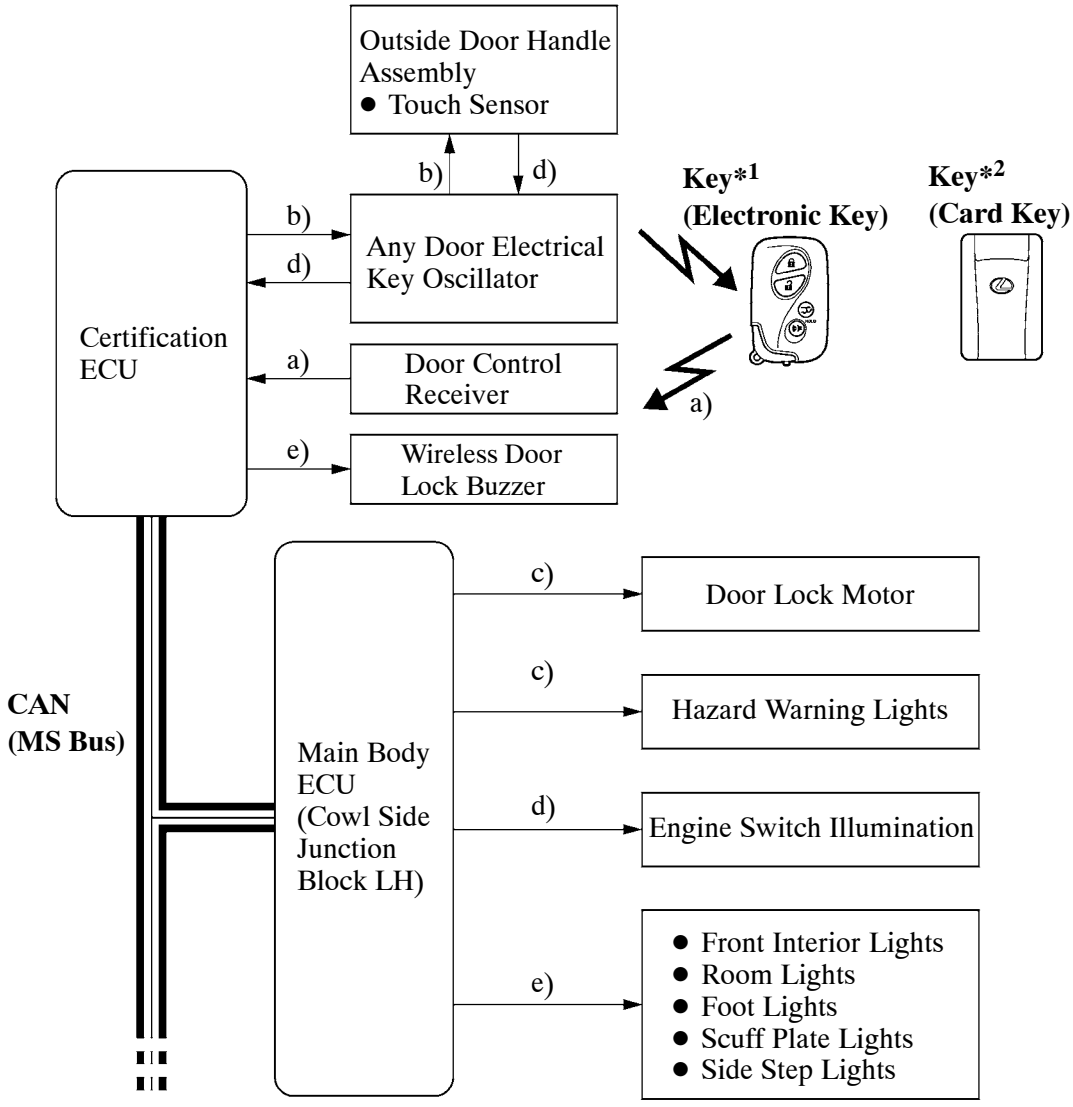
a) When a key enters the actuation area of the entry function, the certification ECU judges and certifies the key ID code received from the door control receiver.

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) At the same time, the certification ECU transmits the lighting signals to the front interior light, room lights, engine switch illumination, foot lights, scuff plate lights and side step lights, and turns ON these illuminations (Illuminated Entry Function).

d) 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.

e) The main body ECU flashes the hazard warning lights twice as an answerback for entry unlock. At same time, the certification ECU sounds the wireless door lock buzzer twice on the Australia, G.C.C. countries and Taiwanese package models.



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*1: Models with Power Back Door System and Panic Function

*2: Option

Entry Unlock Mode Switching

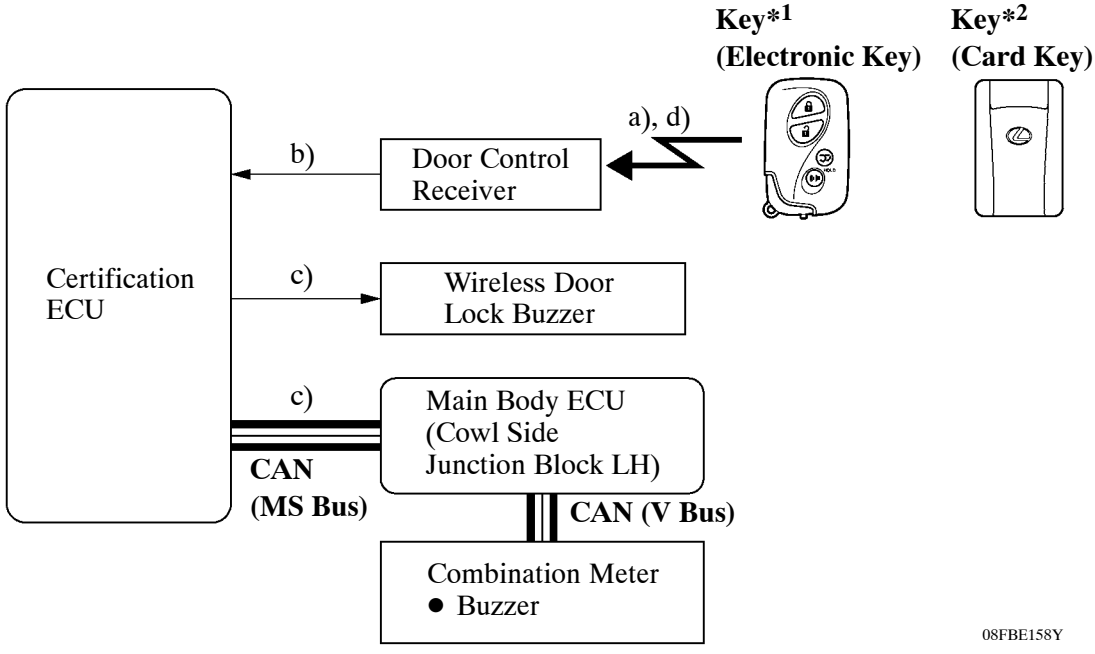
The entry unlock mode can be switched between the mode which unlocks the driver door only (driver door mode) and the mode which unlocks all the doors (all doors mode).

a) When the power source mode is OFF, the driver presses 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 a signal from the door control receiver and switches the entry unlock mode.

c) The certification ECU sounds the wireless door lock buzzer and the buzzer of the combination meter to inform the user that the mode has been switched.

d) If the entry unlock mode needs to be switched again, the driver should 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 turns OFF. Then, the entry unlock mode will be switched again.



Mode	Wireless Door Lock Buzzer	Buzzer in Combination Meter	Multi-information Display
Driver Door (Default)	Sounds in three cycles	Sounds once	
All Doors (Customized)	Sounds in two cycles	Sounds once	

*1: Models with Power Back Door System and Panic Function

*2: Option

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NOTE:

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

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Entry Lock Function

a) This signal is transmitted to the certification ECU when the driver exits the vehicle carrying the key and presses the lock switch on the outside door handle assembly.

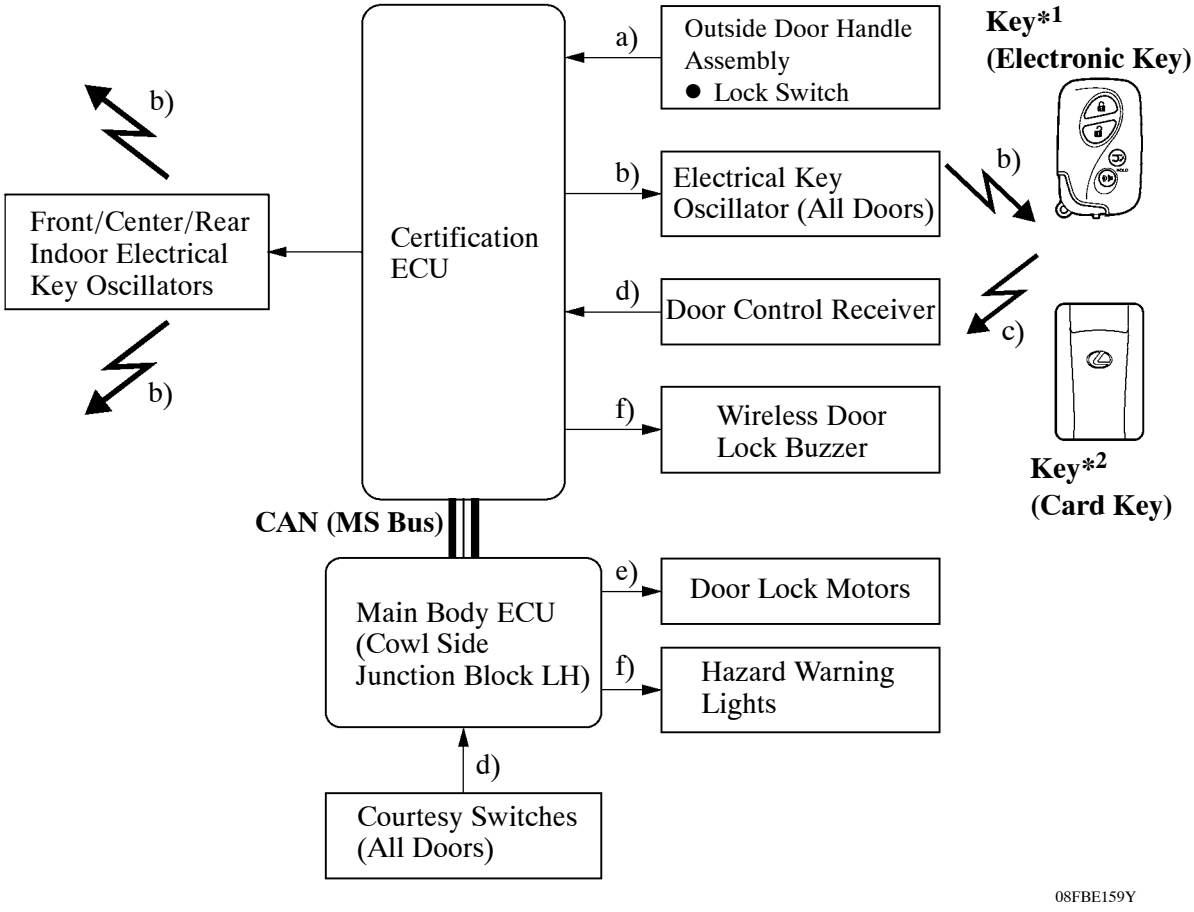
b) The certification ECU transmits a request signal for all electrical key oscillators to form actuation areas.

c) The key receives this signal and returns the ID code to the door control receiver.

d) The certification ECU judges and certifies the ID code from the door control receiver. 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) The main body ECU receives this signal and actuates the door lock motors to lock the doors.

f) The main body ECU blinks hazard warning lights once. At same time, the certification ECU sounds the wireless door lock buzzer once as an answerback for the entry lock function on the Australia, G.C.C. countries and Taiwanese package models.



*1: Models with Power Back Door System and Panic Function

*2: Option

Entry Back Door Open Function

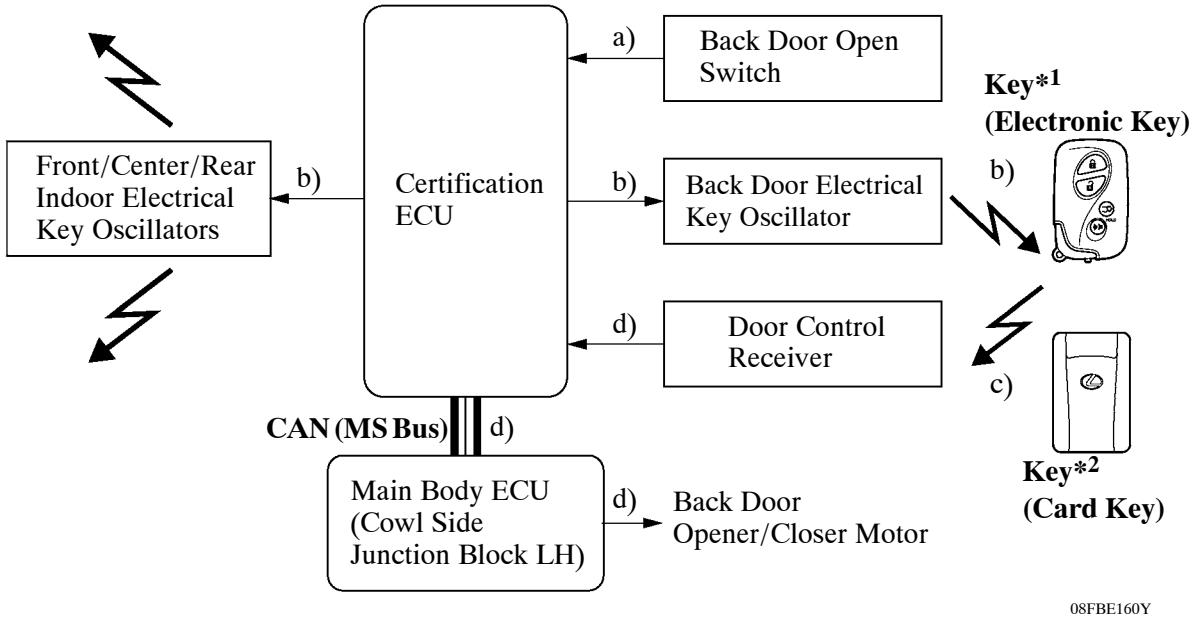
a) The unlock signal is transmitted to the certification ECU when the driver pushes the back door open switch with the key carried in the driver's possessions.

b) The certification ECU transmits a request signal for front, center and rear indoor electrical key oscillators, and back door electrical key oscillator to form actuation areas.

c) The key transmits the ID code to the door control receiver.

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/closer motor to open the back door.



*1: Models with Power Back Door System and Panic Function
*2: Option

Window and Sliding Roof Close Function

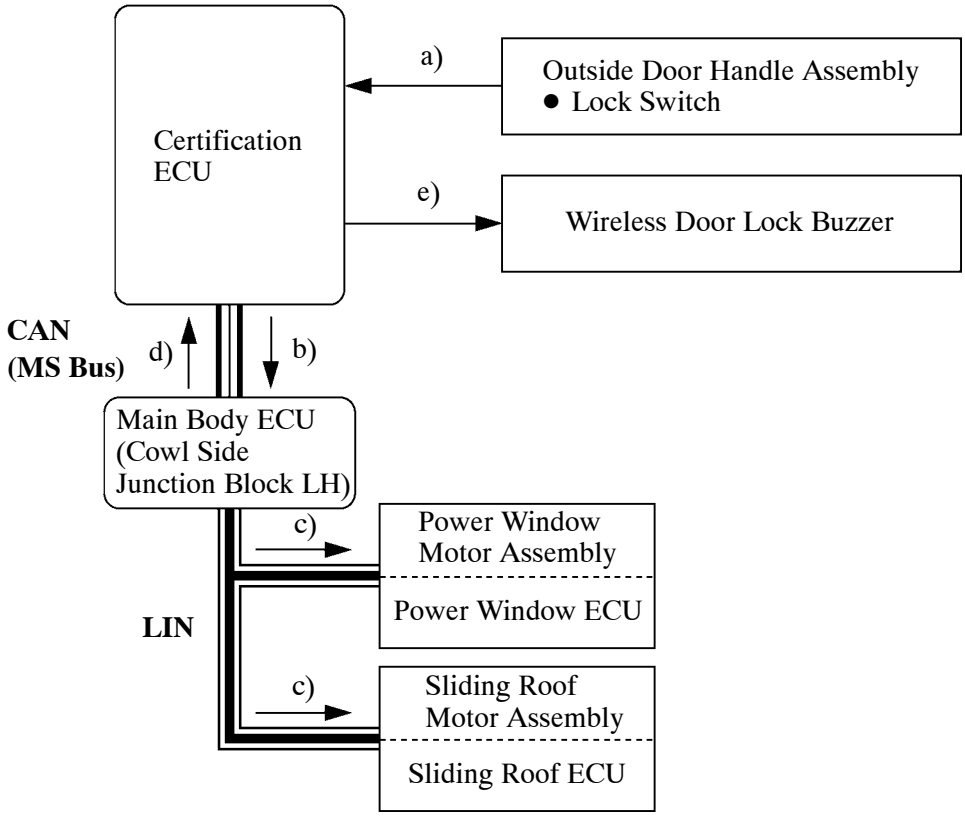
a) After all the doors have been locked, and the driver keeps pressing the lock switch on the outside door handle assembly for approximately 3 seconds, the certification ECU receives continuous door lock switch ON signals.

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 ECU built into the power window motor assembly and the sliding roof ECU built into the sliding roof motor assembly. These ECUs operate their motors to close the windows and sliding roof.

d) After all the windows and sliding roof are closed, the main body ECU receives the full close signals from the power window ECU and the sliding roof ECU, and transmits these signals to the certification ECU.

e) The certification ECU receives the signals from the main body ECU and sounds the wireless door lock buzzer as an answerback for the window and sliding roof close function except for the China models. The buzzer will sound when the close operation of the windows and sliding roof starts, but it will not sound when the close operation has completed.



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Memory Call Function

1) General

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

Condition	Outline
Memory Registration	When all the following conditions are met, the key ID is recorded. ● Power source mode is OFF. ● Driver door is closed. ● Memory No. (1, 2 or 3) button is pressed and held. ● For the electronic key, the lock or unlock button on the key is pressed and held. For the card key*, the lock or unlock side on the door control switch in the power window master switch is pressed and held.
Memory Call Operation	After the door is unlocked using the entry function or the wireless door lock 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. ● Power source mode is OFF. ● Driver door is closed. ● SET button is pressed and held. ● For the electronic key, the lock or unlock button on the key is pressed and held. For the card key*, the lock or unlock side on the door control switch in the power window master switch is pressed and held.

*: Option

2) Memory Registration

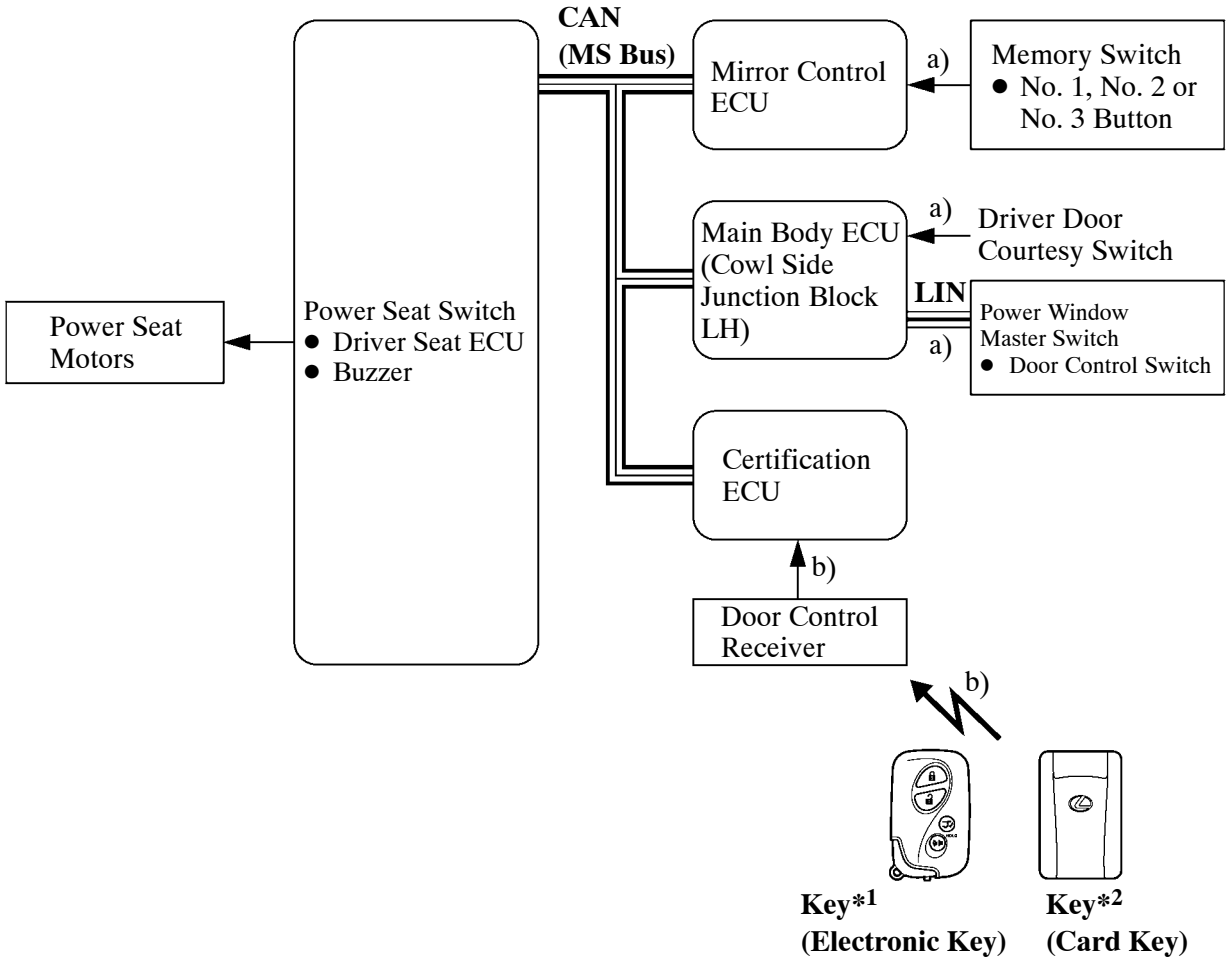
a) The driver seat ECU enters the key ID registration mode (linking mode) when the seat memory No. 1, No. 2 or No. 3 button is pressed with the power source mode OFF and the driver door closed. In this condition, the following operation is performed.

– For the electronic key, when the lock or unlock button on the key is pressed, the key ID is transmitted from the certification ECU to the driver seat ECU.

– For the card key*2, when the lock or unlock side on the door control switch in the power window master switch is pressed, the key ID is transmitted from the certification ECU to the driver seat ECU.

b) The driver seat ECU records the key ID and each position into the memory.

c) When the driver seat ECU completes recording, it beeps the buzzer in the driver seat ECU once as an answerback.



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*1: Models with Power Back Door System and Panic Function
*2: Option

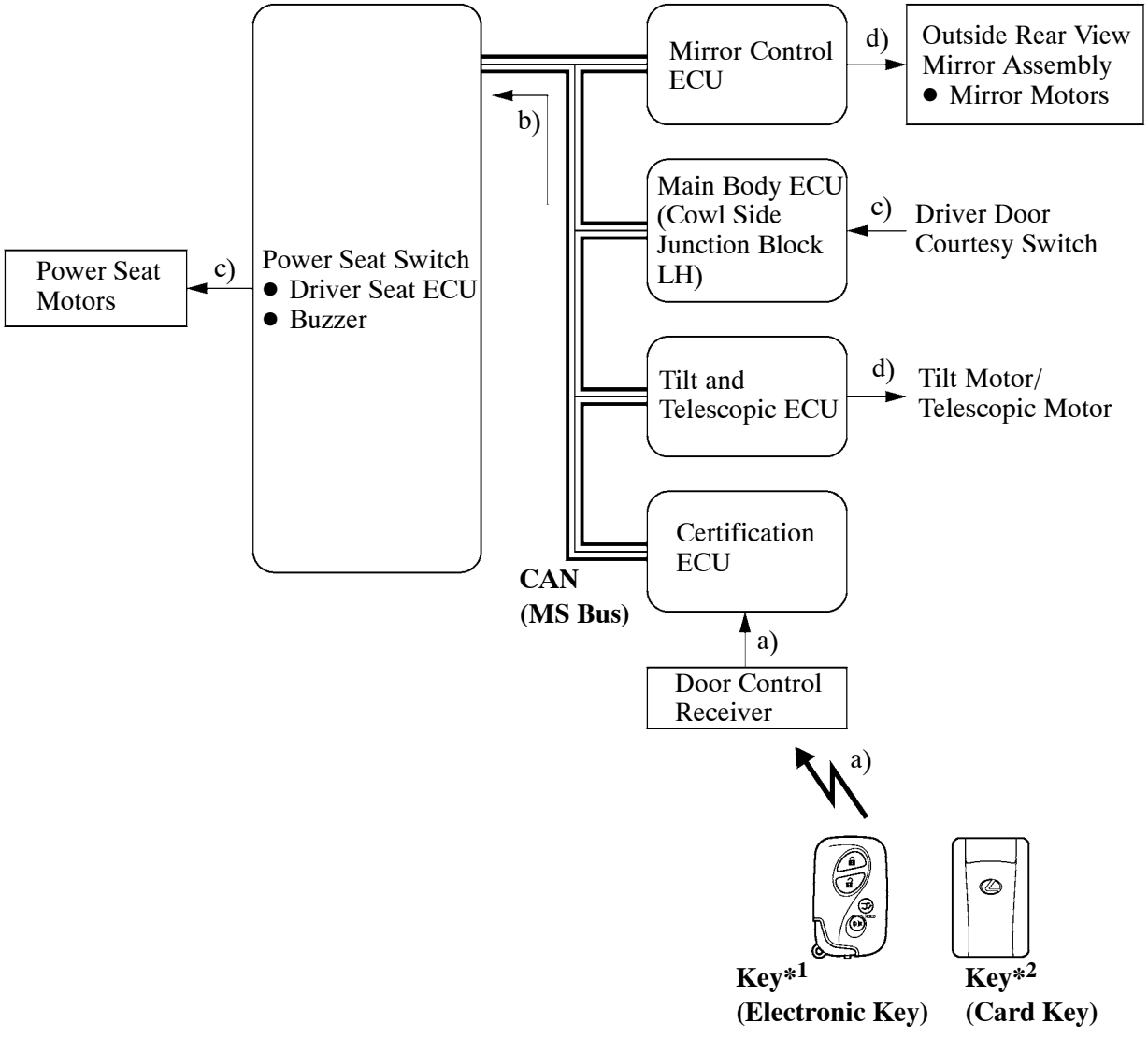
3) Memory Call Operation

a) When the unlock button on the key (electronic key) is pressed or the key (electronic key or card key*2) enters the actuation area, the key ID is input to certification ECU through the door control receiver.

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.



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*1: Models with Power Back Door System and Panic Function

*2: Option

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4) Memory Call Cancel

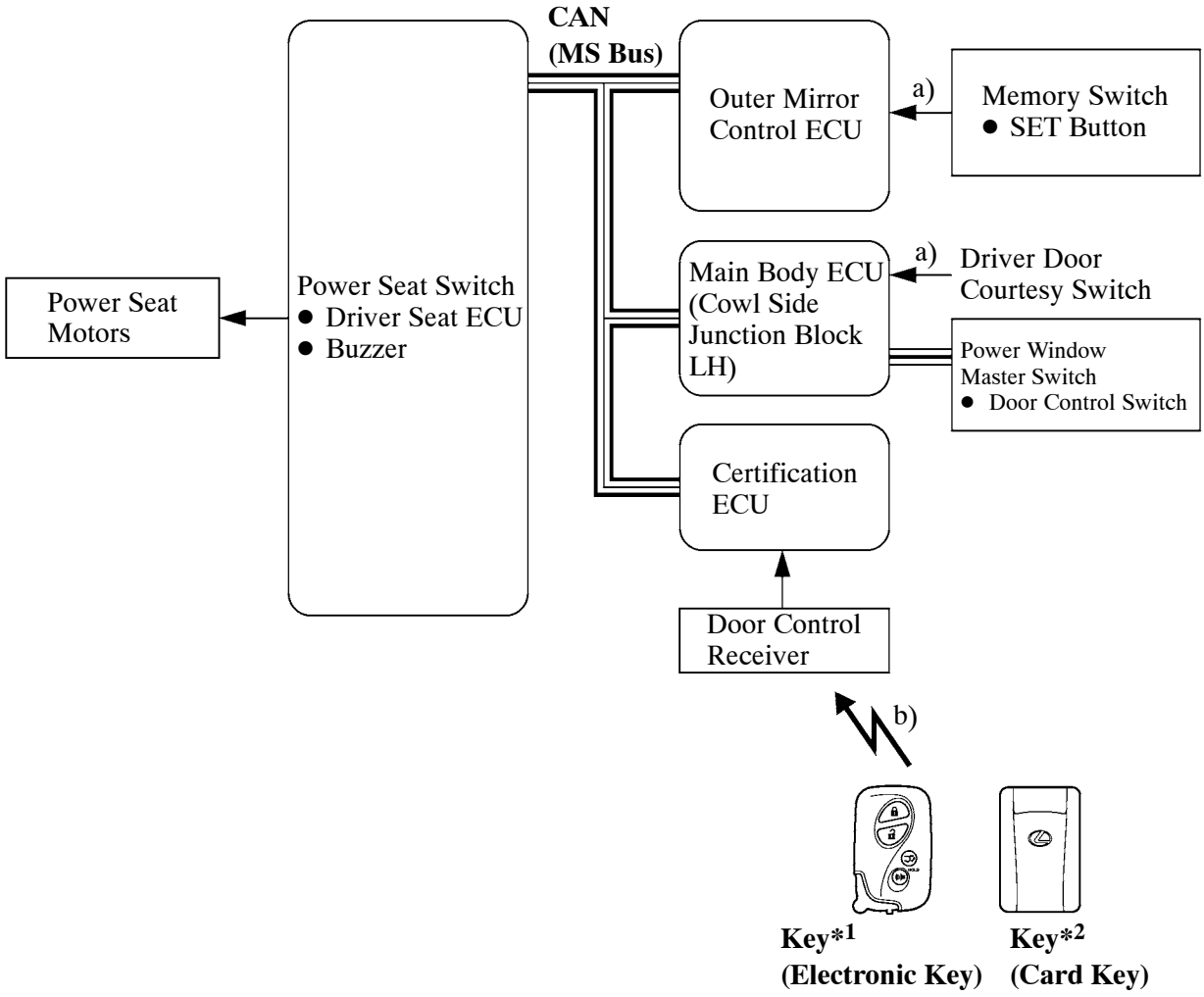
a) If the SET button is pressed when the power source mode is OFF and the driver door is closed, the driver seat ECU enters the memory call cancel mode. In this condition, the following operation is performed.

– For the electronic key, when the lock or unlock button on the key is pressed, the key ID is transmitted from the certification ECU to the driver seat ECU.

– For the card key*2, when the lock or unlock side on the door control switch in the power window master switch is pressed, the key ID is transmitted from the certification ECU to the driver seat ECU.

b) 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.

c) When the driver seat ECU completes switching, it beeps the buzzer in the driver seat ECU twice as an answerback.



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*1: Models with Power Back Door System and Panic Function

*2: Option

Prevention of Key Confinement

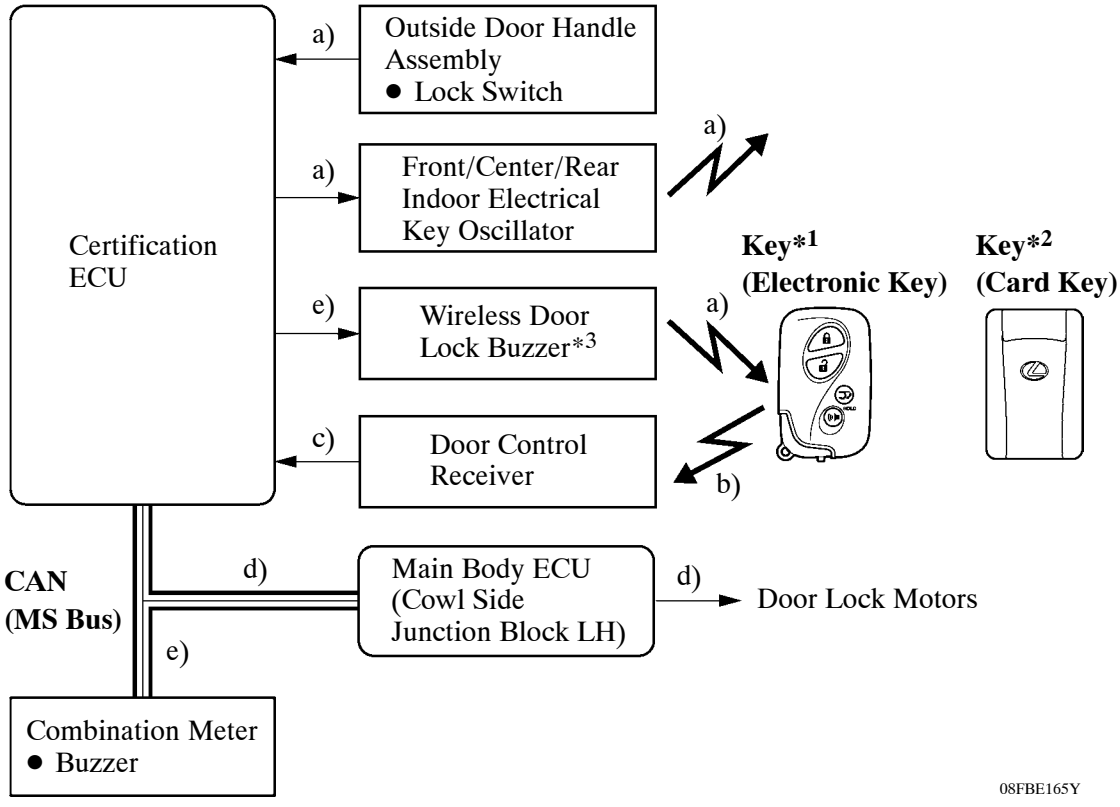
a) When the door is locked by the lock switch of the outside door handle assembly while the key is still inside the vehicle, the certification ECU receives this signal and transmits a request signal for the front, center and rear indoor electrical key oscillators to form actuation areas.

b) The key receives this signal and returns the ID code to the door control receiver.

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 and the buzzer of the combination meter as an answerback.



*1: Models with Power Back Door System and Panic Function
*2: Option
*3: Except for Europe and China Models

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Warning

1) General

When any of the situations below occurs, the entry & start system causes the certification ECU to sound a buzzer in the combination meter and the wireless door lock buzzer*, and display a message on the multi-information display in order to 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.

*: On the China models, the wireless door lock buzzer does not sound.

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:
● Power source mode is 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="3">Combination Meter</td><td>Buzzer</td><td>Continuous sound</td></tr>
<tr><td>Multi-information Display</td><td>

080BE194S</td></tr>
<tr><td>Master Warning Light</td><td>Flash</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:
● Power source mode 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>

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.
● Power source mode is 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="3">Combination Meter</td><td>Buzzer</td><td>Sounds continuously</td></tr>
<tr><td>Multi-information Display</td><td>The following warnings are alternately displayed:


080BE194S


080BE195S</td></tr>
<tr><td>Master Warning Light</td><td>Flash</td></tr>
<tr><td colspan="2">Wireless Door Lock Buzzer</td><td>Sounds continuously*</td></tr>
<tr><td colspan="2">Engine Switch Indicator Light</td><td>—</td></tr>
<tr><td colspan="2" rowspan="5">Warning Stop Condition</td><td>● Key is in the vehicle.</td></tr>
<tr><td>● The wireless door lock buzzer stops.
● Multi-information display:


080BE194S</td></tr>
<tr><td>● Vehicle speed is above 0 km/h (0 mph).</td></tr>
<tr><td>● The wireless door lock buzzer stops.
● Multi-information display:


080BE195S</td></tr>
<tr><td>● Power source mode is OFF.
All warning operations stop.</td></tr>
</table>

*: Except for China 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 ON (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 (IG) or ON (ACC) 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: ● Power source mode is ON (ACC) and the driver door is opened. ● Power source mode is OFF, the steering is unlocked, and the driver door is opened.
Combination Meter	Buzzer	Continues to sound at short and even intervals
	Multi-information Display	—
	Master 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: ● Power source mode is ON (IG). ● Driver door is closed. ● Power source mode is OFF and the steering is locked.

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 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 outside door handle assembly.

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. ● Power source mode is other than OFF. ● Key is not in the vehicle. ● Driver door is opened → closed.
Combination Meter	Buzzer	Sounds once
	Multi-information Display	 080BE195S
	Master Warning Light	Flash
Wireless Door Lock Buzzer		Sounds three times*
Engine Switch Indicator Light		—
Warning Stop Condition		The warning is stopped when one of the following conditions is met: ● Power source mode is OFF. ● Key is in the vehicle.

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. ● Power source mode is other than OFF. ● All doors are closed. ● The key is outside the vehicle (within one of the actuation areas). ● Lock switch on the outside door handle assembly is pressed.
Combination Meter	Buzzer	—
	Multi-information Display	—
	Master Warning Light	—
Wireless Door Lock Buzzer		Sounds for 60 seconds*
Engine Switch Indicator Light		—
Warning Stop Condition		The warning is stopped when one of the following conditions is met: ● The power source mode is OFF and the key is not within the actuation areas. ● Key is in the vehicle.

*: Except for China Models

5) Situation: D

The lock switch on the outside door handle assembly 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: ● Power source mode is OFF. ● Any doors are opened. ● Lock button on the outside door handle assembly is pressed.
Combination Meter	Buzzer	—
	Multi-information Display	—
	Master Warning Light	—
Wireless Door Lock Buzzer		Sounds for 10 seconds*
Engine Switch Indicator Light		—
Warning Stop Condition		The warning is stopped when one of the following conditions is met: ● Power source mode is other than OFF. ● All doors are closed. ● Wireless door lock control function is unlocked. ● 10 seconds have elapsed since the wireless door lock buzzer was activated.

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: ● Power source mode is 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	Buzzer	Sounds once
	Multi-information Display	 080BE195S
	Master Warning Light	Flash
Wireless Door Lock Buzzer		Sounds 3 times*
Engine Switch Indicator Light		—
Warning Stop Condition		The warning is stopped when one of the following conditions is met: ● Power source mode is OFF. ● Vehicle speed is above 0 km/h (0 mph). ● Key is in the vehicle.

*: Except for China Models

7) Situation: F

There are two patterns for situation F.

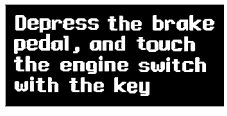
- Pattern 1: When the key is not in the cabin or the key does not operate properly, the driver attempts to start the engine or change the power source mode to ON (IG) or ON (ACC).
- Pattern 2: When the key is not in the cabin or the key does not operate properly, the driver pushes the engine switch twice or more.

In these situations, the following control is performed:

Pattern 1.

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	Buzzer	Sounds once
	Multi-information Display	 080BE195S Displayed for 10 seconds (and then automatically turned OFF)
	Master Warning Light	Flash
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 actuation area, press the lock button of the key and confirm that the indicator of the key comes ON. If the indicator does not come ON, replace the key battery with a new one.

Pattern 2.

Possible Effects without Warning		Confuses the user
Warning Condition		The warning is activated when all of the following conditions are met: ● Power source mode is other than ON (IG). ● Engine switch is pushed twice or more. ● Key is not in the vehicle.
Combination Meter	Buzzer	—
	Multi-information Display	 08FBE230Y Displayed for 60 seconds (and then automatically turned OFF)
	Master 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: ● 60 seconds have elapsed since a warning message was displayed. However, if the engine switch is pushed again, the warning will be activated ● Any door is opened or closed.

8) Situation: G

The lock switch on the outside door handle assembly 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: ● Power source mode is OFF. ● All doors are closed. ● Key is in the vehicle. ● Lock switch on the outside door handle assembly is pressed.
Combination Meter	Buzzer	—
	Multi-information Display	—
	Master Warning Light	—
Wireless Door Lock Buzzer		Sounds for 2 seconds*
Engine Switch Indicator Light		—
Warning Stop Condition		The key is removed from the cabin and the lock switch on the outside door handle assembly is pressed again.

*: Except for China 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 & start system does not function
Warning Condition		The warning is activated when all of the following conditions are met: ● Power source mode switches to OFF after being left ON (IG) for over 20 minutes. ● Key battery voltage is low. ● Key is in the vehicle.
Combination Meter	Buzzer	Sounds once
	Multi-information Display	 080BE196S
	Master Warning Light	Illuminate
Wireless Door Lock Buzzer		—
Engine Switch Indicator Light		—
Warning Stop Condition		The key battery is replaced with a new one.

10) Situation: I

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

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

11) Situation: J

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

Possible Effects without Warning		Engine cannot be started
Warning Condition		A malfunction of the steering lock ECU is detected.
Combination Meter	Buzzer	Sounds once
	Multi-information Display	 080BE19Y
	Master Warning Light	Flash
Wireless Door Lock Buzzer		—
Engine Switch Indicator Light		The amber indicator blinks at 2-second intervals.
Warning Stop Condition		The steering lock ECU returns to normal.

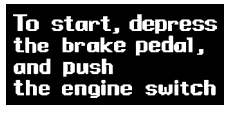
12) Situation: K

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

Possible Effects without Warning		Engine cannot be started
Warning Condition		A malfunction in the main body ECU is detected.
Combination Meter	Buzzer	—
	Multi-information Display	—
	Master 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.

13) Situation: L

A warning message appears on the multi-information display 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		Entry & start system does not function
Warning Condition		The warning is activated when all of the following conditions are met: ● Power source mode is other than ON (IG). ● Any doors are closed → opened. ● The power source mode is changed from OFF to ON (ACC) more than once with the engine OFF and brake pedal not depressed.
Combination Meter	Buzzer	Sounds once
	Multi-information Display	 080BE15Y
	Master 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 power source mode is OFF.

Battery Saving

1) Vehicle Battery Saving Function

In the entry & 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 & start system.

▶ Reinstatement Conditions ◀

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

2) Key Battery and Vehicle Battery Saving Function

In the entry & 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 & start system automatically deactivates.

▶ Reinstatement Conditions ◀

- A wireless door lock control signal (lock and unlock) is input and the ID matches.
- A user presses a lock switch on an outside door handle assembly carrying the key.
- 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 conditions:

- Power source mode 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 LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

Mode	Function
Rewrite	Erases all previously registered codes and registers only the newly received codes. This mode is used whenever a key 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 key. 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 control function. This mode is used when a key is lost.

THEFT DETERRENT SYSTEM

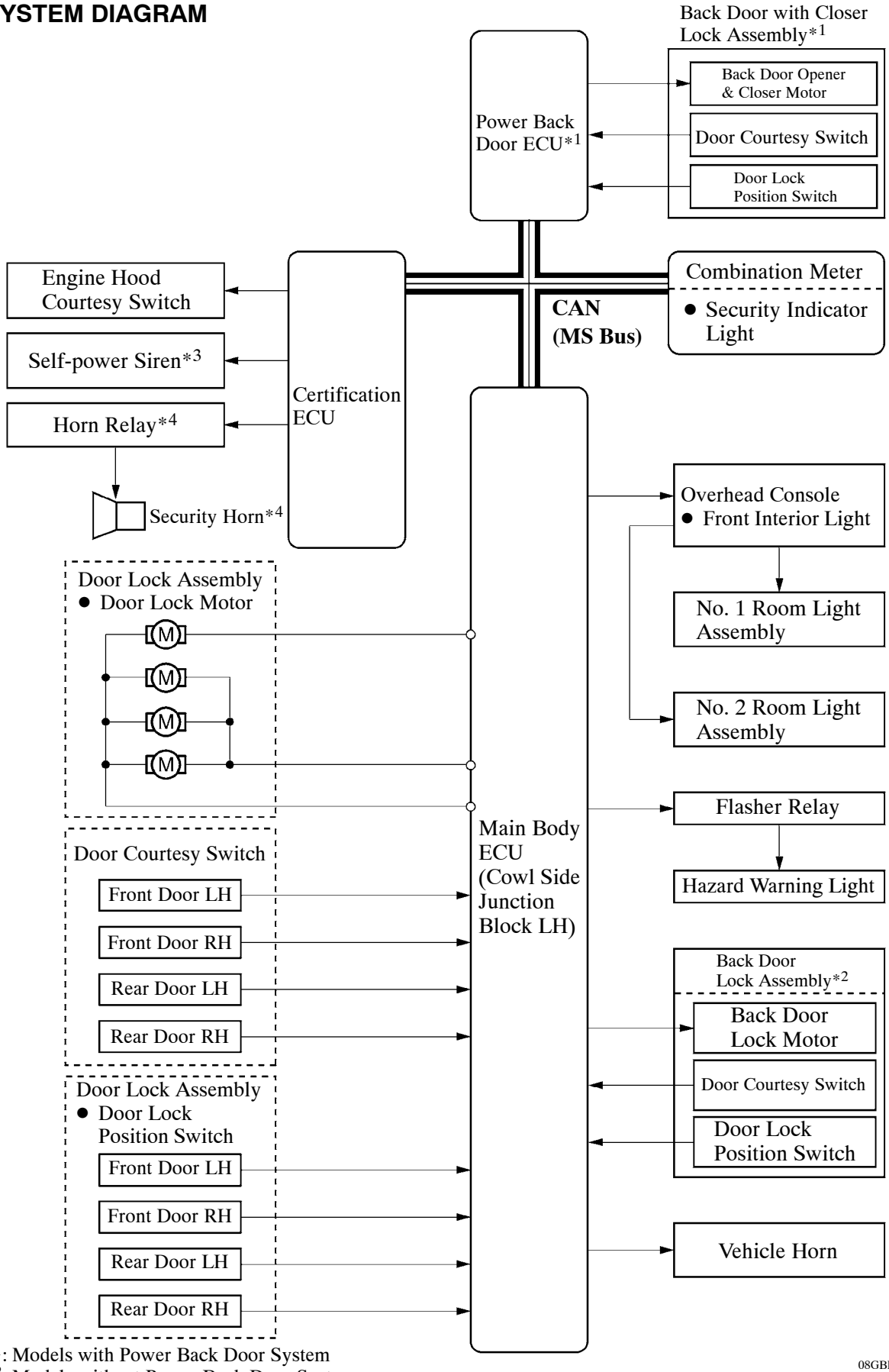
■ DESCRIPTION

- The theft deterrent system sounds an alarm when any of the following actions are detected:
  - Any door is unlocked not by using the key lock button, the entry & start system, or the mechanical key*1.
  - The engine hood is opened.
  - The battery terminals are removed. *2
  - The battery terminals are removed and reconnected.
  - The power source mode has been changed to ON (IG) by hot wiring and not by operating the engine switch.
- The system consists of door lock control system parts, entry & start system parts, the security horn and the security indicator light.
- The certification ECU controls this system.
- The warning methods and timing of the system are listed below.

<table>
<tr><td rowspan="6">Warning Method</td><td>Interior Lights</td><td colspan="2">Illuminates</td></tr>
<tr><td>Hazard Warning Lights</td><td colspan="2">Flash</td></tr>
<tr><td>Vehicle Horn</td><td>Sound</td><td rowspan="2">Approximately 0.4-second cycles</td></tr>
<tr><td>Security Horn*3</td><td>Sound</td></tr>
<tr><td>Self-power Siren*2</td><td colspan="2">Sounds a warning at the cycle of the self-power siren itself</td></tr>
<tr><td>Door Lock Motors</td><td colspan="2">Lock</td></tr>
<tr><td colspan="2">Warning Time</td><td colspan="2">Approximately 30 seconds</td></tr>
</table>

*1: G.C.C. Countries and Australia Models
*2: Europe Models
*3: Except Europe Models

■SYSTEM DIAGRAM

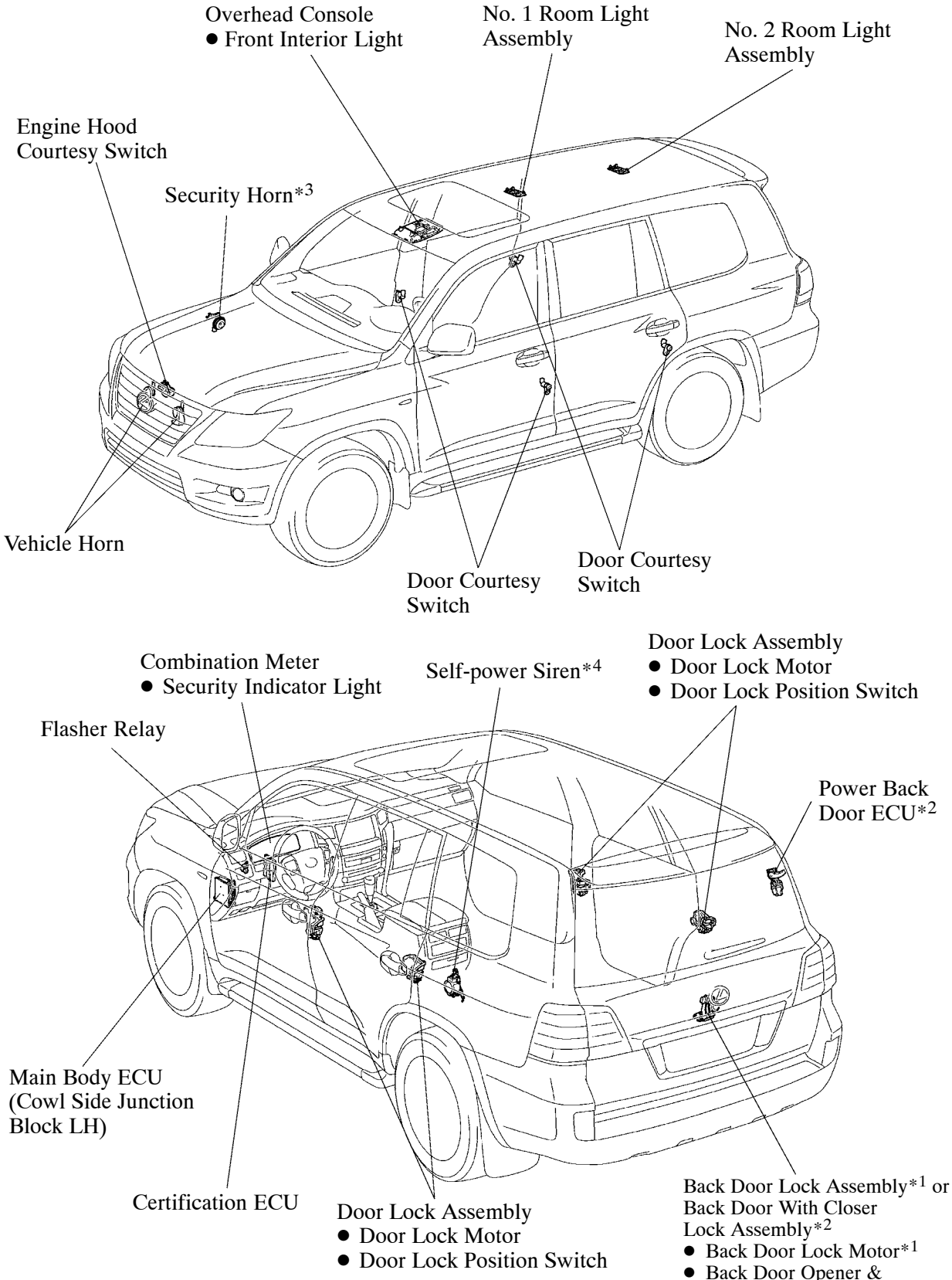


*1: Models with Power Back Door System
*2: Models without Power Back Door System
*3: Europe Models
*4: Except Europe Models

08GBE100Y

BE

■ LAYOUT OF MAIN COMPONENTS



*1: Models without Power Back Door System
*2: Models with Power Back Door System
*3: Except Europe Models
*4: Europe Models

LHD Model

08GBE85Y

■ FUNCTION

The theft deterrent system has the following function:

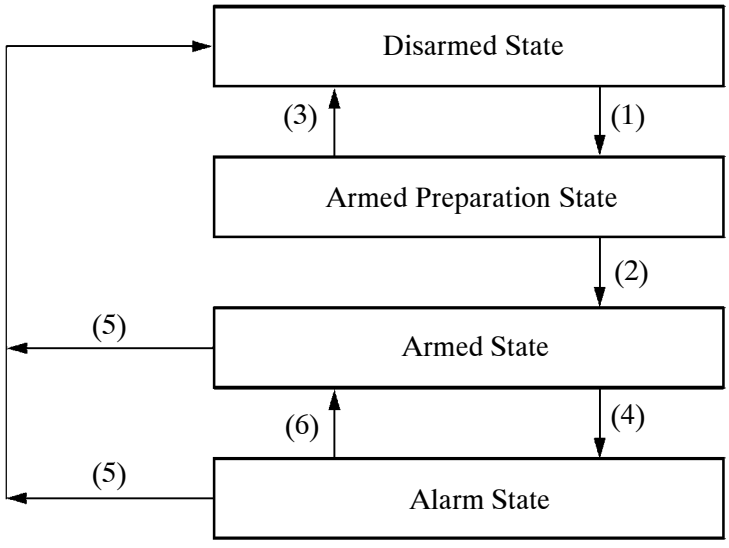
Function	Outline
Alarm	When the theft deterrent system enters the alarm state, the warning items (interior lights, hazard warning lights, vehicle horn and security horn*1 and self-power siren*2) are operated for approximately 30 seconds.
Security Indicator	When the state of the theft deterrent system enters the armed preparation or alarm state, the security indicator light is illuminated to inform the user. This indicator is also the engine immobilizer indicator. It blinks when the engine immobilizer is in an engaged state.
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.
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 of the front door is unlocked not by using the mechanical key. (Engine switch is OFF) The function stops when one of the following conditions is met. ● All doors are locked (lock function of door lock or key is operated). ● The warning ends after approximately 30 seconds. ● Either of the front door is unlocked using the key.

*1: Except Europe Models
*2: Europe 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 is activated 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 is activated.	—



- The theft deterrent system operates as described in the diagram above when one of items in the table 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 lock button, the entry & start system, or the mechanical key*1.
(2)	The system state is switched when the doors, engine hood, and back door are all closed and locked, and 30 seconds have elapsed*2.
(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.

*1: G.C.C. Countries and Australia Models
*2: 10 seconds for the China models

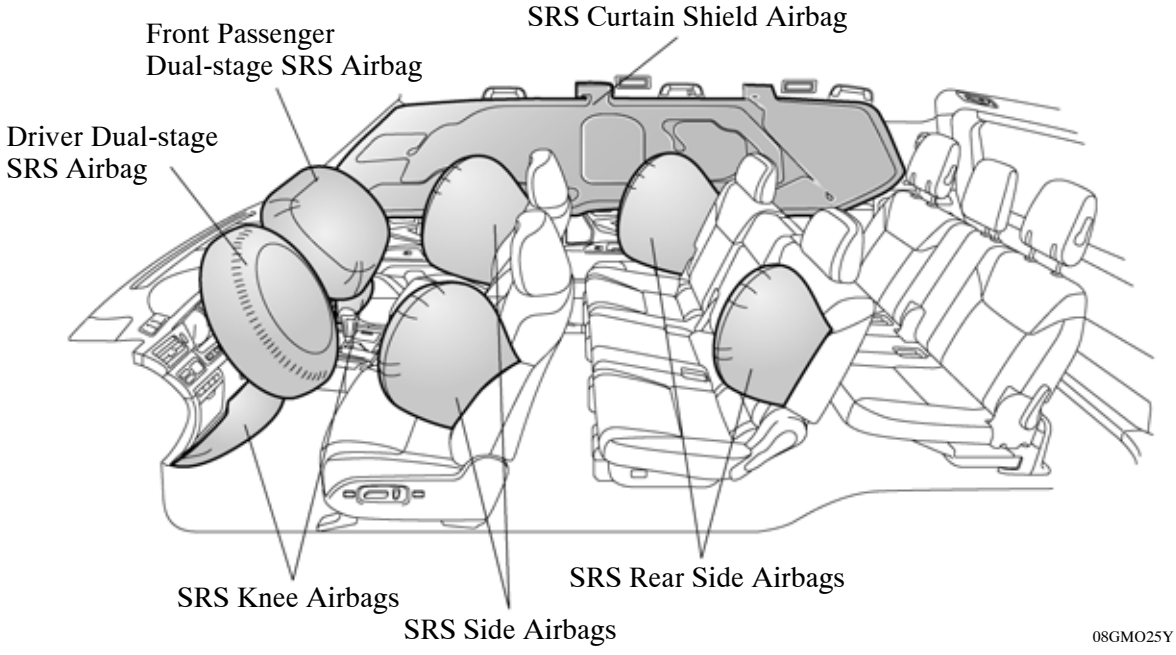
(Continued)

Condition	Item
(4)	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 changed from “lock” to “unlock” through an operation other than the key or the entry unlock function. ● With the back door closed, the back door is opened by a method other than the entry & start system. ● With the engine hood closed, the engine hood is opened. ● A terminal is disconnected from the battery and reconnected. ● The power source mode is changed to ON (IG) by directly connecting the engine switch, not by operating the engine switch.
(5)	The system state is switched when one of the following conditions is met. ● Any door is unlocked with the mechanical key, the entry & start system or the unlock button of the key. ● The back door is opened with the entry & start system. ● The power source mode has been changed to ON (IG) by operating the engine switch.
(6)	The system state is switched after the alarm time elapses.

SRS AIRBAG SYSTEM

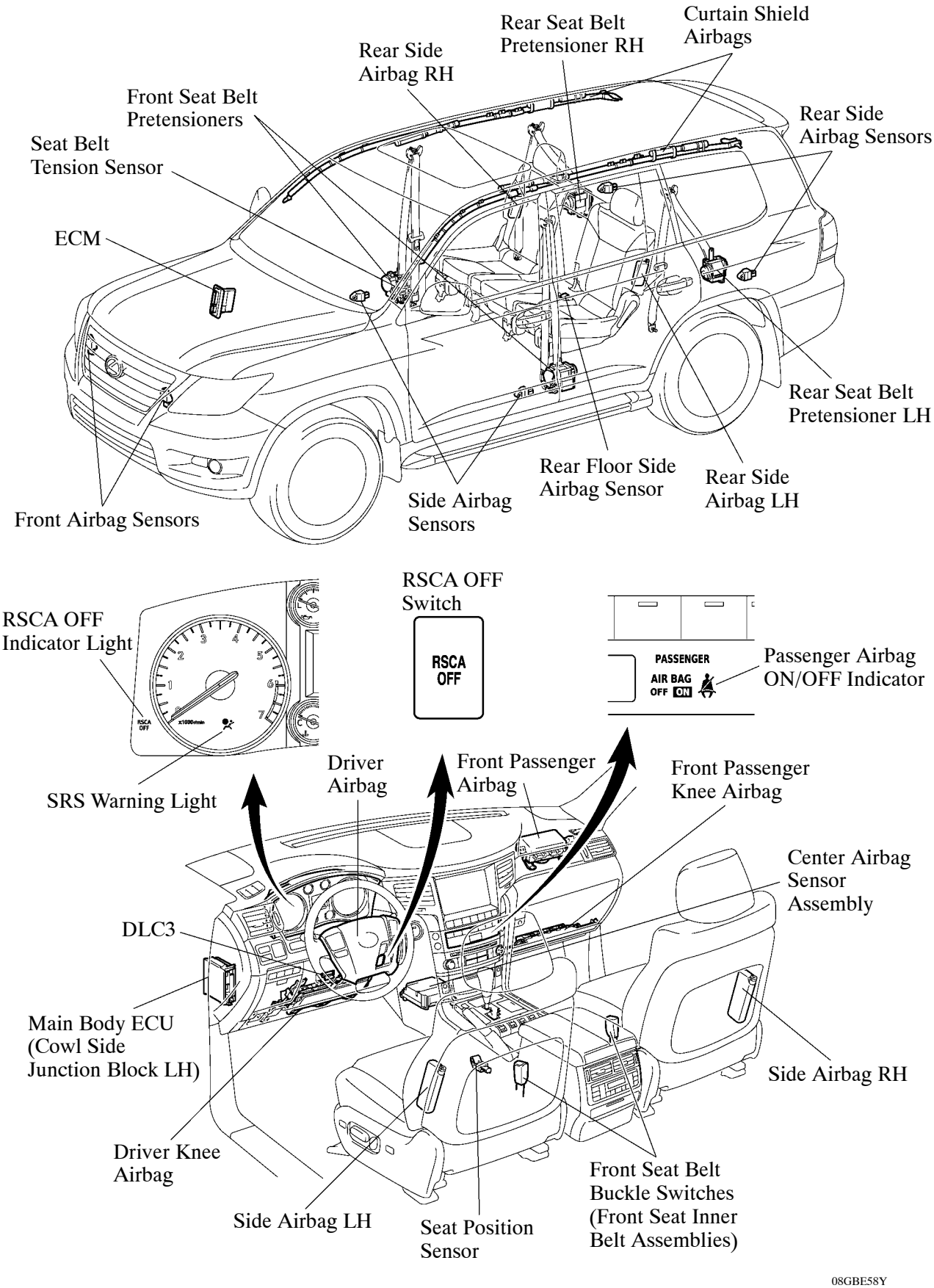
■ DESCRIPTION

- The driver and front passenger dual-stage SRS (Supplemental Restraint System) airbags supplement the seat belts to help to reduce the shocks to the heads and chests 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.
- The SRS side airbags for the driver and the front passenger and the SRS rear side airbags for the rear No. 1 seat outer passengers help to reduce shocks to the chests and heads of the driver, front passenger, and rear No. 1 seat outer passengers in the event of a side collision.
- The SRS curtain shield airbags help to reduce shocks to the chests and heads of the driver, front passenger, rear No. 1 seat and rear 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 deploy the curtain shield airbags for the driver, front passenger, rear No. 1 seat and rear No. 2 seat outer passengers and the seat belt pretensioners for the driver, front passenger, and rear No.1 seat outer passengers, in the event that the vehicle rolls over. The RSCA OFF switch is provided on the driver side of the instrument panel to allow the driver to disable this function.
- An airbag manual ON-OFF switch is provided as standard equipment on the Europe models to disable the deployment of the front passenger airbag, front passenger side knee airbag, and front passenger side airbag (side airbag RH).
- The function of the center airbag sensor assembly is to record the front seat belt wearing condition while the airbag is inflating.
- If any of the airbags have been deployed, the center airbag sensor assembly transmits a collision detection signal to the ECM. For details, see page EG-79.
- During a collision, the center airbag sensor assembly of the SRS airbag system sends a door unlock signal to the main body ECU in order to unlock all doors. For details, see page BE-171.



LHD Model

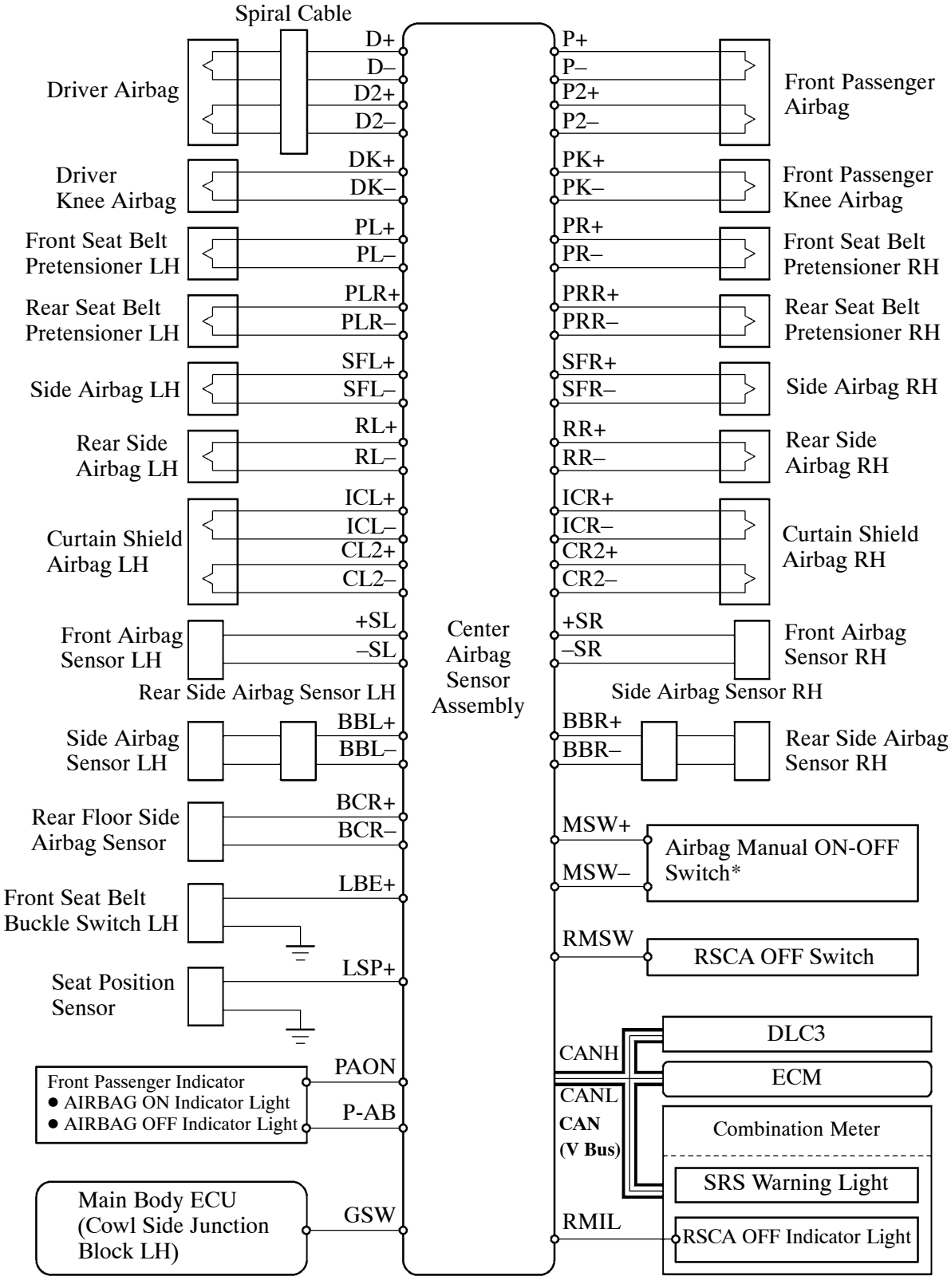
■ LAYOUT OF MAIN COMPONENTS



LHD Model

BE

■WIRING DIAGRAM



08GBE40Y

*: Europe Models

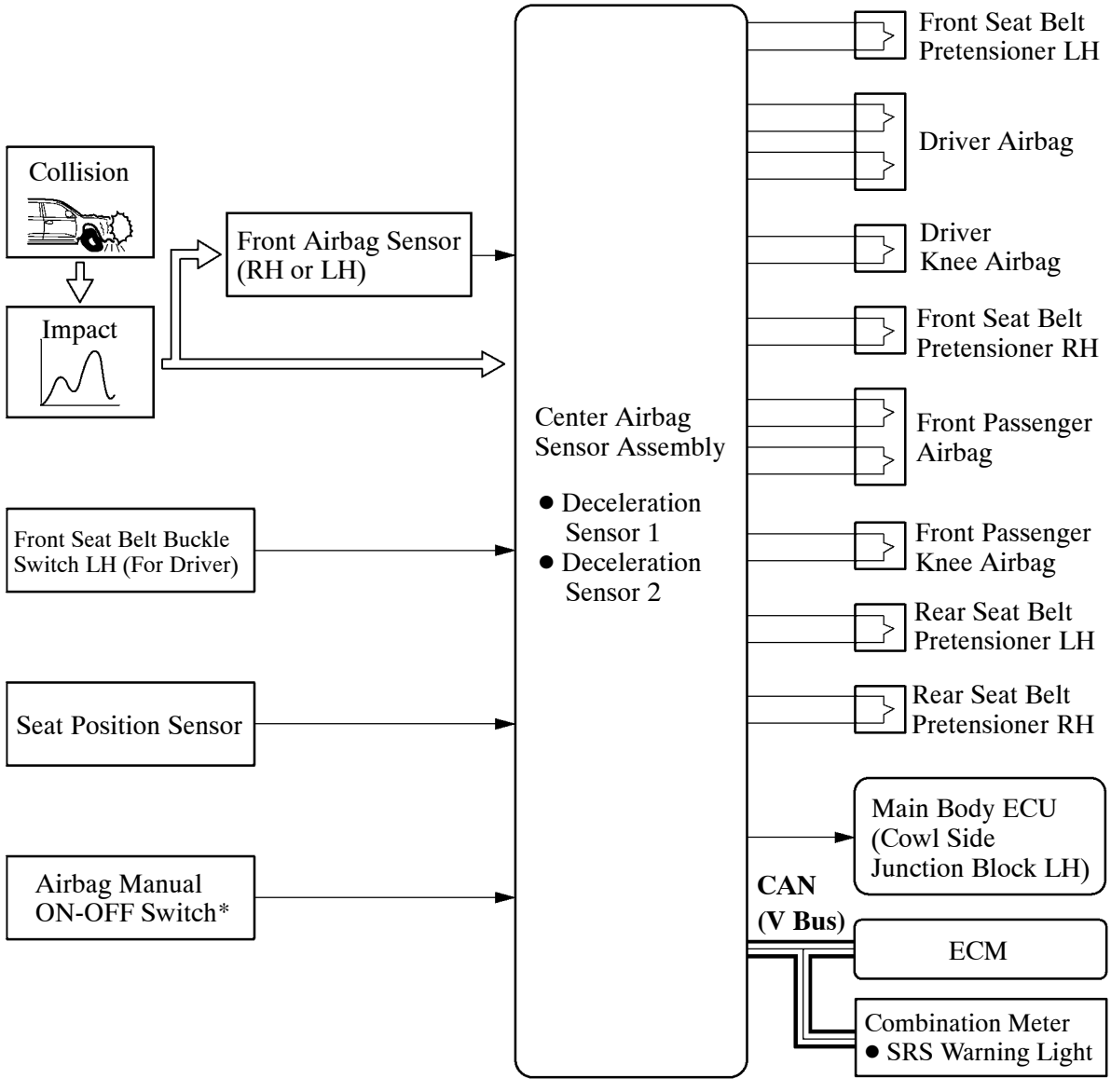
LHD Model

■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 and front passenger 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.
- The deceleration sensor is enclosed in the front airbag sensor. 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.

▶ Front Airbag Operation ◀



LHD Model

*: Europe Models

BE

2. Dual-stage SRS Airbag System

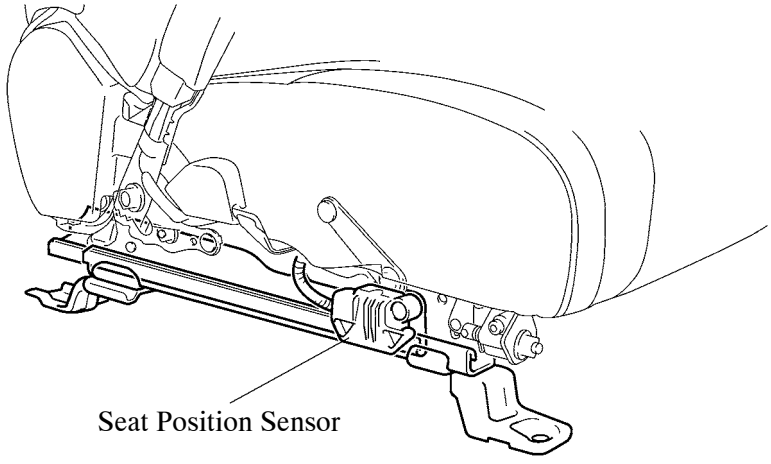
General

In the dual-stage SRS airbag 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 Sensor

1) General

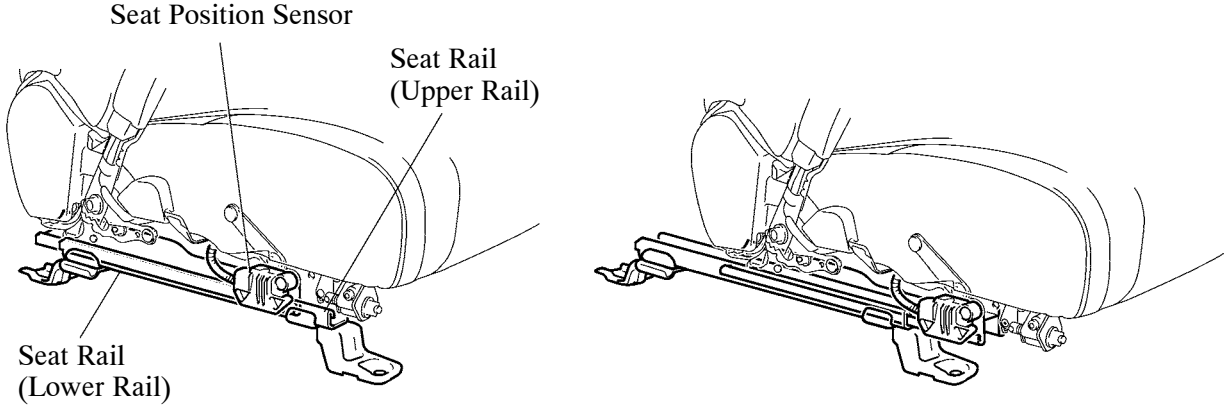
The seat position sensor is mounted on the upper rail portion of the driver seat rail, and includes a Hall IC and a magnet. This sensor is used to detect the sliding position of the driver seat.



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2) Operation

When the seat is in the rearward position, the lower rail portion of the seat rail is close to the seat position 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 sensor varies depending on the seat position. The Hall IC detects this variation and outputs signals to the center airbag sensor assembly.



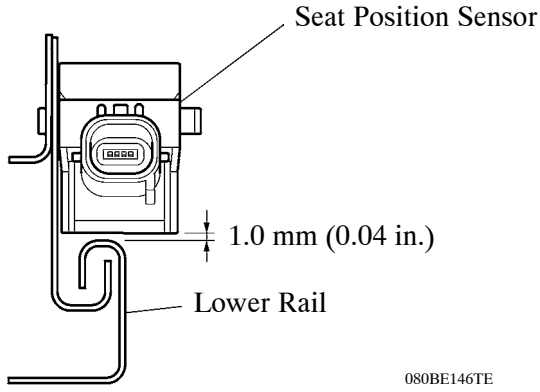
Seat position is rearward **Seat position is forward**

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Service Tip

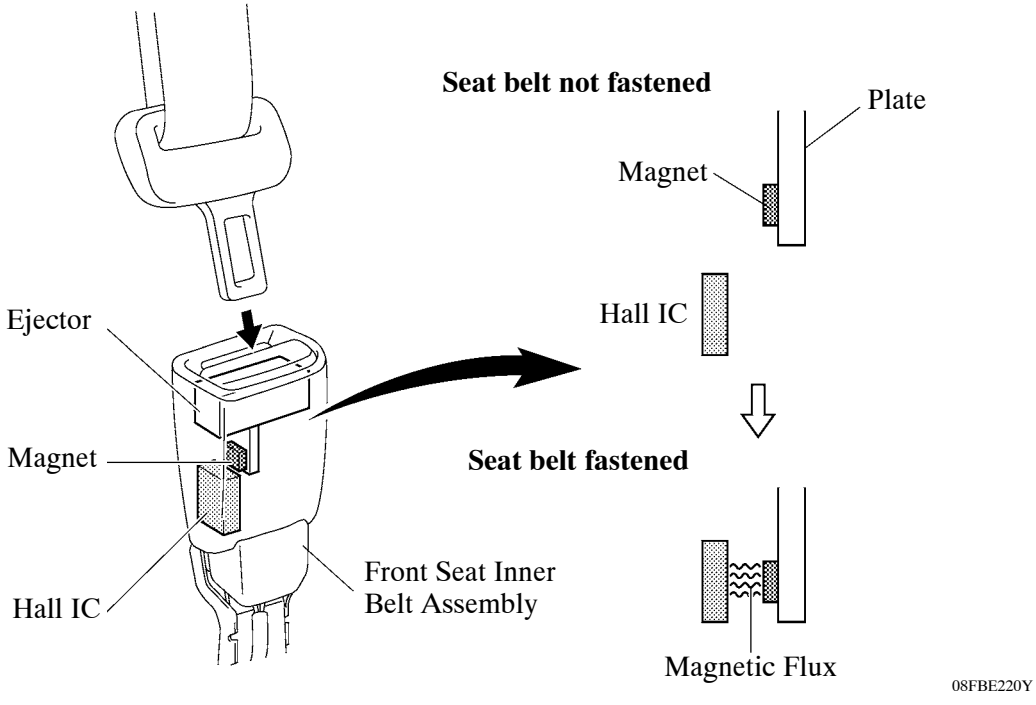
Follow the procedure indicated below to install the seat position sensor.
1) Insert a 1.0 mm (0.04 in.) feeler gauge between the seat position sensor and the lower rail portion.
2) Tighten the mounting bolt to the specified torque with the seat position sensor pushed down as shown.

For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).



Front Seat Belt Buckle Switch

- The front seat belt buckle switch detects whether or not the seat belt is fastened.
- The non-contact type switch is composed of a Hall IC and a 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.
- On the driver's side, the Hall IC detects the changes in the magnetic flux density in accordance with the seat belt removal or insertion, and outputs a signal to the center airbag sensor assembly.



3. SRS Driver and Front Passenger Airbags

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 SRS 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 passenger protection provided by the seat belts and front airbags.

5. Front Airbag Sensor

The 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

- With the airbag for side collisions, if the side airbag sensor detects an impact, the center airbag sensor assembly causes the side, rear side and curtain shield airbags to be deployed simultaneously.
- With the airbag for rear side collisions, if the rear side airbag sensor detects an impact, the center airbag sensor assembly causes the rear side and curtain shield airbags to be deployed simultaneously.
- The airbag deployment during side/rear side collisions is shown in the tables below.

▶ Airbag for Side Collision ◀

Collision Detecting Sensor	Side Airbag	Rear Side Airbag	Curtain Shield Airbag
● Side Airbag Sensor ● Rear Floor Side Airbag Sensor ● Center Airbag Sensor Assembly	○	○	○

▶ Airbag for Rear Side Collision ◀

Collision Detecting Sensor	Side Airbag	Rear Side Airbag	Curtain Shield Airbag
● Rear Side Airbag Sensor ● Rear Floor Side Airbag Sensor ● Center Airbag Sensor Assembly	—	○	○

3. SRS Driver and Front Passenger Airbags

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 SRS 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 passenger protection provided by the seat belts and front airbags.

5. Front Airbag Sensor

The 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

- With the airbag for side collisions, if the side airbag sensor detects an impact, the center airbag sensor assembly causes the side, rear side and curtain shield airbags to be deployed simultaneously.
- With the airbag for rear side collisions, if the rear side airbag sensor detects an impact, the center airbag sensor assembly causes the rear side and curtain shield airbags to be deployed simultaneously.
- The airbag deployment during side/rear side collisions is shown in the tables below.

▶ Airbag for Side Collision ◀

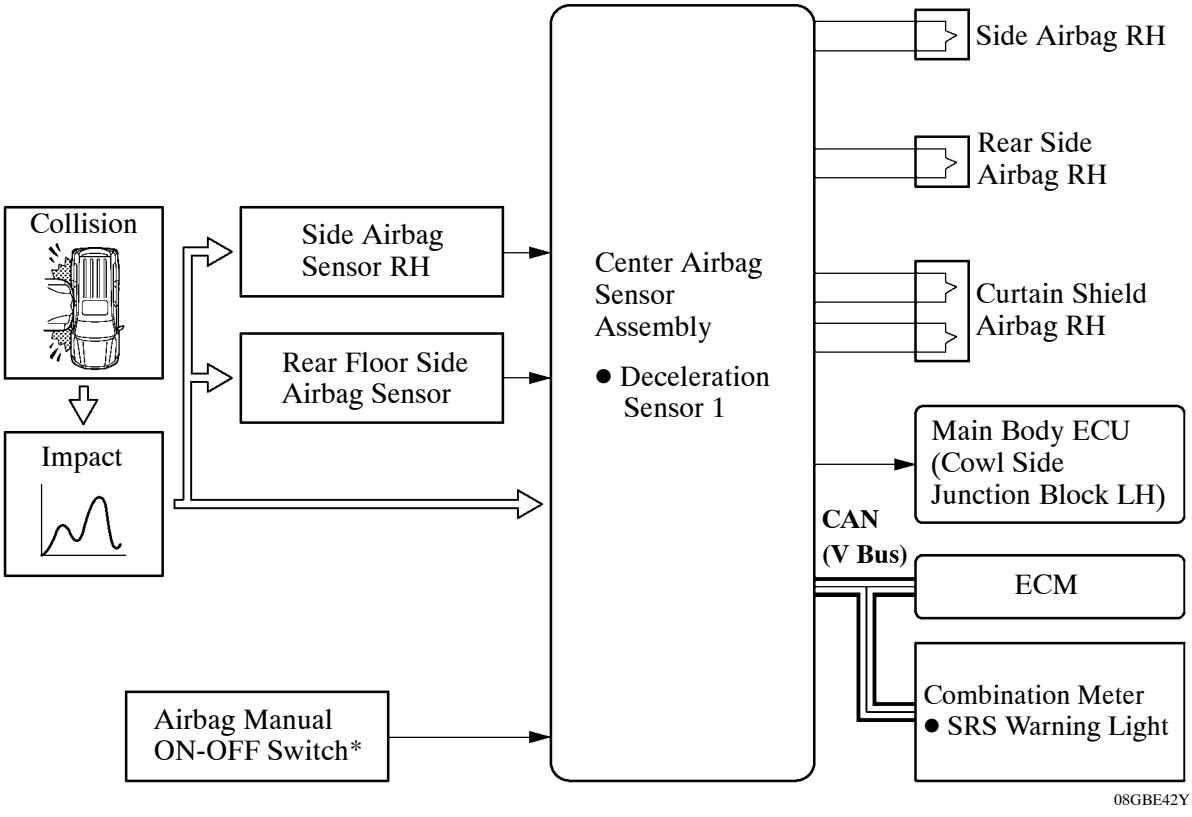
Collision Detecting Sensor	Side Airbag	Rear Side Airbag	Curtain Shield Airbag
● Side Airbag Sensor ● Rear Floor Side Airbag Sensor ● Center Airbag Sensor Assembly	○	○	○

▶ Airbag for Rear Side Collision ◀

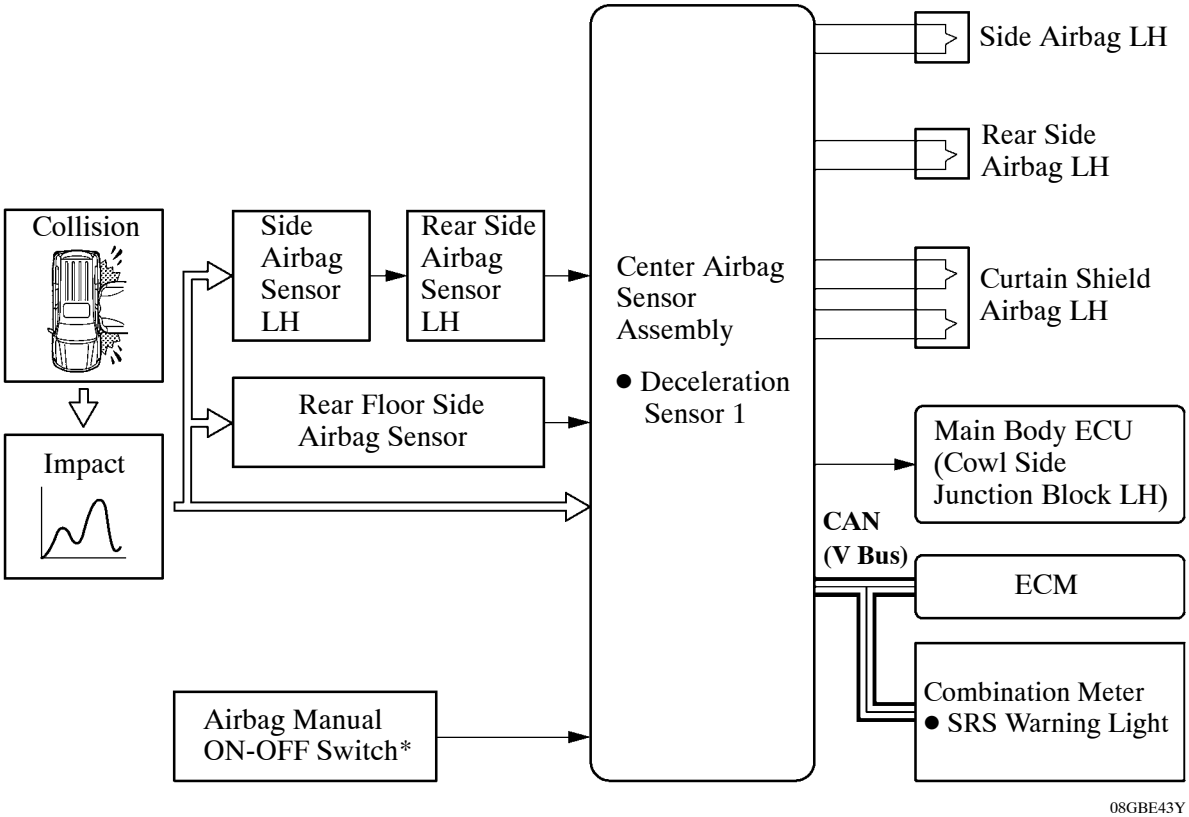
Collision Detecting Sensor	Side Airbag	Rear Side Airbag	Curtain Shield Airbag
● Rear Side Airbag Sensor ● Rear Floor Side Airbag Sensor ● Center Airbag Sensor Assembly	—	○	○

2. Airbags for Side Collision

▶ System Operation for Right Side Collision ◀



▶ System Operation for Left Side Collision ◀

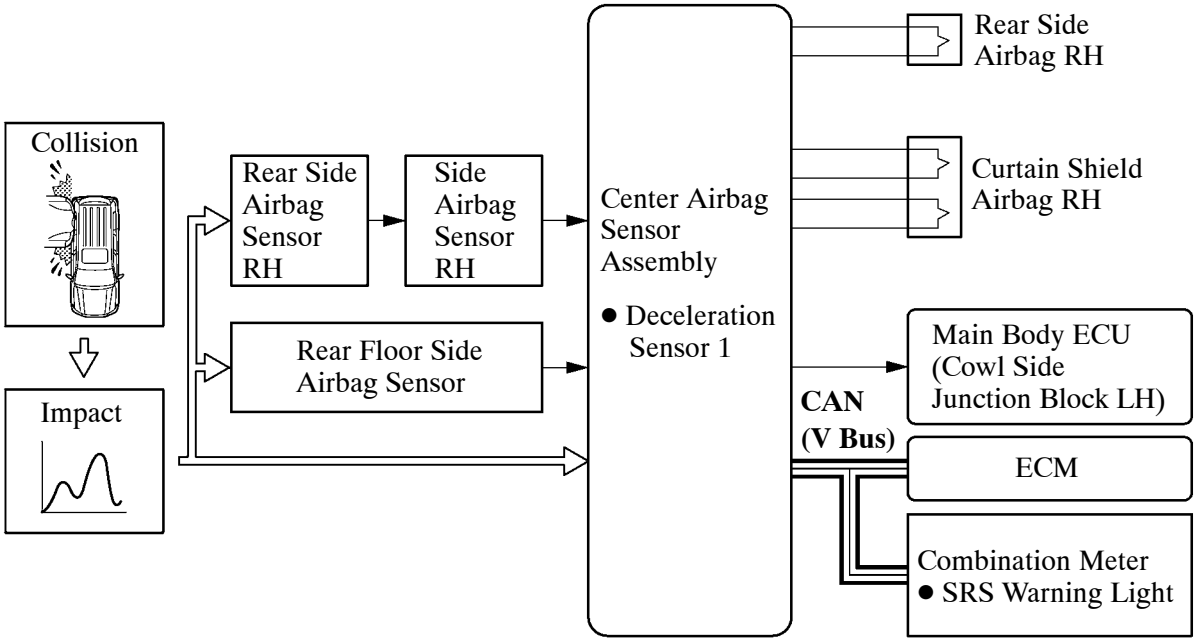


*: Europe Models

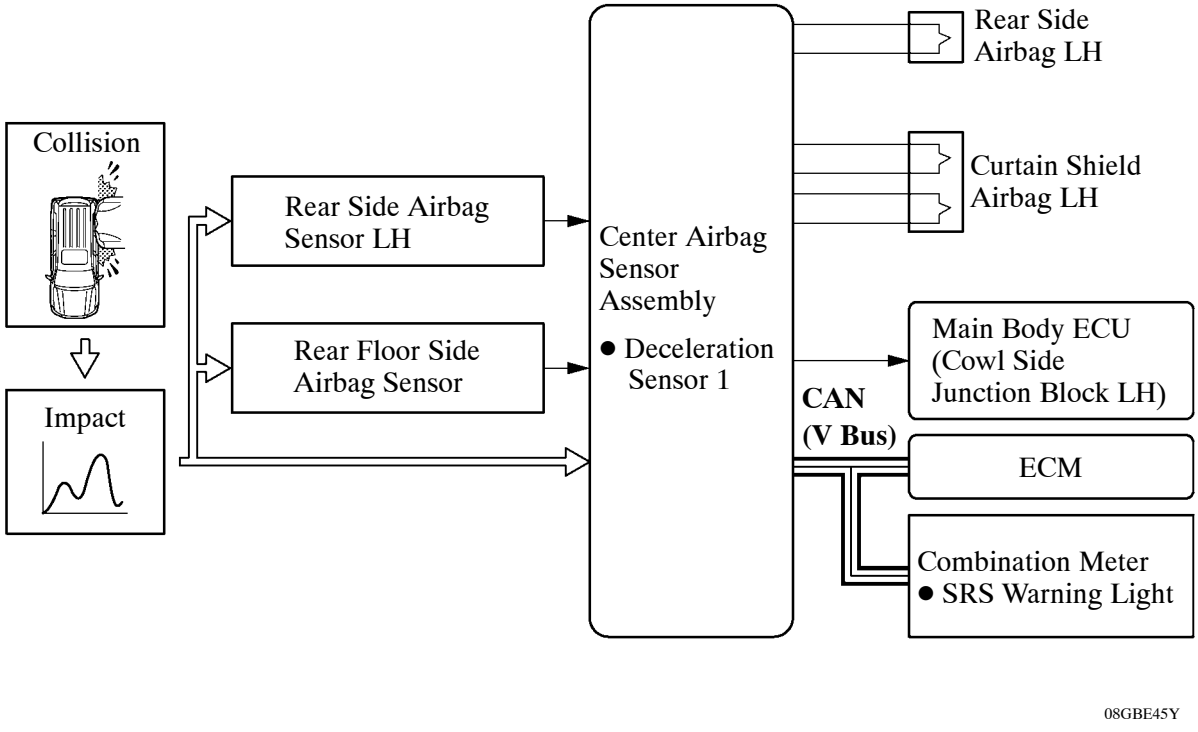
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3. Airbags for Rear Side Collision

▶ System Operation for Rear Right Side Collision ◀



▶ System Operation for Rear Left Side Collision ◀

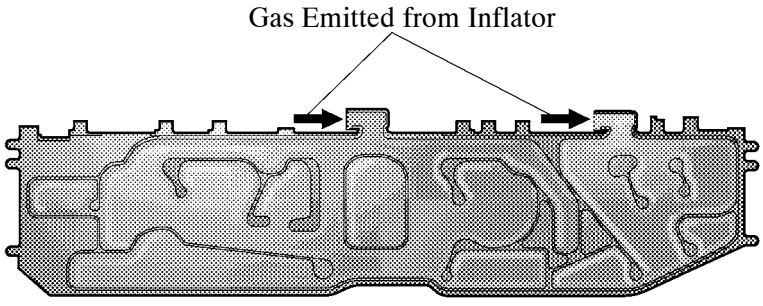


4. SRS Side Airbag and SRS Rear Side Airbag

SRS 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

SRS curtain shield airbags extend from the driver's and front passenger's front pillars to the rear pillars 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. Therefore, the SRS curtain shield airbag uses 2 inflators.



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

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

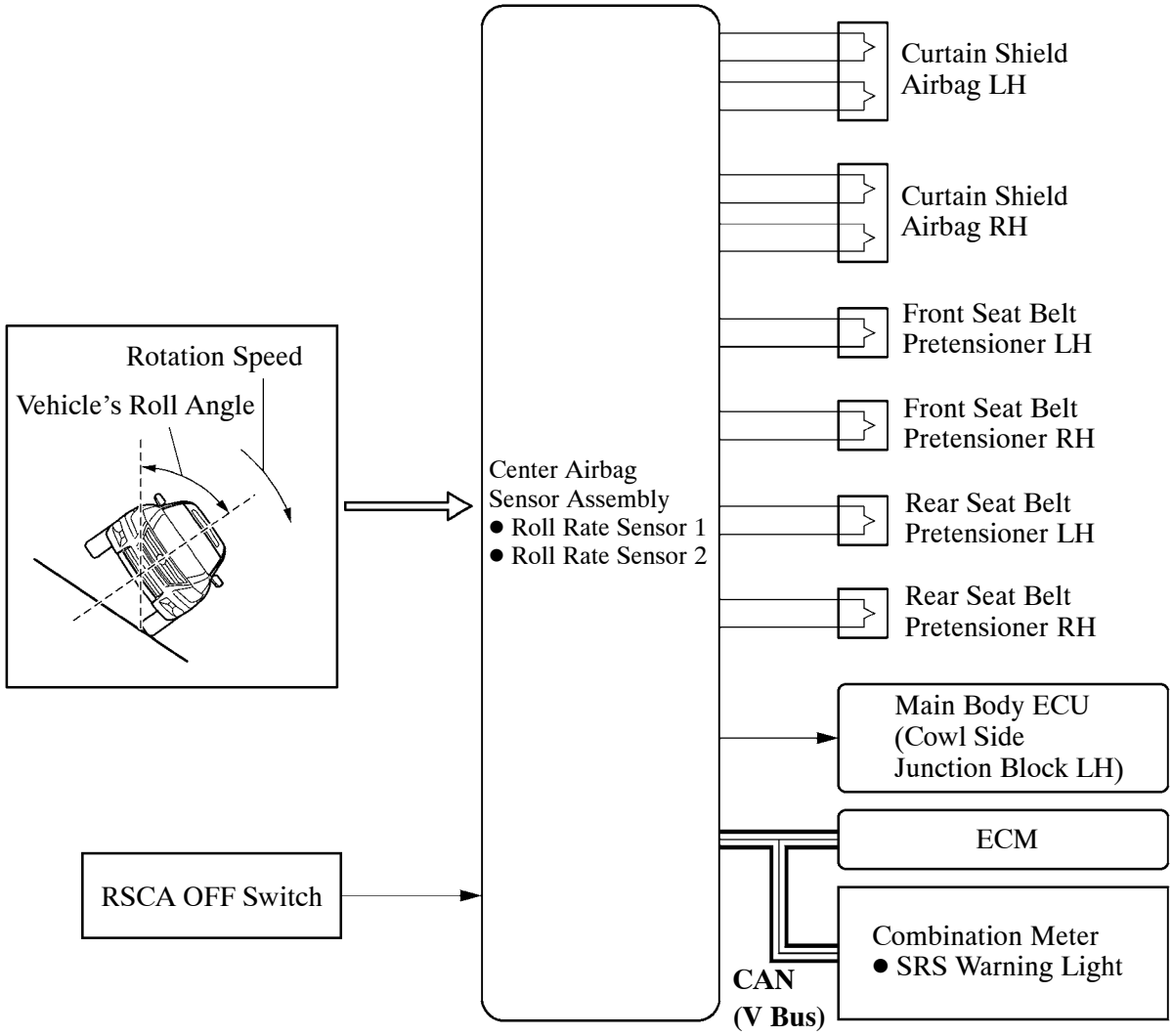
■AIRBAG FOR ROLLOVER

1. General

If the vehicle is rolling sideways, the RSCA (Roll Sensing Curtain Shield Airbag) helps to reduce the impact applied to the occupants by operating the left and right curtain shield airbags for the driver, front passenger, rear No. 1 seat and rear No. 2 seat outer passengers, and the seat belt pretensioners for the driver, front passenger and rear No. 1 seat outer passengers.

- 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.

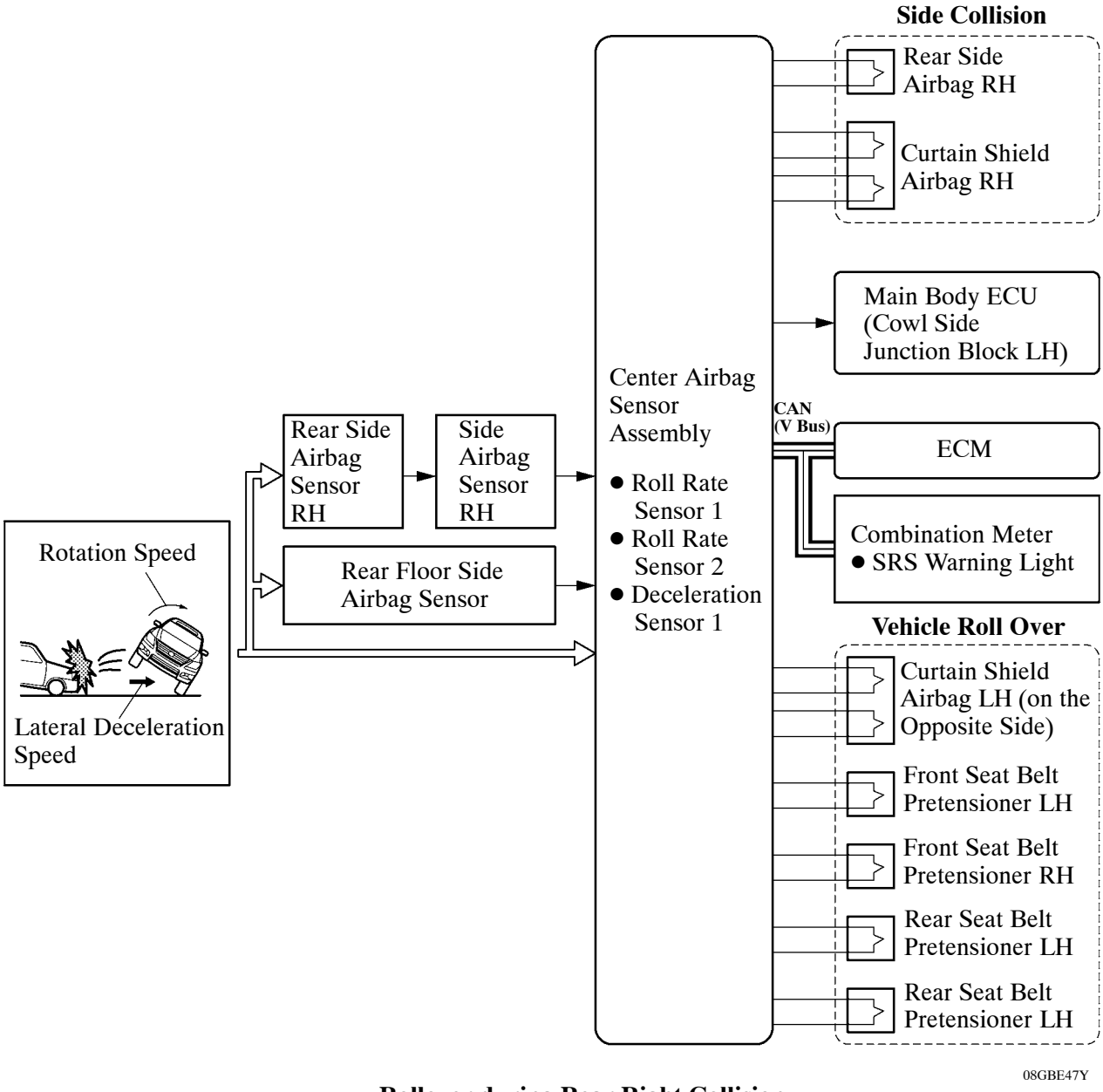
▶ System Operation ◀



Rollover due to Incline 08GBE46Y

- 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 side or rear side airbag and curtain shield airbag on the side which experienced the collision. By detecting the rollover using 2 roll rate sensors and deceleration sensor 1 which can detect lateral deceleration, the center airbag sensor assembly deploys the curtain shield airbag on the opposite side of the collision and activates the seat belt pretensioners.

▶ System Operation ◀



Rollover during Rear Right Collision

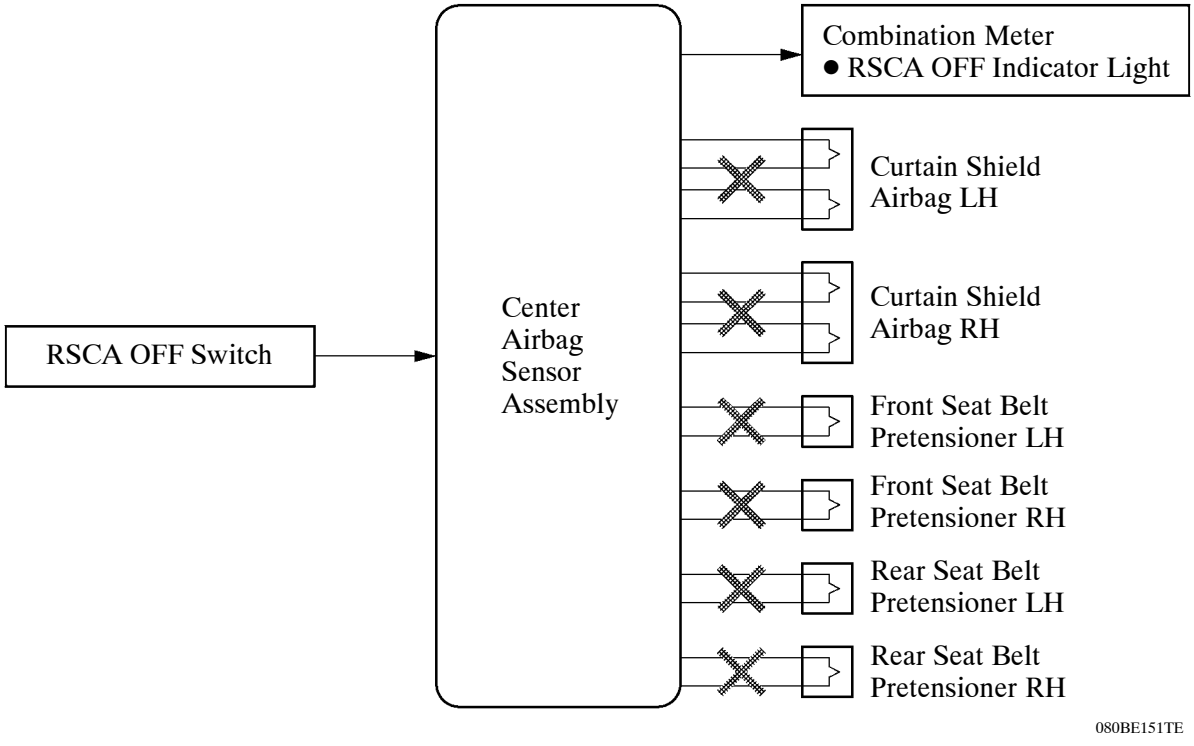
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2. RSCA OFF Switch

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

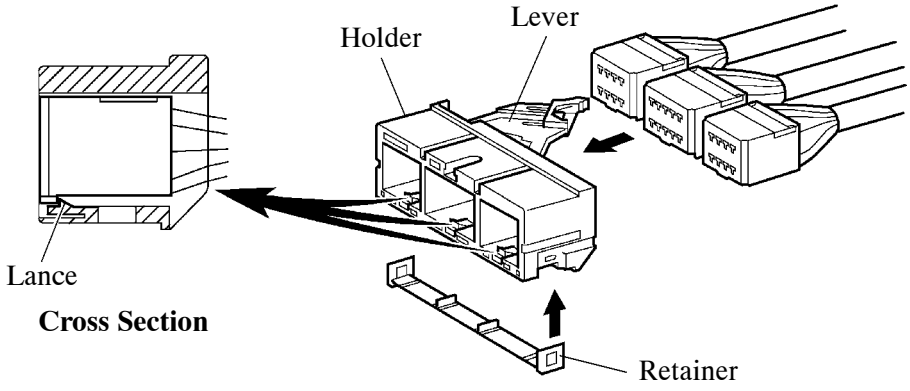
- If the RSCA OFF switch remains pressed for approximately 2 seconds or more, the center airbag sensor assembly cuts off the operation of the RSCA.
- In the case of a side collision, the center airbag sensor assembly will operate the curtain shield airbags regardless of whether the RSCA OFF switch is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

▶ System Diagram ◀

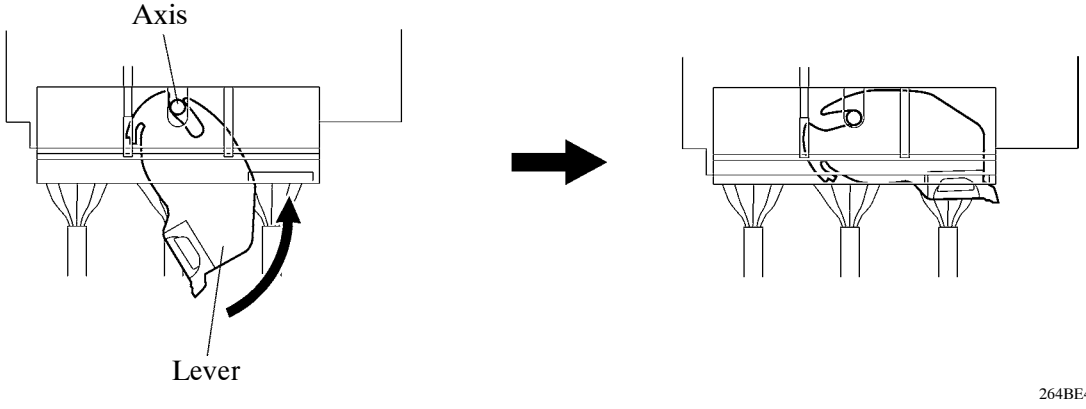


■IMPROPER CONNECTION PREVENTION LOCK MECHANISM

- The 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.



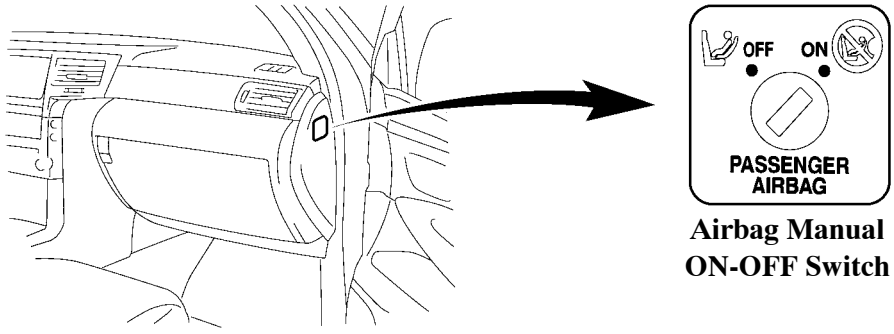
- When the holder and connectors are connected to the center airbag sensor assembly, the lever is pushed into position end by rotating it around the axis of the connector lock pin in order to lock the holder securely.



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■AIRBAG MANUAL ON-OFF SWITCH

- An airbag manual ON-OFF switch is provided as standard equipment on the Europe models to disable the deployment of the front passenger airbag, front passenger side knee airbag, and front passenger side airbag (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 mechanical key, which is supplied with the 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 center cluster illuminates to inform the occupant.



Airbag Manual ON-OFF Switch

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■CENTER AIRBAG SENSOR ASSEMBLY

- When the center airbag sensor assembly reaches a decision to deploy the airbags based on the signals detected by the front airbag sensors and the sensors in 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 center airbag sensor assembly reaches a decision to deploy the airbags based on the signals detected by the side airbag sensors, rear airbag sensors, and rear floor side airbag sensor, it deploys the SRS side airbags, rear side airbags, and curtain shield airbags. Furthermore, the center airbag sensor assembly is equipped with a diagnosis function to detect a malfunction in the airbag system.
- 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
Main Body ECU	Forced Door Unlock Signal	Direct Circuit
Combination Meter	● Front Seat Belt Buckle Switch (for Driver) ON Request Signal ● SRS Warning Light ON Request Signal	CAN Communication Circuit

■ 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 5-digit DTC for the SRS airbag system.
- The 5-digit DTC can be read by connecting an intelligent tester II to DLC3.
- If the SRS airbags deploy, the center airbag sensor assembly will turn ON the SRS warning light and store a DTC. The SRS warning light can be turned OFF only by replacing the center airbag sensor assembly with a new one.

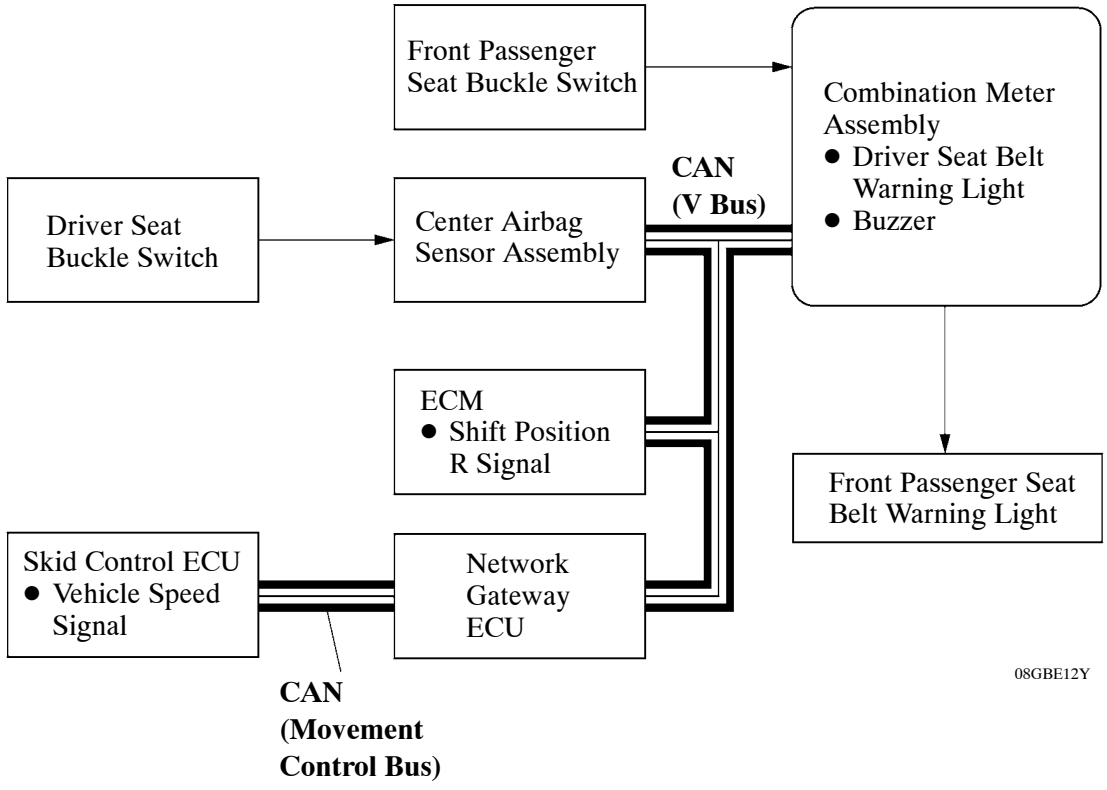
For details, refer to the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

SEAT BELT WARNING SYSTEM

■ DESCRIPTION

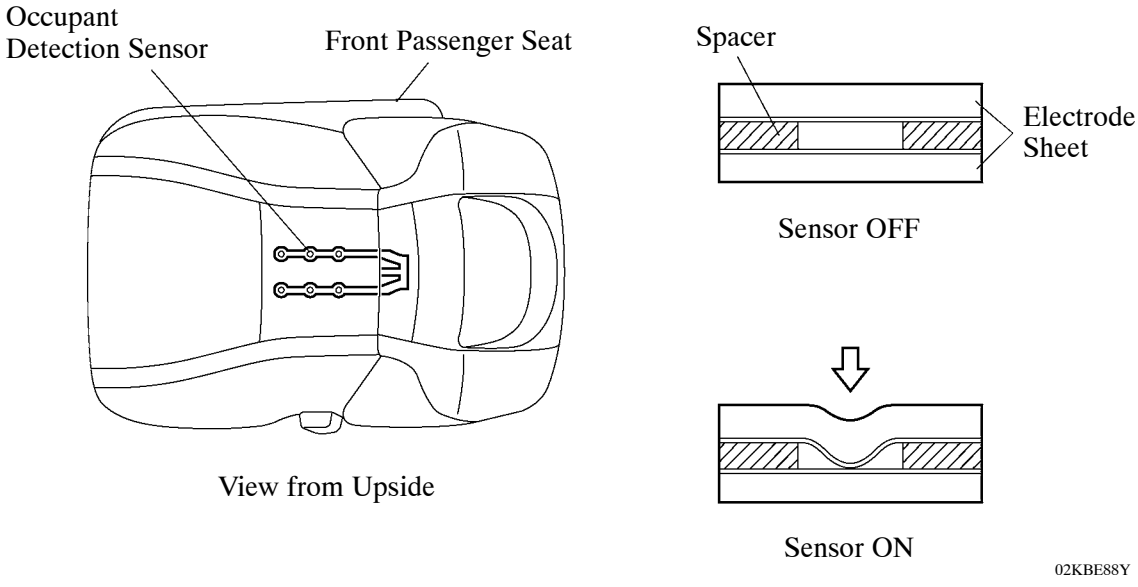
- The seat belt warning system is provided as standard equipment on all models.
- If a seat belt is not fastened, this system flashes the seat belt warning light or sounds the buzzer in the combination meter assembly as a reminder.
- When the engine switch is turned ON (IG), this system detects the condition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

▶ System Diagram ◀



■ OCCUPANT DETECTION SENSOR

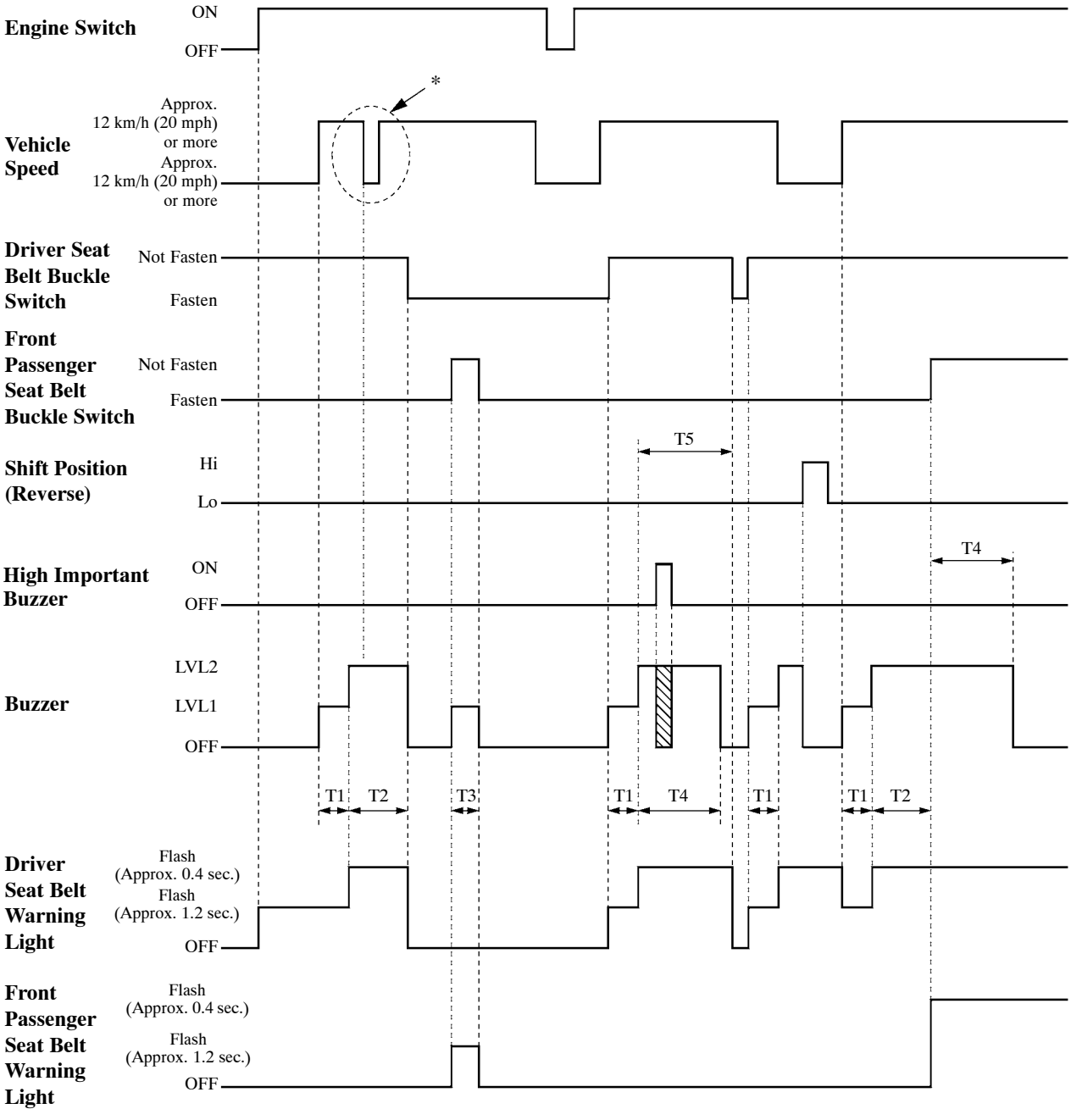
The occupant detection sensor, which is enclosed in the seat cushion of the front passenger seat, is used to detect whether or not the front passenger seat is occupied.
This sensor, which is shaped as illustrated below, consists of a construction in which 2 sheets of electrodes sandwich a spacer. When 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.



■ WARNING METHOD

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

▶ Timing Chart ◀



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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 optional equipment. There are two types of the pre-crash safety systems: a conventional type and a dynamic radar type. For details on the provision, see the Equipment List on page MO-33.
- 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. For details, see page BE-248.
- The pre-crash safety system (radar type) predicts the possible collision of the vehicle with an obstacle, based on information received from various sensors. The obstacle may be a vehicle on the travel course. It lessens the damage sustained in the collision by working in unison with other systems: systems that optimize the characteristics of the occupant protection devices such as the seat belt retraction mechanism, and systems that dampen the conditions of a collision, such as the brake control system. For details, see page BE-255.
- The pre-crash safety system (radar type) uses a millimeter wave radar sensor to predict a possible collision with a vehicle or an obstacle in front. It retracts the seat belts before the collision and effects brake assist control.

■ PRE-CRASH SAFETY SYSTEM

1. General

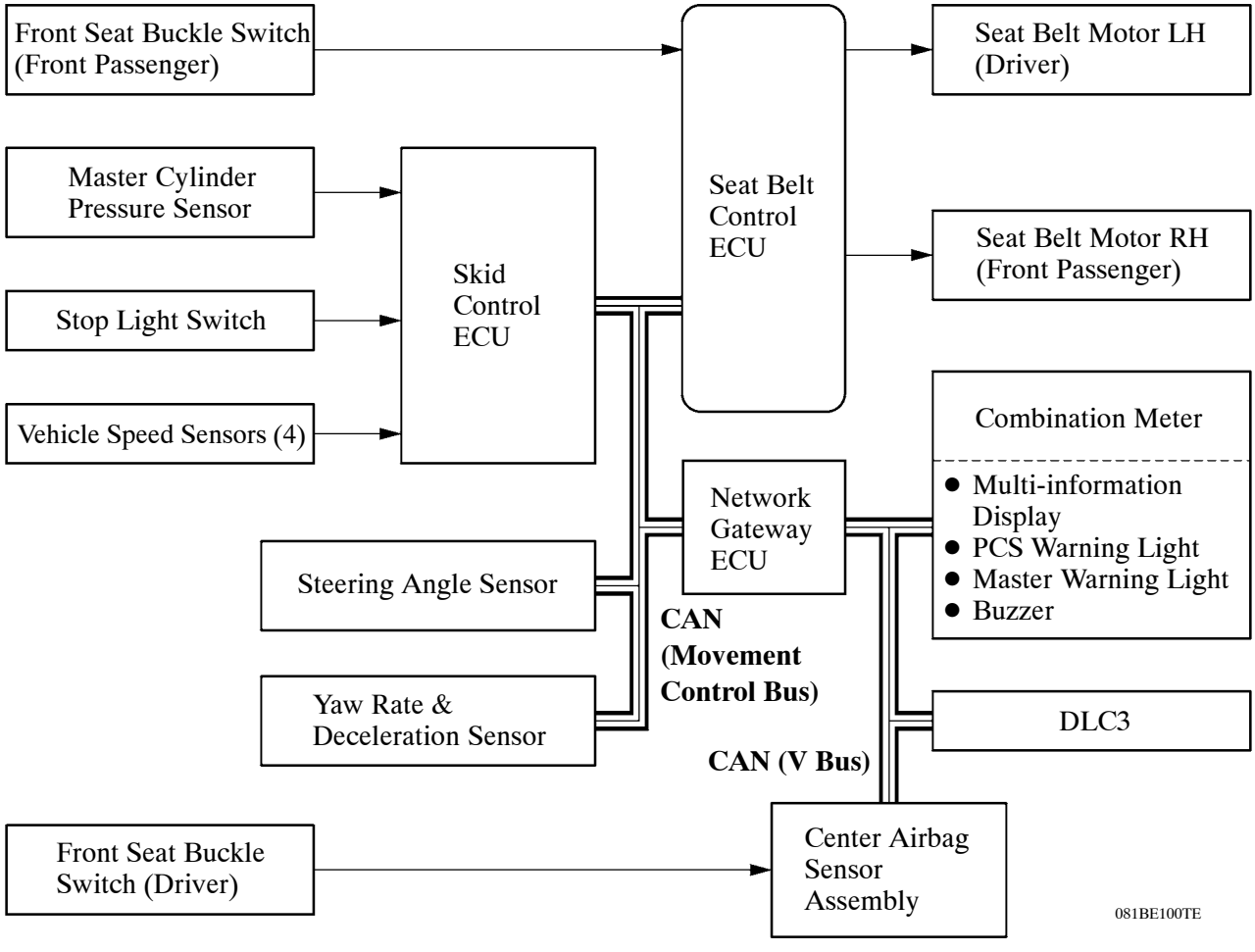
The pre-crash safety system will operate under the following conditions.

System Operation	Operating Condition
Sudden Braking Operation	● When the brakes are suddenly applied.
Front or Rear Wheel Skid Tendency Operation	● 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).

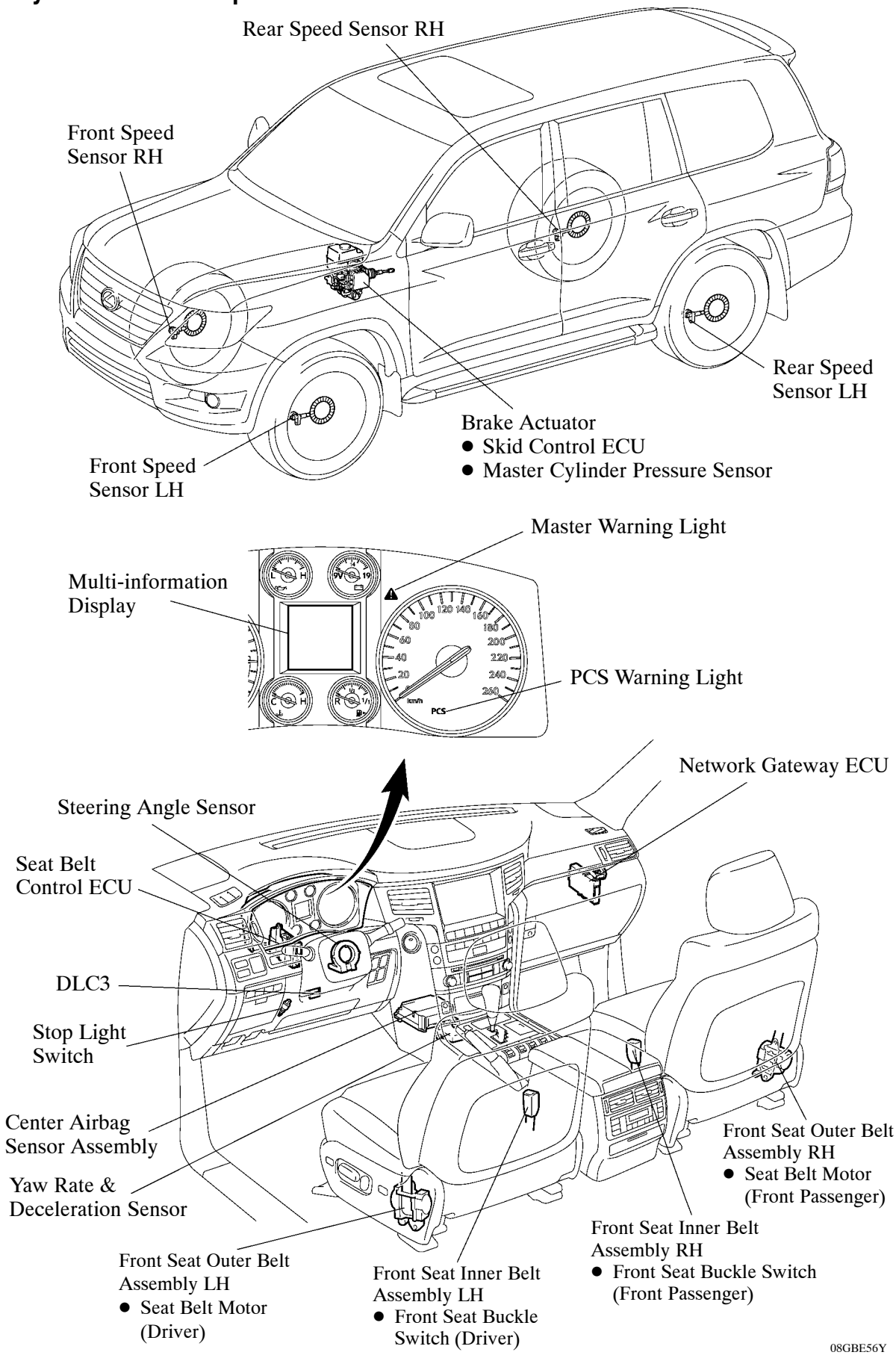
The pre-crash safety system will not operate under the following conditions.

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

▶ System Diagram ◀



2. Layout of Main Components



LHD Model

BE

3. Function of Main Components

General

Item		Function
Combination Meter	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 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).
Brake Actuator	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.
Vehicle Speed Sensor (4)		Detects the wheel speed and transmits the signals to the skid control ECU.
Yaw Rate & Deceleration 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 LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

Combination Meter

- The master warning light, PCS warning light, warning message of the multi-information display, and buzzer in the combination meter 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.

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

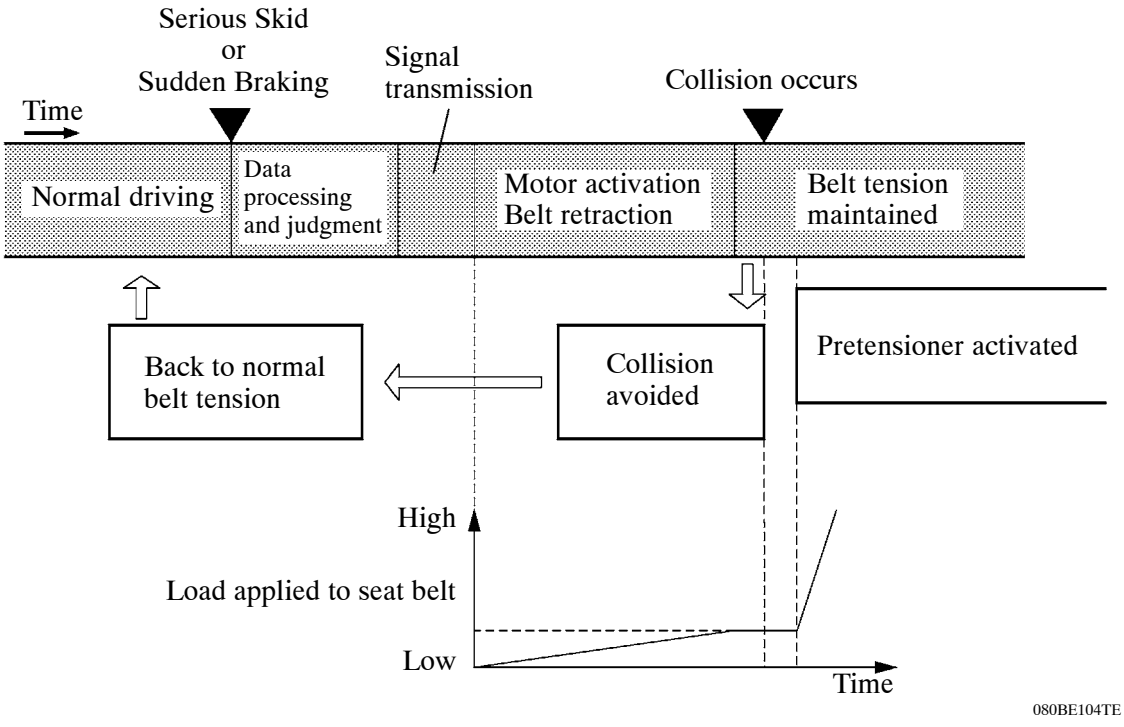
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4. System Operation

General

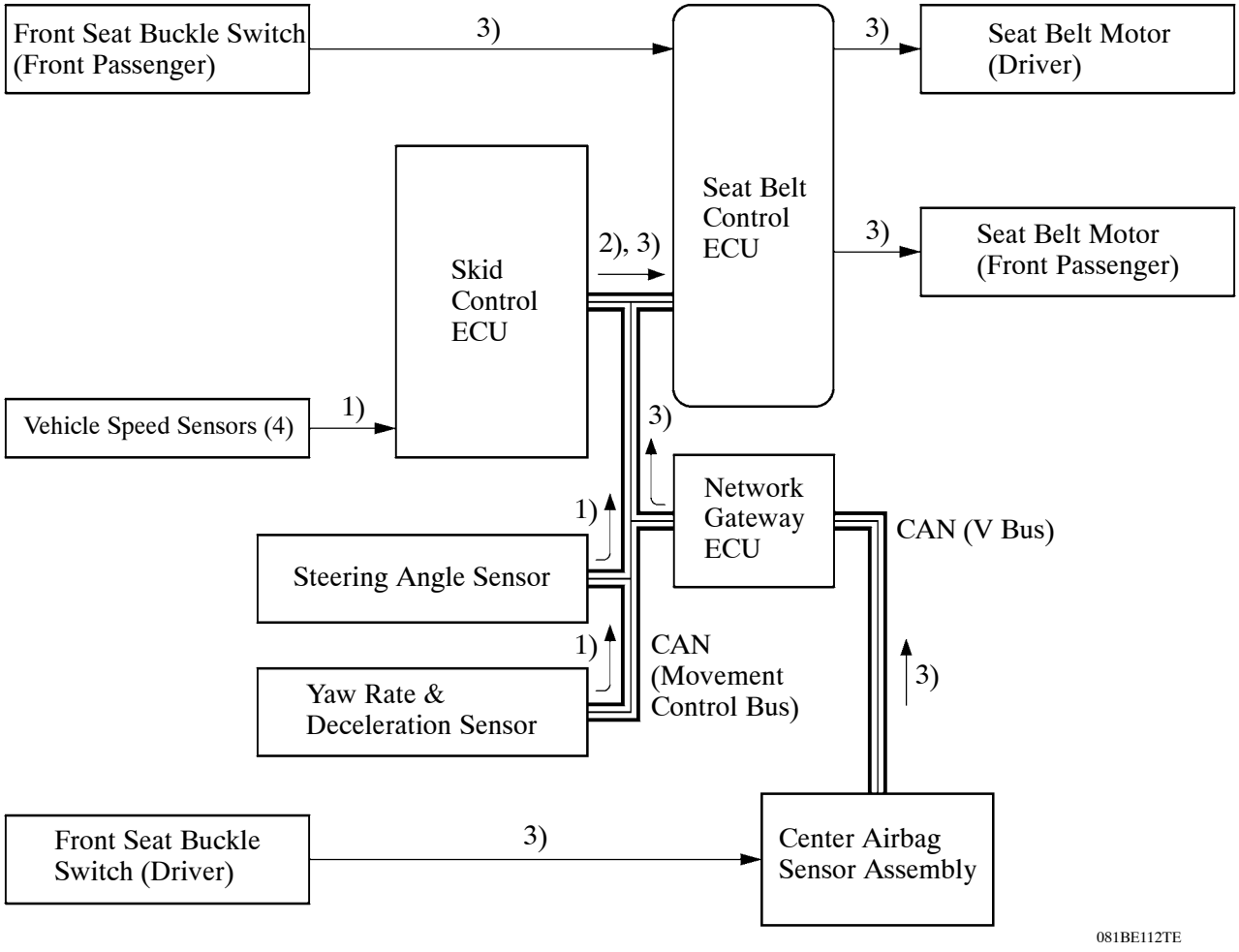
Upon receiving signals from the skid control ECU which indicate that a serious skid is occurring or that the brakes have been applied suddenly, the seat belt control ECU retracts the front seat belts to help reduce possible injury to the driver and front passenger.

▶ Operation Flow ◀



Front or Rear Wheel Skid Tendency Operation

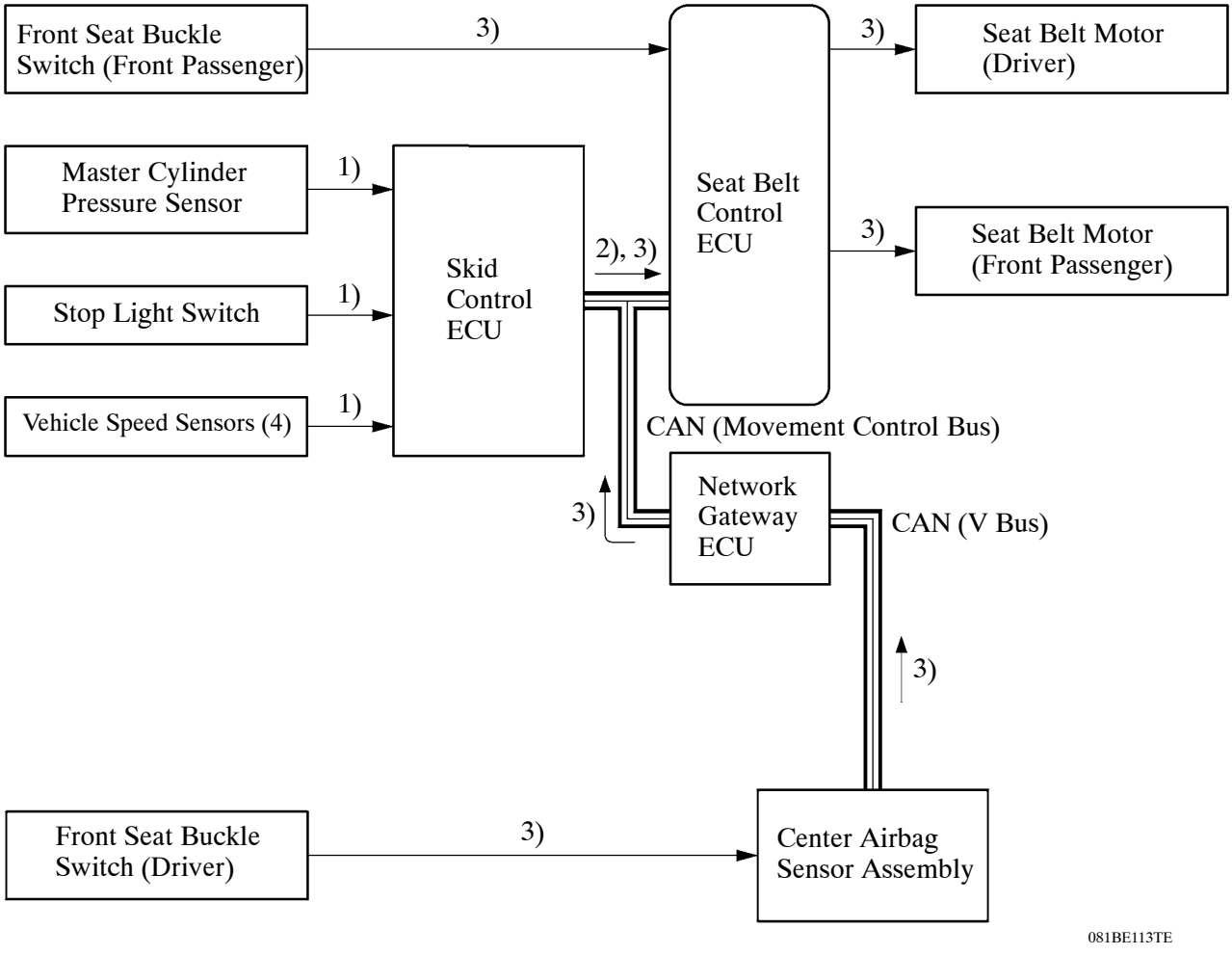
1) While the vehicle is traveling at approximately 30 km/h (20 mph) or more, the skid control ECU determines that skid recovery is difficult based on the signals from the steering angle sensor, yaw rate sensor, and speed sensors.
2) The skid control ECU sends a seat belt operation request signal to the 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 conditions of the vehicle have stabilized.



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Sudden Braking Operation

1) While the vehicle is traveling at approximately 30 km/h (20 mph) or more, 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.



■PRE-CRASH SAFETY SYSTEM (RADAR TYPE)

1. General

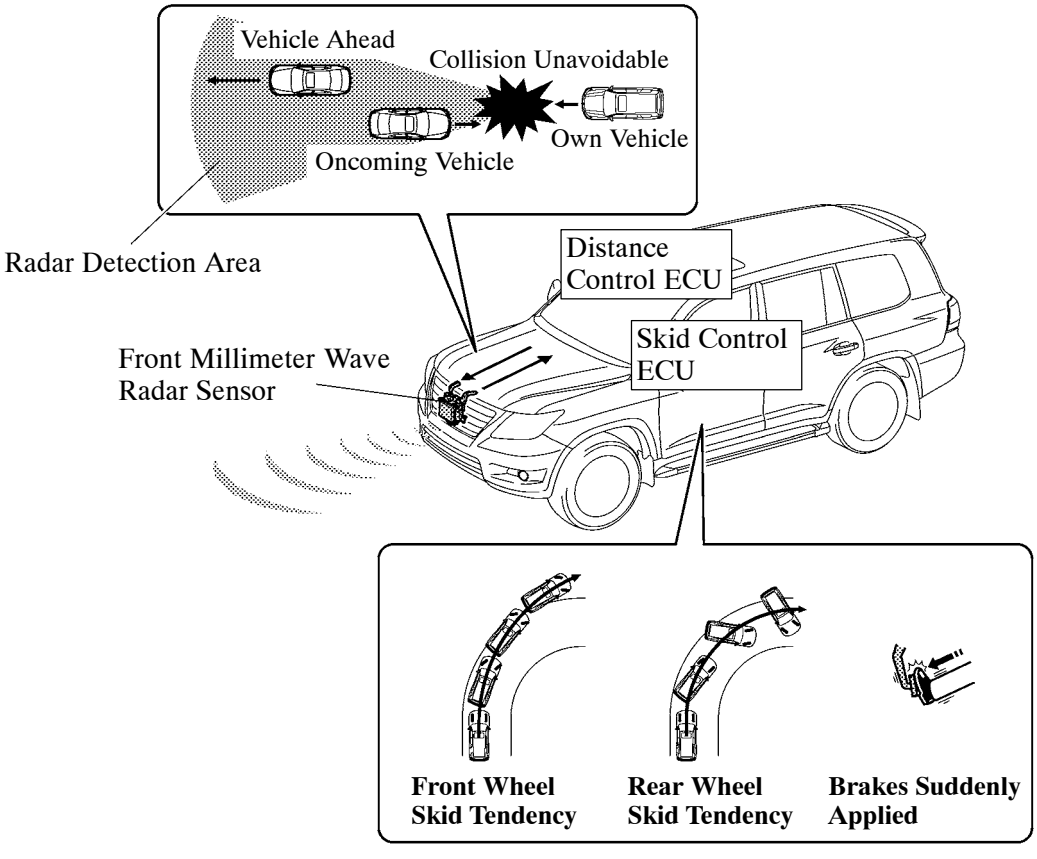
- The pre-crash safety system (radar type) retracts the slack in the front seat belts. Then, it sets the brake control system in the brake assist standby mode below are present before a collision. This lessens the injury sustained by the driver and front passenger.

System Operation	Operating Condition
Pre-crash Safety Operation	When a collision with an obstacle in front of the vehicle or a collision with the vehicle ahead is determined to be unavoidable.
Sudden Braking Operation	The sudden braking operation and serious vehicle skid operation are the same as in the pre-crash safety system.
Serious Vehicle Skid Operation	

- The millimeter wave radar sensor and distance control ECU determine whether a collision with an obstacle in front of the vehicle or a collision with the vehicle ahead is unavoidable.
- The millimeter wave radar sensor and distance control ECU make this determination based on the vehicle speed relative to the speed of an oncoming vehicle or based on the speed with which an object is being approached.
- The skid control ECU determines emergency braking, front wheel skid tendency and rear wheel skid tendency. For details, see page CH-128.

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▶ Unavoidable Collision Judgment ◀



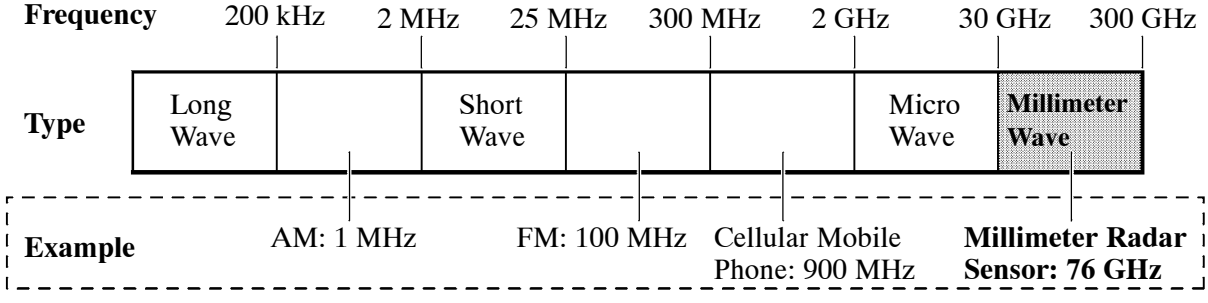
- The pre-crash safety system will not operate under the following conditions.

Non-Operating Condition	1) Oncoming vehicle relative speed is approx. 30 km/h (20 mph) or less. 2) The vehicle speed is approx. 30 km/h (20 mph) or less. (For a sudden braing operation, and a front or rear wheel skid tendency operation) 3) The vehicle speed is approx. 5 km/h (3 mph) or less. (For pre-crash safety operation) 4) The seat belt is not buckled. 5) Collision objects cannot be detected by the millimeter wave radar sensor: ● Objects that cannot be detected: plastic items (safety cones, etc.), etc. ● Objects that cannot be detected in a stable manner: people, bicycles, motorcycles, trees, animals, snow fence, etc. 6) Engine switch is OFF or ON (ACC). 7) Multi-information display in the combination meter displays "**Check PCS System**" and "**PCS Not available now**" warning messages. 8) The vehicle collides with an object located outside the detection area of the millimeter wave radar sensor.

— REFERENCE —

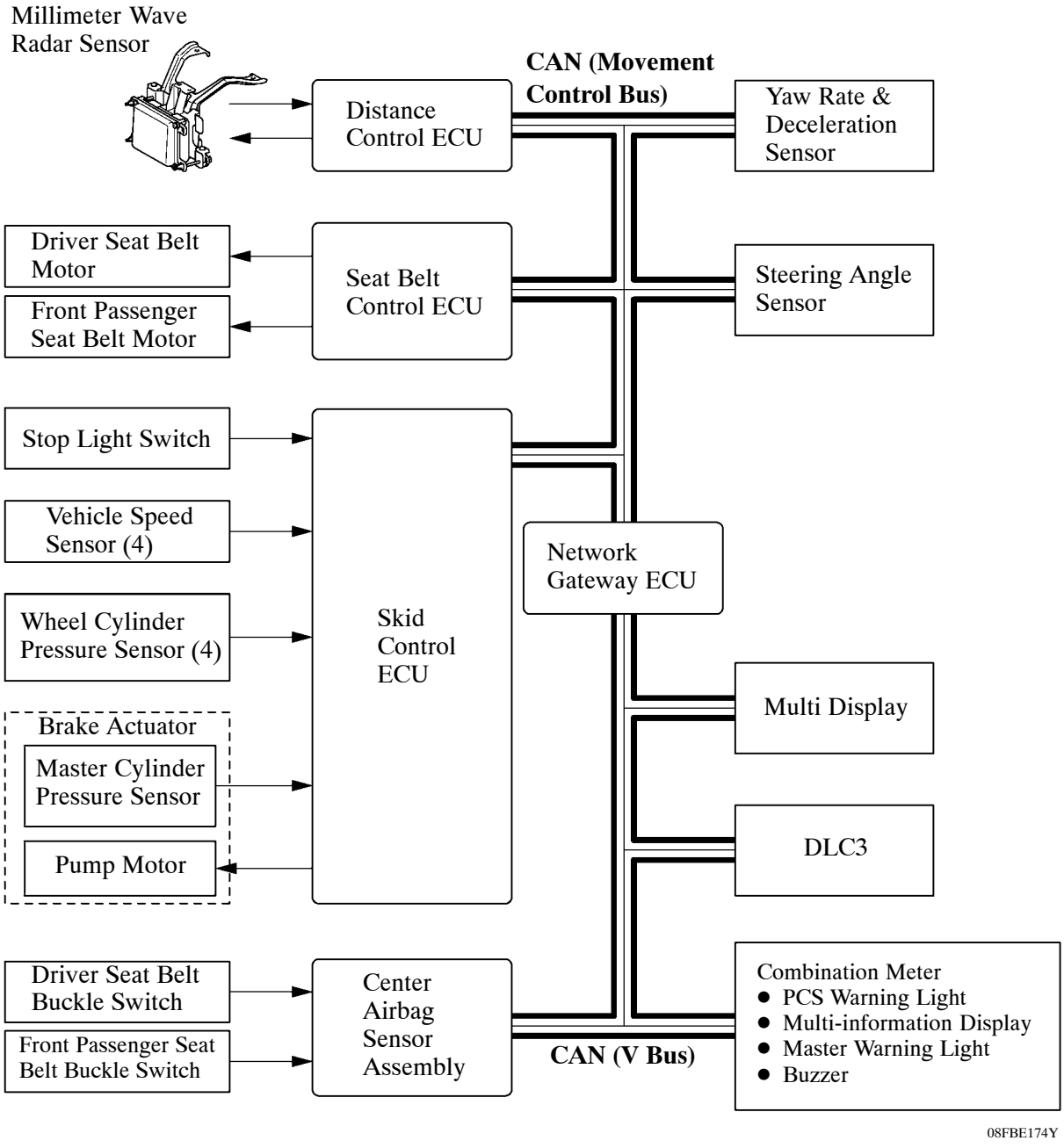
Millimeter Wave Radar:
Millimeter wave radar uses an extremely high frequency band between 30 GHz and 300 GHz, with an extremely short wavelength between 1 and 10 mm (0.04 and 0.40 in.) in a vacuum. The millimeter wave radar sensor of the pre-crash safety system uses frequencies in the 76 GHz band.
The millimeter wave radar is less affected by weather conditions such as rain, fog, or snow, and provides excellent characteristics for recognizing objects. Therefore, it is well suited to the pre-crash safety system and the dynamic radar cruise control system.

▶ Main Wave Types and Frequencies ◀



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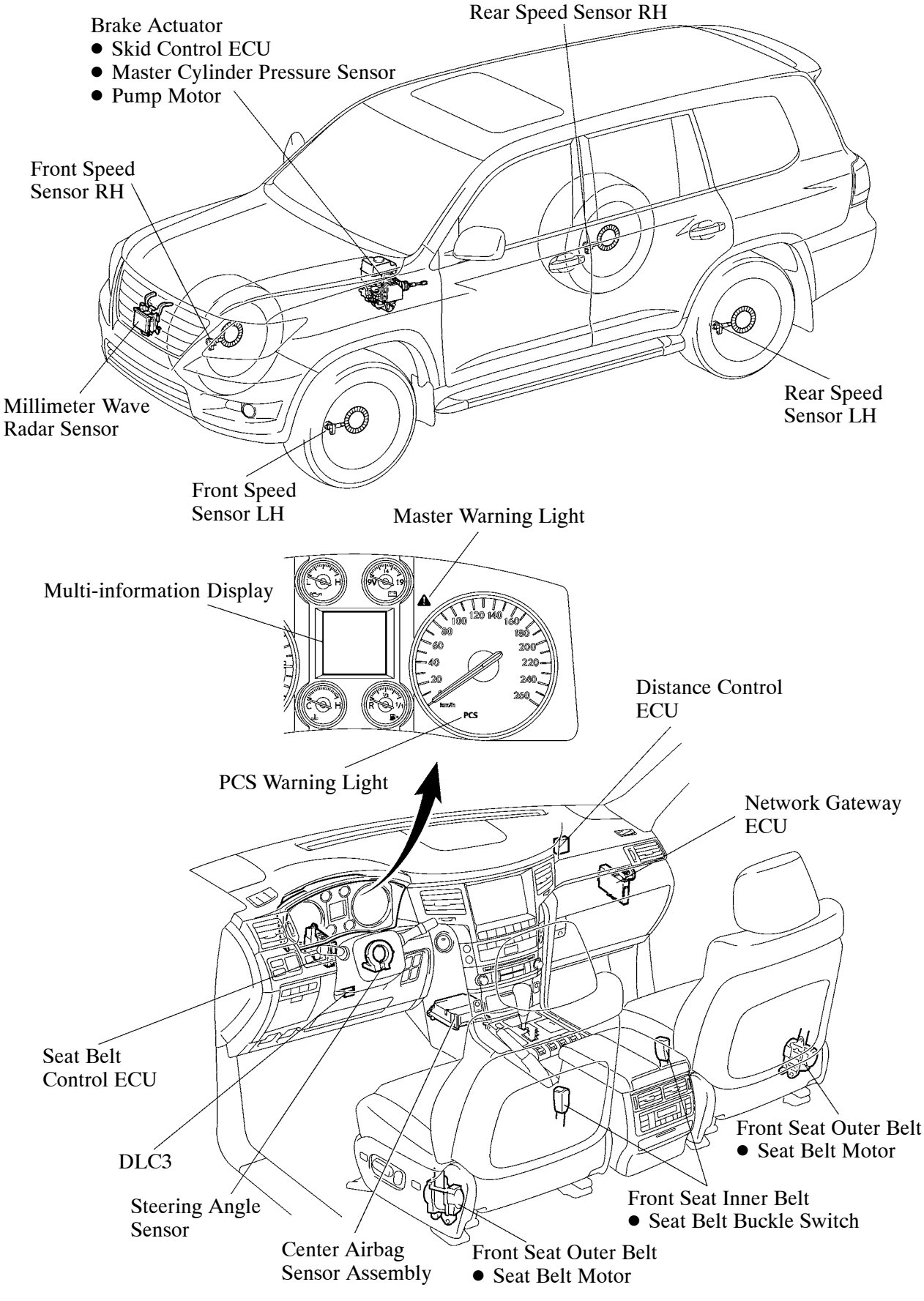
2. System Diagram



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3. Layout of Main Components



LHD Model

4. Function of Main Components

General

Item		Function
Combination Meter	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 to warn the driver in accordance with signals from the seat belt control ECU.
Millimeter Wave Radar Sensor		Radiates millimeter waves to forward, uses the reflected millimeter waves for detecting the presence of a vehicle being driven ahead, the vehicle-to-vehicle distance, and the relative speed, and transmits these pieces of information to the distance 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 LH		Detects the condition (verifies use of belt) of the driver seat belt and transmits a signal to the center airbag sensor assembly.
	Seat Belt Buckle Switch	
Front Seat Inner Belt RH		Detects the condition (verifies use of belt) of the front passenger seat belt and transmits a signal to the center airbag sensor assembly.
	Seat Belt Buckle Switch	
Center Airbag Sensor Assembly		Transmits the condition (fastened or unfastened) of the driver seat belt to the seat belt control ECU.
Distance Control ECU		Makes a judgment that a collision is unavoidable based on the information received from the millimeter wave radar sensor. It then outputs a seat belt operation signal and brake assist standby request signal.
Seat Belt Control ECU		● Receives a seat belt operation request signal from the distance control ECU or 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).
Skid Control ECU		● Receives a brake assist standby request signal from the distance control ECU and switches the brake assist to the standby mode. When a stop light switch signal is input, it operates the brake assist. ● Determines that the brakes have been applied suddenly through a signal received from the master cylinder pressure sensor, and outputs a seat belt operation signal to the seat belt control ECU. ● Determines the presence of a front wheel skid tendency or rear wheel skid tendency, and outputs a seat belt operation signal to the seat belt control ECU. ● Transmits a vehicle speed signal to the distance control ECU.

(Continued)

Item		Function
Brake Actuator	Master Cylinder Pressure Sensor	Detects the master cylinder pressure and transmits a signal to the skid control ECU.
	Wheel Cylinder Pressure Sensor	Detects the wheel cylinder pressure and transmits a signal to the skid control ECU.
	Pump Motor	Receives an actuate signal from the skid control ECU and generates hydraulic pressure for brake control.
Stop Light Switch		Detects if the brake pedal is pressed and transmits a signal to the skid control ECU.
Vehicle Speed Sensor		Detects the wheel speed signal and transmits the signal to the skid control ECU.
Yaw Rate & Deceleration Sensor		Detects the yaw rate and lateral/longitude deceleration of the vehicle and transmits the signal to the skid control ECU and the distance control ECU.
Steering Angle Sensor		Detects the angle and direction of steering and transmits a signal to the skid control ECU and the distance control ECU.

Service Tip

When the seat belt control ECU is replaced, 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 is turned ON (IG).
(2) Monitor the PCS warning light for at least 3 seconds after the engine switch is turned ON (IG). Make sure that the warning light does not remain ON.
(3) Connect the intelligent tester II to the DLC3 and enter the select active test mode.
(4) Perform active test of the seat belt motor and check that the motor operates properly.

For details, refer to LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

Combination Meter

The combination meter is provided with the master warning light, PCS warning light, buzzer, and multi-information display to inform the driver of a malfunction in 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.

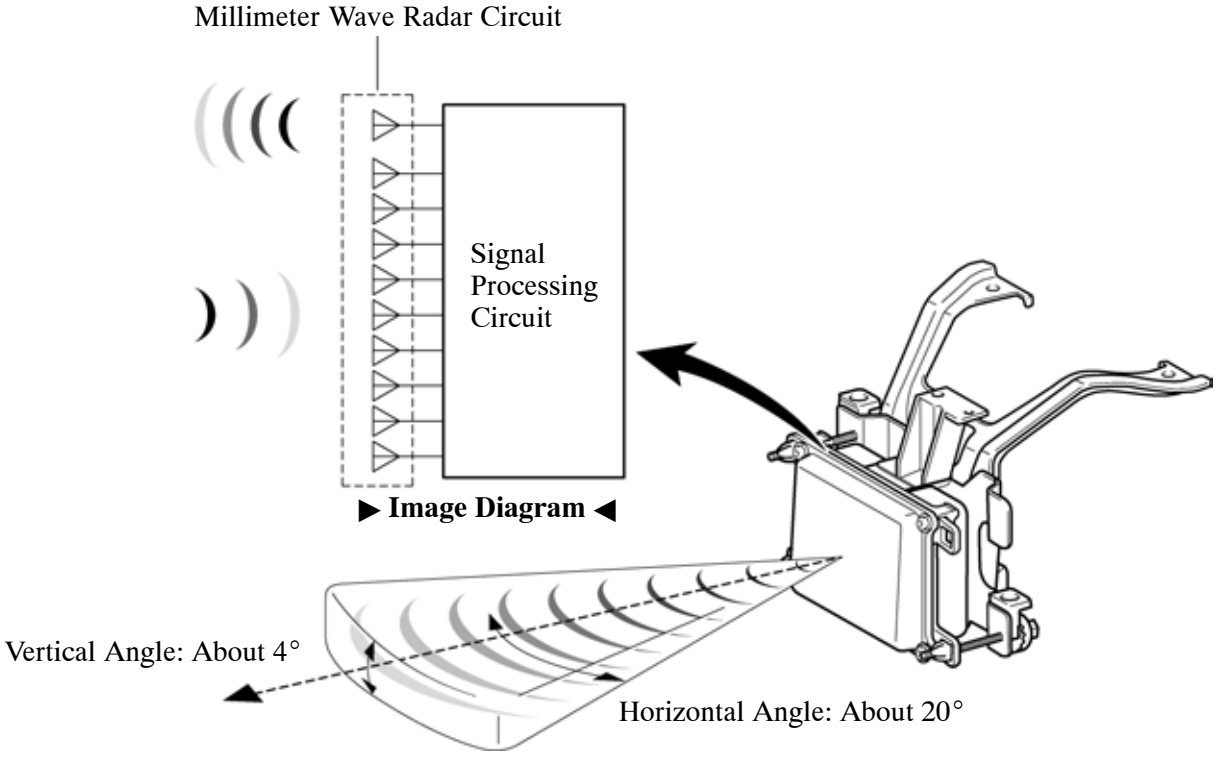
Multi-information Display	Detail	 0150BE35C	PCS 01YBE200P	Buzzer	DTC
 08FBE175Y	This message appears when the seat belt control ECU detects a system malfunction.	Illuminate	Illuminate	Sounds once	○
 08FBE176Y	This message appears when the seat belt control ECU determines the following conditions: ● Dirty millimeter wave radar sensor* ● Poor weather condition ● Overheated seat belt control ECU. After these conditions have been eliminated, the system will operate normally.	—	Flash	Sounds once	×

○: Repair is required/DTC is output
×: Repair is not required/DTC is not output
—: Not available
*: When the vehicle is driving on a road with less traffic and less objects to reflect millimeter waves, the distance control ECU may determine it as a dirty millimeter wave radar sensor condition because the millimeter wave radar sensor doesn't detect any reflected millimeter waves. After that, however, once the millimeter wave radar sensor detects reflected millimeter waves, the pre-crash safety system will resume automatically.

Millimeter Wave Radar Sensor

1) General

- The millimeter wave radar sensor consists of a millimeter wave radar circuit, signal processing circuit, and CPU.
- The millimeter wave radar circuit consists of one transmission antenna and nine reception antennas.
- The millimeter wave radar sensor outputs millimeter waves when the vehicle speed is above 0 km/h (0 mph), and does not when the vehicle speed is at 0 km/h (0 mph). The millimeter wave radar sensor uses frequencies in the 76 GHz band.
- The reception antennas receive the millimeter waves that have been reflected.
- The signal processing circuit detects the distance, relative speed, and the direction of the object by generating millimeter waves and calculating the signals received by the reception antennas. Then, it transmits this information to the distance control ECU.
- The millimeter wave radar sensor is also used by the dynamic radar cruise control system.

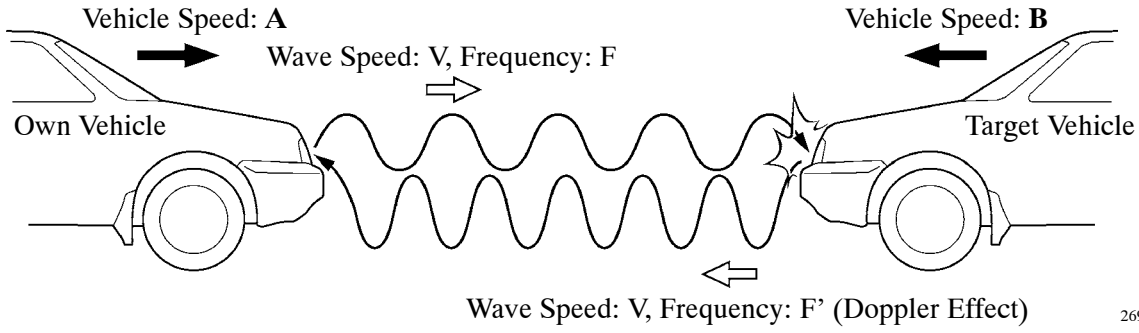


2) Calculation Method

The distance to the object, azimuth (horizontal angle), and relative speed are calculated from the information that is provided by reflected millimeter waves as described below.

Distance	Calculated based on the length of time between emission and reception of millimeter waves by the millimeter wave radar sensor.
Azimuth	Calculated based on the angle of the millimeter wave reflected by an object.
Relative Speed	Calculated by utilizing the changes (Doppler effect*) that occur in the frequencies of the reflected millimeter waves.

*: The Doppler effect causes the observer to perceive the radio waves emitted by a moving object to be at higher frequencies as it approaches, and to be at lower frequencies at it recedes. This phenomenon is created because when an object is located far away, the radio waves are perceived at higher frequencies than when it is at the radio source.



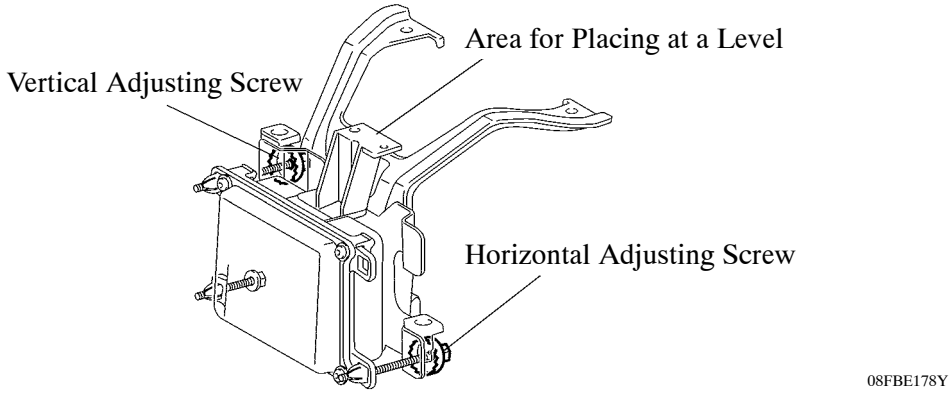
By applying the following formula, the vehicle speed **B** of the target vehicle can be calculated.

Doppler Effect: $F' = \frac{V + \mathbf{B}}{V - \mathbf{A}} F$

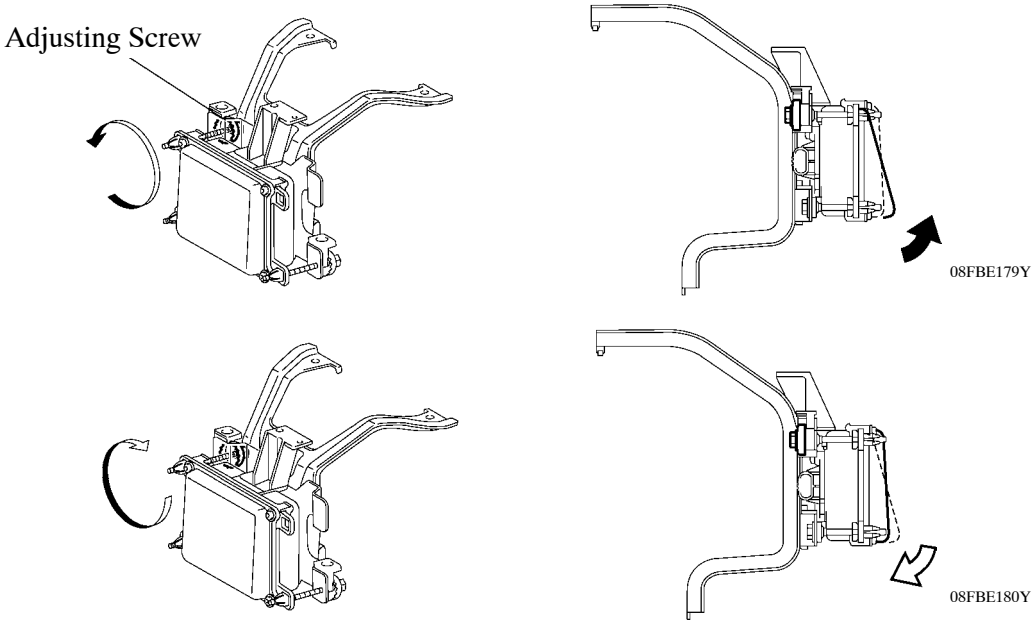
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Service Tip

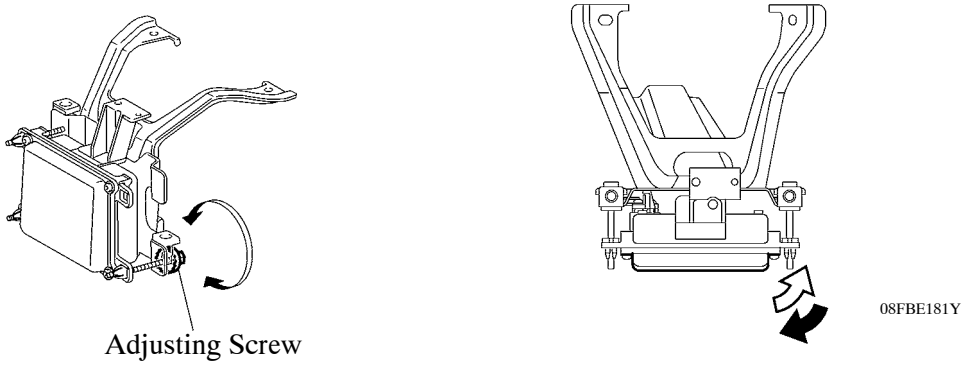
After a millimeter wave radar sensor has been replaced or removed and reinstalled, the intelligent tester II must be used to adjust the sensor angle. To ensure the proper precision, the sensor must be adjusted in the horizontal and vertical state. For this reason, the sensor is provided with an area for placing at a level, as well as a horizontal adjusting screw and a vertical adjusting screw. For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).



- Turn vertical adjusting screw to adjust the vertical direction of the millimeter wave radar sensor.
  Reference: One turn of the screw moves the sensor by approximately 0.72°.



- Turn the horizontal adjusting screw to adjust the horizontal direction of the millimeter wave radar sensor.
  Reference: One turn of the screw moves the sensor by approximately 0.33°.



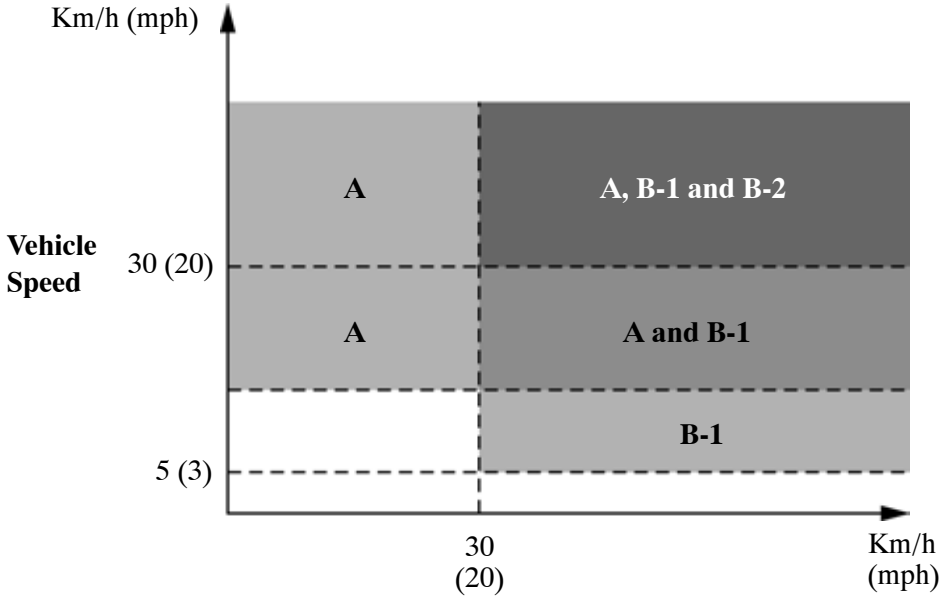
5. System Operation

General

The pre-crash safety system consists of the following three operations: pre-crash safety (unavoidable collision) operation, front or rear wheel skid tendency operation and sudden braking operation. The impact dampening components have the operation ranges indicated below.

Range	Operation	Operation Condition	Impact Dampening Component
A*	Sudden Braking Operation Front or Rear Wheel Skid Tendency Operation	● Engine switch is ON (IG). ● Seat belt is buckled. ● Vehicle speed is approx. 30 km/h (20 mph) or above.	● Seat Belt Retracting Operation
B-1	Pre-crash Safety Operation	● Engine switch is ON (IG). ● Seat belt is buckled. ● Vehicle speed is approx. 5 km/h (3 mph) or above. ● Oncoming vehicle relative speed is approx. 30 km/h (20 mph) or above.	
B-2		● Engine switch is ON (IG). ● Seat belt is buckled. ● Vehicle speed is approx. 30 km/h (20 mph) or above. ● Oncoming vehicle relative speed is approx. 30 km/h (20 mph) or above.	● Seat Belt Retracting Operation ● Brake Assist Standby Condition

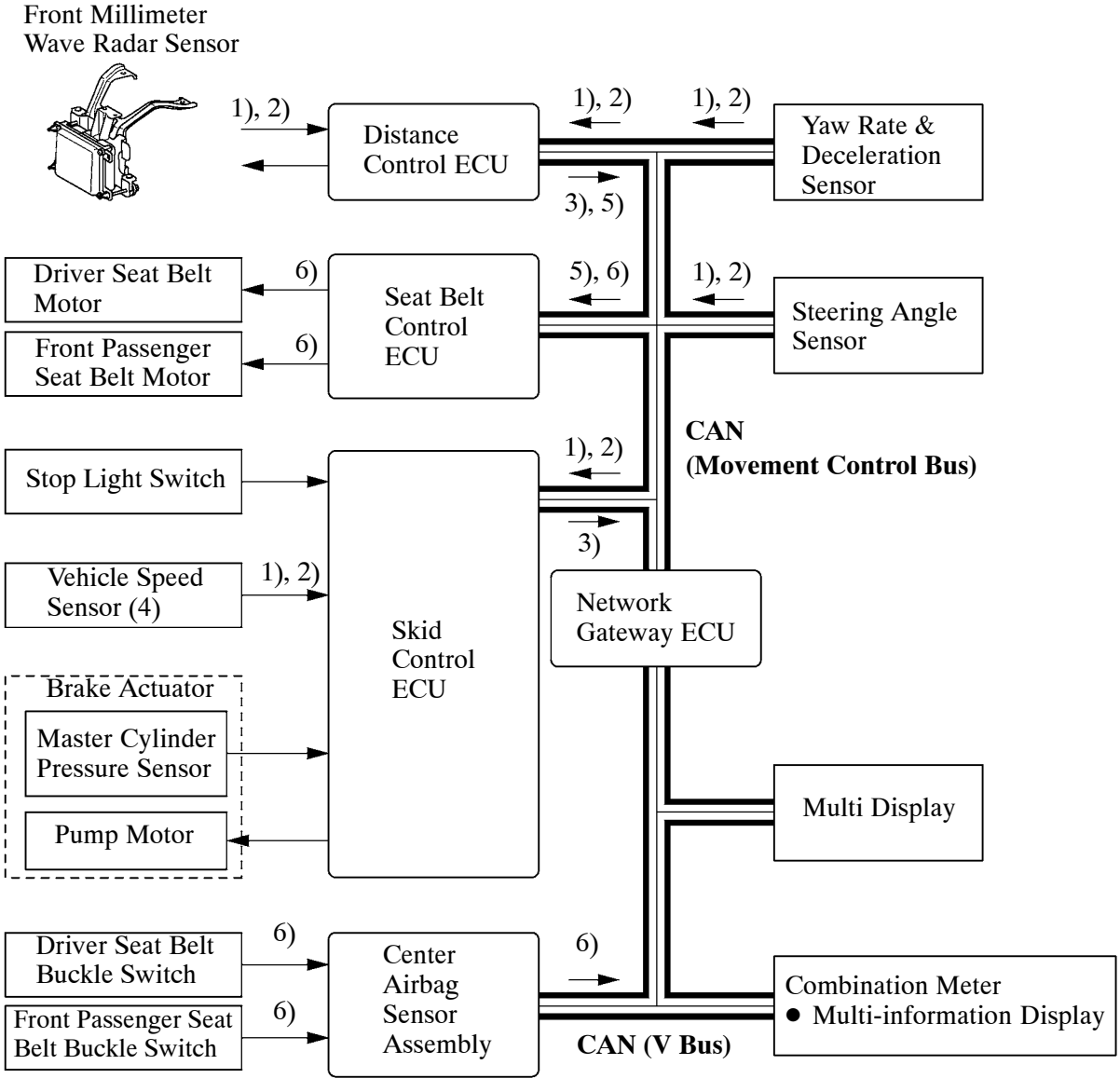
*: For these operations, see the Pre-crash Safety System on see page BE-248.



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Pre-crash Safety Operation

1) The distance control ECU determines that the possibility of a collision is high based on the signals received from the millimeter wave radar sensor, steering angle sensor, vehicle speed sensor, and yaw rate & deceleration sensor.
2) The distance control ECU determines that an unavoidable collision condition exists based on the signals received from the millimeter wave radar sensor, vehicle speed sensor, steering angle sensor, and yaw rate & deceleration sensor.
3) The distance control ECU outputs a brake assist standby request signal to the skid control ECU.
4) Upon receiving this signal, the skid control ECU switches the brake assist to the standby mode.
5) The distance control ECU outputs a seat belt operation request signal to the seat belt control ECU.
6) The seat belt control ECU determines the seat belt motor operation condition based on this signal and the seat belt buckle switch signal, and retracts the slack in the seat belts by operating the seat belt motors.
7) If no collision occurs, the seat belts and the brake assist will return to their normal states.

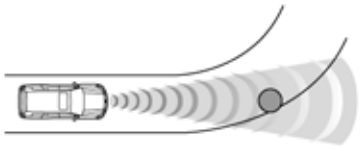


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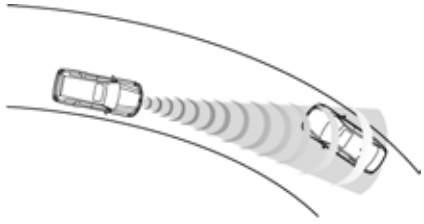
6. Precaution for Pre-crash Safety System (Dynamic Radar Type) Operation

Millimeter Wave Radar Sensor

When the millimeter wave radar sensor detects an object ahead under the conditions described below, the distance control ECU may determine that a collision is unavoidable, and operate the pre-crash safety system (dynamic radar type). However, this is not abnormal.

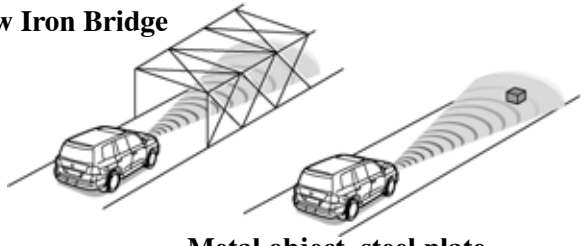


Object on road surface at corner entrance (Guard Rail, Street Light, Sign, Signboard)

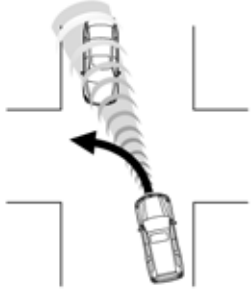


Opposing traffic vehicle during cornering

Narrow Iron Bridge



Metal object, steel plate, or bump on road surface



Opposing traffic at intersection

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The millimeter wave radar sensor might not be able to detect the following objects as collision objects:

Objects that cannot be detected	Plastic items (safety cones, etc.), etc.
Objects that cannot be detected in a stable manner	People, bicycles, motorcycles, trees, animals, snow fence, etc.

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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

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

- 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 the intelligent tester II to the DLC3.

For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

CRUISE CONTROL SYSTEM

■DESCRIPTION

There are two cruise control systems, a conventional type and a dynamic radar type.

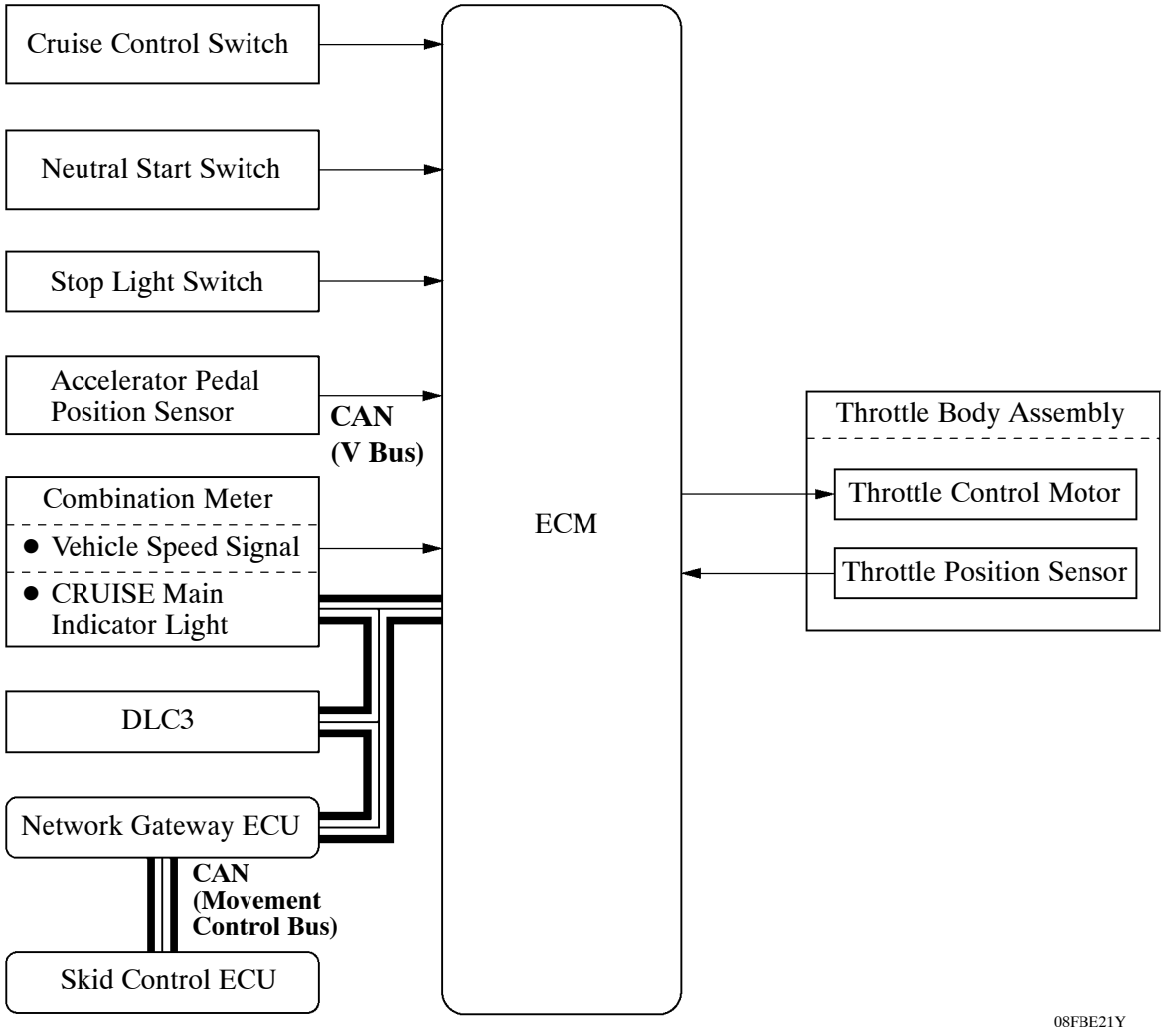
- The conventional type is standard equipment. It maintains the vehicle speed set by the driver. For details, see page BE-269.
- The dynamic radar type is the set option with pre-collision system (radar type). In addition to the conventional type of constant speed control, it uses vehicle-to-vehicle distance control. For details, see page BE-273.

■CRUISE CONTROL SYSTEM

1. General

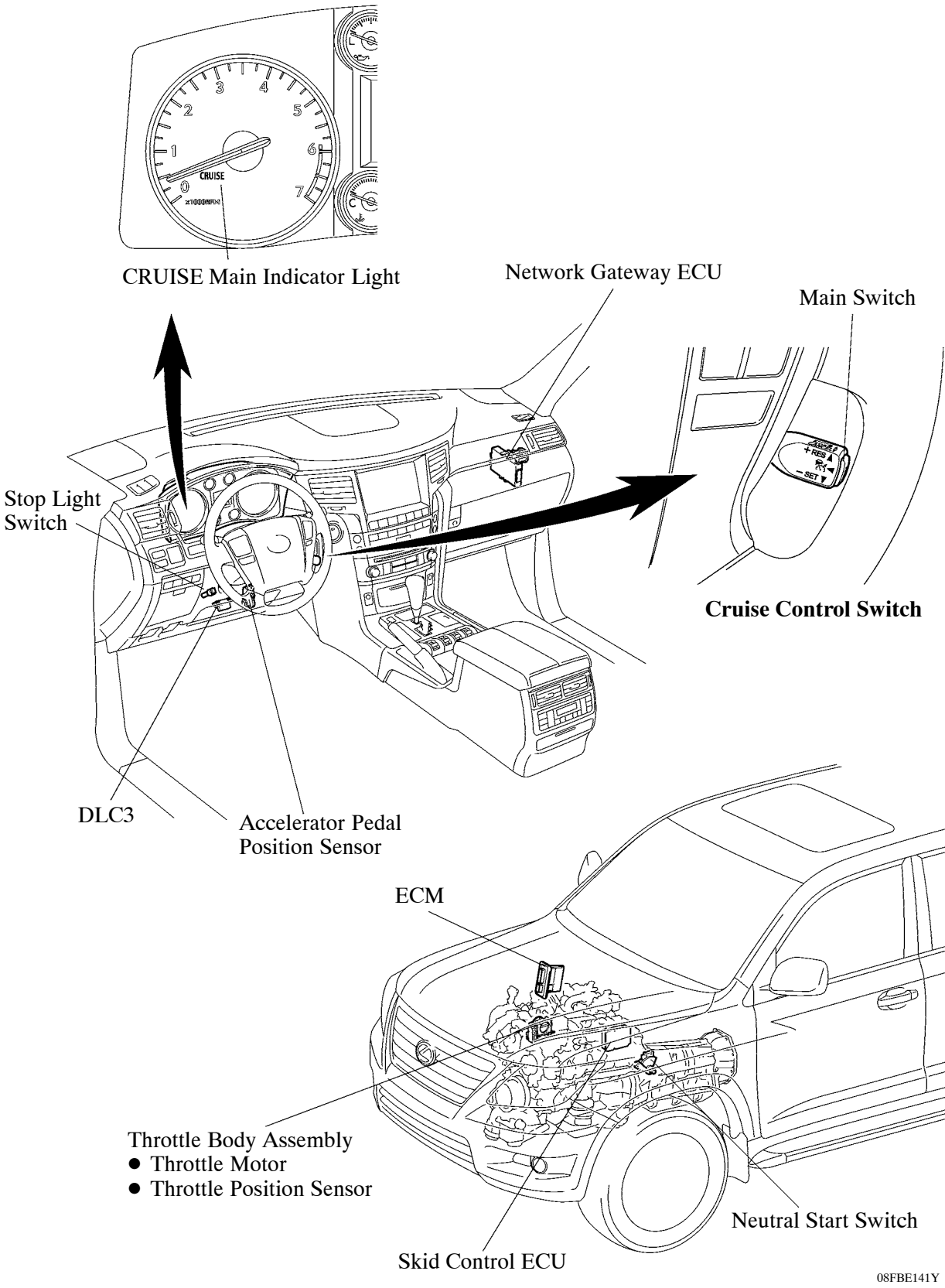
The conventional type operates as follows: When the cruise control system is set to a desired vehicle speed, the ECM regulates the throttle valve position to maintain the vehicle speed without the driver having to depress the accelerator pedal.
This system effects control through the ETCS-i (Electronic Throttle Control System-intelligent).

▶ System Diagram ◀



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2. Layout of Main Components



LHD Model

3. System Control

General

The cruise control has the following functions.

Function	Outline
Constant Speed Control	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.
Set Control	When the main switch is turned ON and the cruise control switch is pressed to the SET/– side and released, the ECM stores the vehicle speed in memory and continues to control the vehicle at that speed.
Coast Control	When the cruise control switch is kept pushed to the SET/– side while the vehicle is running in the cruise control mode, the throttle control motor is energized in the throttle closing direction. The vehicle keeps decelerating and the ECM stores the vehicle speed when the cruise control switch is released. From then on, the ECM controls the vehicle speed at that speed constantly.
Tap-down Control	When the difference between the actual vehicle speed and the set speed is less than 5 km/h (3 mph), the set speed can be lowered approximately 1.6 km/h (1 mph) each time by operating the SET/– switch quickly within approximately 0.6 seconds.
Accelerator Control	When the cruise control switch is kept pushed to the RES/+ side while the vehicle is running in the cruise control mode, the throttle control motor is energized in the throttle opening direction. The vehicle keeps accelerating and the ECM stores the vehicle speed when the cruise control switch is released. From then on, the ECM controls the vehicle speed at that speed constantly.
Tap-up Control	When the difference between the actual vehicle speed and the set speed is less than 5 km/h (3 mph), the set speed can be increased approximately 1.6 km/h (1 mph) each time by operating the RES/+ switch quickly within approximately 0.6 seconds.
Low Speed Limit Control	The low speed limit is the lowest speed that can be set in cruise control mode, and is designed to approximately 40 km/h (25 mph). The cruise control mode cannot be set below that speed. If the vehicle speed drops below that speed while running in the cruise control mode, the cruise control mode is cancelled automatically. However, the cruise control ECU retains the set speed in memory.
High Speed Limit Control	The high speed limit is the highest speed that cruise control mode can be set and is designed at approximately 200 km/h (125 mph). ● The cruise control mode cannot be set if the vehicle speed exceeds the high speed limit. ● The vehicle will not accelerate when the RES/+ switch is operated if the vehicle speed exceeds the high speed limit.
Manual Cancel Control	If any of the following signals is sent to the ECM while the vehicle is running in the cruise control mode, the cruise control mode is cancelled accordingly. ● Stop light switch ON signal (Depress the brake pedal) ● D position circuit in neutral start switch OFF signal (Move the shift lever from D to N.) ● When 1st, 2nd or 3rd range is selected in S mode position. ● CANCEL switch ON signal ● Main switch OFF signal

(Continued)

Function	Outline
Resume Control	● When the driver pushes the cruise control switch to the RES/+ side after the vehicle speed has exceeded the low speed limit, the cruise control resumes operation to reach the set speed that was in the memory at the time the cruise control mode had been canceled. ● Even if the vehicle speed drops below the low speed limit, resume can be performed after the vehicle speed exceeds the low speed limit. ● If the cruise control mode is canceled by turning OFF the main switch or the malfunction of the cruise control system, the set speed is not stored. As a result, resume control cannot be performed.
Shift Down Control	When the vehicle is cruising uphill, shift down control may be performed by the ECT (Electronic Control Transmission). The ECM transmits the shit up request signal to the ECT ECU when the ECM judges the end of cruising uphill based on the throttle valve angle.
Automatic Cancel Control	When any of the following conditions occurs during cruise control driving, the set speed in the memory is cleared to cancel the cruise control mode. Furthermore, the CRUISE main indicator light blinks until the main switch is turned OFF, and the operation of the cruise control is disabled until the main switch is turned ON again. ● Stop light switch open or short circuit ● The vehicle speed signal abnormal
	When any of the following conditions occurs during the cruise control driving, the speed that is set in the memory is cleared to cancel the cruise control mode. Furthermore, the CRUISE main indicator light blinks until the main switch is turned OFF, and the operation of the cruise control is disabled until the engine switch is turned OFF again. ● Stop light switch input signal abnormal ● Cancel circuit malfunction
	When any of the following conditions occurs, the system will cancel the cruise control mode. ● The vehicle speed drops 16 km/h (9.9 mph) below the set speed in memory. (The set speed will be cleared from memory.) ● The vehicle speed is below the low speed limit [40 km/h (25 mph)]. (The set speed will be retained in memory.)
Other Cancellation Items	While the vehicle is being driven under cruise control mode, cruise control mode will be canceled if the VSC is activated. (The set speed will be retained in memory.)

Diagnosis

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

- The 5-digit DTCs can be read by connecting an intelligent tester II to the DLC3.

For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

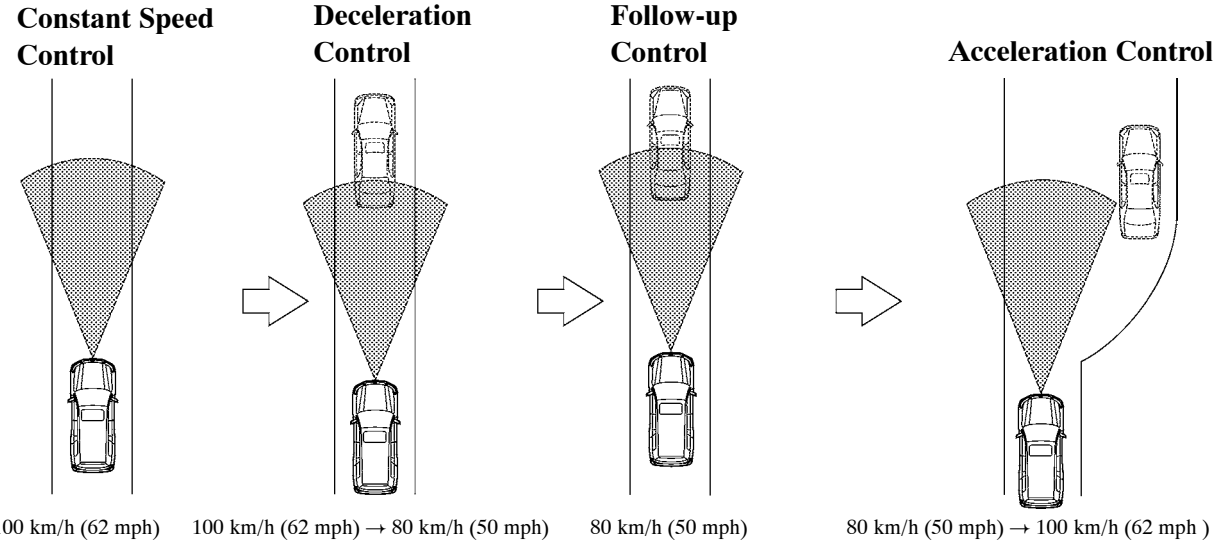
■DYNAMIC RADAR CRUISE CONTROL SYSTEM

1. General

The dynamic radar cruise control system has two cruise control modes: Constant speed control mode, and vehicle-to-vehicle distance control mode.

- The cruise control switch is used for switching between the two modes. The mode in which the cruise control system starts is the vehicle-to-vehicle distance control mode.
- The dynamic radar cruise control system is controlled by the distance control ECU, millimeter wave radar sensor and ECM.
- The combination meter informs the driver of the control conditions.

Mode	Outline
Constant Speed Control Mode	The constant speed control mode is the same as in the cruise control system.
Vehicle-to-vehicle Distance Control Mode	In the vehicle-to-vehicle distance control mode, the system recognizes and determines the lane in which the driver's own vehicle and the vehicle ahead are traveling. Thus, the system is able to maintain the proper vehicle-to-vehicle distance in accordance with the vehicle speed, and allows the vehicle to be driven under follow-up control. ● The driver can operate the distance control switch on the steering wheel to select the vehicle-to-vehicle distance in three stages: long, middle, and short. ● This mode consists mainly of four controls: constant speed control, deceleration control, follow-up control, and acceleration control. ● The illustrations below show control examples while the driver's own vehicle is operating at 100 km/h (62 mph), and the vehicle ahead is operating at 80 km/h (50 mph). ● The distance control ECU increases and decreases the vehicle speed by controlling the engine and brakes through transmitting the target acceleration rate, target deceleration rate and brake request signals to the skid control ECU and ECM.

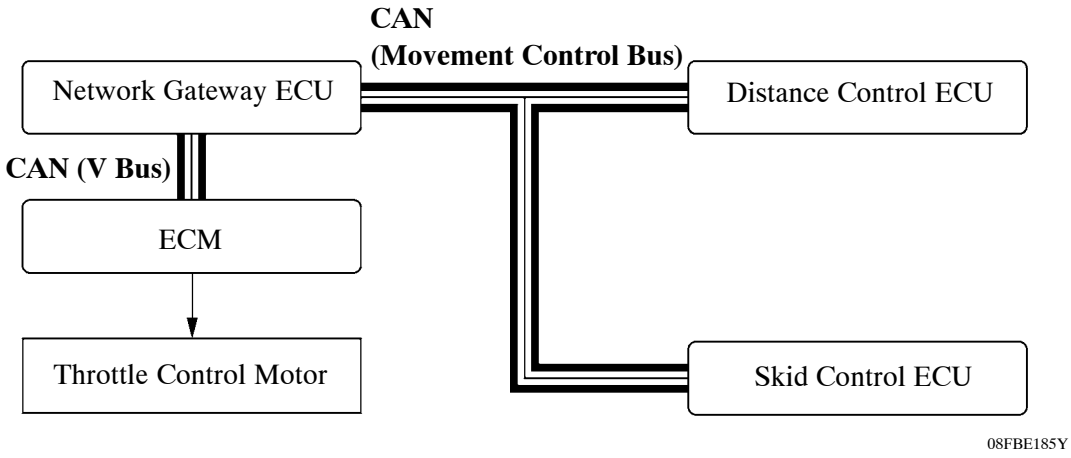


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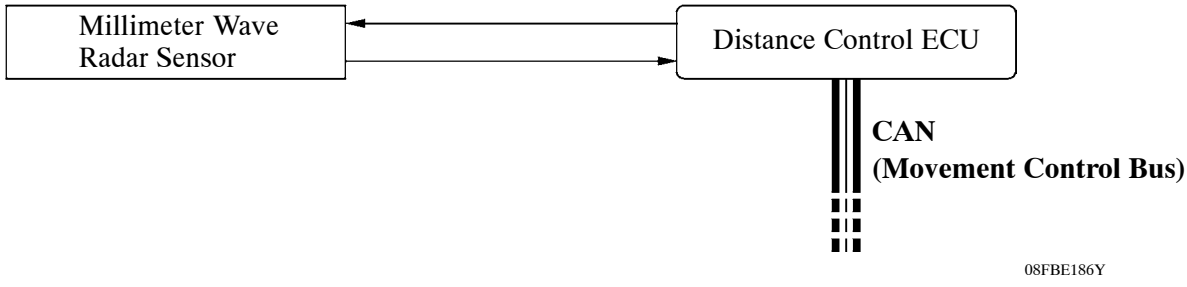
Service Tip

When either the distance control ECU or the ECM is replaced, the millimeter wave radar sensor information stored in the replaced ECU must be initialized. For details, see LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

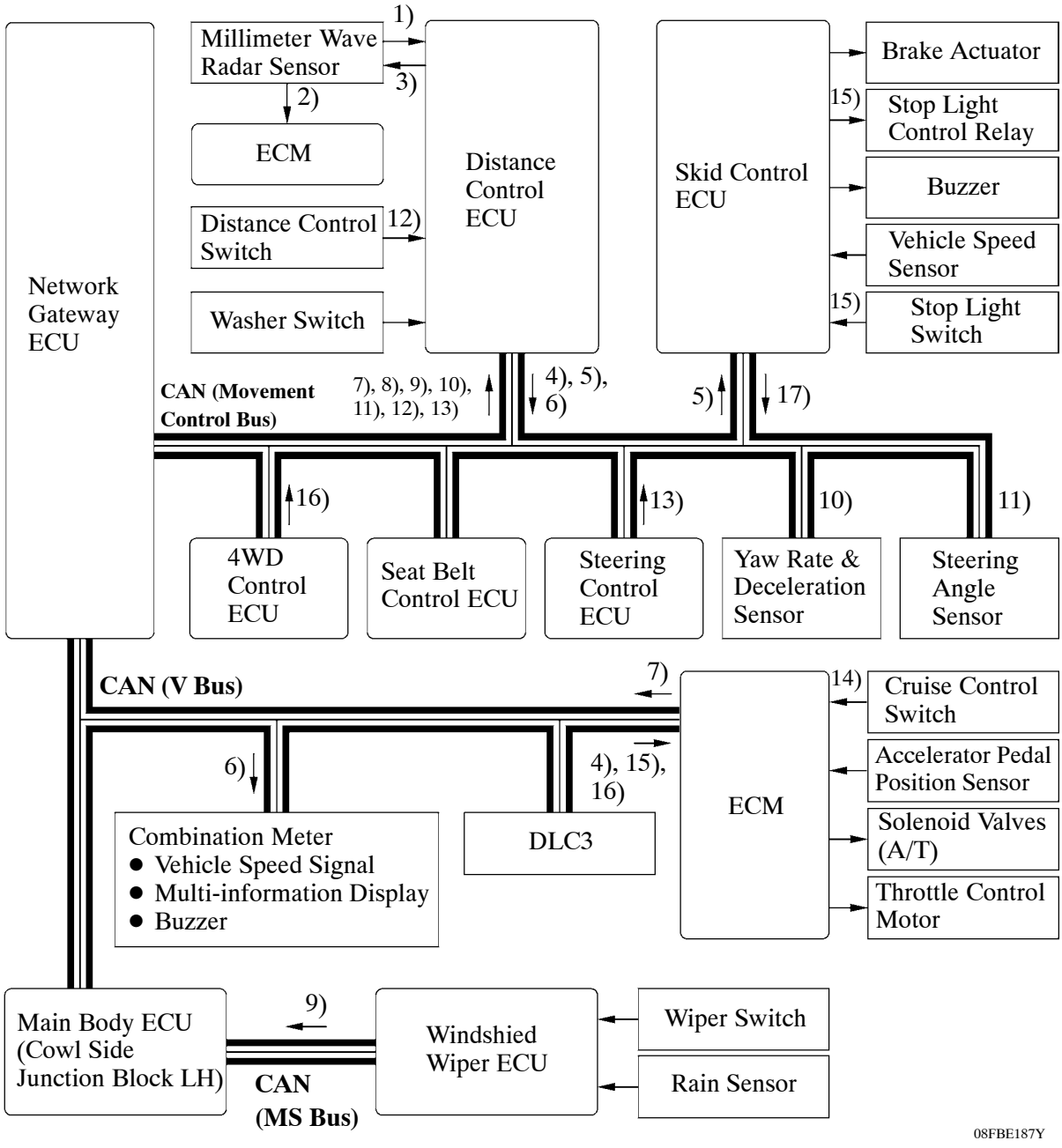
- As in the cruise control system, the constant speed control mode is controlled by the distance control ECU, which outputs signals to the skid control ECU and the ECM.



- The vehicle-to-vehicle distance control mode is controlled by the millimeter wave radar sensor and distance control ECU. Thus, the signals are output to the actuators and the ECU while exchanging data as indicated below.



2. System Diagram



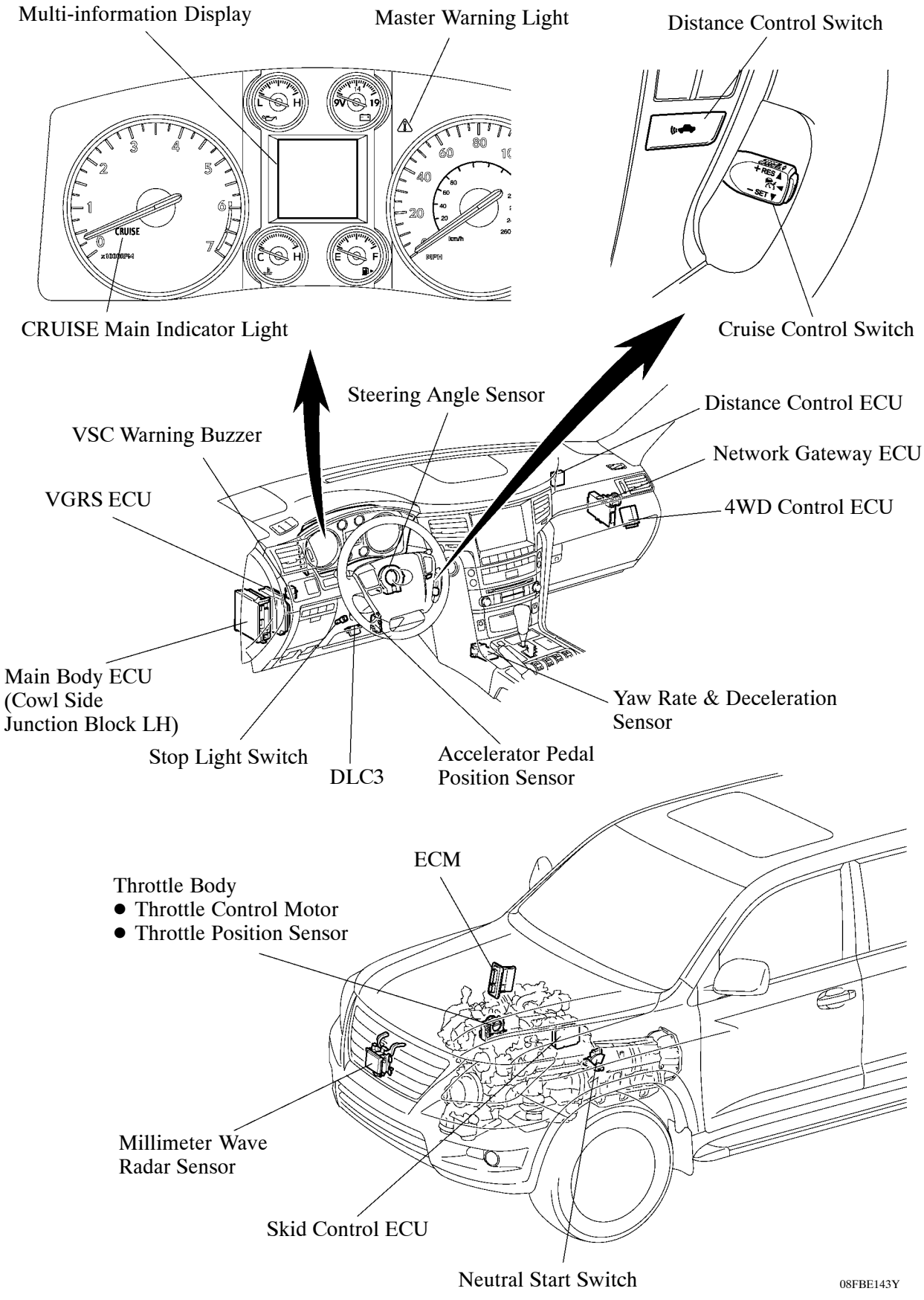
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No.	Transmit	Receive	Data List	Communication
1)	Millimeter Wave Radar Sensor	Distance Control ECU	● Information about Vehicle Ahead (distance, relative speed, etc.) ● Diagnostic Data	Serial
2)		ECM	Millimeter Wave Radar Sensor Operation Signal	Wire
3)	Distance Control ECU	Millimeter Wave Radar Sensor	● Actual Vehicle Speed ● Estimated Curve Radius ● Set Distance	Serial
4)		ECM	● Cruise Control Status ● ETC Control Request ● Target Acceleration Rate ● Vehicle-to-vehicle Distance ● Brake Request ● Poor Weather Detection ● Millimeter Wave Radar Sensor Dirtiness Detection ● Diagnosis Data	CAN
5)		Skid Control ECU	● Warning Request ● Cruise Control Status ● Brake Request ● Target Deceleration Rate ● Target Deceleration Rate Gradient	CAN
6)		Combination Meter	● Display Request ● Warning Request	CAN
7)	ECM	Distance Control ECU	● Cruise Control Status ● Accelerator Pedal Idle ● Set Vehicle Speed ● Actual Vehicle Speed ● Set Distance ● Cruise Control Switch ● Brake Request Response ● Stop Light Signal	CAN
8)	Skid Control ECU		● Wheel Speed ● Brake System Malfunction Flag ● Zero Point Information of Yaw Rate ● Buzzer Malfunction Flag	CAN
9)	Wiper ECU		Wiper Status	CAN
10)	Yaw Rate & Deceleration Sensor		Yaw Rate	CAN
11)	Steering Angle Sensor		Angle and Direction of Steering	CAN
12)	Distance Control Switch		Select Vehicle-to-Vehicle Distance	Wire
13)	Steering Control ECU		VGRS Control Status	CAN

(Continued)

No.	Transmit	Receive	Data List	Communication
14)	Cruise Control Switch	ECM	Set Vehicle Speed	Wire
15)	Stop Light Switch		Stop Light Switch ON/OFF	Wire
16)	4WD Control ECU		Cruise Control Cancel Request	CAN
17)	Skid Control ECU	Stop Light Control Relay	Stop Light Illumination Signal	Wire

3. Layout of Main Components



4. Function of Main Components

Item		Outline
Cruise Control Switch	Main Switch	Turns ON/OFF the power to the cruise control system.
	MODE Switch	Switches the control mode, between the constant speed control mode and vehicle-to-vehicle distance mode.
	CANCEL Switch	A cancel signal can be output to the ECM through the operation of this switch.
	RES/+ Switch	The acceleration function and resumption of a preset speed can be performed by operating this switch. A signal is output to the ECM when this switch is operated.
	SET/– Switch	The deceleration function and vehicle speed setting resume signals are output to the ECM due to operation of this switch.
Distance Control Switch		While the system is in the vehicle-to-vehicle distance control mode, the driver can operate the distance control switch to select the vehicle-to-vehicle distance in three stages: long, middle, and short.
Stop Light Switch		Detects the pressing of the brake pedal and transmits a signal to the ECM.
Combination Switch	Wiper Switch	Transmits wiper switch information to the wiper ECU.
Millimeter Wave Radar Sensor		Radiates millimeter waves forward, uses the reflected millimeter waves for detecting the presence of a vehicle being driven ahead, the vehicle-to-vehicle distance, and the relative speed, and transmits these pieces of information to the distance control ECU. This sensor is also used in the pre-crash safety system. For details, refer to BE-247.
Distance Control ECU		While the system is in the vehicle-to-vehicle distance control mode, the distance control ECU detects the vehicle being followed based on signals from the millimeter wave radar sensor. Then, the distance control ECU calculates the acceleration or deceleration rate required in order to attain the target vehicle-to-vehicle distance, and outputs a request signal to the ECM and/or skid control ECU.
Combination Meter	CRUISE Main Indicator Light	● Illuminates when the main switch on the cruise control switch has been pressed to turn the system ON. ● If the distance control ECU detects a malfunction, this light flashes to warn the driver.
	Master Warning Light	Illuminates when there is a malfunction in the system.
	Buzzer	If the ECM and distance control ECU detects automatic cancel or warning signals while the vehicle is operating under cruise control, the buzzer sounds to inform the driver.
	Multi-information Display	During the dynamic radar cruise control, the multi-information display receives signals from distance control ECU, in order to display the system conditions.
Steering Angle Sensor		Detects the angle and direction of steering and transmits signals to the skid control ECU and distance control ECU.

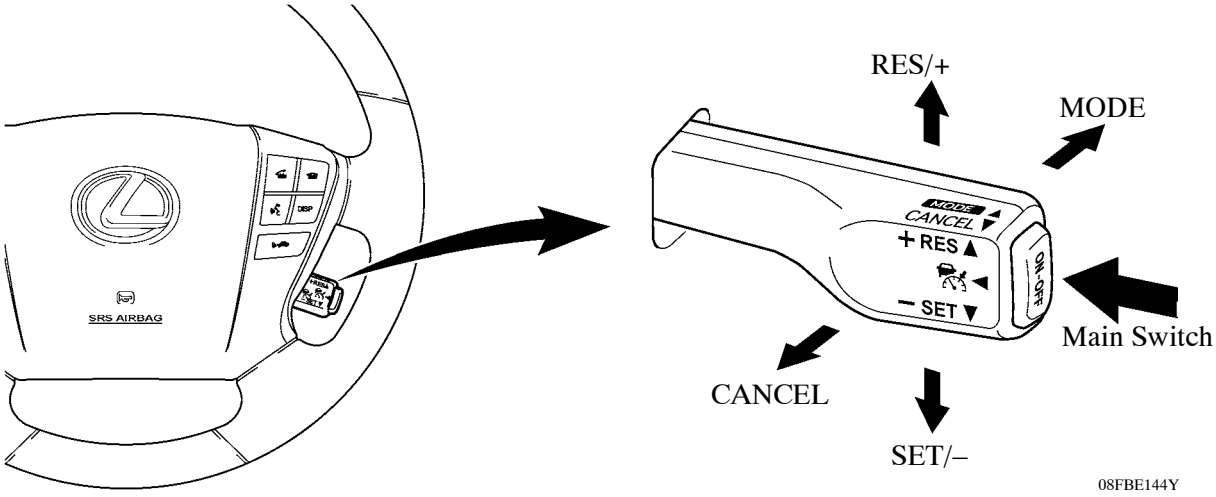
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Item	Outline
Yaw Rate & Deceleration Sensor	Detects the yaw rate of the vehicle and transmits signals to skid control ECU and distance control ECU.
Skid Control ECU	While the system is operating in vehicle-to-vehicle distance control mode, the skid control ECU actuates the brake actuator in accordance with the brake request signal received from the distance control ECU. In addition, it transmits signals such as a wheel speed and estimated vehicle acceleration speed to the distance control ECU.
Brake Actuator	Actuates the brakes in accordance with the signals from the skid control ECU.
Stop Light Control Relay	Illuminates the stop light in accordance with the stop light illumination request signal from the skid control ECU.
ECM	● Controls the cruise control system in accordance with signals from the switches, sensors, skid control ECU and distance control ECU. ● If the ECM detects a malfunction in the cruise control system, it will store DTC (Diagnostic Trouble Code).

5. Construction and Operation

Cruise Control Switch

- The cruise control switch consists of the main, RES/+, MODE, SET/– and CANCEL switches. The RES/+, MODE, SET/– and CANCEL switches are a lever that operates in four directions.
- The cruise control switch is an automatic reset (normally open) type that turns ON only when the switch is being operated and turns OFF as soon as the driver releases the switch. Furthermore, the functions of the control switch are active only when the cruise control system has been turned ON using the main switch on the cruise control switch.

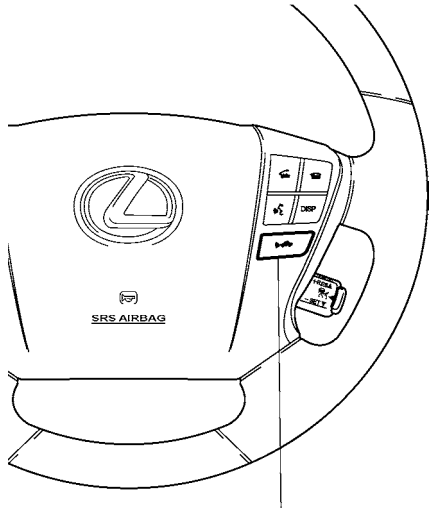


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Distance Control Switch

- While the vehicle is being driven in vehicle-to-vehicle distance control mode, the vehicle-to-vehicle distance setting can be changed each time the distance control switch is pressed, as follows; long → middle → short.
- If the engine switch is turned OFF and back to ON (IG), the system will be set to “long”.
- The vehicle-to-vehicle distance is set as follows:



Distance Control Switch

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Mode	Vehicle-to-vehicle Distance*
Long	Approx. 50 m (164 ft.)
Middle	Approx. 40 m (131 ft.)
Short	Approx. 30 m (98 ft.)

*: While driving at a vehicle speed of 80 km/h (50 mph).

Combination Meter

The combination meter provides a master warning light, CRUISE main indicator light, buzzer, and multi-information display to give information or a warning in the dynamic radar cruise control system.

- The multi-information display indicates information such as the set vehicle speed, the constant speed control mode, the vehicle-to-vehicle distance, the presence of a vehicle ahead, and the warning message.
- Examples of the illumination or display of each indicator light, warning light or multi-information display are shown below.

Mode	Condition	Multi-information Display	CRUISE 01YBE168P	0150BE35C	Buzzer
Constant Speed Control	Being Controlled	 08GBE50Y	Illuminate	—	—
Vehicle-to-vehicle Distance Control	Set Standby	 08FBE189Y	Illuminate	—	—
	Under Constant Speed Control (No Vehicle Ahead)	 **Long** **Middle** **Short** 08GBE97Y	Illuminate	—	—
	Under Follow-up Control (Vehicle Ahead)	 **Long** **Middle** **Short** 08GBE51Y	Illuminate	—	—
	Deceleration Control (Proximity Warning)	 08GBE52Y Flashes display frame, vehicle ahead and indication between.	Illuminate	—	Sounds Continuously
System Failure	Millimeter wave radar sensor is dirty.	 08FBE193Y	Flash	Illuminate	Sounds Once

(Continued)

Mode	Condition	Multi-information Display	CRUISE 01YBE168P	0150BE35C	Buzzer
System Failure	Poor Weather Condition	 08FBE194Y	Flash	Illuminate	Sounds Once
	System Check*	 08FBE195Y	Flash	Illuminate	Sounds Once
Beam Axis Adjustment		 08FBE196Y	Flash	—	—

*: When a DTC (Diagnostic Trouble Code) is memorized.

6. System Control

General

The control of the dynamic radar cruise control system varies depending on the mode:
A: Constant Speed Control Mode
B: Vehicle-to-vehicle Distance Control Mode

Control	Outline	Mode	
		A	B
Constant Speed Control [See page BE-287]	The ECM compares the actual vehicle speed and the set speed. If the vehicle speed is higher than the set speed, it uses the throttle control motor to decrease the throttle opening. If the actual vehicle speed is lower than the set speed, it uses the throttle control motor to increase the throttle opening.	○	○
Deceleration Control [See page BE-288]	Effects throttle control and brake control in order to decelerate the vehicle so that the vehicle-to-vehicle distance between the driver's own vehicle and the vehicle ahead equals the set distance.	—	○
Follow-up Control [See page BE-289]	After effecting deceleration control, the vehicle follows the vehicle ahead in order to maintain the proper vehicle-to-vehicle distance in accordance with the vehicle speed.	—	○
Acceleration Control [See page BE-290]	Accelerates the vehicle in order to attain the set vehicle speed if the vehicle ahead or the driver's own vehicle has changed lanes.	—	○
Set Control	While this system fulfils the following conditions, and the cruise control switch is pressed to the SET/– side and released when the main switch on the cruise control switch has been pressed to turn the system ON, the ECM stores the vehicle speed and maintains the vehicle constantly at that speed. ● The shift lever is in D position ● The shift lever is moved to the S mode, and shift range is 4th, 5th or 6th.	○	○
	The vehicle is running within the following speed range: ● About 45 to 200 km/h	○	—
	The vehicle is running within the following speed range: ● Australia and Taiwanese Package: About 45 to 135 km/h ● G.C.C. Countries: About 45 to 170 km/h	—	○
Low Speed Limit Control	The low speed limit is the lowest speed that cruise control can be set at and it is designed to be approx. "40 km/h (25 mph)". The cruise control cannot be set below that speed. If the vehicle speed drops below that speed while running in the cruise control, the cruise control will be cancelled automatically. However, the set vehicle speed in the memory is kept.	○	○

(Continued)

Control	Outline	Mode	
		A	B
Coast Switch Control	While the cruise control switch is held to the SET/– side, the vehicle speed and the set speed change as follows, according to the mode:	○	○
	● The vehicle decelerates constantly. ● The set speed changes to the speed at which the switch was turned OFF.	○	—
	● The vehicle setting speed decreases in increments of 5 km/h or 5 mph. [Example: 57 → 55 → 50 km/h, 57 → 55 → 50 mph] ● The vehicle decelerates rapidly due to ETCS-i.	—	○
Tap-down Control	When the cruise control switch is pushed momentarily (approx. 0.6 sec) to the SET/– side, the vehicle speed and the set speed change as follows, according to the mode: ● The vehicle will decelerate in increments of approximately 1.6 km/h (1 mph) for each time the switch was pressed. ● However, if the difference between the actual vehicle speed and the set speed is greater than 5 km/h (3 mph), the set speed will change to the speed at which the vehicle was being driven at the time the switch was operated	○	—
Accelerator Control	When the cruise control switch is pushed to the RES/+ side and held, the vehicle speed and the set speed change as follows, according to the mode:	○	○
	● The vehicle will accelerate constantly. ● The set speed changes to the speed at which the switch was turned OFF.	○	—
	● The set speed increases in increments 5 km/h or 5 mph. [Example: 52 → 55 → 60 km/h, 52 → 55 → 60 mph] ● The vehicle will accelerate to the speed that is set at the time the switch is released. However, only the set speed will change during follow-up control.	—	○
Resume Control	● When the driver pushes the cruise control switch to the RES/+ side after the vehicle speed has exceeded the low speed limit, the cruise control resumes operation to reach the vehicle speed that was set at the time the driver canceled cruise control. ● Even if the vehicle speed drops below the low speed limit, resume can be performed when the vehicle speed exceeds the low speed limit.	○	○
	If the vehicle ahead changes driving lanes during follow-up control, the vehicle speed is gradually increased to the set speed. At this time, the vehicle speed can be increased promptly by pushing the cruise control switch to the RES/+ side.	—	○
Tap-up Control	When the cruise control switch is pushed momentarily (approx. 0.6 sec.) to the RES/+ side, the vehicle speed and the set speed change as follows. ● The vehicle will accelerate in increments of approx. 1.6 km/h (1 mph) for each time the switch was pressed. ● However, if the difference between the actual vehicle speed and the set speed is greater than 5 km/h (3 mph), the set speed changes to the speed as which the vehicle was being driven at the time the switch was operated.	○	—

(Continued)

Control	Outline	Mode	
		A	B
Shift Down Control	When the vehicle is cruising uphill, shift down control may be performed by the ECT (Electronic Control Transmission). The ECM transmits the shit up request signal to the ECT ECU when the ECM judges the end of cruising uphill based on the throttle valve angle.	○	○
Manual Cancel Control	If any of the following conditions is met, the cruise control will be cancelled. ● A stop light switch ON signal is sent to the ECM (the brake pedal is depressed). ● The shift lever is moved from D to N. ● The 1st, 2nd or 3rd range is selected in the S mode position. ● A CANCEL switch ON signal is sent to the ECM (the cruise control switch is moved to the CANCEL side). ● A main switch OFF signal is sent to the ECM. ● A VSC operation signal is sent to the ECM.	○	○
Automatic Cancel Control [See page BE-291]	When an automatic cancel signal is sent to the ECM, the cruise control operation is canceled. At this time, the warning method and the control resumption condition vary according to the cancel signal.	○	○
Mode Switching Control	The following operations switch the modes: 1) Main switch on the cruise control switch is ON. (Starts in the vehicle-to-vehicle distance control mode) 2) Cruise control switch is held to the MODE side. (Approx. 1 second or more) If the switch is pushed to any other side before switching modes, switch the cruise control system OFF; then, perform steps 1) and 2) again.	○	○
Diagnosis [See page BE-292]	If a malfunction occurs in the dynamic radar cruise control system during cruise control operation, the ECM cancels cruise control and diagnoses and memorizes the faults related to the malfunction.	○	○

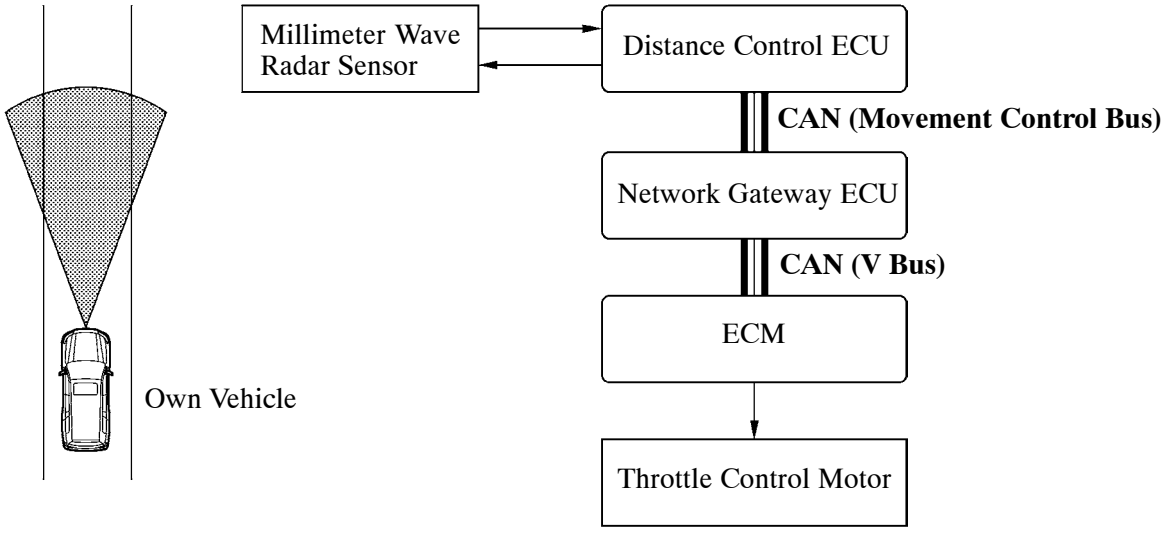
Constant Speed Control

1) General

- In the constant speed control mode, the constant speed control is effected by the ECM.
- In the vehicle-to-vehicle distance control mode, the constant speed control is effected by the millimeter wave radar sensor and distance control ECU.

2) Constant Speed Control in Vehicle-to-Vehicle Distance Control Mode

The millimeter wave radar sensor transmits the information about the vehicle ahead to the distance control ECU and also transmits a millimeter wave radar sensor operation signal to the ECM. The distance control ECU transmits this signal to the ECM. The ECM compares the set speed and the actual vehicle speed, and effects constant speed control by regulating the throttle control in order to attain the set speed.

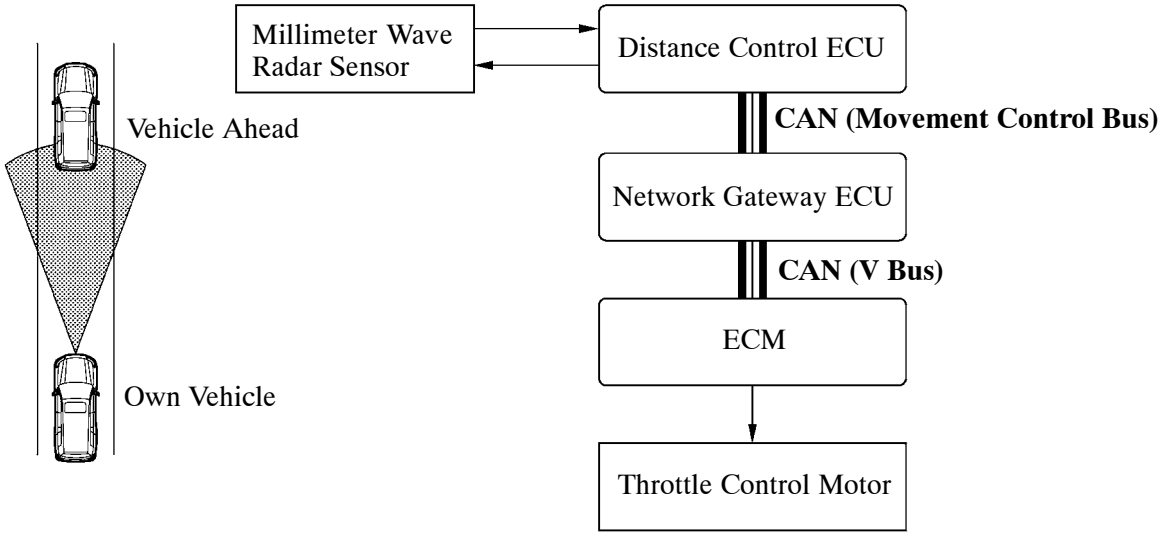


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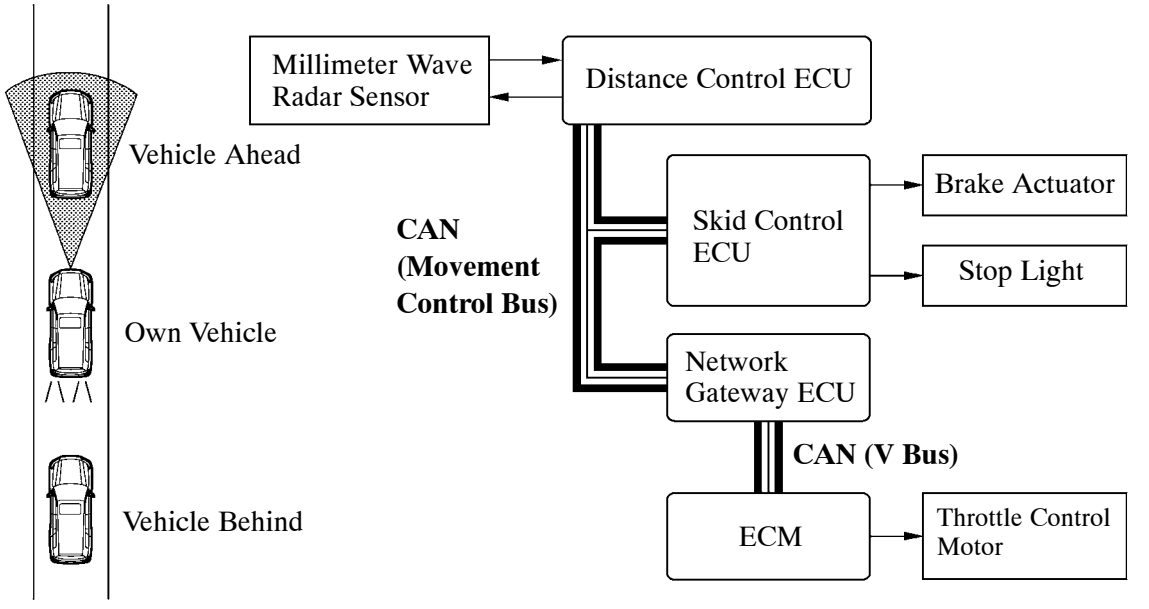
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Deceleration Control

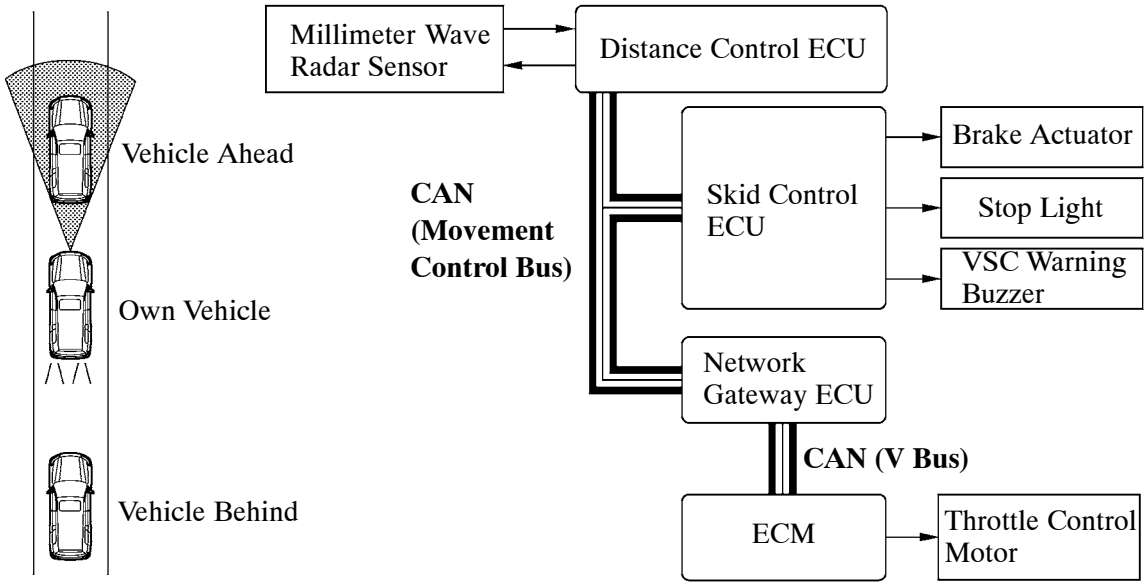
- The distance control ECU calculates the target deceleration rate in accordance with signals from the millimeter wave radar sensor, and transmits a deceleration request signal to the ECM. Upon receiving this signal, the ECM closes the throttle valve in order to cause the vehicle to decelerate.
- This control is not effected in the presence of a parked vehicle or object, or below the settable vehicle speed range.



- If distance control ECU determines that further deceleration is necessary, it transmits a brake request signal to the ECM. Upon receiving this signal, the ECM transmits a brake request signal to skid control ECU. Skid control ECU then controls the brake actuator to apply the brakes.
- At this time, if the deceleration rate is higher than a predetermined value, the skid control ECU outputs a stop light illumination request signal to the stop light control relay, in order to inform anyone who might be following the vehicle.



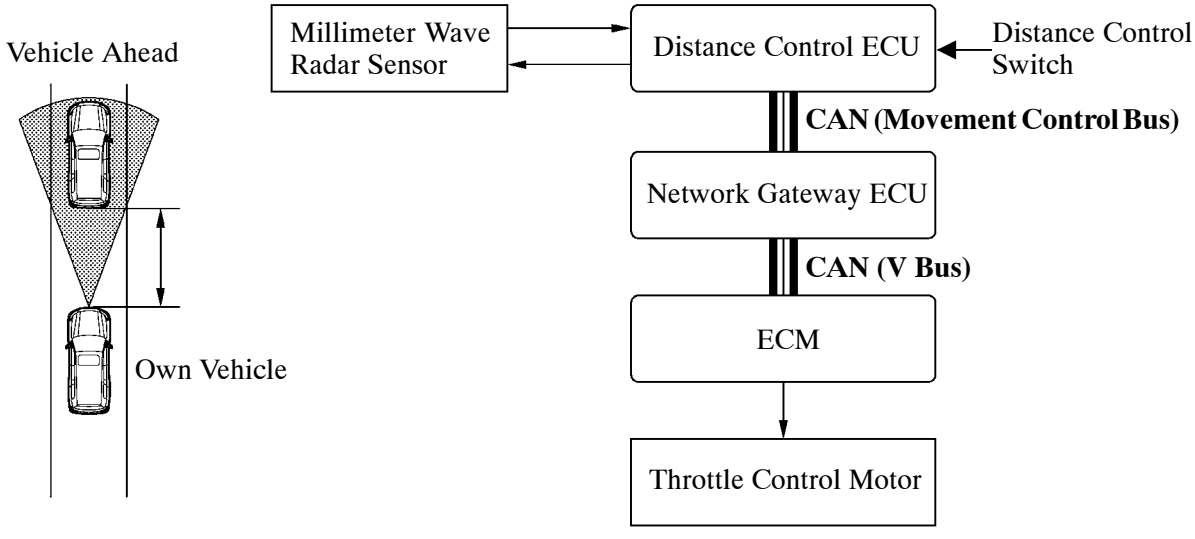
- If further deceleration is necessary after the stop light is illuminated, the skid control ECU sounds the VSC warning buzzer based on the request signal from the distance control ECU to urge the driver to depress the brake pedal.



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Follow-up Control

- After effecting deceleration control, distance control ECU transmits a request signal to the ECM so that the vehicle can follow the vehicle ahead while maintaining the proper vehicle-to-vehicle distance according to the vehicle speed. Upon receiving this signal, the ECM regulates the throttle in order to effect follow-up control.
- Three stages (long, middle, and short) of vehicle-to-vehicle distance can be selected by operating the distance control switch.

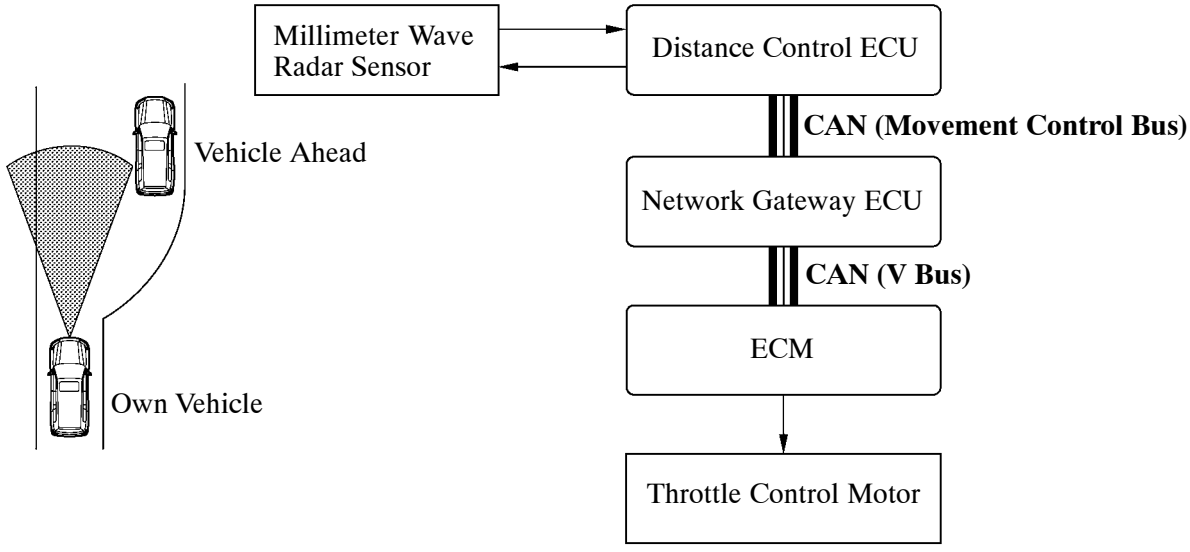


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Acceleration Control

If the distance control ECU detects (based on the millimeter wave radar sensor) that either the vehicle ahead or own vehicle has changed lanes, an acceleration request signal is transmitted to the ECM in order to attain the set vehicle speed. Upon receiving this signal, the ECM regulates the throttle in order to effect acceleration control.



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Automatic Cancel Control

If any of the conditions listed below occurs while the vehicle is in cruise control (A: constant speed control mode; B: vehicle-to-vehicle distance control mode), the cruise control will be canceled. Then, the following warning will be issued.

1) Warning message is displayed on the multi-information display.
2) Master warning light illuminates.
3) Buzzer sounds.
4) CRUISE main indicator light flashes.

Mode	Description of Malfunction	Warning
A and B	If any of the conditions listed below occurs, the ECM clears the set speed and cancels the cruise control. ● Malfunction of the vehicle speed signal. ● An open or short circuit in the stop light switch. The cruise control is prohibited until the conditions are restored or the cruise control system is turned OFF and back ON again using the main switch on the cruise control switch.	1) "CHECK CRUISE SYSTEM" 2) Illuminate 3) Sound Once 4) Flash
	If the condition below occurs, the ECM clears the set speed and cancels the cruise control. ● Malfunction in the ETCS-i The cruise control is prohibited until the conditions are restored or the cruise control system is turned OFF and back ON again using the main switch on the cruise control switch.	1) — 2) Illuminate 3) — 4) —
	If the condition below occurs, the ECM cancels the cruise control while retaining the set speed in its memory. ● The vehicle speed drops below low speed limit [approx. 40 km/h (25 mph)].	1) — 2) — 3) Sound Once 4) —
A	If the condition below occurs, the ECM cancels the cruise control. ● The vehicle speed drops more than 16 km/h (10 mph) below the set speed.	1) — 2) — 3) — 4) —
B	If any of the conditions listed below occurs, the ECM clears the set speed and cancels the cruise control. ● Malfunction of the millimeter wave radar sensor. ● Displacement of the axis of the millimeter wave radar sensor. ● Malfunction in the dynamic radar cruise control system other than those given above. The cruise control is prohibited until the engine switch is turned ON (IG) again.	1) "CHECK CRUISE SYSTEM" 2) Illuminate 3) Sound Once 4) Flash
	If the condition below occurs, the ECM cancels the cruise control while retaining the set speed in its memory. ● The millimeter wave radar sensor is dirty. The cruise control is prohibited until the conditions are restored or the main switch on the cruise control switch is turned ON again.	1) "CLEAN RADAR SENSOR" 2) Illuminate 3) Sound Once 4) Flash
	If any of the conditions listed below occurs, the ECM cancels the cruise control while retaining the set vehicle speed in its memory. ● The wipers operate at high speed (including AUTO mode). ● The measurement becomes extremely unstable due to poor weather conditions. The cruise control is prohibited until the conditions are remedied or the cruise control system is turned OFF and back ON again using the main switch on the cruise control switch.	1) "CRUISE NOT AVAILABL" 2) Illuminate 3) Sound Once 4) Flash

Diagnosis

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

- The 5-digit DTCs can be read by connecting an intelligent tester II to the DLC3.

For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

REAR VIEW MIRROR

■ DESCRIPTION

The functions of the rear view mirror are described in the table below.

Mirror	Function	Outline
Inner Rear View Mirror Assembly	Automatic Glare-resistant EC (Electro Chromic) Mirror	This function can automatically reduce headlight glare from an on-coming vehicle during nighttime driving.
Outer Rear View Mirror Assembly	Mirror Heater (See page BE-330)	When the rear window defogger switch is turned ON, the mirror surface is heated for a certain period of time.
	Foot Light (See page BE-42)	This function illuminates around the doors in conjunction with the illuminated entry system operation.
	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.
	Manual Retractable	This function retracts the outer rear view mirror assemblies when the retractable outer mirror switch is pressed.
	Automatic Retractable	When all doors are locked from the outside of the vehicle while the engine switch is ON (IG), the outside rear view mirrors are retracted. When all doors are unlocked from the outside of the vehicle while the engine switch is OFF, the outside rear view mirrors are returned to their original position.
	Reverse-linked Mirror	When the shift lever is shifted into the R position, the outer rear view mirrors on the driver and passenger sides tilt downward, thus facilitating confirmation of the rear side of the vehicle.
	Automatic Glare-resistant EC (Electro Chromic) Mirror	This function can automatically reduce headlight glare from an on-coming vehicle during nighttime driving.
	Memory System (See page BE-303)	The system stores up to 3 mirror positions.

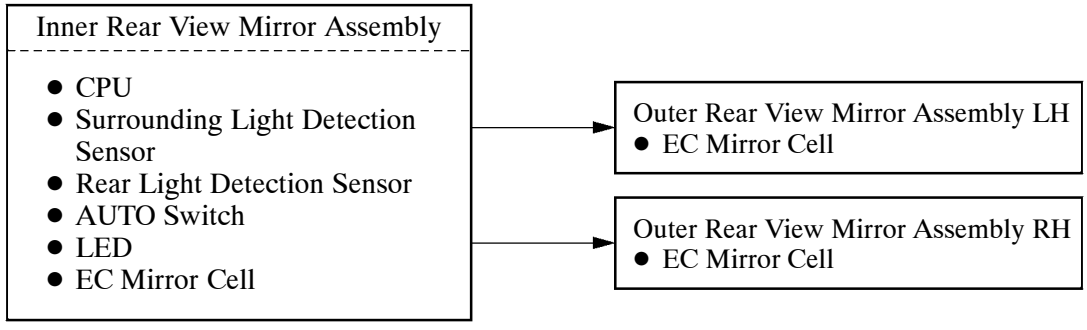
■AUTOMATIC GLARE-RESISTANT EC MIRROR

1. General

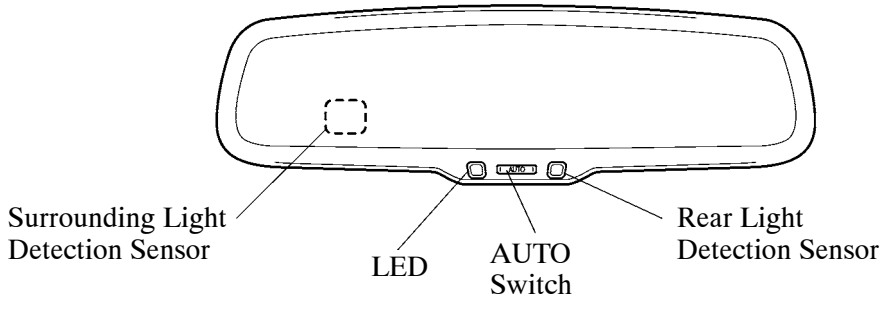
During nighttime driving, if a large difference in intensity exists between the surrounding light and the light reflected off the inner rear view mirror from the headlights behind, an automatic glare-resistant EC (Electro Chromic) mirror automatically reduces the reflection rate of the inner or outer 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.
- The EC mirror cells of the outer rear view mirrors are activated simultaneously when the inner rear view mirror is activated. However, 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 engine switch is changed from OFF to ON (IG), this system defaults to AUTO mode.

▶ System Diagram ◀



080BE107TE



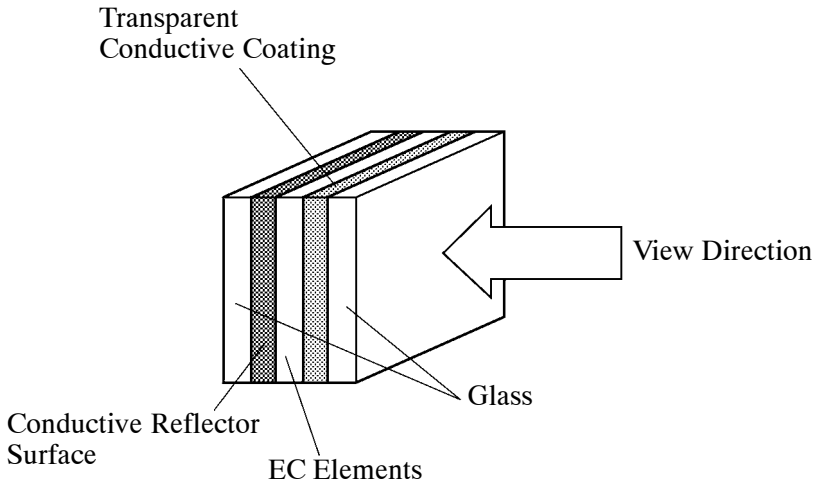
080BE108TE

2. Function of Main 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.
AUTO Switch	Changes the mode between AUTO and AUTO OFF.
EC Mirror Cell	Varies the reflection 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

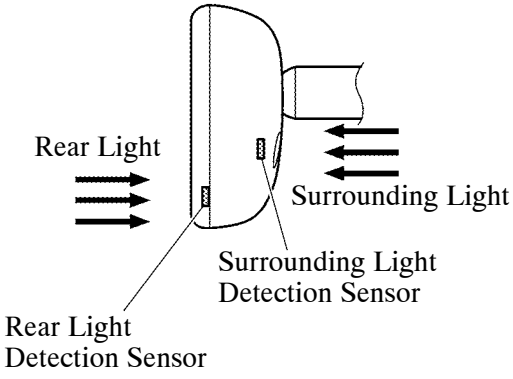
- The EC elements are placed between a layer of transparent conductive coating and a layer of conductive reflector surface, which are placed between 2 sheets of glass.
- The EC elements have color changing characteristics. These characteristics are utilized to electronically vary the mirror reflection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



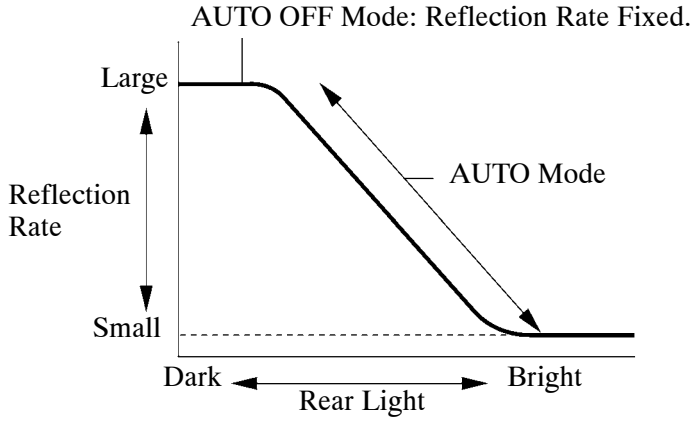
025BE185P

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.



279BE41



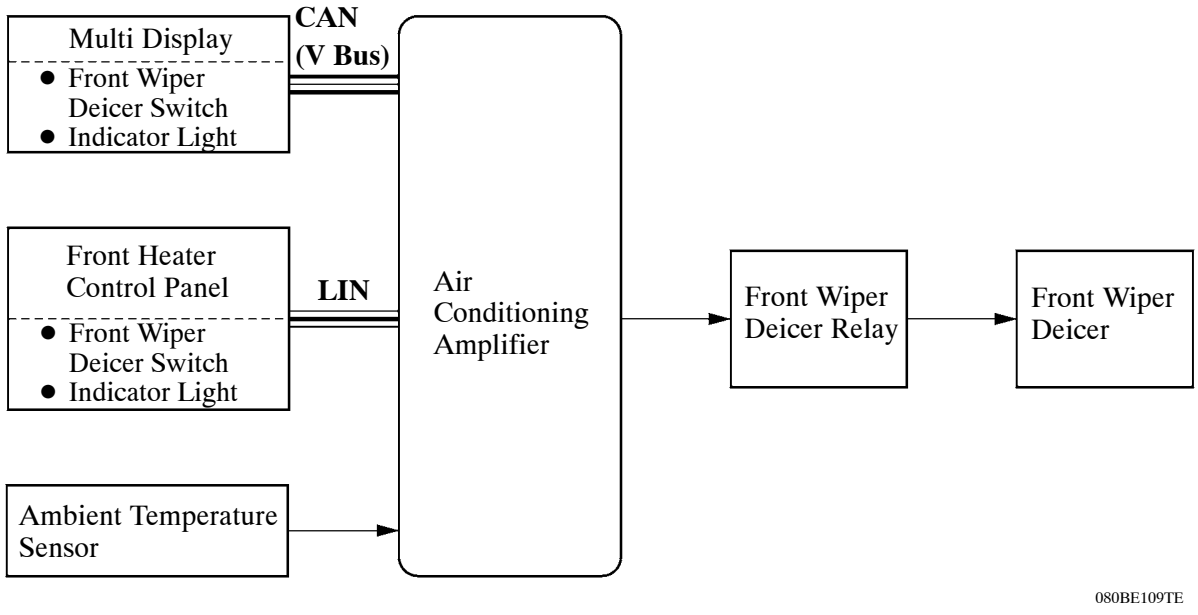
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FRONT WIPER DEICER SYSTEM

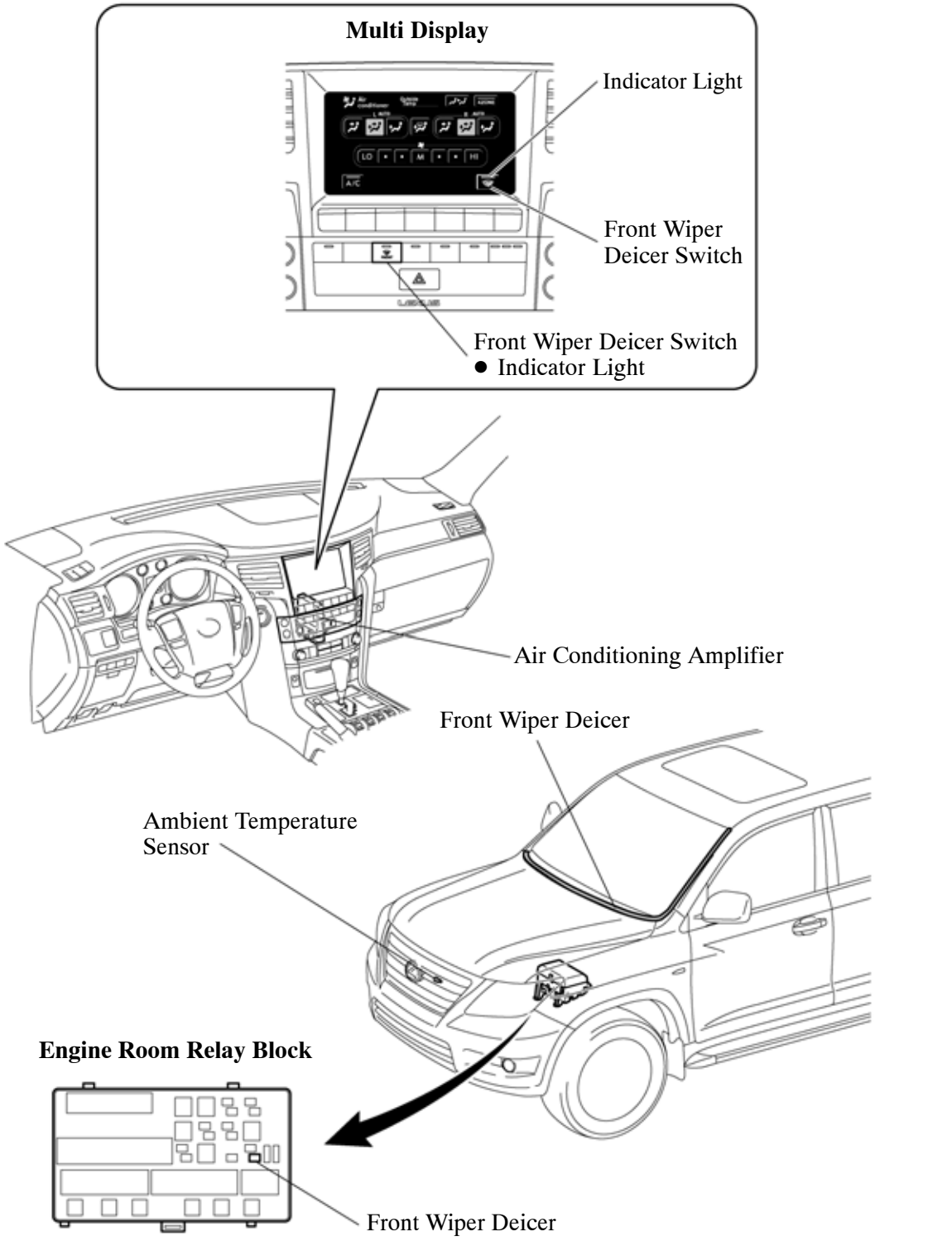
■ DESCRIPTION

- The front wiper deicer system uses a heater element in the windshield glass to help to deice frozen front wipers.
- This system is provided as standard equipment for the Europe and China models.

▶ System Diagram ◀



■ LAYOUT OF MAIN COMPONENTS



LHD Models

■SYSTEM OPERATION

The front wiper deicer system is turned ON or OFF when the following conditions are met.

Operation	Condition	Indicator Light
OFF to ON	The front wiper deicer switch is pressed to start deicing. The outside air temperature is 0°C 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-330. ● The outside air temperature is 5°C or higher.	OFF

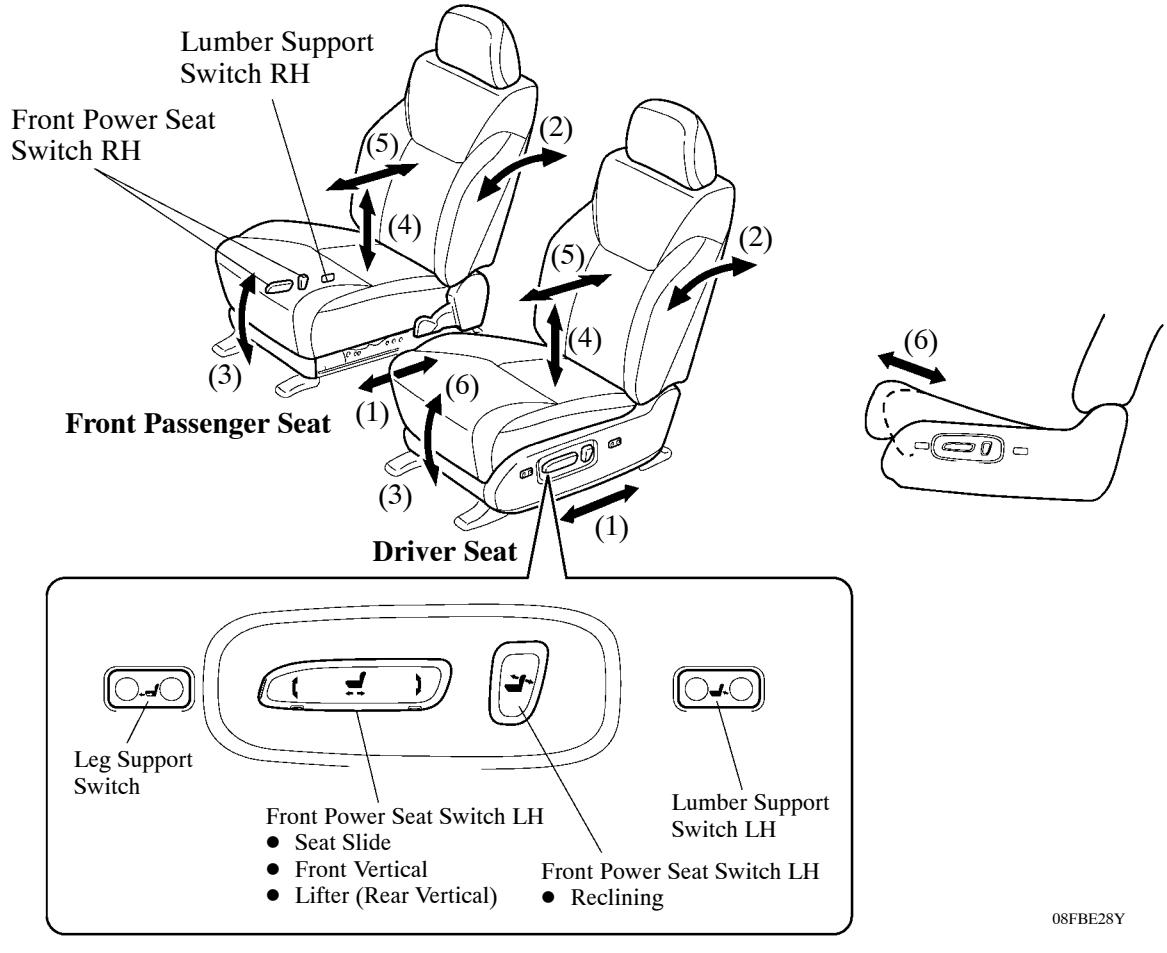
POWER SEAT SYSTEM

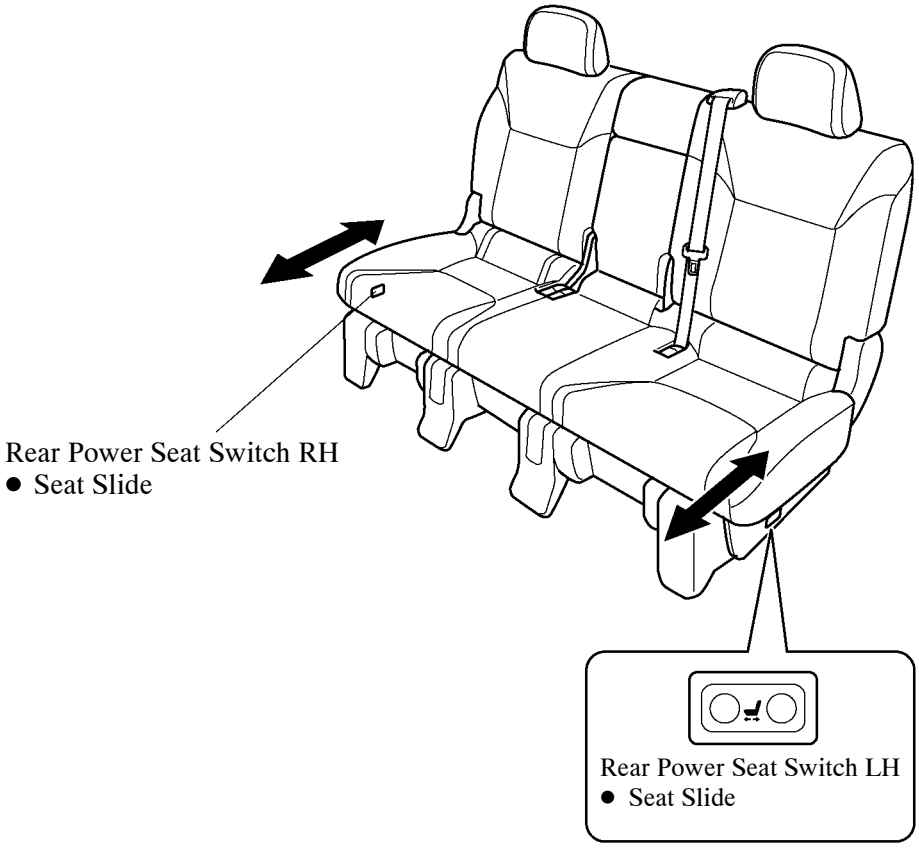
■ DESCRIPTION

- The power seat system is provided as standard equipment on all 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-303.
- A leg support adjustment function is provided in order to deal with a wide range of driver heights. The length of the cushion pad front edge can be adjusted.
- The power seat system for the driver, front passenger, and rear No. 1 seat has the following functions:

Function			Stroke		
			Driver	Front Passenger	Rear No. 1 Seat LH and RH
(1)	Seat Slide	mm (in.)	240 (9.4)	←	105 (4.1)
(2)	Reclining	degrees	78	←	50*
(3)	Front Vertical	mm (in.)	35 (1.4)	←	Not available
(4)	Lifter (Rear Vertical)	mm (in.)	50 (2.0)	←	Not available
(5)	Lumber Support	mm (in.)	35 (1.4)	←	Not available
(6)	Leg Support	mm (in.)	40 (1.6)	Not available	Not available

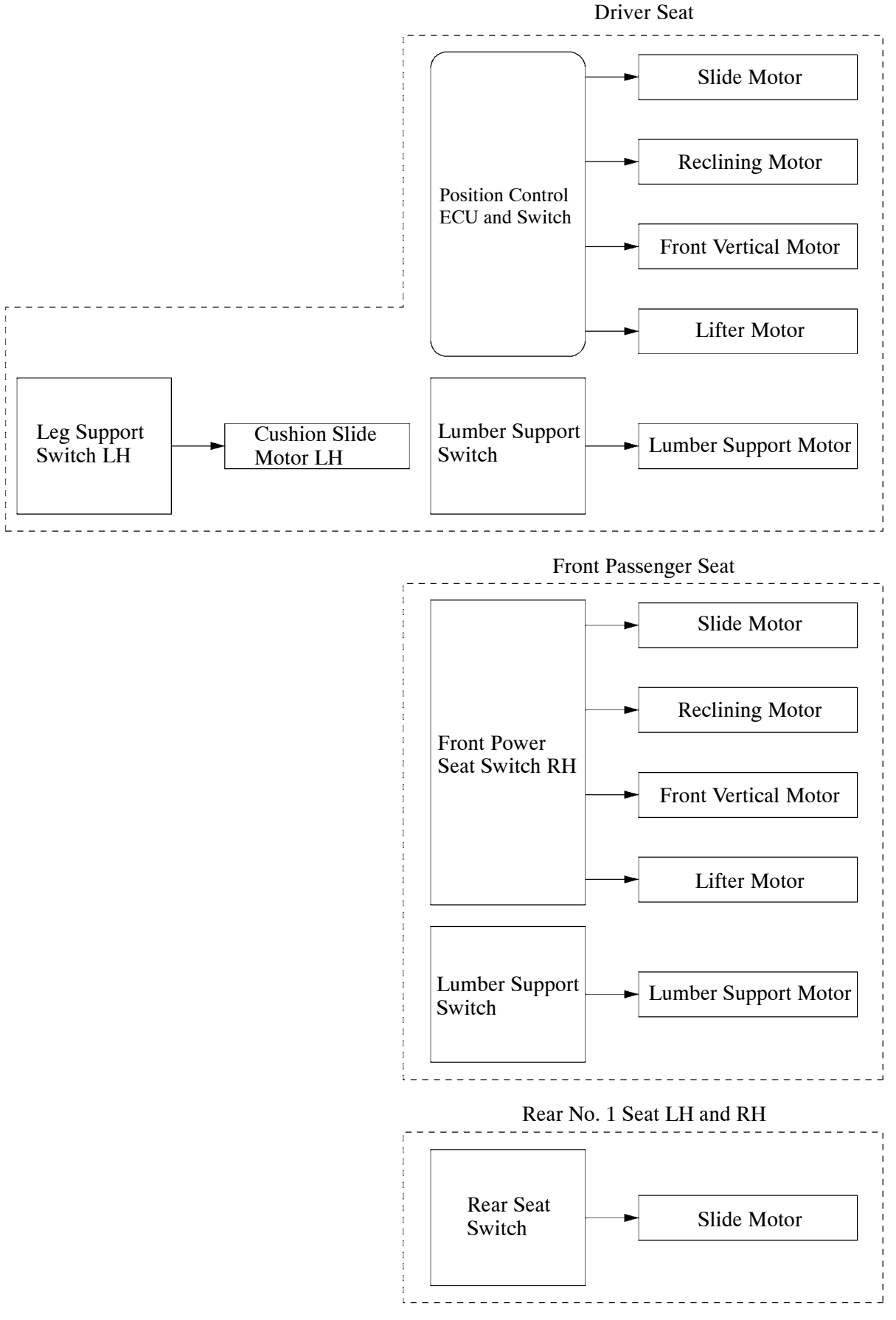
*: Manual Operation





Rear No. 1 Seat

▶ System Diagram ◀



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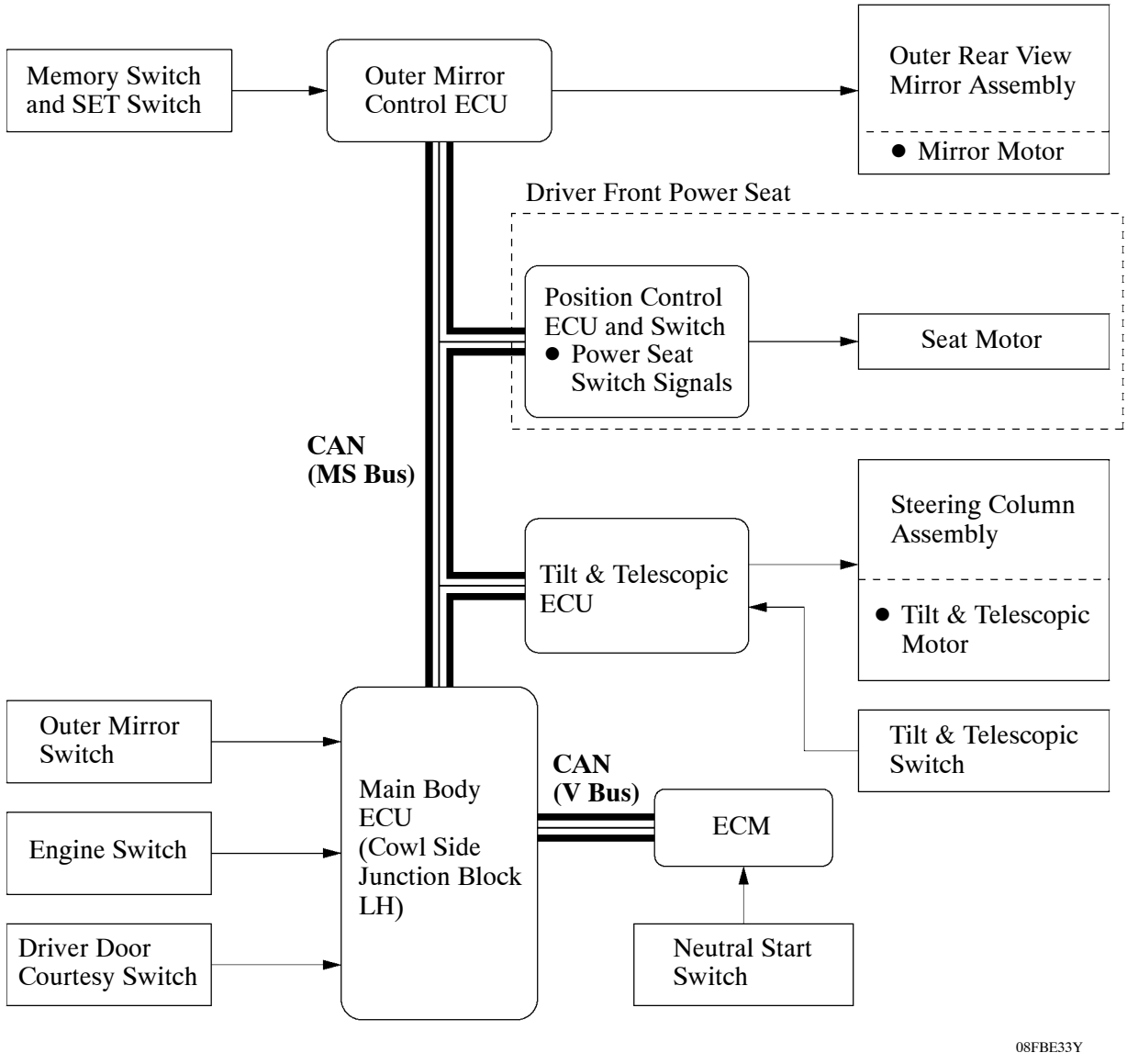
MEMORY SYSTEM

■ DESCRIPTION

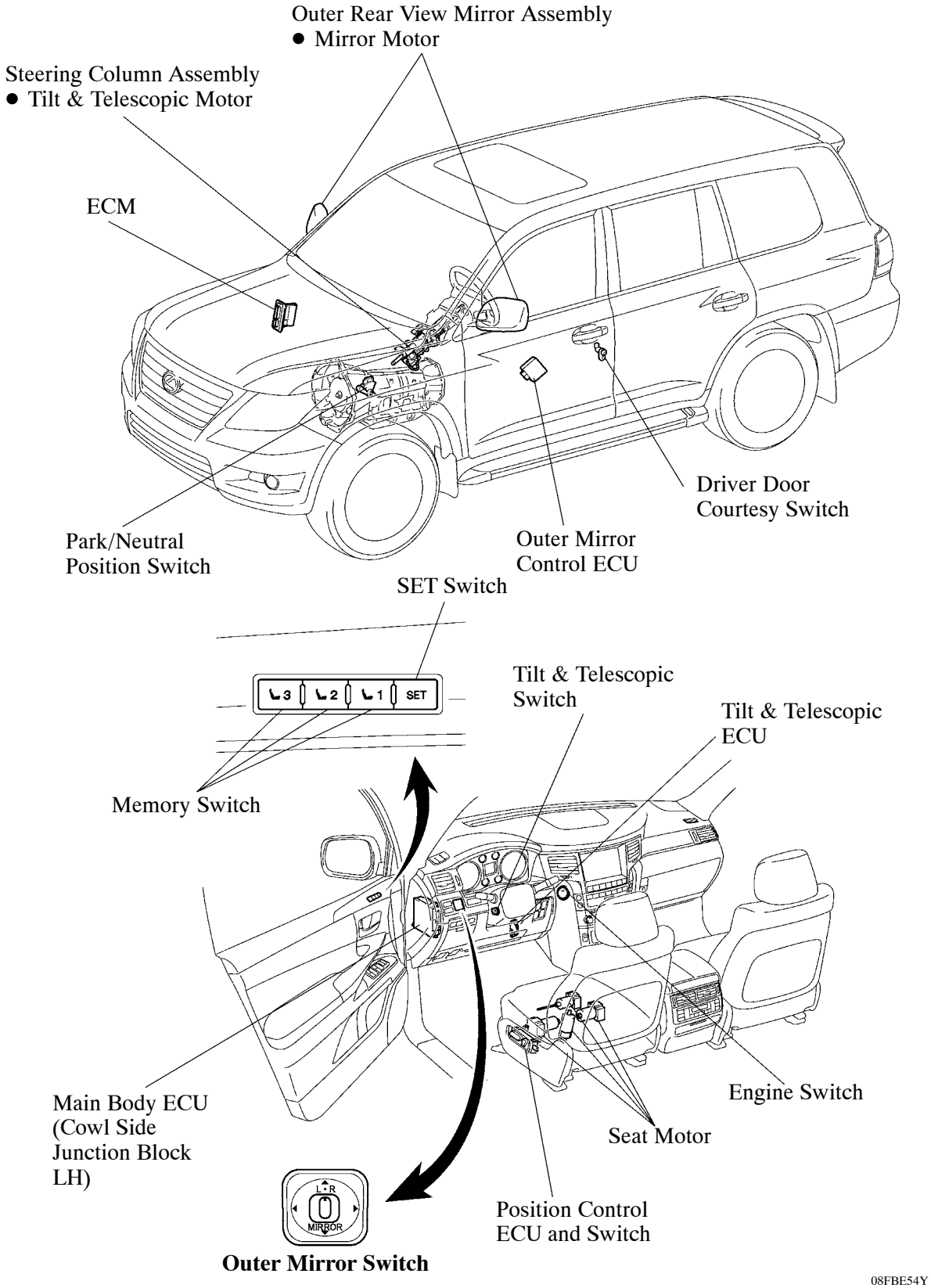
- The memory system is provided as standard equipment on all models.
- This system can store 3 positions for the driver seat, outer rear view mirror assembly, and steering column assembly respectively.
- The position control ECU and switch stores seat slide, front vertical, lifter (rear vertical), and reclining positions in its memory.
- The outer mirror control ECU stores the outer rear view mirror assembly position in its memory.
- The multiplex tilt & telescopic ECU stores the tilt and telescopic position in its memory.
- The position control ECU and switch 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-205)
- The memory and recall conditions of this system are as follows.

Function	Condition
Memory	Stores the positions when all conditions below have been met and switch 1, 2, or 3 is pushed while the SET switch is pushed. ● Engine switch is ON. ● 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 all conditions below have been met, the system operates to adjust the positions. ● Engine switch is ON. ● Shift position is P. If switch 1, 2, or 3 is pressed when all conditions below have been met 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 ◀



■ LAYOUT OF MAIN COMPONENTS

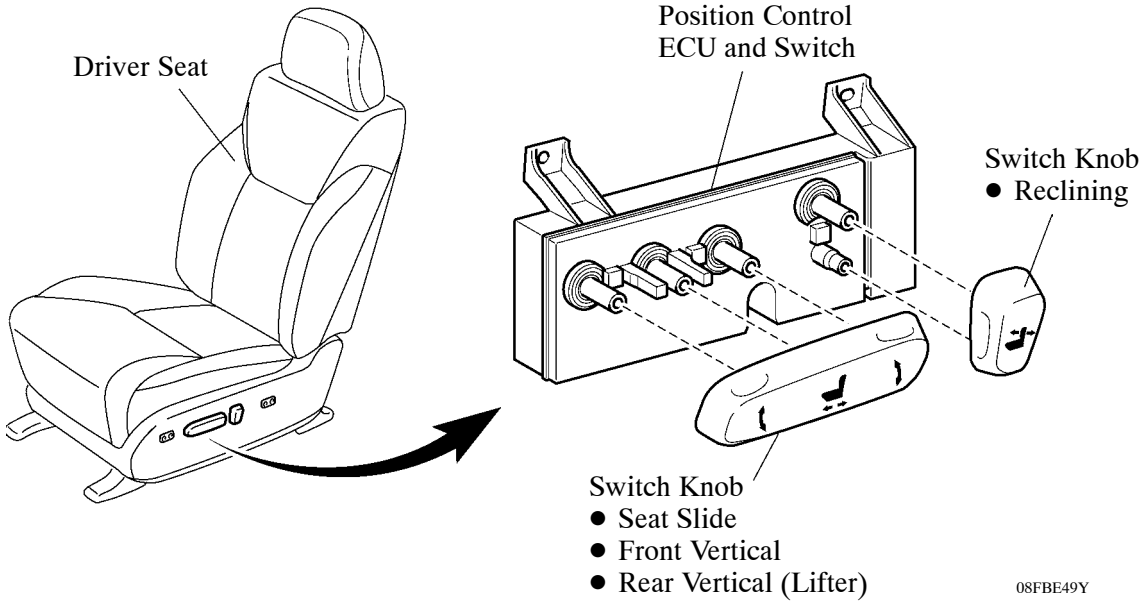


LHD Models

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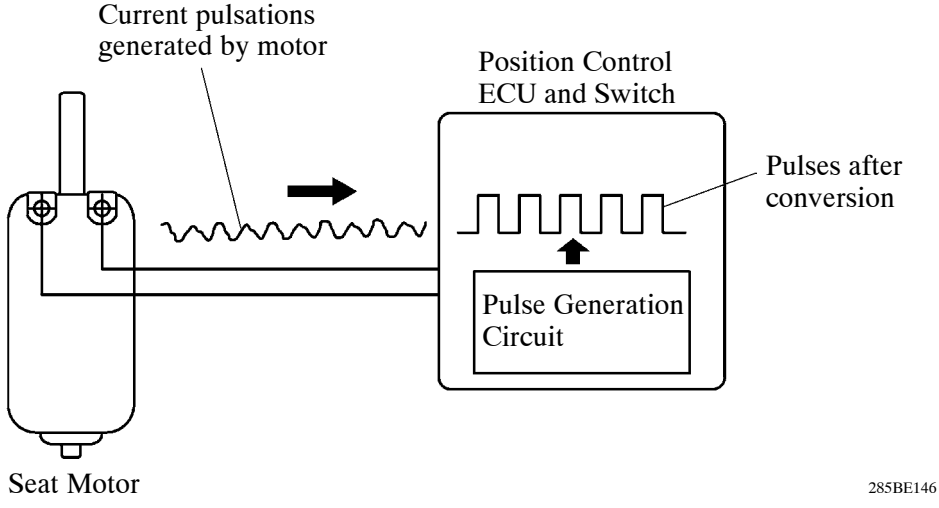
■ POSITION CONTROL ECU AND SWITCH

- The position control ECU and switch 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 position control ECU and switch 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 assembly position, and 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.



■ SEAT POSITION DETECTION METHOD

A pulse generation circuit in position control ECU and switch 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.

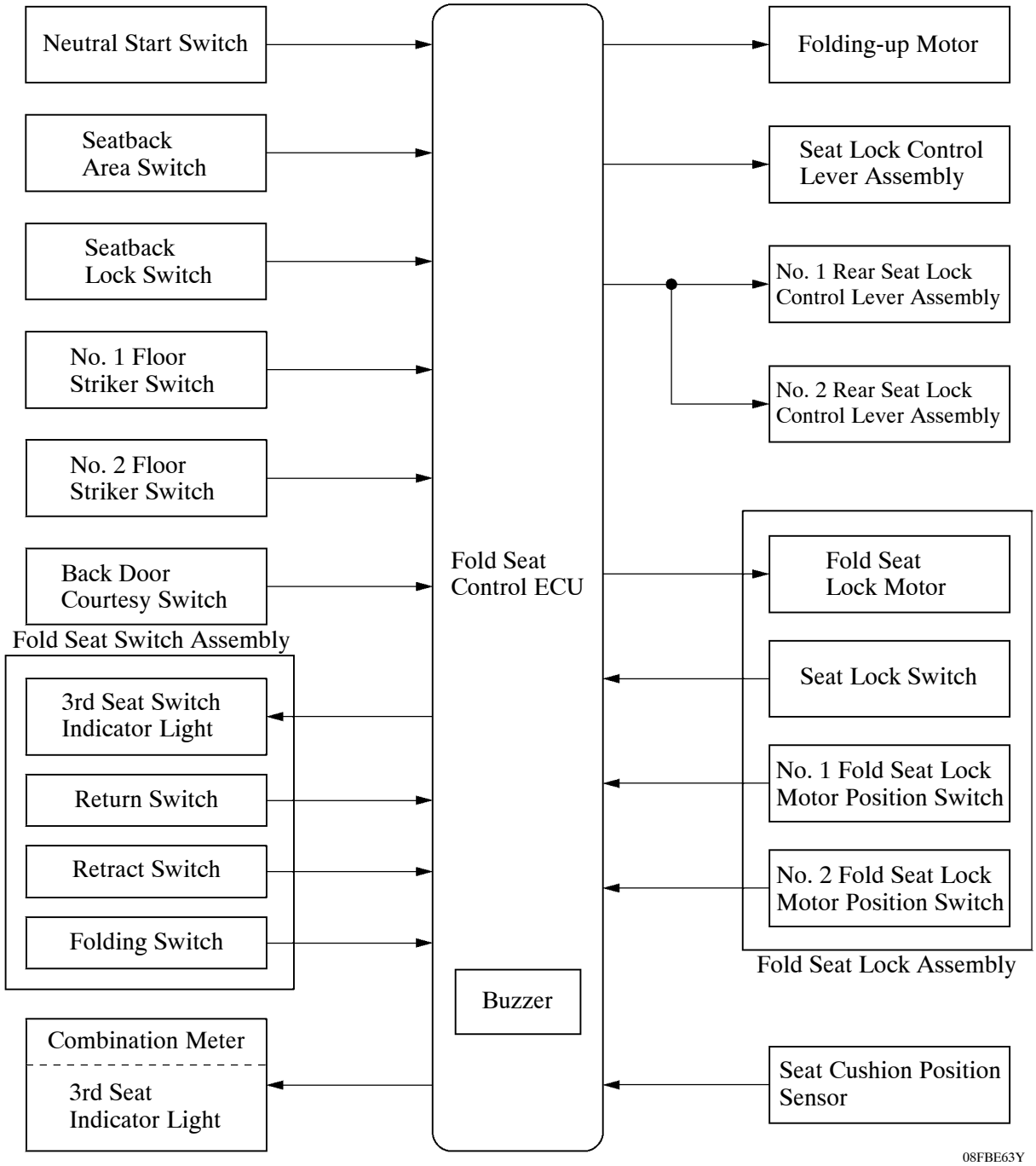


REAR NO. 2 SEAT WITH AUTOMATIC FOLDING-UP FUNCTION

■ DESCRIPTION

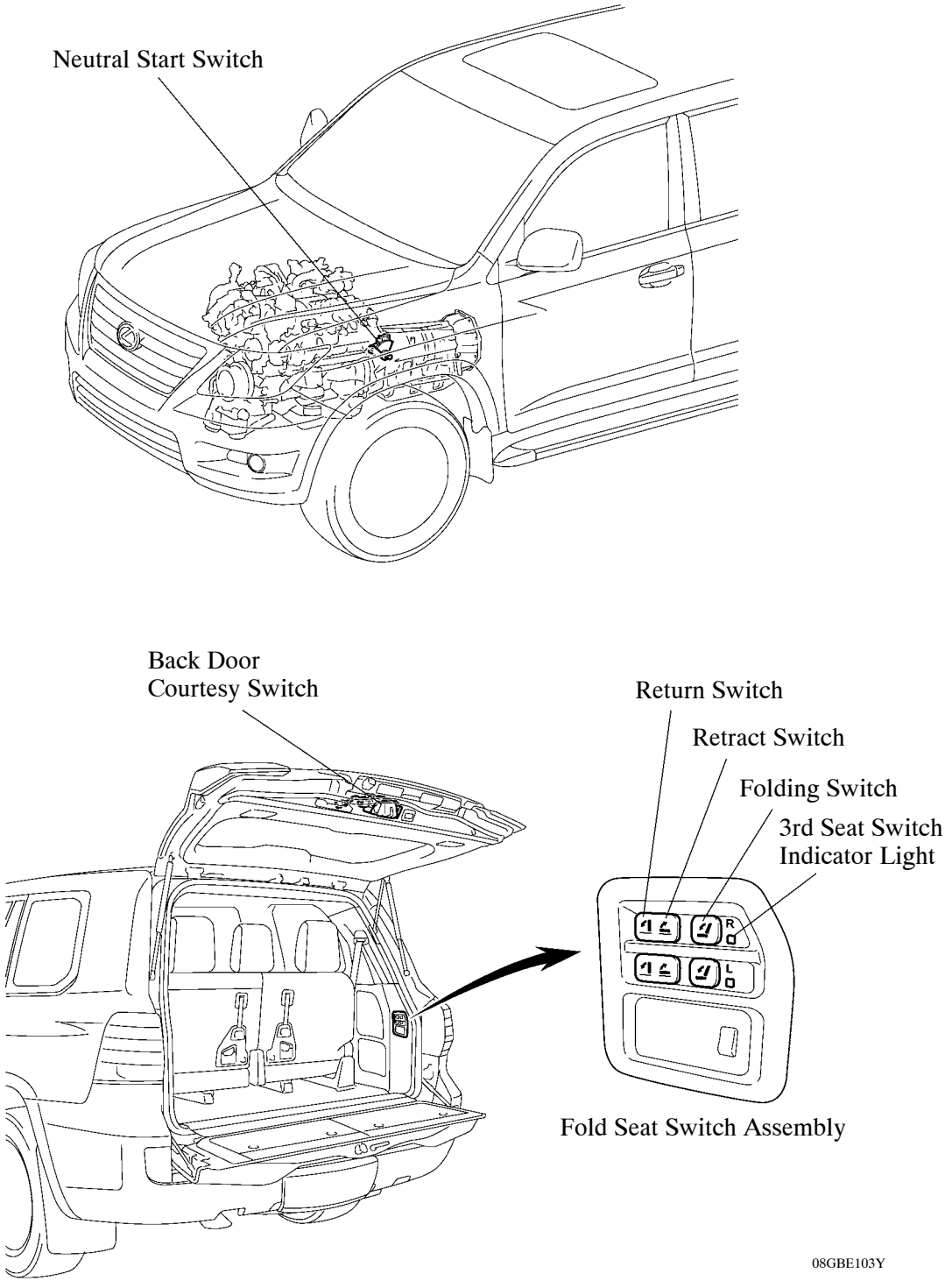
- A rear No. 2 seat with automatic folding-up function is available as optional equipment on all models.
- Through the operation of the return switch, retract switch, or folding switch, the rear No. 2 seat with automatic folding-up function can change the rear No. 2 seat from the sitting mode to the folding-up mode or folding mode. The seat must be operated manually to change from the folding mode to the sitting mode. For details, see page BE-311.
- The left and right sides of the rear No. 2 seat with automatic folding-up function can be operated independently.
- The wiring diagram below is for one side of the rear No. 2 seat with automatic folding-up function. The same wiring diagram applies to the other side of the rear No. 2 seat.

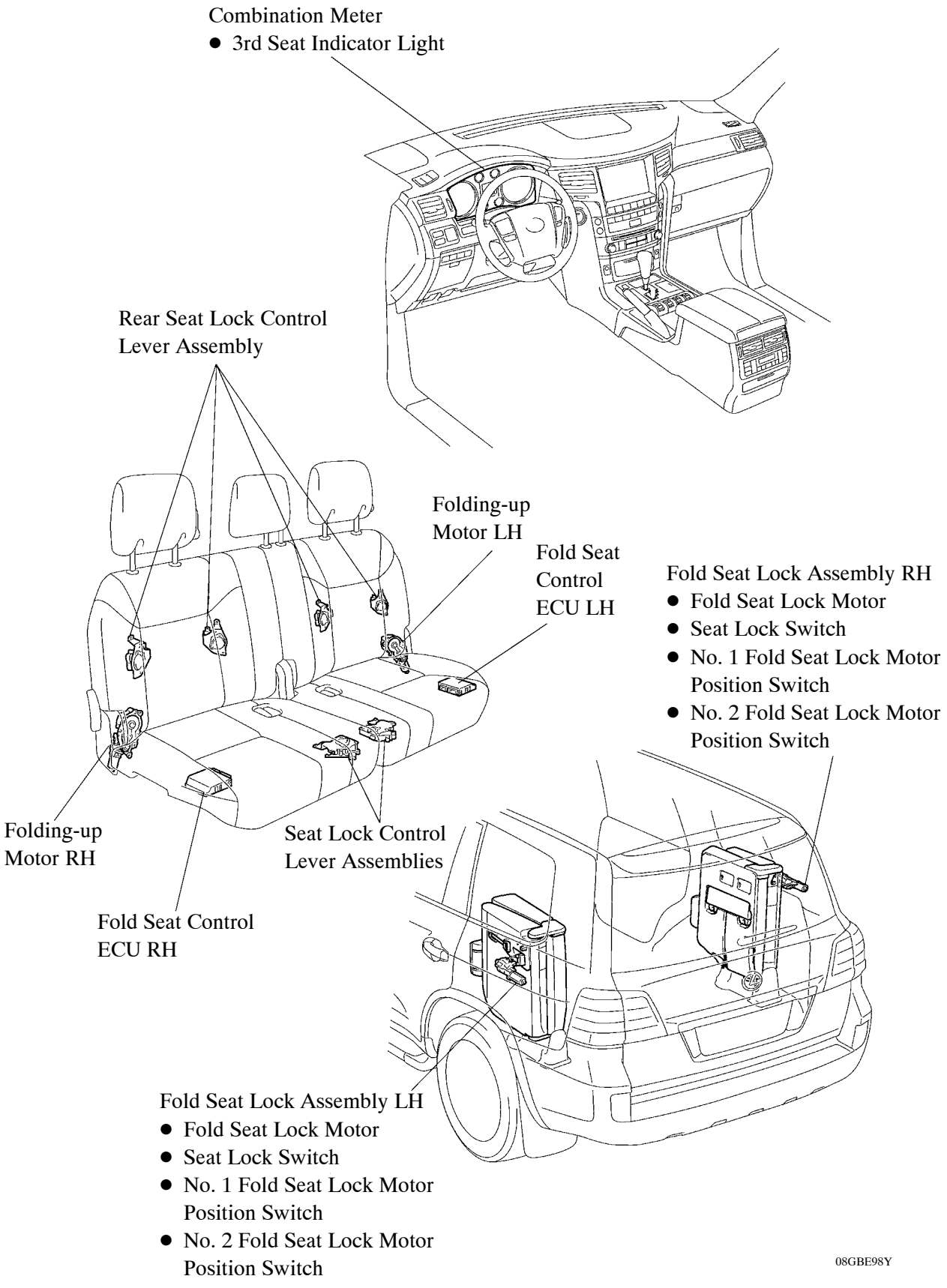
▶ System Diagram ◀



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■ LAYOUT OF MAIN COMPONENTS




Combination Meter
● 3rd Seat Indicator Light
Rear Seat Lock Control Lever Assembly
Folding-up Motor LH
Fold Seat Control ECU LH
Fold Seat Lock Assembly RH
● Fold Seat Lock Motor
● Seat Lock Switch
● No. 1 Fold Seat Lock Motor Position Switch
● No. 2 Fold Seat Lock Motor Position Switch
Folding-up Motor RH
Seat Lock Control Lever Assemblies
Fold Seat Control ECU RH
Fold Seat Lock Assembly LH
● Fold Seat Lock Motor
● Seat Lock Switch
● No. 1 Fold Seat Lock Motor Position Switch
● No. 2 Fold Seat Lock Motor Position Switch
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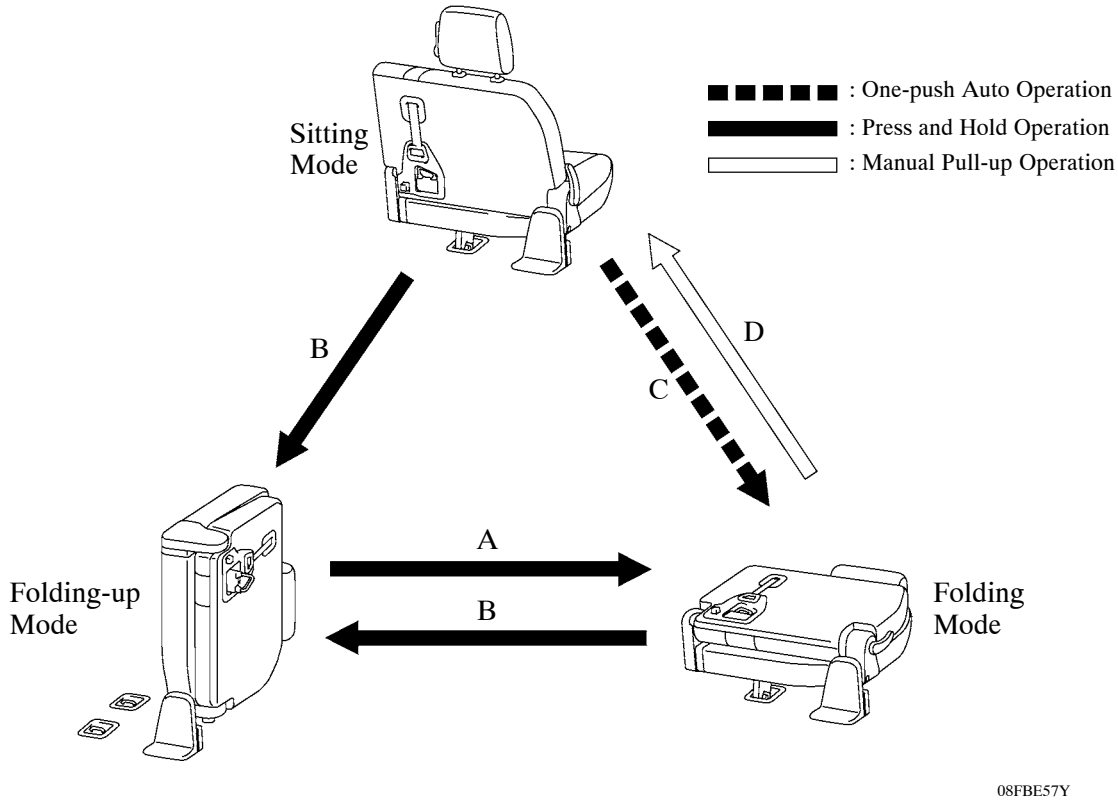
■FUNCTION OF MAIN COMPONENTS

Component		Function
Retract Switch		Transmits a folding-up condition request signal to the fold seat control ECU.
Return Switch		When the rear No. 2 seat is in the folding-up mode, this switch transmits a folding mode request signal to the fold seat control ECU.
Folding Switch		When the rear No. 2 seat is in the sitting mode, this switch transmits a folding mode request signal to the fold seat control ECU.
3rd Seat Switch Indicator Light		This light illuminates or flashes when the system detects a malfunction in the rear No. 2 seat with automatic folding-up function.
Fold Seat Control ECU		● Outputs operating signals to the motors. ● Sounds the buzzer according to the conditions. ● Illuminates or flashes the 3rd seat switch indicator light according to the conditions.
Seat Lock Control Lever Assembly		Operates to unlock the rear No. 2 seat.
Folding-up Motor		Operates to perform a folding mode operation from the folding-up mode; or operates to perform a folding-up mode operation.
Rear Seat Lock Control Lever Assembly		Operates to unlock the seatback.
Seat Cushion Position Sensor		Outputs pulse signals, which are synchronized to the rotational movement of the folding-up motor, to the fold seat control ECU.
Floor Striker Switch		Detects the mode of the rear No. 2 seat and outputs an OFF signal (when the seat is in the folding or sitting mode) and an ON signal (when the seat is in the folding-up mode) to the fold seat control ECU.
Seatback Lock Switch		Detects the locked state of the seatback and outputs an OFF signal (when the seatback is unlocked) and an ON signal (when the seatback is locked) to the fold seat control ECU.
Seatback Area Switch		Detects the position of the seatback and sends a signal to the fold seat control ECU.
Neutral Start Switch		Transmits the shift position P signal to the fold seat control ECU.
Fold Seat Lock Assembly	Fold Seat Lock Motor	Locks the rear No. 2 seat in the folding-up mode.
	Seat Lock Switch	Outputs an operation signal of the fold seat lock motor to the fold seat control ECU.
	Fold Seat Lock Motor Position Switch	Outputs pulse signals, which are synchronized to the rotational movement of the fold seat lock motor, to the fold seat control ECU.
Back Door Courtesy Switch		Detects the open or closed condition of the back door.
Combination Meter		Displays the characters “3rd Seat” on the multi-information display when there is a malfunction in the rear No. 2 seat with automatic folding-up function or the operating conditions have not been met.*

*: In case that the rear No. 2 seat with automatic folding-up function stops operating while the rear No. 2 seat is transferring from one mode to another mode.

■STANDARD OPERATION

When the return switch, retract switch or folding switch is operated, the rear No. 2 seat with automatic folding-up function operates as shown below while the back door is open and the engine switch is OFF, or the engine switch is ON (IG) and the shift lever is in the P position.

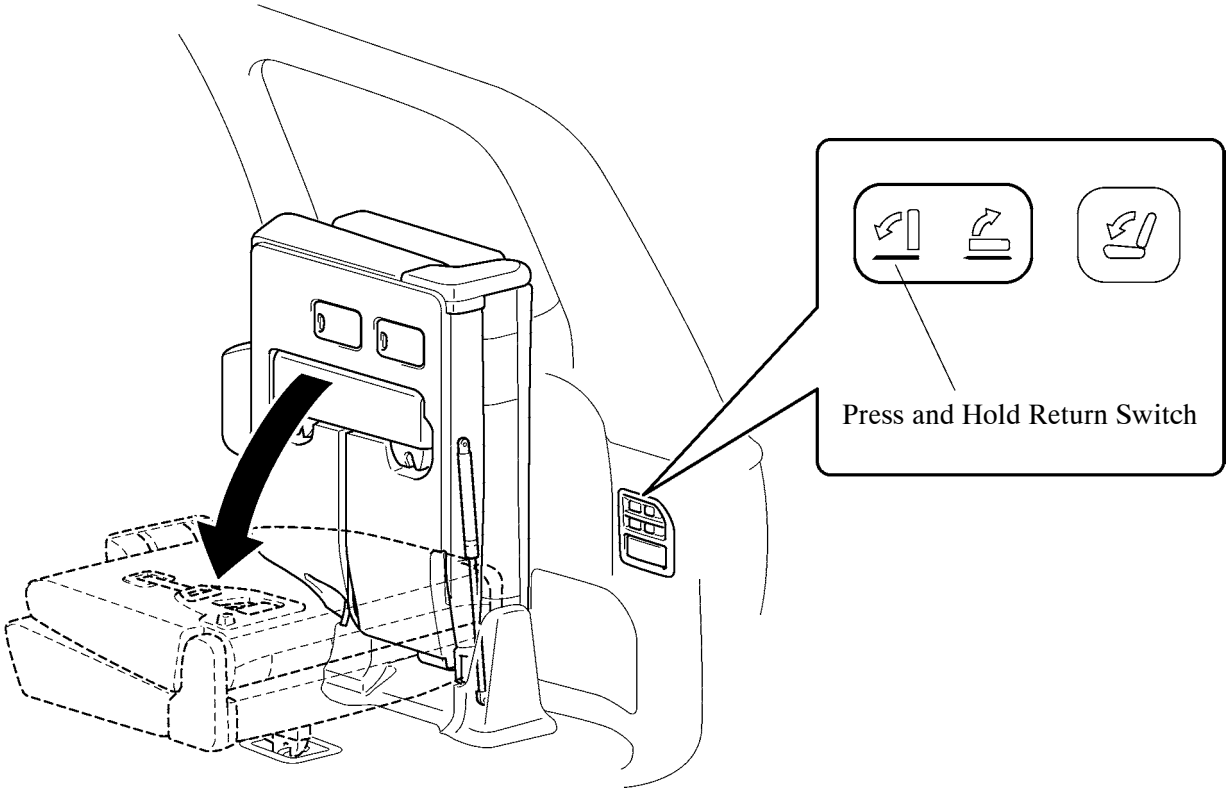


Operating Switch:
A: Return Switch
B: Retract Switch
C: Folding Switch
D: Manual Pull-up Operation

1. Operation from Folding-up Mode to Folding Mode

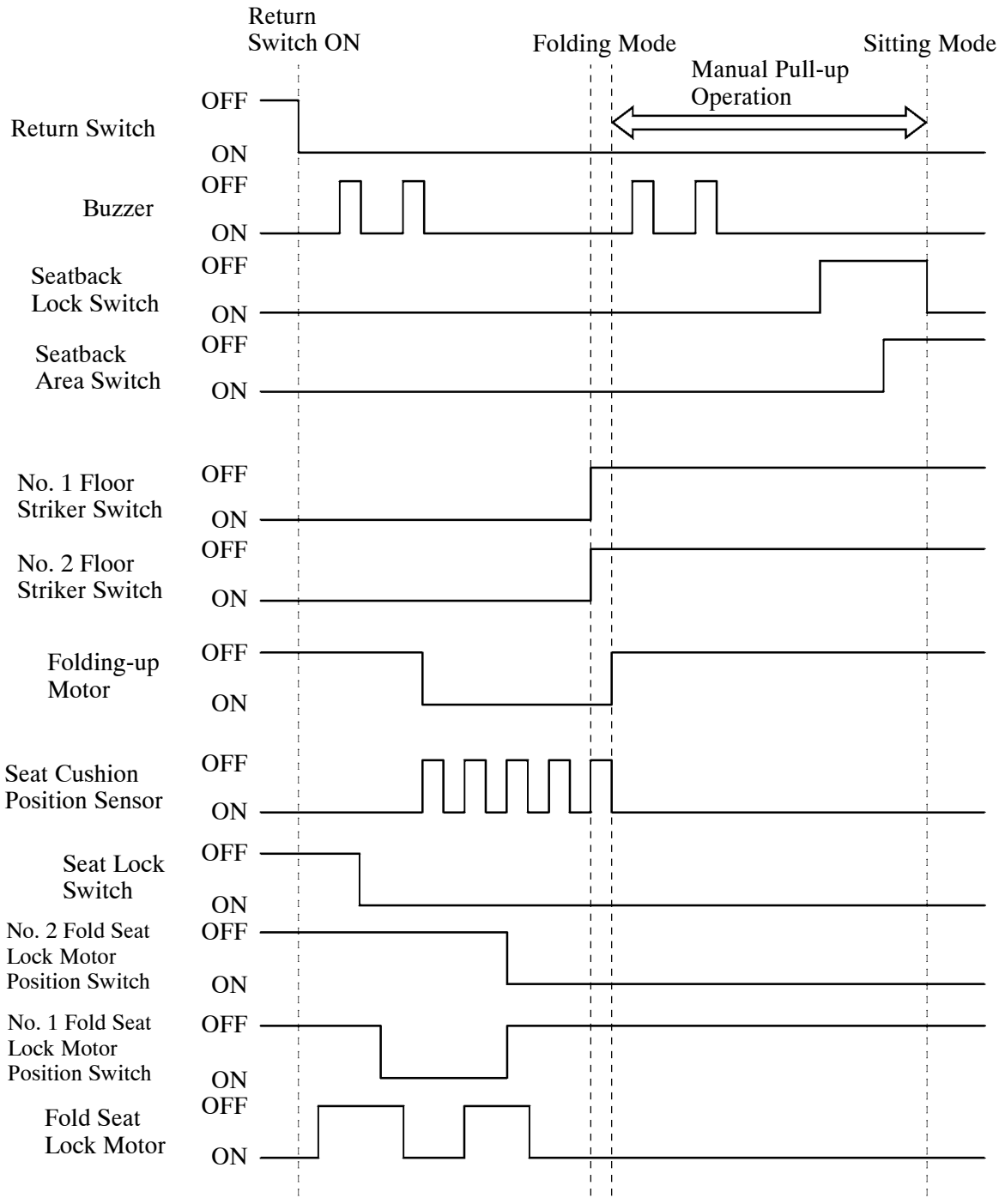
The operation from the folding-up mode to the folding mode is as follows. The described operation is for the rear No. 2 seat RH. The operation for the rear No. 2 seat LH is the same as the RH.

1) Press and hold the return switch while the back door is open and the engine switch is OFF, or the engine switch is ON (IG) and the shift lever is in the P position.
2) The buzzer sounds twice, the fold seat lock motor actuates, the lock between the rear No. 2 seat and the fold seat lock assembly becomes disengaged and the seat operates until it is in the folding mode.
3) The No. 1 and No. 2 floor striker switches turn OFF, the buzzer sounds twice, and the folding mode operation ends.
4) If the return switch is turned OFF during a folding mode operation, the operation stops, the 3rd seat switch indicator light illuminates, and the buzzer sounds for approximately 10 seconds.



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▶ Timing Chart ◀



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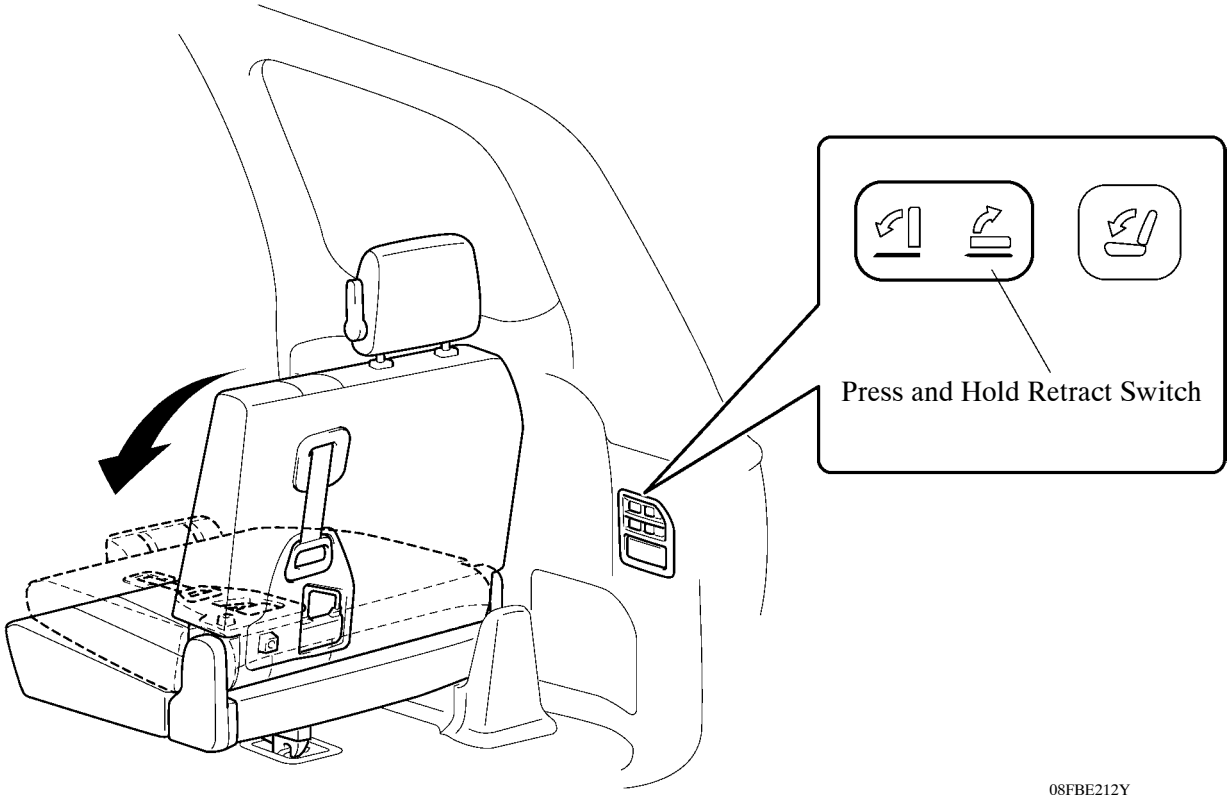
2. Operation from Sitting Mode to Folding-up Mode

The operation from the sitting mode to the folding-up mode is as follows. The described operation is for the rear No. 2 seat RH. The operation for the rear No. 2 seat LH is the same as the RH.

1) Press and hold the retract switch while the back door is open and the engine switch is OFF, or the engine switch is ON (IG) and the shift lever is in the P position.
2) The No. 1 and No. 2 rear seat lock control lever assemblies actuate to unlock the seatback, and the seat operates until it is in the folding mode. During the operation, the headrest retracts automatically.
3) The seatback lock switch turns ON, placing the seat in the folding mode. After approximately 0.1 second, the seat lock control lever assembly actuates to unlock the lock between the rear No. 2 seat and the floor striker, and the No. 1 and No. 2 floor striker switches turn ON.
4) The buzzer sounds twice, and the folding motor actuates until the seat is in the folding-up mode.*
5) The seat lock switch in the fold seat lock assembly turns ON. After approximately 0.1 second, the fold seat lock motor actuates to operate the lock between the rear No. 2 seat and the fold seat lock assembly.
6) Approximately 0.1 second after the No. 1 and No. 2 fold seat lock motor position switches are turned OFF, the operation of the fold seat lock motor stops, the buzzer sounds twice, and the folding-up mode operation ends.
7) If the retract switch is turned OFF during a folding-up mode operation, the operation stops, the 3rd seat switch indicator light illuminates, and the buzzer sounds for approximately 10 seconds.

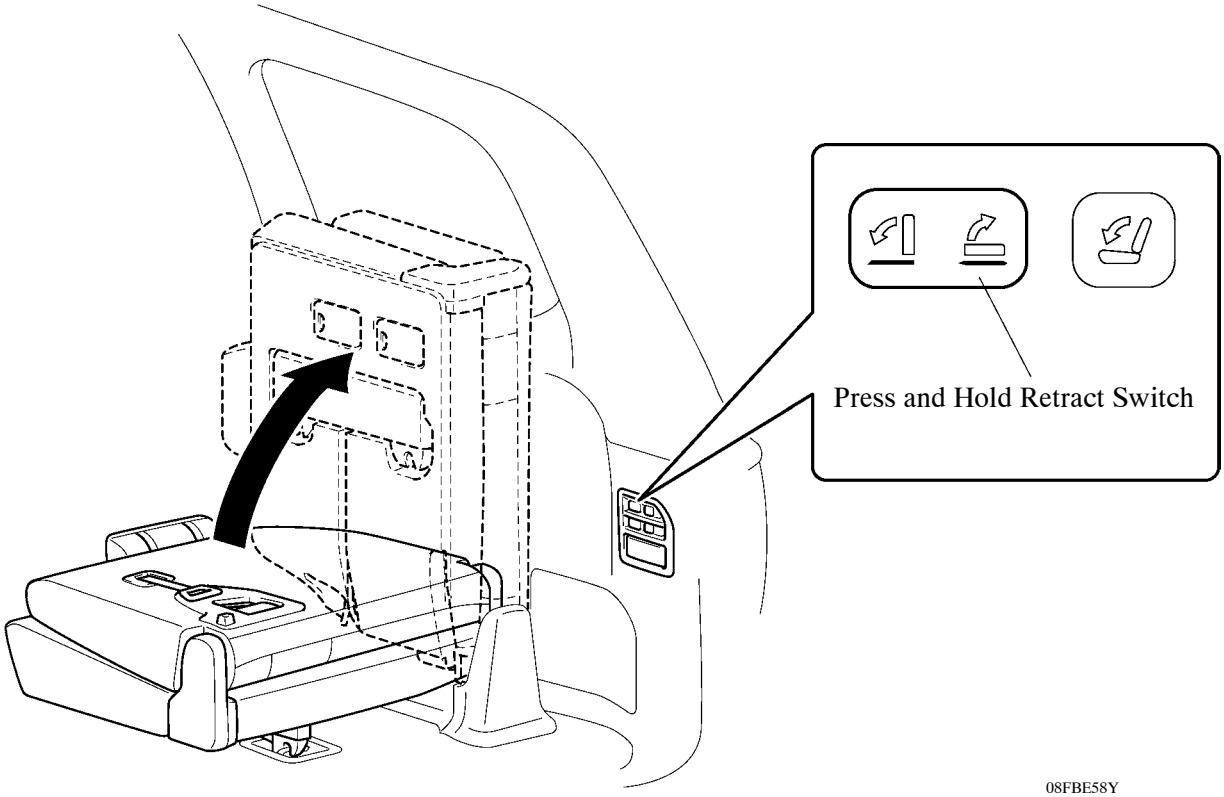
*: If the seat is placed in the folding mode through the operation of the folding switch, it can be transferred to the folding-up mode operation by pressing and holding the retract switch after the folding mode operation has ended.

▶ Operation from 1) to 4) ◀



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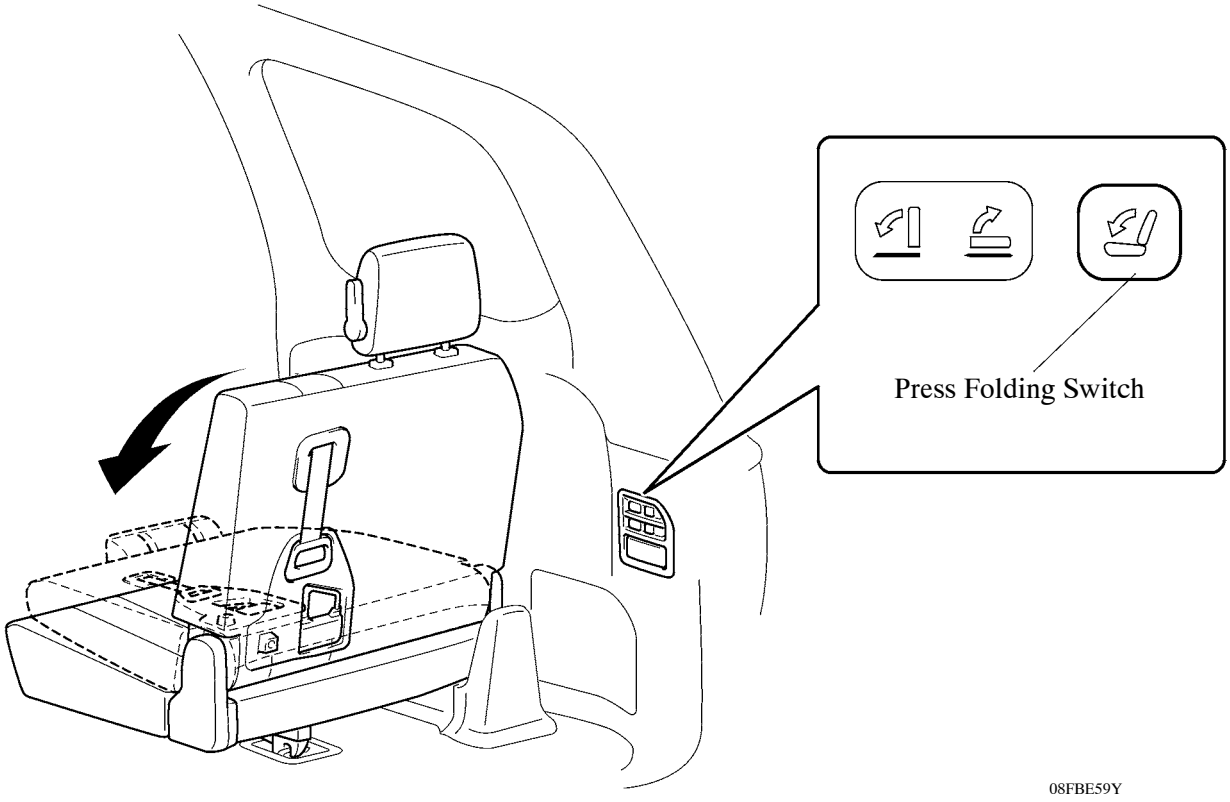
▶ Operation from 4) to 6) ◀



3. Operation from Sitting Mode to Folding Mode

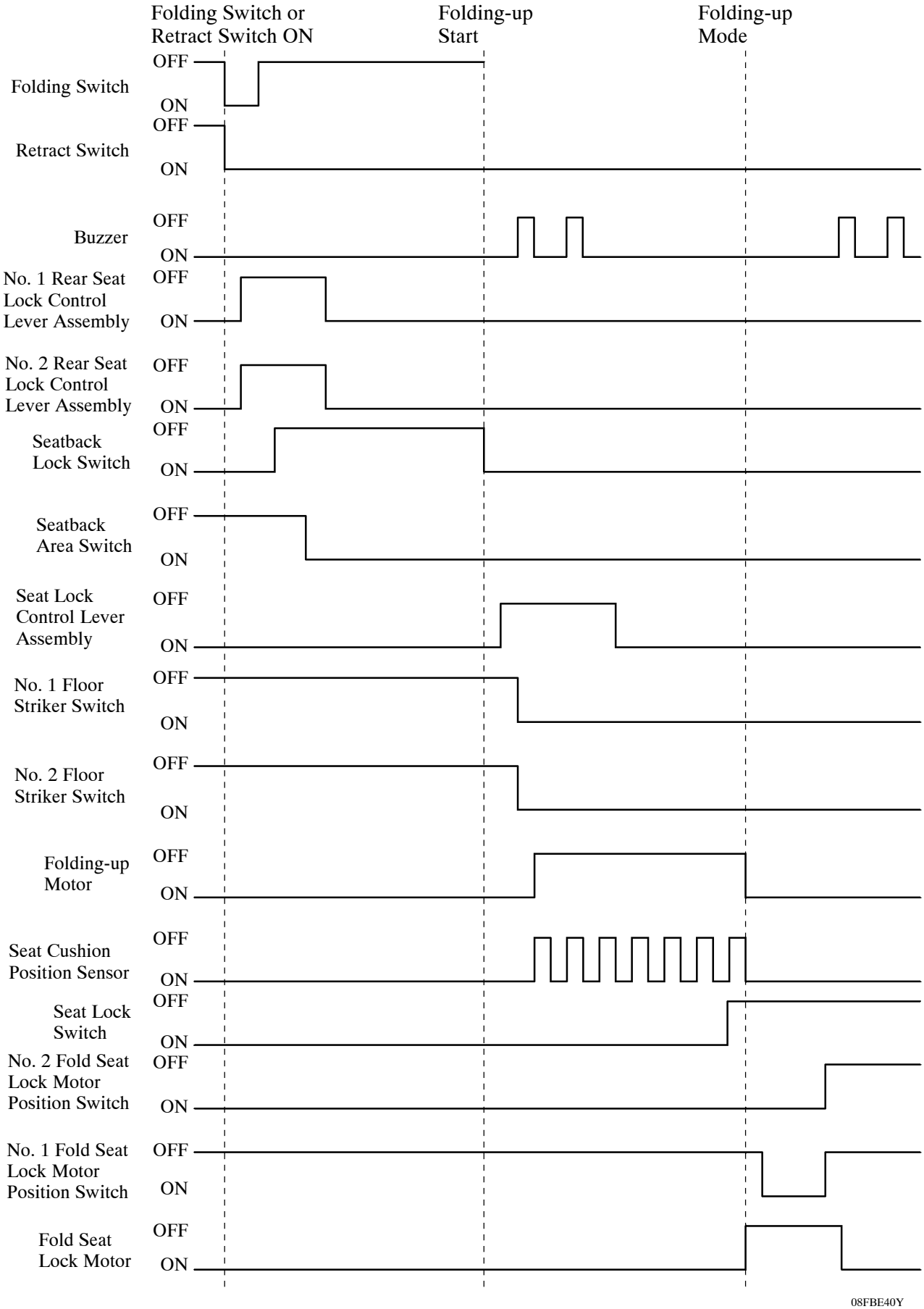
The operation from the sitting mode to the folding mode is as follows. The described operation is for the rear No. 2 seat RH. The operation for the rear No. 2 seat LH is the same as the RH.

1) Press the folding switch once while the back door is open and the engine switch is OFF, or the engine switch is ON (IG) and the shift lever is in the P position.
2) The No. 1 and No. 2 rear seat lock control lever assemblies actuate to unlock the seatback, and the seat operates until it is in the folding mode. During the operation, the headrest retracts automatically.
3) The seatback lock switch turns ON and the folding operation ends.



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▶ Timing Chart ◀



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■ WARNING

If the fold seat control ECU detects a malfunction in the rear No. 2 seat with automatic folding-up function, the buzzer sounds for 10 seconds, the 3rd seat switch indicator light illuminates or flashes, and "3rd Seat" appears on the multi-information display in the combination meter. Refer to the table below for details.

Malfunction	Buzzer	3rd Seat Switch Indicator Light				Multi-information Display*4
		Illuminate	Flash*1	Flash*2	Flash*3	
● When the rear No. 2 seat is operating, the operation switch is turned OFF. ● When the engine switch is ON and the rear No.2 seat is operating, the shift lever is moved to a position other than P.	○	○	—	—	—	○
When retract motor is stopped due to an overcurrent or pulse malfunction.	○	—	○	—	—	○
When the seat is in the sitting mode, the retract switch is remained ON, and the seat is not in the folding mode 10 seconds later.	○	—	○	—	—	○
When the fold seat lock motor is stopped due to an overcurrent or irregular position information.	○	—	—	—	○	○
When the engine switch is ON (IG) or the back door is open, the rear No. 2 seat is stopped in the middle position of its operation.	—	○	—	—	—	○
When the return switch or the retract switch is operated, the engine switch is ON (IG) and the shift lever is moved to a position other than P.	—	—	○	—	—	—
When the folding switch is operated, the engine switch is ON (IG) and the shift lever is moved to a position other than P.	—	—	—	○	—	—

*1: Continuous flashing at 0.8 ± 0.08 second intervals (while the malfunction conditions are met).
*2: Flashing 3 at times 0.8 ± 0.08 second intervals
*3: Continuous flashing at 2.4 ± 0.24 second intervals (while the malfunction conditions are met).
*4: Displays only when the engine switch is ON (IG)

■ DIAGNOSIS

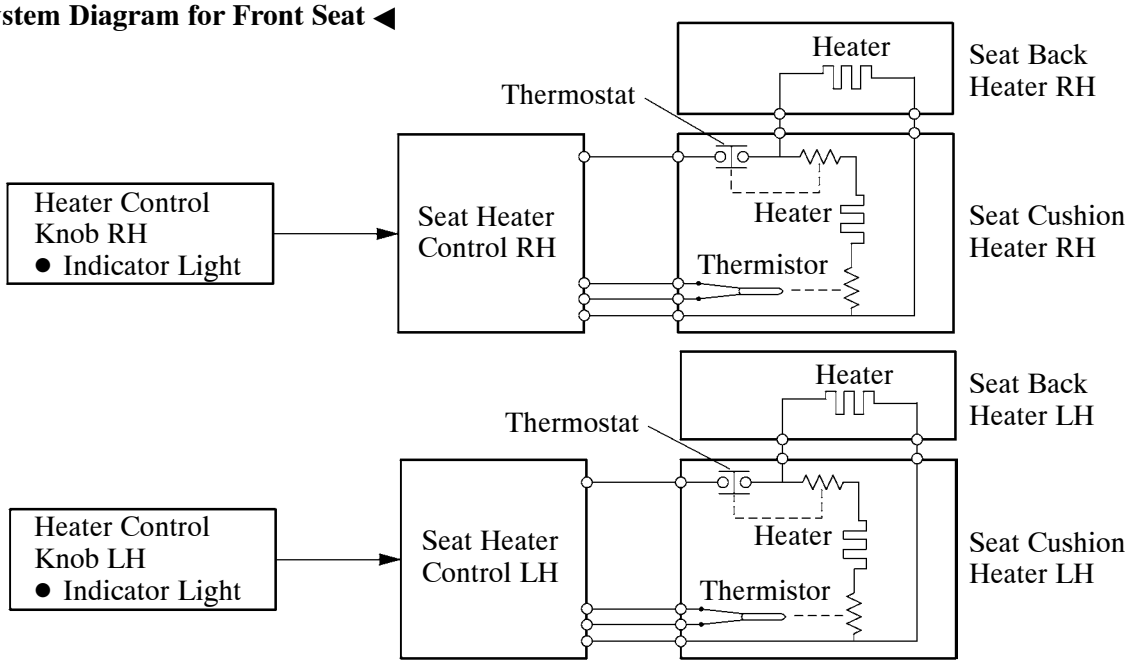
- If the fold seat control ECU detects a malfunction in the rear No. 2 seat with automatic folding-up function, it stores 5-digit DTC (Diagnostic Trouble Code) in memory.
- The 5-digit DTC can be read by connecting an intelligent tester II to the DLC3.

SEAT HEATER SYSTEM

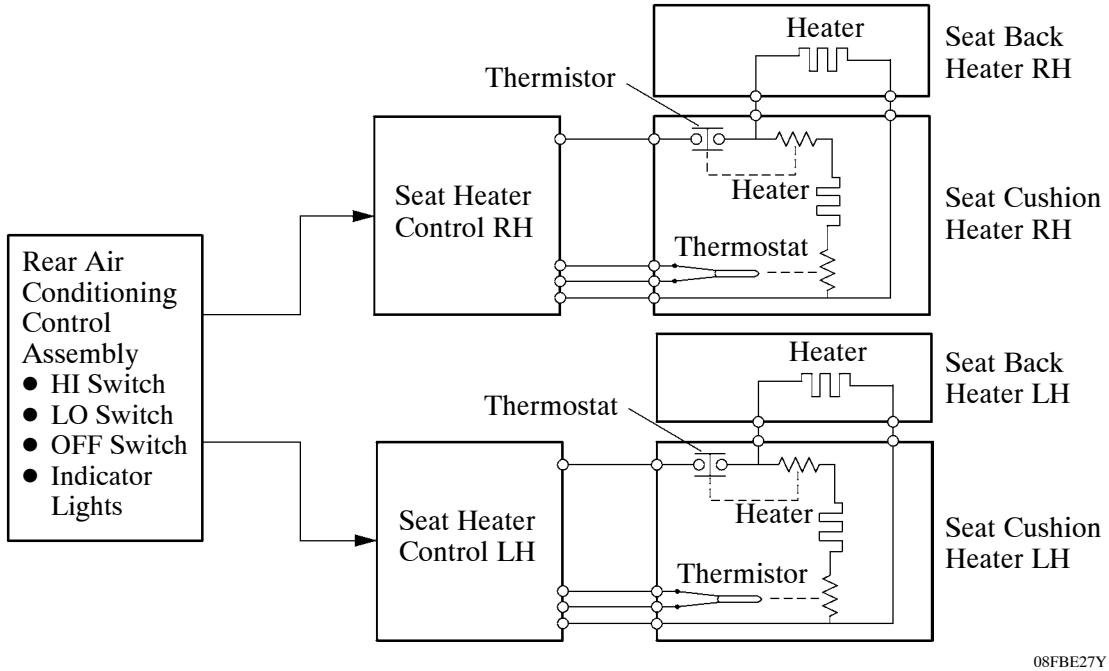
■ DESCRIPTION

- The front seat heater system is provided as standard equipment for the G.C.C. countries models. The front and rear No. 1 seat heater system is provided as standard equipment for the Europe and China models, and is available as optional equipment for the Australia models.
- 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 a thermistor that are enclosed in the cushion.

▶ System Diagram for Front Seat ◀

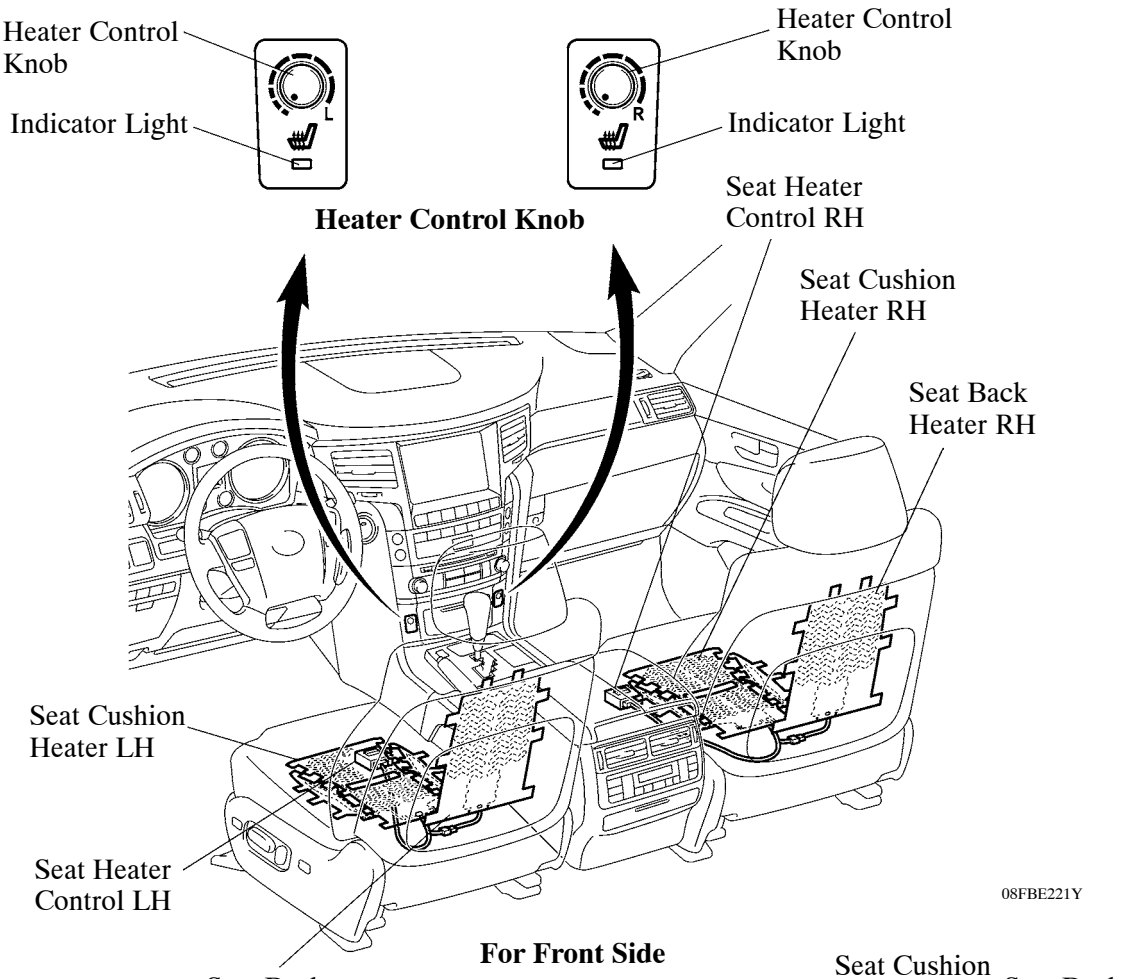


▶ System Diagram for Rear No. 1 Seat ◀

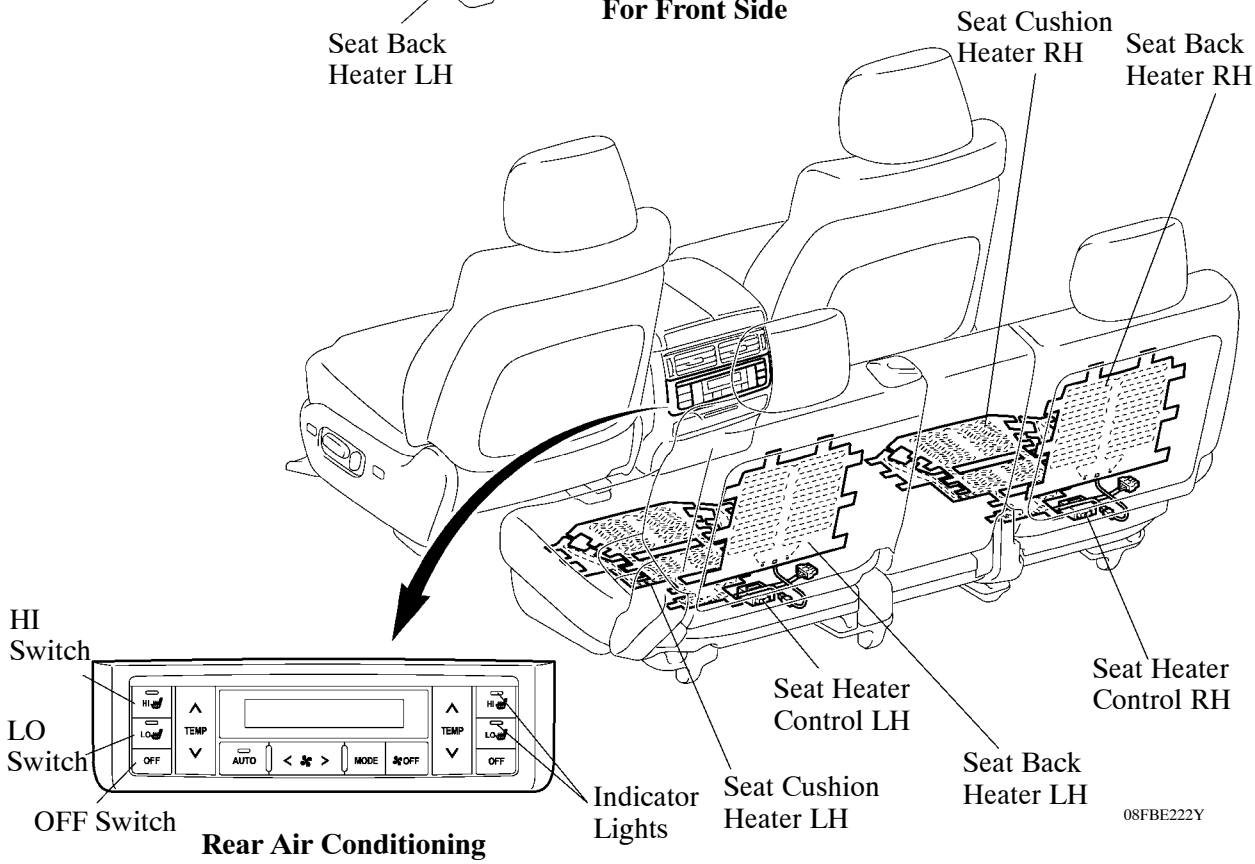


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■ LAYOUT OF MAIN COMPONENTS



For Front Side



Rear Air Conditioning Control Assembly

For Rear Side

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CLIMATE CONTROL SEAT SYSTEM

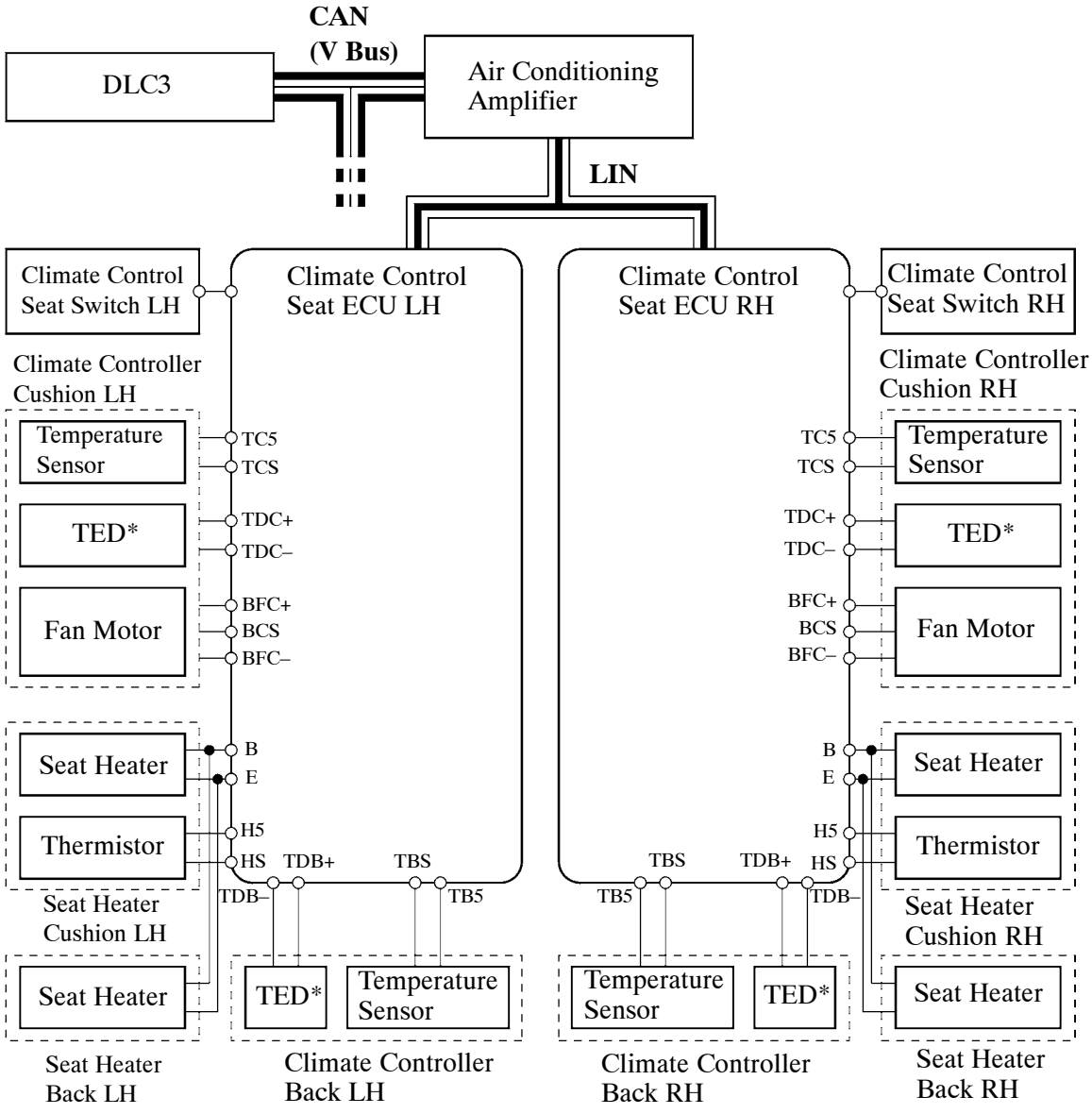
■ DESCRIPTION

- The climate control seat system is available as optional equipment on all models.
- The climate control seat system allows the driver and front passenger to adjust the temperatures of the seatbacks and the seat cushions of the front seats.
- The climate control seat system uses 2 methods to control the seat surface temperatures: One using a Peltier element* to warm or cool the airflow provided to the seat surface and the other using a hot wire to warm up the seat surface. Both functions are controlled by the climate control seat ECU which is built into front seat.

* Peltier Element: Consisting of two different types of metals, the area in which the metals are joined generates or absorbs heat when an electric current is applied to element at a prescribed temperature.

■SYSTEM DIAGRAM

▶ **Front Seat** ◀

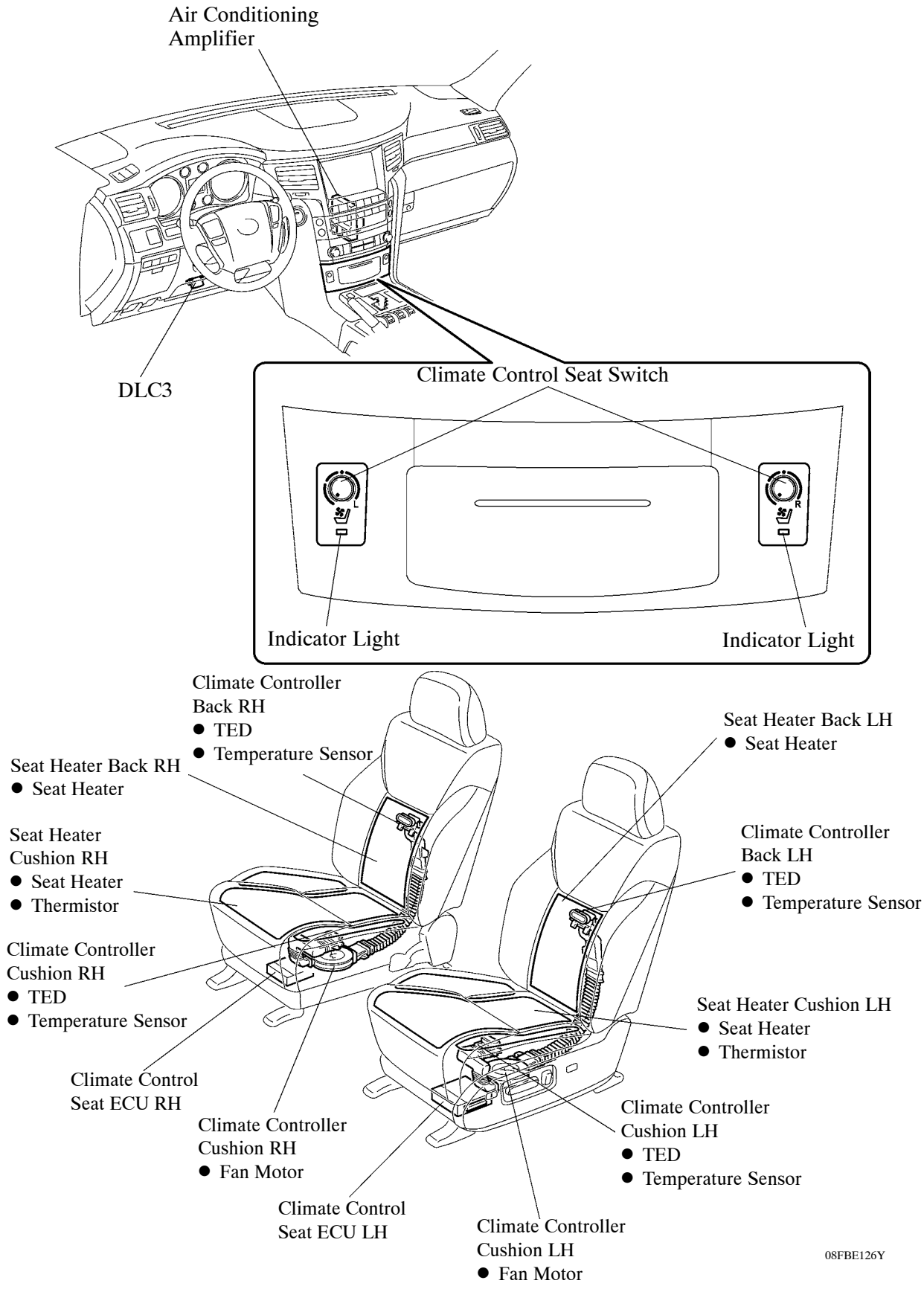


*: TED (Thermo Electric Devices) Indicates Peltier Elements.

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■ LAYOUT OF MAIN COMPONENTS



LHD Models

■ FUNCTION OF MAIN COMPONENTS

Component		Outline
Climate Control Seat Switch		Switches the modes: ● Cool air in 3 stages: MIN, MID and MAX modes ● Airflow ● Warm air in 3 stages: MIN, MID and MAX modes
Climate Controller	Temperature Sensor	Detects the surface temperature of the seat back and seat cushion.
	TED (Thermo Electric Device)	Cools and heats through the function of the peltier element.
	Fan Motor	Provides airflow to the seat back and seat cushion upon receiving instructions from the ECU in accordance with the volume setting of the climate control seat switch.
Climate Control Seat ECU		● Controls the system based on the signals from the temperature sensor and the climate control seat switch. ● Monitors the output amperage of the climate control fan motor.
Seat Heater		The fast acting seat heater warms the seat in the initial stage of the heating mode.

■SYSTEM OPERATION

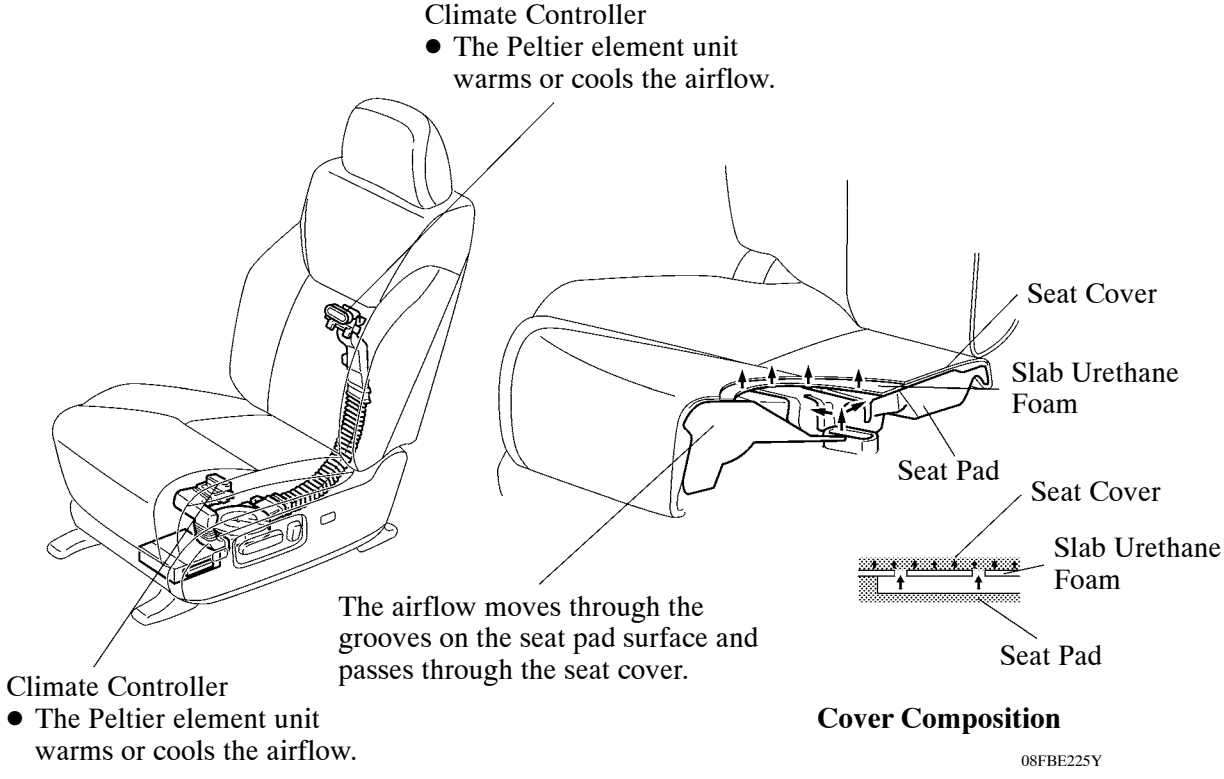
1. General

This system effects the controls listed below:

Control	Outline
Normal Control	Normal control is conducted when the climate control seat switch is turned to COOL or HOT with the engine switch turned to ON (IG).
Power ON Full-power Control	Power ON full-power control is conducted when the climate control seat switch is turned to any HOT mode or MAX COOL with the engine switch turned ON (IG).
Fail-safe	If the climate control seat system malfunctions, the system stops its function.
Self-diagnosis	If the climate control seat system malfunctions, a DTC (Diagnostic Trouble Code) is stored in the climate control seat ECU.

2. Normal Control

This system operates the climate control fan motor located underneath the seat to provide airflow to the seat cushion and seatback. The airflow is warmed or cooled by the Peltier element in the climate controller. The air that flows to the seat surface is distributed by moving along the grooves on the seat pad surface. This air is then moves through the slab urethane foam and seat cover.



3. Power ON Full-power Control

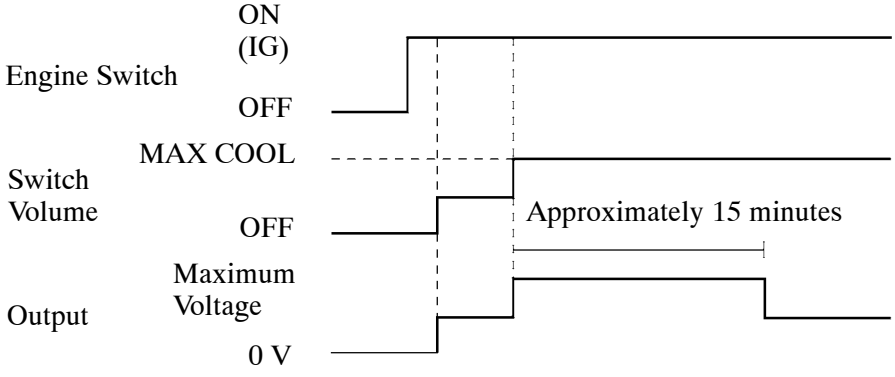
General

- This control outputs maximum voltage to the climate controller and the climate control fan motor when power is turned ON.
- MAX COOL control is conducted when the climate control seat switch is turned to MAX COOL with the engine switch turned ON (IG).
- MAX HOT control is conducted when the climate control seat switch is turned to MAX HOT, MID HOT or MIN HOT with the engine switch turned ON (IG). When the seat temperature reaches the set temperature, the seat heater turns OFF and then the climate controller maintains the seat temperatures.

MAX COOL Control

MAX COOL control is conducted under the following conditions:

- The engine switch is turned ON (IG).
- After the climate control seat switch has been turned ON, and the switch volume has been turned to MAX COOL.
- Full-power control is performed for approximately 15 minutes.
- Any climate controller temperature sensor detects 0°C or more.

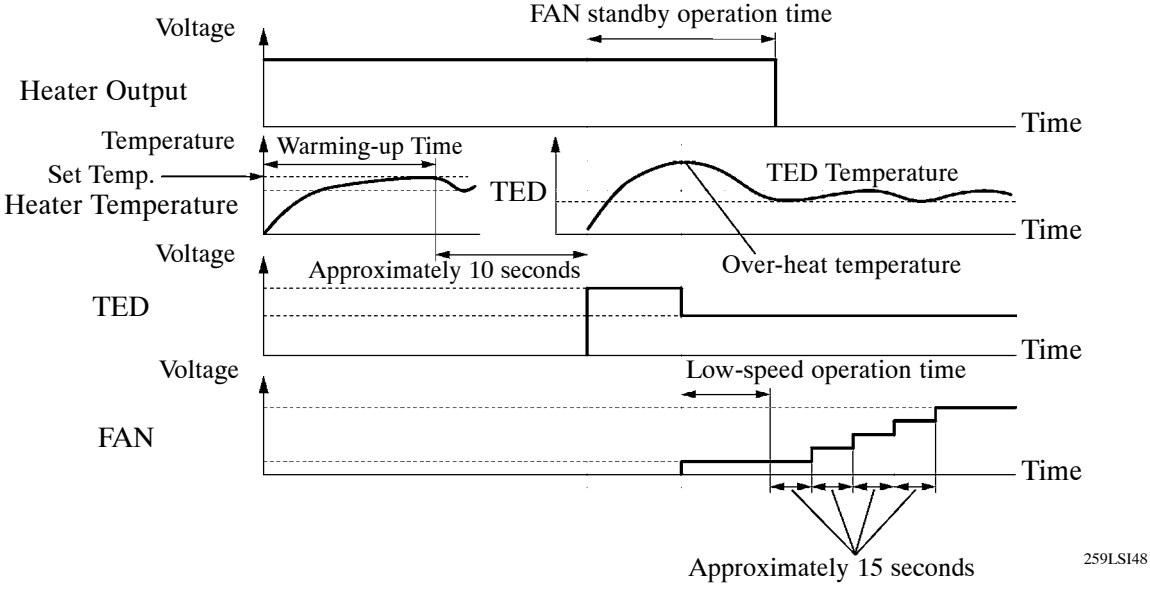


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MAX HOT Control

MAX HOT control is conducted under the following conditions:

- The engine switch is turned ON (IG).
- After the climate control seat switch has been turned ON, and the switch volume has been turned to MAX HOT, MID HOT or MIN HOT.
- When the seat reaches the set temperature, switching the heater ON/OFF keeps the seat temperature.
- TED operates after approximately 10 seconds.
- When the TED over-heat temperature is detected, the output voltage is decreased and the FAN begins to operate. Then, switching the TED ON/OFF keeps the set temperature.
- After a certain time passes, the output voltage to the FAN is increased gradually every 15 seconds.



4. Fail-safe

General

Fail-safe control effects the following three controls:

- Overcurrent protection control
- Transient voltage drop control
- Temperature sensor open/short detection control

Overcurrent Protection Control

Areas for detecting overcurrent are provided in the climate controller and the seat heater. The climate control stops or reinstates when the conditions listed below have been met.

▶ Climate Controller ◀

Detection Condition	When both conditions listed below have been met: ● The climate control seat switch is ON. (Except airflow mode) ● The amount of current provided for the climate controller actuation has exceeded 10 A for 2 seconds or more.
Reinstatement Condition	● When the climate control seat switch is turned OFF, the indicator light turns OFF, and when the switch is operated, the indicator light operates in accordance with the volume. ● The engine switch is turned to OFF then back to ON (IG).

▶ **Seat Heater** ◀

Detection Condition	When both conditions listed below have been met: ● The climate control seat switch is ON. (Except airflow mode) ● The amount of current provided for the seat heater has exceeded 10 A for 2 seconds or more.
Reinstatement Condition	When the climate control seat switch is turned OFF, the indicator light turns OFF, and when the switch is operated, the indicator light operates in accordance with the volume. ● The engine switch is turned to OFF then back to ON (IG).

Transient Voltage Drop Control

When the power source voltage of the climate control seat ECU has met the conditions listed below, this control stops or is reinstated.

Detection Condition	When both conditions listed below have been met: ● The climate control seat switch is ON. ● The power source voltage of the climate control seat ECU continuously drops below approximately 8 V for approximately 10 msec.
Reinstatement Condition	The reinstatement conditions consist of the resumption of system control in accordance with the volume setting of the climate control seat switch when the power source voltage of the ECU reaches above approximately 10 V continuously for approximately 10 msec.

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Temperature Sensor Open/Short Detection Control

The control is suspended or reinstated when the voltage of the temperature sensors that is supplied to the input signal terminals (TBS, TCS, and HS) has met the conditions listed below:

▶ **Temperature Sensor (for Climate Control)** ◀

Suspended Condition	The detected value is 230°F (110°C) or more or –40°F (–40°C) or less for 8 consecutive seconds.
Reinstatement Condition	The normal value is detected by the sensors for 8 consecutive seconds.

▶ **Temperature Sensor (for Seat Heater)** ◀

Suspended Condition	The detected value is 230°F (110°C) or more or –40°F (–40°C) or less for 8 consecutive seconds.
Reinstatement Condition	The normal value is detected by the sensors for 8 consecutive seconds.

5. Self-diagnosis

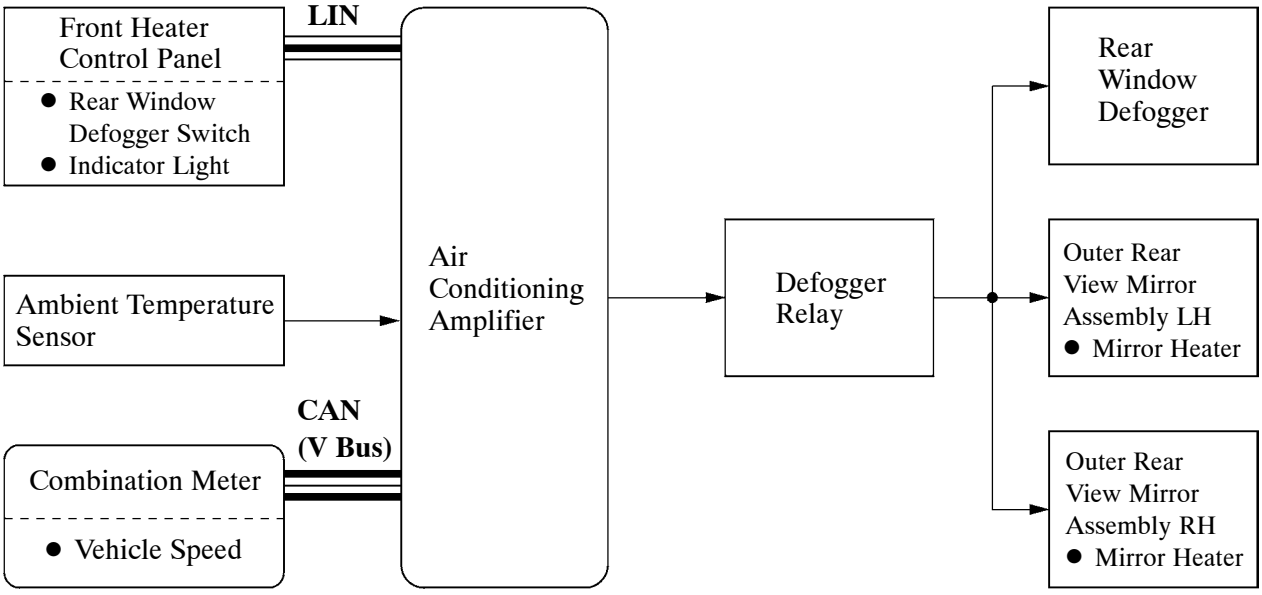
If the climate control seat system malfunctions, the system stops its function and a DTC (Diagnostic Trouble Code) is stored in the climate control seat ECU. The DTC can be read by connecting an intelligent tester II to DLC3.

REAR WINDOW DEFOGGER SYSTEM

■ DESCRIPTION

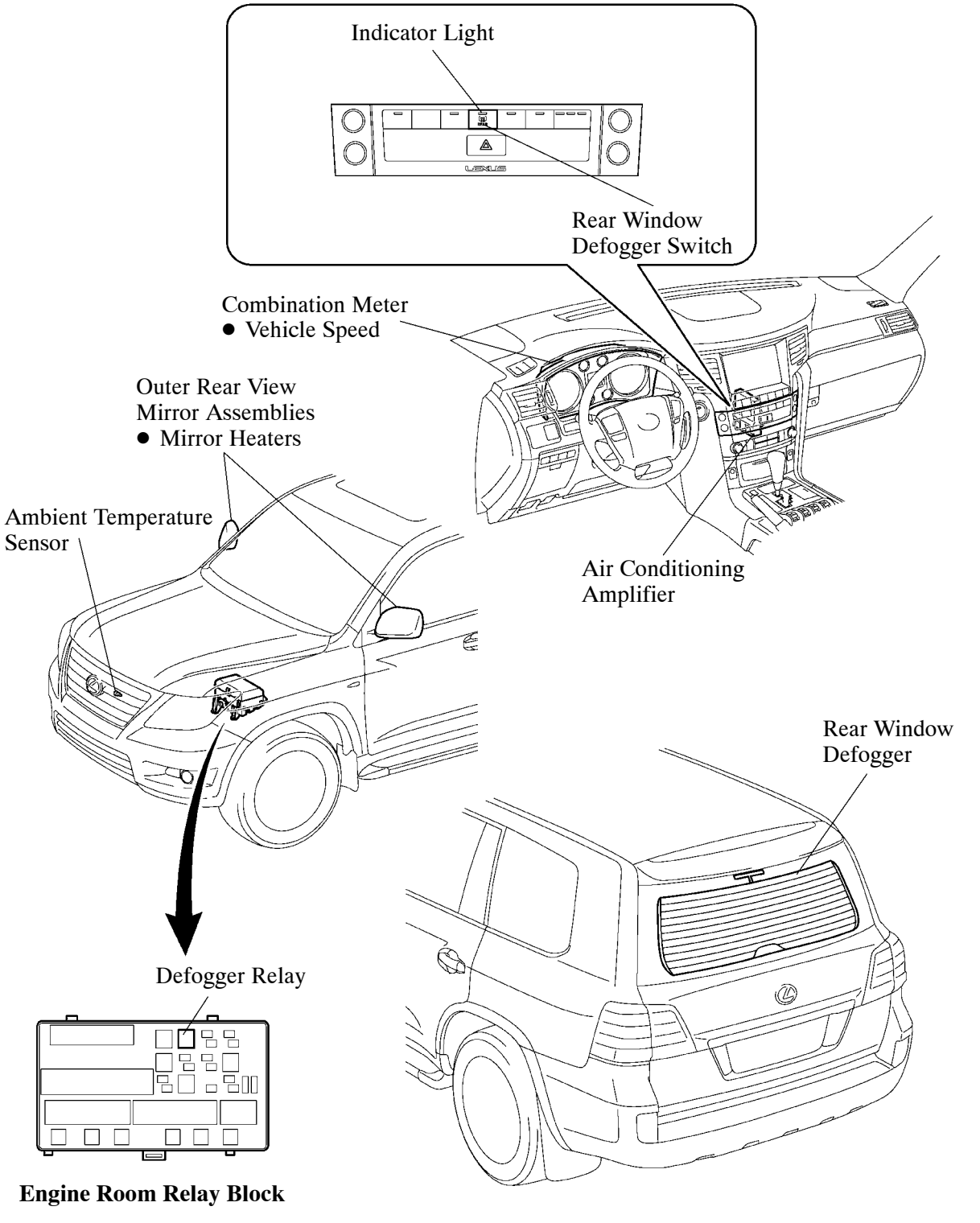
- The rear window defogger system uses the heater wire on the rear window glass to defog the rear window glass.
- This system is provided as standard equipment on all models.
- The rear window defogger system operates at the same time as the heater function of the outer rear view mirror assemblies.

▶ System Diagram ◀



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■ LAYOUT OF MAIN COMPONENTS



LHD Models

■ SYSTEM OPERATION

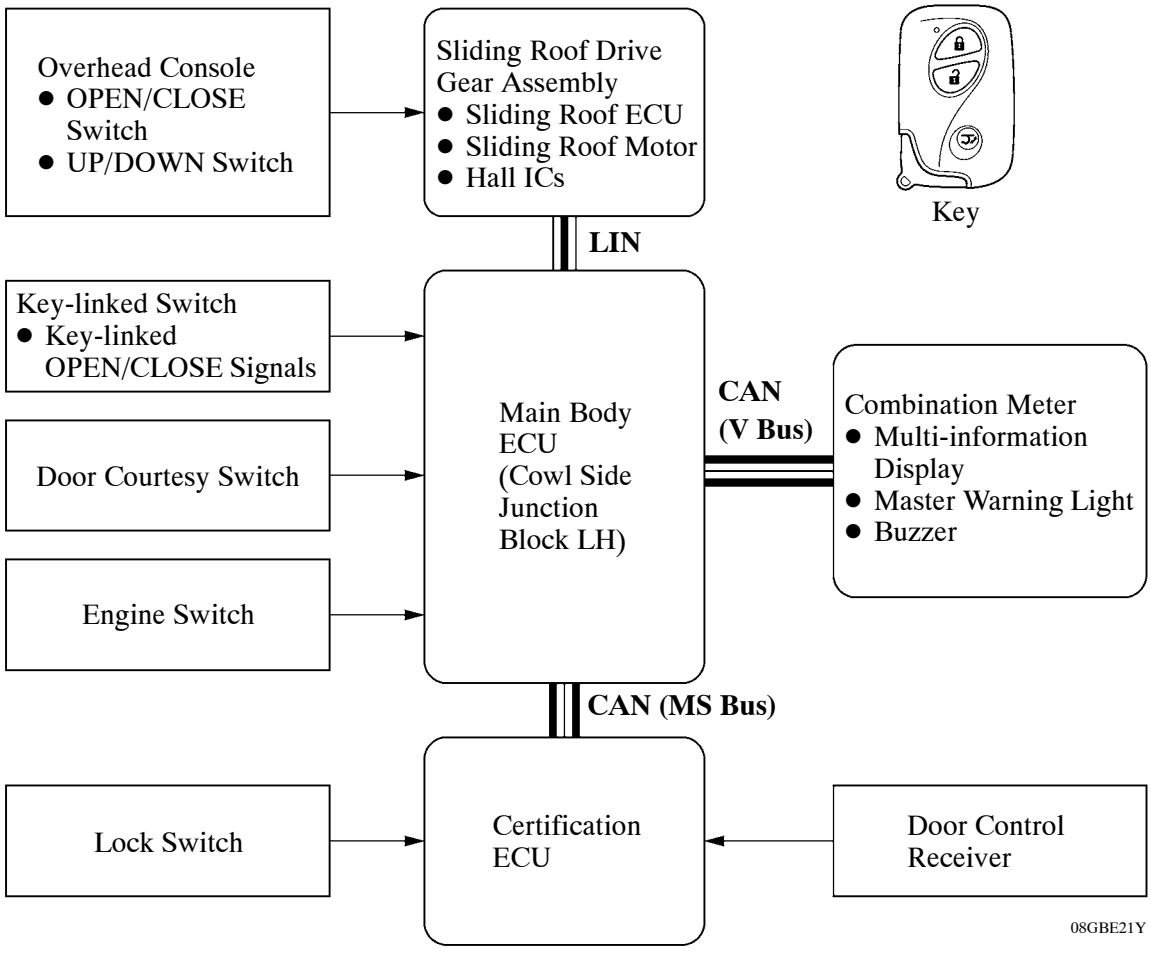
- The rear window defogger system is activated when the engine switch is turned ON (IG), and the rear window defogger switch is pushed.
- The rear window defogger switch is provided with a timer function to turn OFF the defogger and outer rear view mirror heater after approximately 15 minutes.
- If both of the following conditions are met approximately 15 minutes after the defogger and outer rear view mirror heater were activated, the defogger and outer rear view mirror heater continue to operate up to 255 minutes. If the following conditions are not met, the rear window defogger system stops operating immediately.
  - The outside temperature is –3°C (26.6°F) or below.
  - The vehicle speed is 50 km/h (30 mph) or more.

SLIDING ROOF SYSTEM

■ DESCRIPTION

- The sliding roof system is provided as standard equipment on all models.
- 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 assembly.

▶ System Diagram ◀



Service Tip

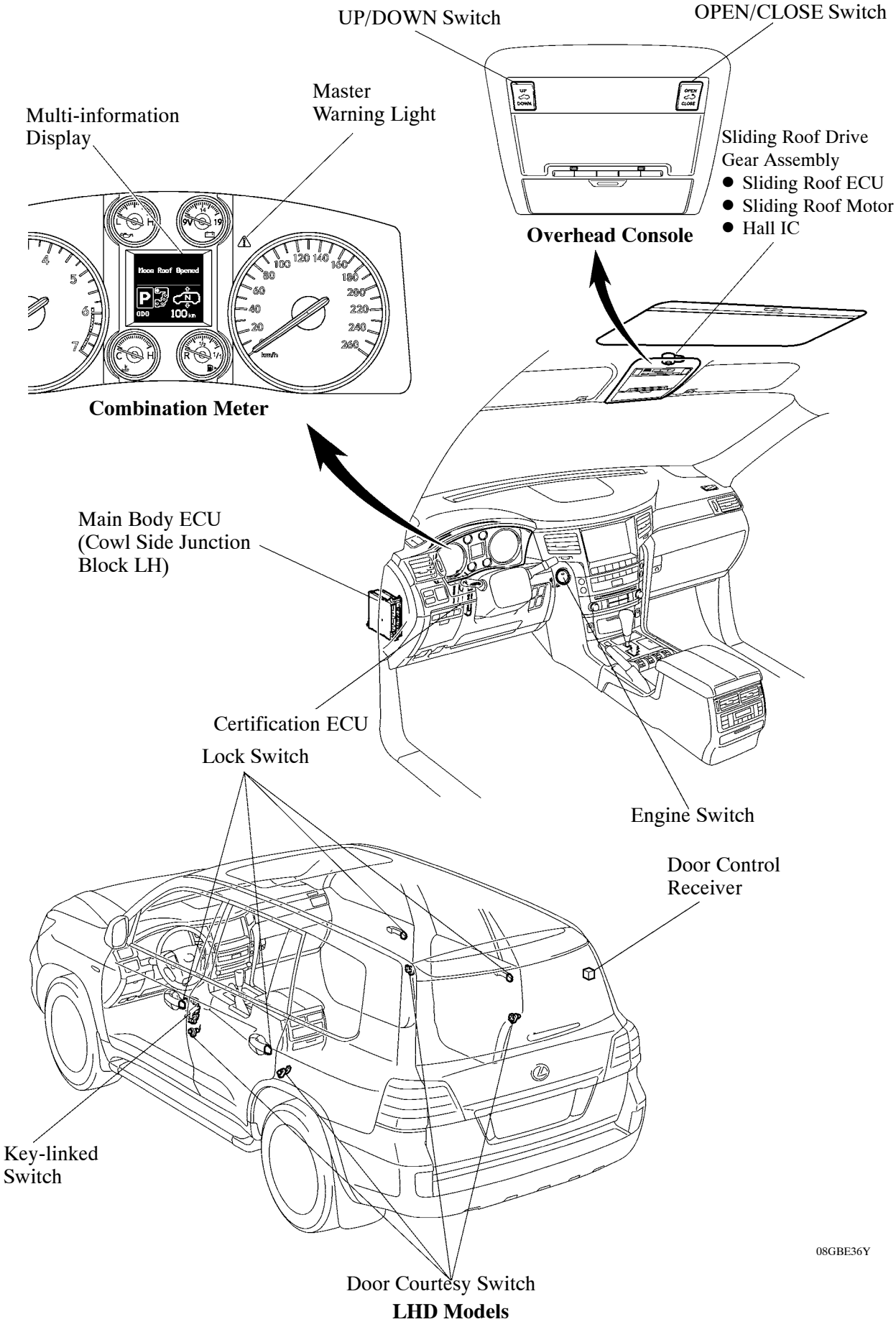
The memory is not cleared if battery terminals are disconnected. However, initialization is necessary after the sliding roof motor assembly is replaced. Perform the initialization as follows:

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 LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

■ LAYOUT OF MAIN COMPONENTS



LHD Models

■ FUNCTION

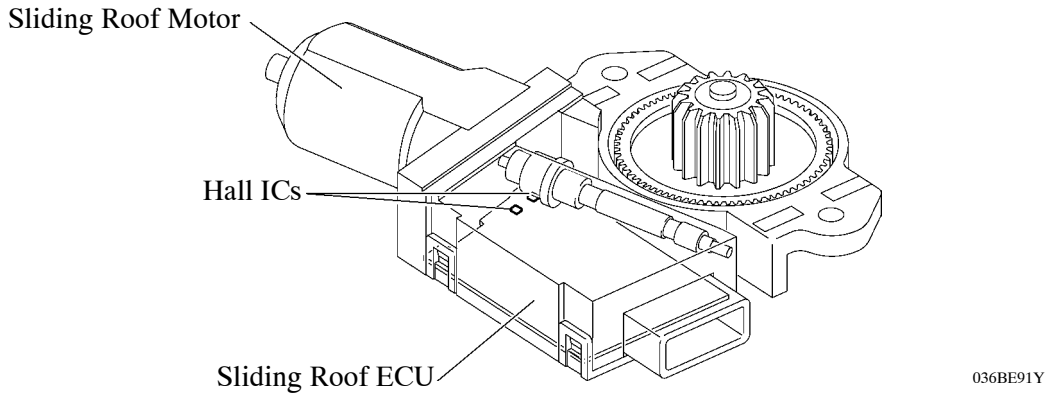
The sliding roof system has the following functions:

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	The jam protection function automatically stops the sliding roof and moves it open halfway or fully tilt up if a foreign object gets jammed in the sliding roof during close or tilt down operation.
Key-off Operation	The key-off operation function makes it possible to operate the sliding roof for approximately 43 seconds after the engine switch is turned ON (ACC) or OFF if the front doors are not opened. While the sliding roof is operating in the auto mode, the operation stops immediately after 43 seconds have elapsed.
Key-linked Open-and-close*	When the main body ECU receives an unlock/lock signal from the key continuously for longer than 2.4 seconds, the sliding roof ECU controls the sliding roof motor in accordance with the signal to open/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 is not in the detection area, the driver's door is locked, and the key in the driver's door 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 is turned. Similarly, when the driver's door is unlocked, turning and maintaining the driver's door key 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 sounds once. Then, a warning message appears on the multi-information display.

*: 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-18.

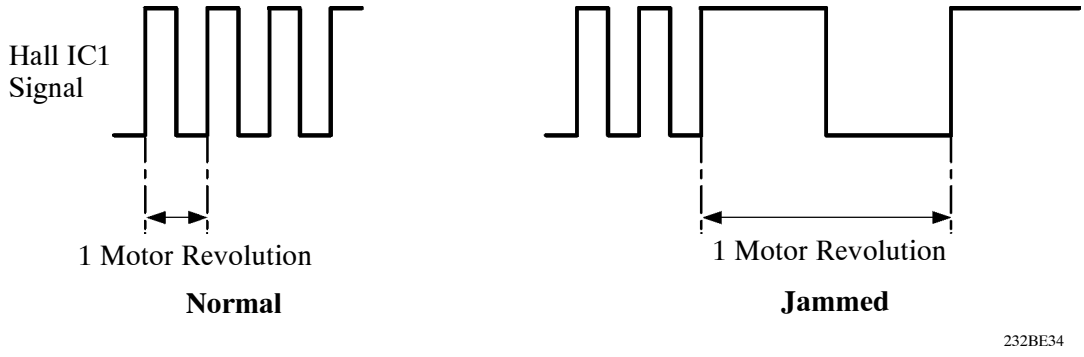
■JAM PROTECTION FUNCTION

- 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.

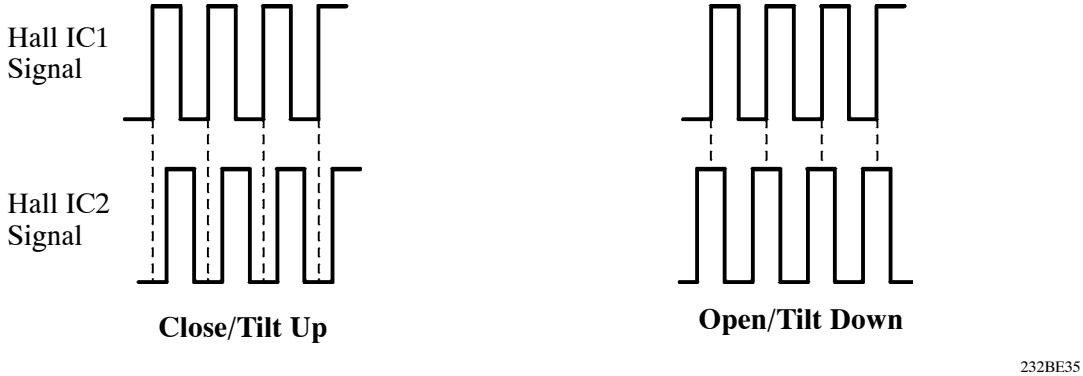


- To control the jam protection function, the sliding roof ECU monitors the amount of movement and judges jamming of the sliding roof based on the pulse signals from the Hall IC1, and the moving direction of the sliding roof from the phase difference between the pulses from the Hall IC1 and Hall IC2.

▶ Monitoring Amount of Movement Judgment of Jamming ◀



▶ Judgment of Movement Direction ◀



■ SLIDING SYSTEM OPEN WARNING

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 turns ON the master warning light and sounds the buzzer in the combination meter. Then, a warning message appears on the multi-information display.

<table>
<tr><td colspan="2">Warning Condition</td><td>The warning is activated if all of the following conditions are met:
● Sliding roof is not fully closed.
● Engine switch is OFF.
● Driver door is opened.</td></tr>
<tr><td rowspan="2">Combination Meter Assembly</td><td>Multi-information Display</td><td>

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<tr><td>
0150BE35C</td><td>Blinks</td></tr>
<tr><td colspan="2">Warning Stop Condition</td><td>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 is ON (IG).
● Driver door is closed.</td></tr>
</table>

POWER BACK DOOR SYSTEM

■ DESCRIPTION

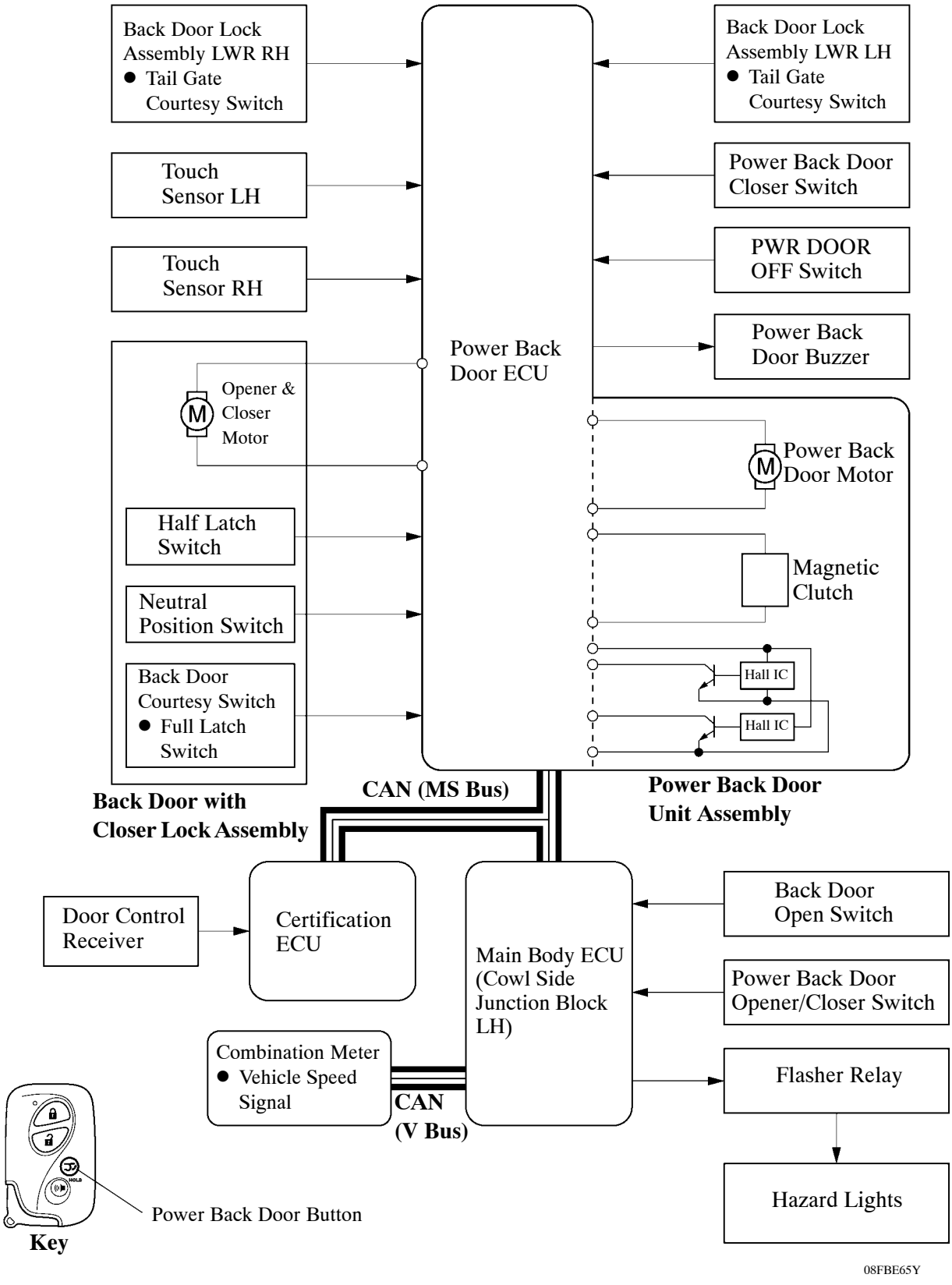
The power back door system is available as optional equipment on all models. The power back door system enables the back door to be opened and closed automatically by a motor in accordance with the signals from the power back door opener/closer switch or the power back door button on the key.
In addition, a power back door closer switch has been provided at the back door for convenience.

- The PWR DOOR OFF switch is the main switch for this system.
- The power back door ECU has been built into the power back door unit assembly.
- This system, which is controlled by the power back door ECU, operates when the conditions indicated below have been met.

Engine Switch	Operating Condition
ON (IG)	The PWR DOOR OFF switch is ON*1.
	The back door is unlocked*2, *3.
	Battery voltage is 10.5 V or more.
	The shift lever is in the P position*3.
	The vehicle speed is 3 mph (5 km/h) or less*3.
	The tail gate is closed.
OFF	The PWR DOOR OFF switch is ON*1.
	The back door is unlocked*2, *3.
	Battery voltage is 10.5 V or more.
	The tail gate is closed.

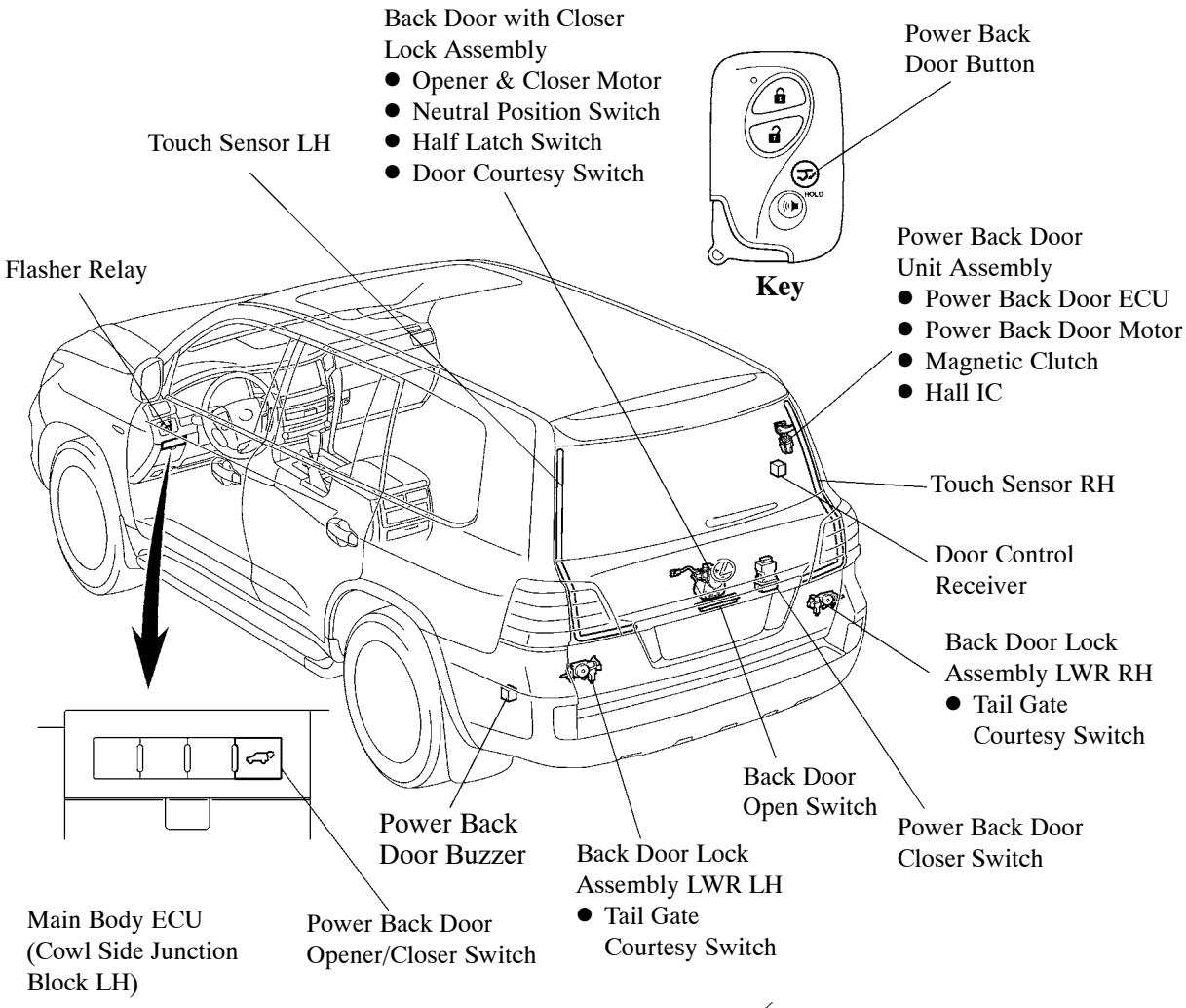
*1: The state in which the switch is not pressed.
*2: The power back door can be operated if it is open.
*3: The operating condition for the opener function.

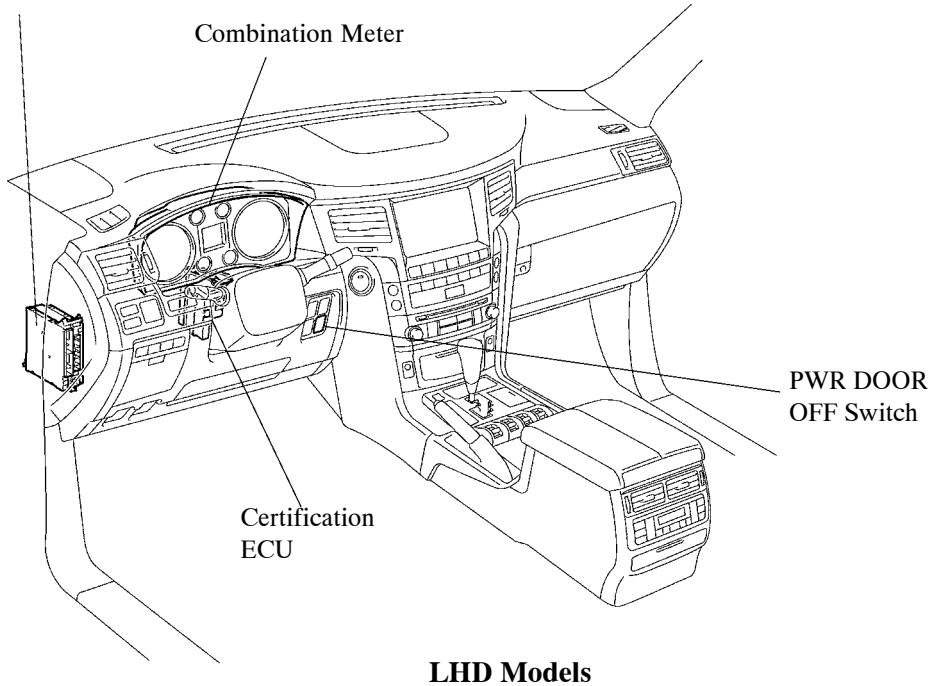
▶ System Diagram ◀



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■ LAYOUT OF MAIN COMPONENTS





LHD Models

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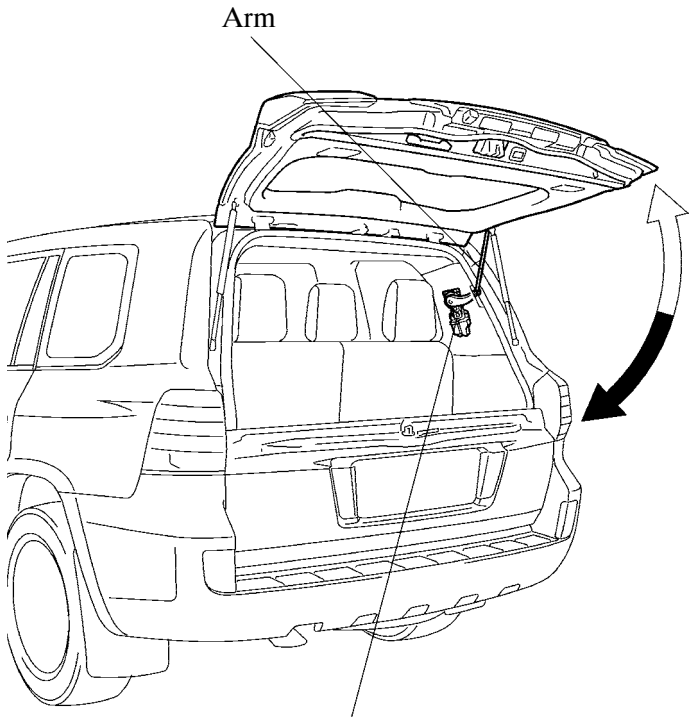
■ FUNCTION OF MAIN COMPONENTS

Component			Function
Power Back Door Unit Assembly	Power Back Door Motor		Opens and closes the back door when actuated by the power back door ECU.
	Power Back Door ECU		Controls the power back door system in accordance with the signals received from the switches, sensors and ECU.
	Magnetic Clutch		Transmits the rotation of the power back door motor to the sector gear.
	Hall IC		Detects the back door position and the opening and closing speeds of the back door.
Back Door with Closer Lock Assembly	Opener & Closer Motor		Locks and unlocks the latch of the back door with closer lock assembly when actuated by the power back door ECU.
	Back Door Courtesy Switch		Detects whether the back door is opened or closed. This switch turns OFF when the back door is opened or ajar and ON when the back door is closed.
		Full Latch Switch	Detects the fully closed position of the latch, turns ON in the over latch condition.
	Neutral Position Switch		Detects the initial (neutral) position of the sector gear of the opener & closer motor. The switch is ON when the back door lock operates to the open side, and OFF when it operates to the close side.
	Half Latch Switch		Detects the ajar position of the latch, turns ON in the open latch condition.
Touch Sensor			Detects if an object is jammed in the back door.
Tail Gate Courtesy Switch			Transmits an OFF signal when the tail gate is closed, and an ON signal when the tail gate is open, to the power back door ECU.
Power Back Door Buzzer			When the power back door system starts to operate, the buzzer sounds to inform the driver that the system is operating. The buzzer also sounds if the operating conditions have not been met or if a jammed condition has been detected.
PWR DOOR OFF Switch			● Setting this switch to OFF prohibits system operation. ● In case that this switch is OFF, it is possible to do the open/close operation of the back door manually as the magnetic clutch of the power back door motor is OFF.
Power Back Door Opener/Closer Switch			The back door opens or closes when this switch is turned ON from inside of the vehicle.
Power Back Door Closer Switch			The back door closes when this switch is turned ON from outside of the vehicle.
Key			The back door opens or closes when the power back door button on the key is pressed from outside of the vehicle.
Back Door Open Switch			This switch releases the latch of the back door lock for manual opening of the back door. Pressing the back door open switch during operation of the power back door system enables switching to manual operation of the back door.
Main Body ECU (Cowl Side Junction Block LH)			The main body ECU transmits a back door lock/unlock control signal, vehicle speed signal, and a shift P signal to the power back door ECU via CAN. Also, it receives a hazard request signal from the power back door ECU via CAN, and operates the flasher relay.
Combination Meter			Outputs vehicle speed signals to the power back door ECU.

■CONSTRUCTION AND OPERATION

1. Power Back Door Unit Assembly

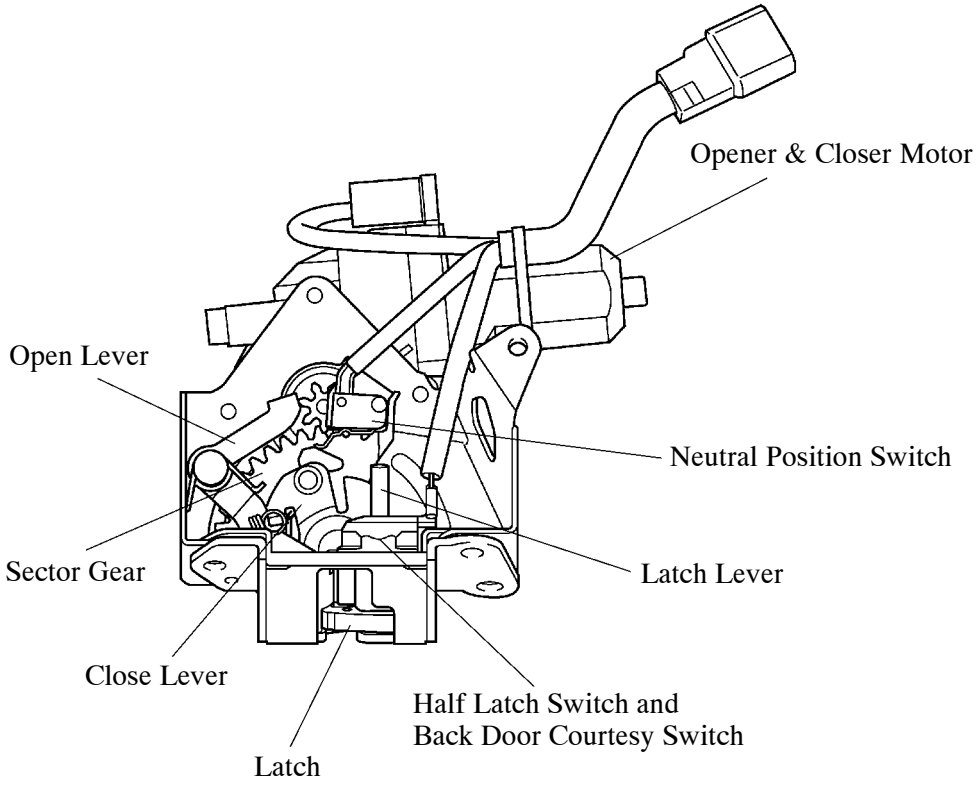
Rotation of the power back door motor moves the arm forward and back via the gears, link mechanism and slider mechanism. The back door is opened and closed by movement of this arm.



2. Back Door with Closer Lock Assembly

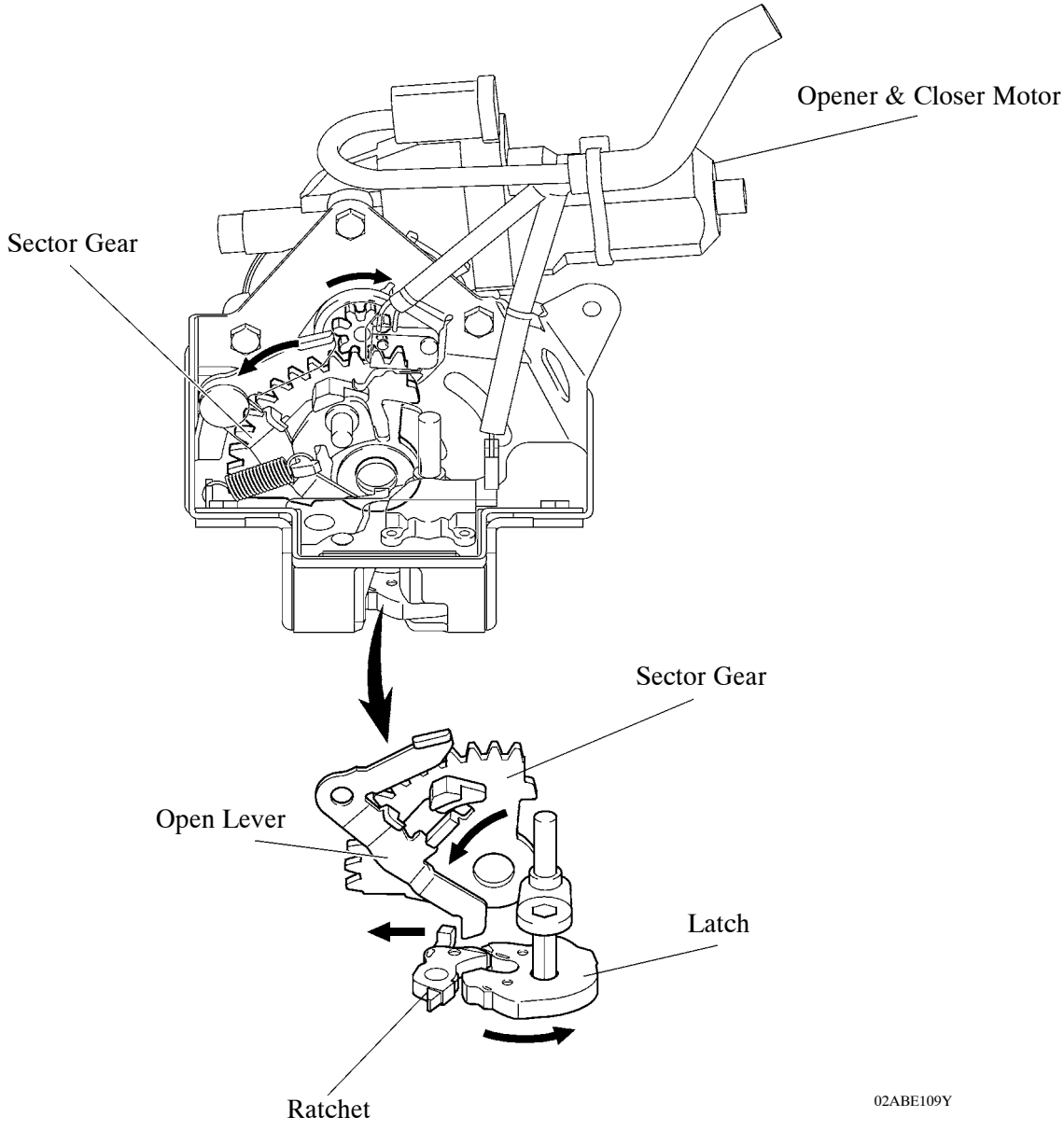
General

- The back door with closer lock assembly consists of 3 position detection switches (neutral position switch, half latch switch, and back door courtesy switch), sector gear, open lever, latch, and opener & closer motor.
- The rotation of the opener & closer motor is transmitted to the close or open lever via the sector gear. The operation of the open or closer lever engages or releases the latch.
- When this system does not operate due to a discharged battery or other malfunctions, the back door can be opened by directly operating the open lever in the back door with closer lock assembly.



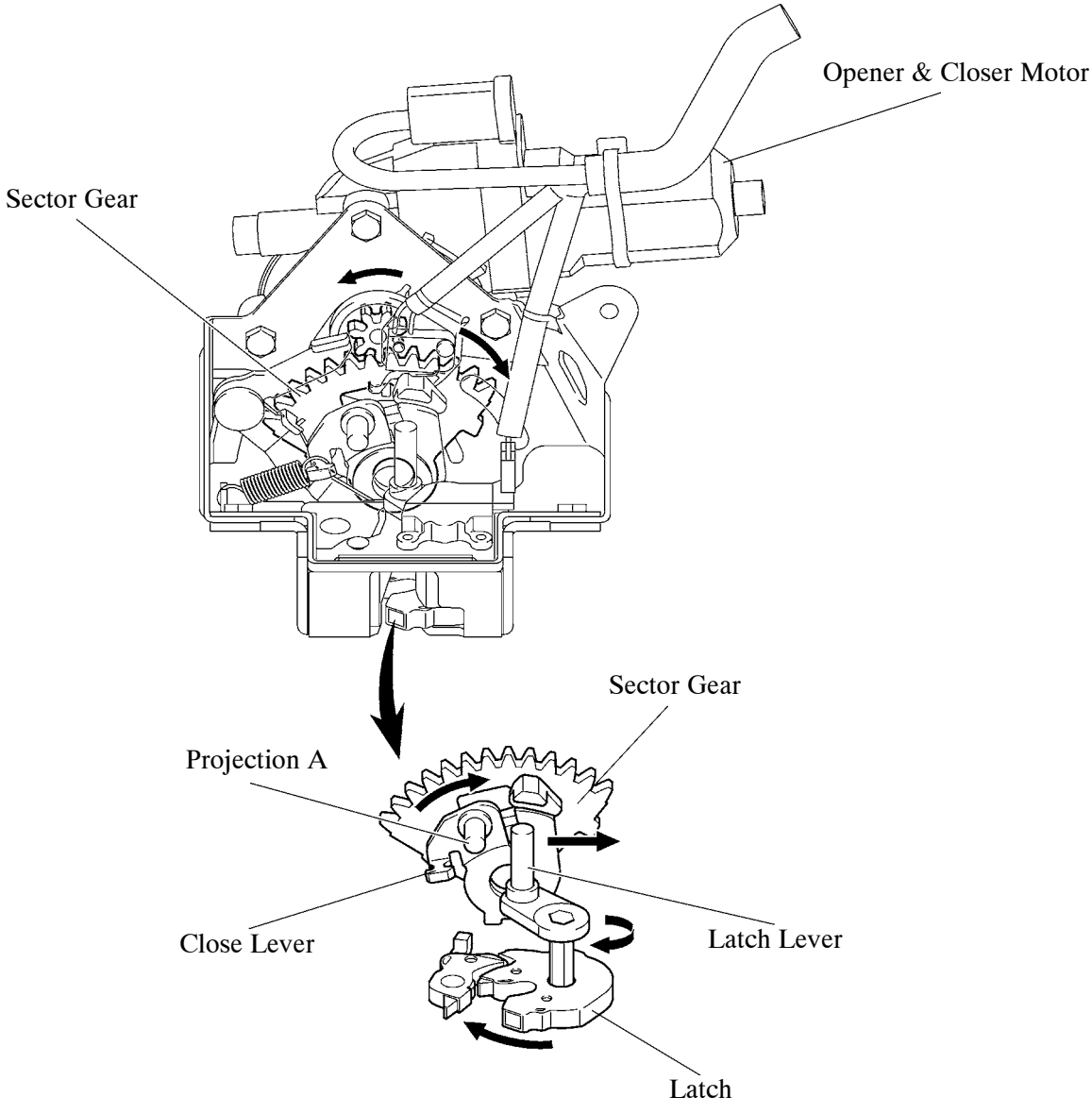
Opener Operation

When the opener & closer motor rotates clockwise, the sector gear, which links the opener & closer motor via the gear, moves to the left. This makes the sector gear push the open lever to the left. As a result, the ratchet moves in the releasing direction to release the latch.



Closer Operation

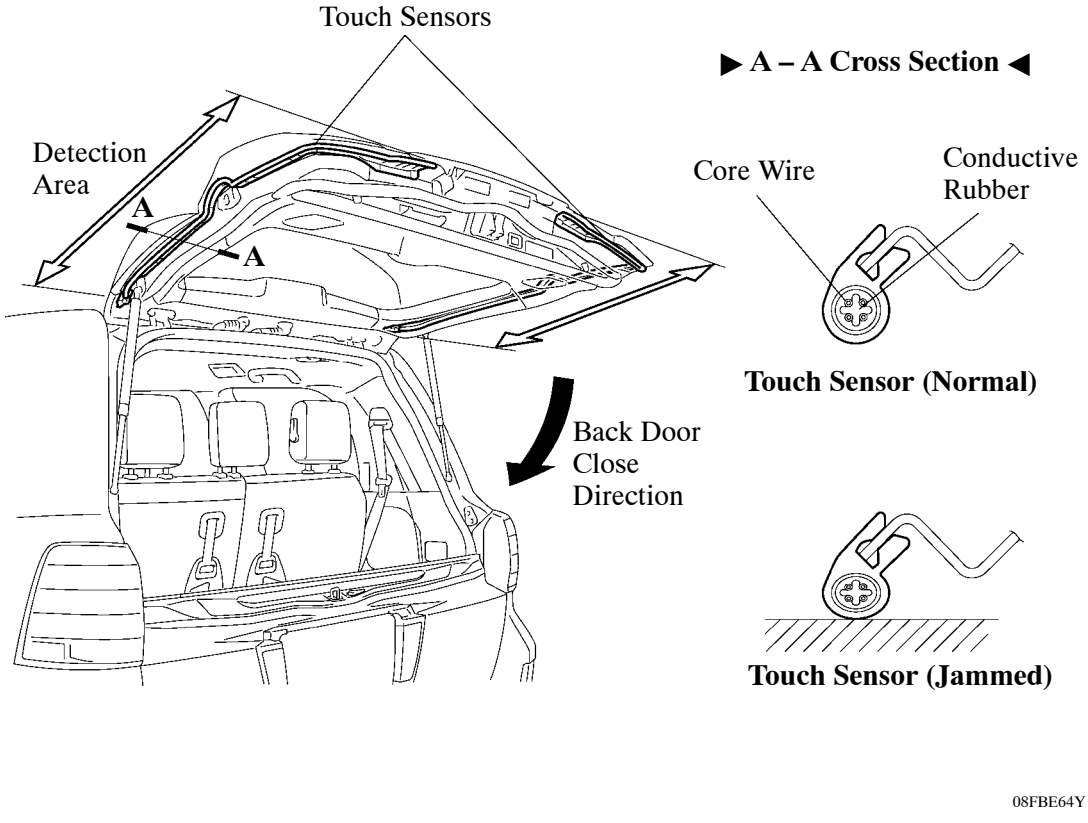
When the opener & closer motor rotates counterclockwise, the sector gear, which links the opener & closer motor via the gear, moves to the right. This makes the projection A, which is mounted on the closer lever that moves in conjunction with the sector gear, push the latch lever to the right. As a result, the latch moves in the engaging direction.



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3. Touch Sensor

While the back door is moving in the closing direction, if one of the touch sensors located on each side of the back door becomes compressed due to the jamming of a foreign object, the built-in pieces of conductive rubber contact each other, causing the resistance of the sensor to change and a current to flow. Accordingly, the power back door ECU determines that the back door has jammed.



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■SYSTEM CONTROL

1. General

This system performs the functions listed below.

Function	Outline
Opener (See page BE-349)	Upon receiving an ON signal from the power back door opener/closer switch or the power back door button on the key with the back door closed, the power back door ECU actuates the opener & closer motor and the power back door motor in order to release the latch of the back door lock and open the power back door.
Closer (See page BE-350)	Upon receiving an ON signal from the power back door opener/closer switch, power back door closer switch with the back door open, or manually closing the back door to a predetermined position or the power back door button on the key, the power back door ECU actuates the power back door motor and the opener & closer motor in order to close the back door and engage the latch of the back door lock.
Jam Protection (See page BE-351)	Upon receiving the signals from a touch sensor and the Hall ICs of the power back door motor, the power back door ECU detects that an object is jammed in the back door, and reverses the movement of the power back door motor. The power back door buzzer sounds for 0.13 seconds twice when a jammed object is detected.
Reverse Control	During a power back door operation, if the power back door ECU detects an ON signal from the power back door opener/closer switch or the power back door button on the key, the power back door ECU sounds the power back door buzzer for approximately 0.2 seconds and reverses the power back door motor in order to reverse the back door to a predetermined position.
Back Door Open/Close Speed Control	In accordance with the signals received from the Hall ICs, the power back door ECU effects the following controls: ● Reduces the closing speed from approximately 200 mm (7.9 in.) before the back door is fully closed, in order to reduce the jamming load. ● Reduces the opening speed from approximately 80 mm (3.1 in.) before the back door is fully open, in order to reduce the shock that occurs when it is fully open.
Others	● If the tail gate is open before an open operation of the power back door, the power back door will not perform an open operation. ● If the tail gate opens while the power back door is being open, the open operation of the power back door continues. ● If the tail gate is open before a close operation of the back door, the power back door will not perform a close operation. ● If the tail gate is open while the power back door is being closed, the close operation of the power back door stops, and performs an openoperation.
Diagnosis	If the power back door ECU detects a malfunction in the power back door system, the power back door ECU diagnoses the failed section and stores the DTC (Diagnostic Trouble Code) in the main body ECU via the CAN. For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

(Continued)

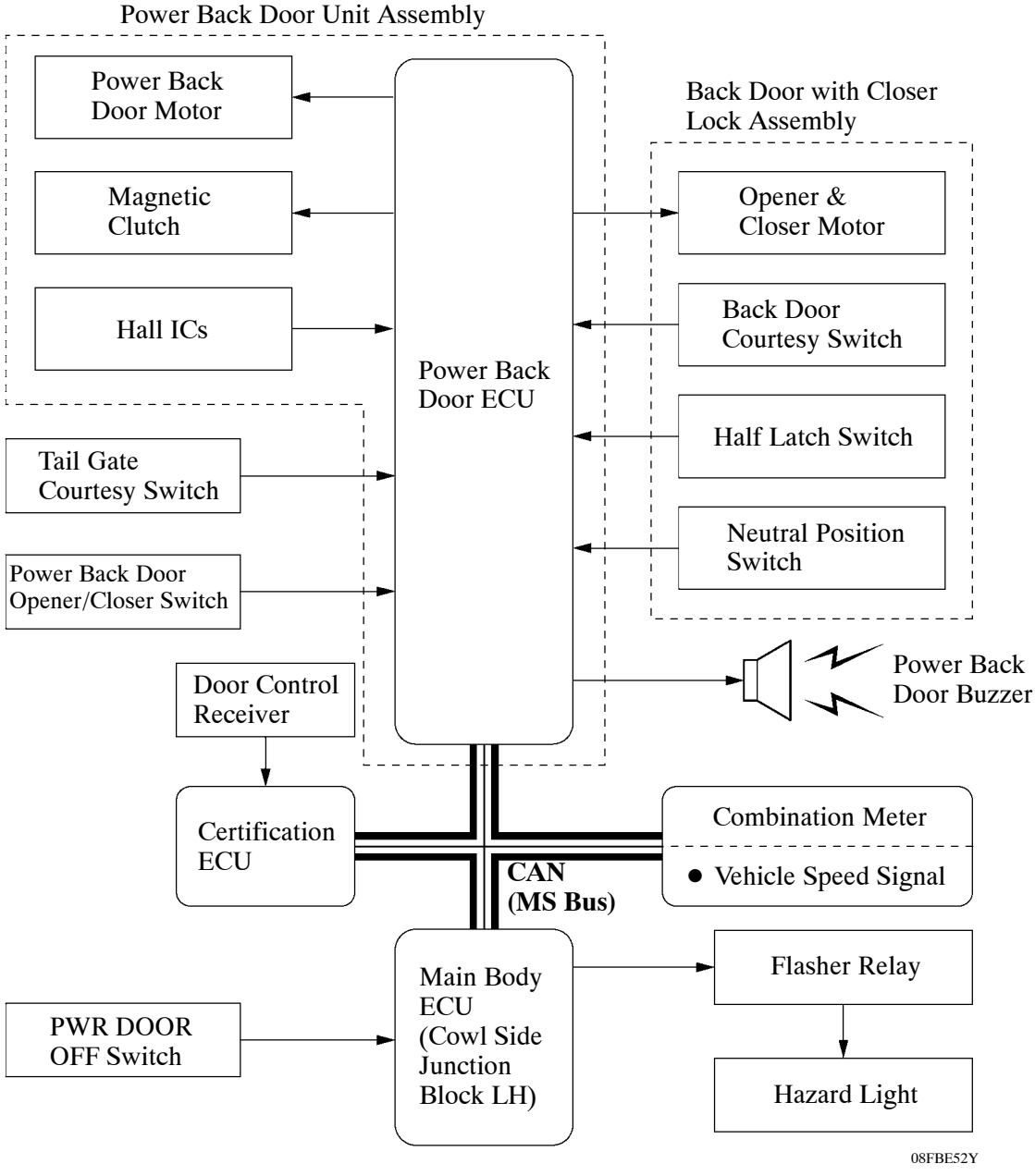
Function	Outline
Fail-safe	● If the power back door ECU detects any of the malfunctions listed below during power back door operation, the power back door ECU stops the power back door motor and sounds the warning buzzer simultaneously, then turns OFF the magnetic clutch and stops the system. – Open circuit in the touch sensor – The power back door motor is operated continuously for 30 sec. or more. – Abnormal back door position signal (Hall IC signal) – Abnormality with position switches on back door with closer lock assembly. ● During a power back door operation, if the shift lever is shifted to a position other than P, the power back door ECU performs the aforementioned fail-safe operation.*

*: Only for the opener operation

2. Opener Function

The operation of the power back door opener function is described below.

1. The power back door opener/closer switch or the power back door button on the key is turned ON for 1 second or more with the back door and tail gate closed.
2. The buzzer sound for 0.8 seconds while the power back door button has been pressed for a certain time. The hazard lights will flash twice simultaneously with the start of the operation.
3. The opener & closer motor operates to unlock the latch.
4. Through the state of the back door courtesy switch, the power back door ECU detects that the latch has been released, and actuates the power back door motor to start opening the back door.
5. Through the state of the half latch switch, the power back door ECU detects that the back door is open, and reverses the opener & closer motor to its initial position.
6. Through the state of the neutral position switch, the power back door ECU detects that the motor has reverted to its initial position. Then, it stops the opener & closer motor.
7. Through the Hall ICs of the power back door motor, the power back door ECU detects the back door position, and stops the power back door motor just before the back door is in its full open position, and turns OFF the magnetic clutch.

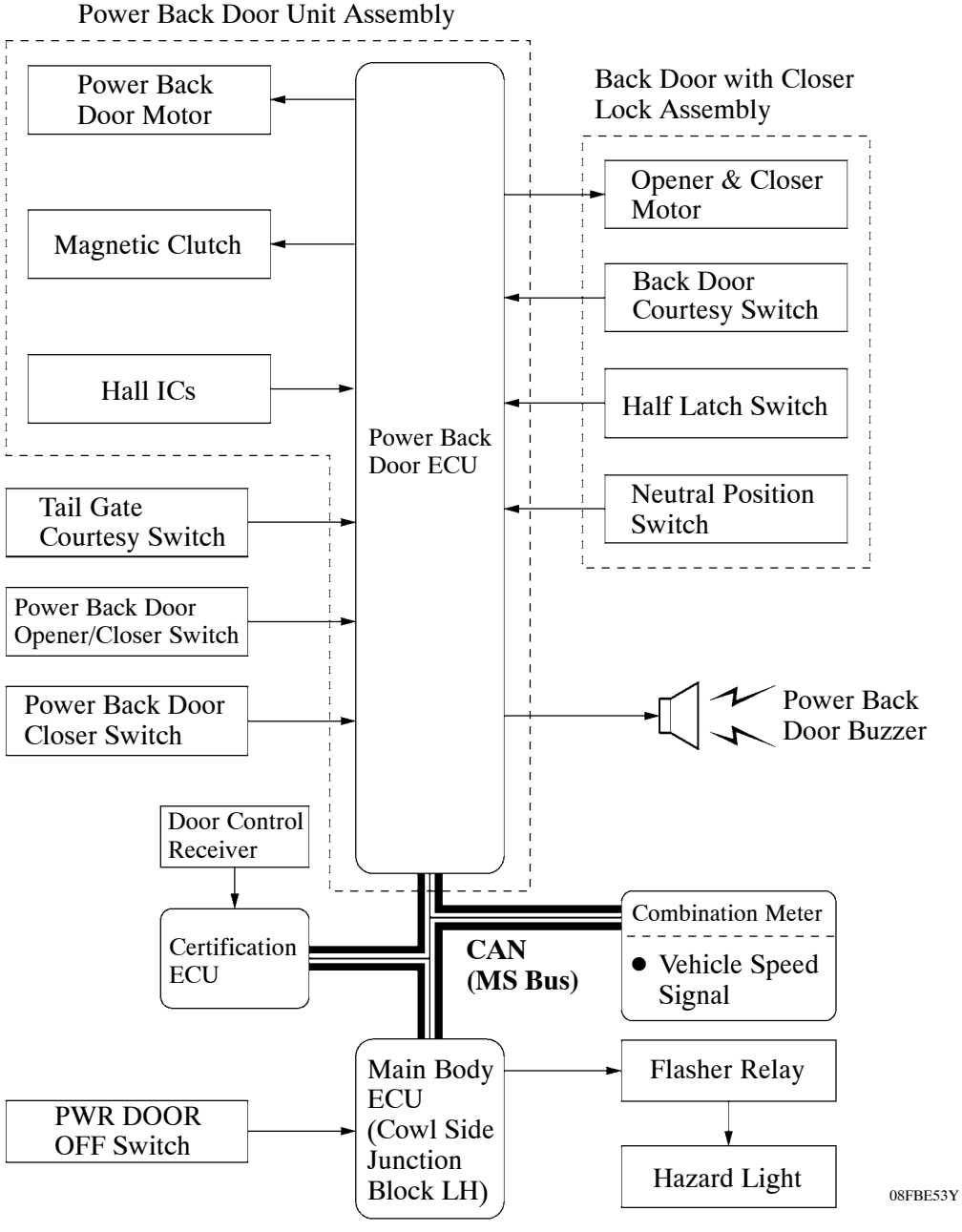


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3. Closer Function

The operation of the power back door closer function is described below.

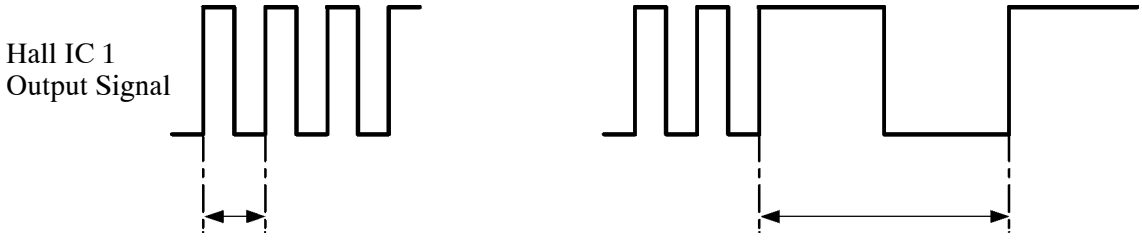
1. The power back door opener/closer switch, the power back door closer switch, or the power back door button on the transmitter is turned ON for 1 second or more with the back door open and tail gate close, or the back door is manually closed to a predetermined position.
2. The buzzer sound for 0.8 seconds while the power back door button has been pressed for a certain time. The hazard lights will flash twice simultaneously with the start of the operation.
3. The power back door ECU actuates the power back door motor to start closing the back door.
4. Upon detecting that the latch is disengaged through the state of the half latch switch, the power back door ECU actuates the opener & closer motor to engage the latch.
5. Upon detecting that the back door has closed through the state of the back door courtesy switch, the power back door ECU stops the magnetic clutch and the power back door motor.
6. Upon detecting that the latch has been engaged through the state of the half latch switch (ON → OFF), the power back door ECU operates the opener & closer motor forward in order to fully close the power back door.
7. If the power back door ECU detects that the half latch switch has been turned ON again after the back door has fully closed, it stops the opener & closer motor. Then, it operates the opener & closer motor in reverse in order to return the sector gear to its initial position, until the neutral position switch turns ON.



4. Jam Protection Function

- The power back door ECU determines the jamming of the back door upon receiving the signals from a touch sensor and the Hall ICs of the power back door motor.
- The power back door ECU determines the back door movement amount and the back door opening/closing speed (back door foreign object jamming) from the pulse signals from the Hall IC of the power back door motor, and the back door position (back door movement direction) from the phase difference between the pulses from Hall IC 1 and Hall IC 2 of the power back door motor.
- If a foreign object has been jammed during opening or closing of the power back door, the pulse width of the output signal from Hall IC of the back door motor changes. The power back door ECU judges this change in pulse width as jamming, reversing the power back door motor.
- If jamming is detected again during this reversal operation, the power back door ECU again reverses the power back door motor. However, if jamming is detected during the second closing operation or more, the power back door ECU turns OFF the magnetic clutch of the power back door motor, then sounds the power back door buzzer and stops power back door system operation. After the system is stopped, power back door system operation is restored by fully closing the back door manually.
- If either of the touch sensors located on each side of the back door is compressed by a jammed foreign object while the back door is closing, the resistance of the sensor changes. The power back door ECU judges this resistance change as jamming, and reverses the power back door motor.

▶ Judgment of Amount of Movement and Opening/Closing Speed ◀

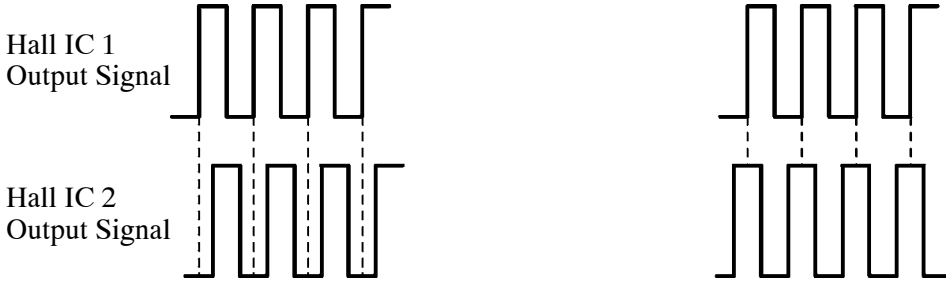


Standard Pulse (Normal)

When Power Back Door Motor Speed Changes (Jammed)

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▶ Judgment of Back Door Moving Direction ◀



Back Door Open

Back Door Close

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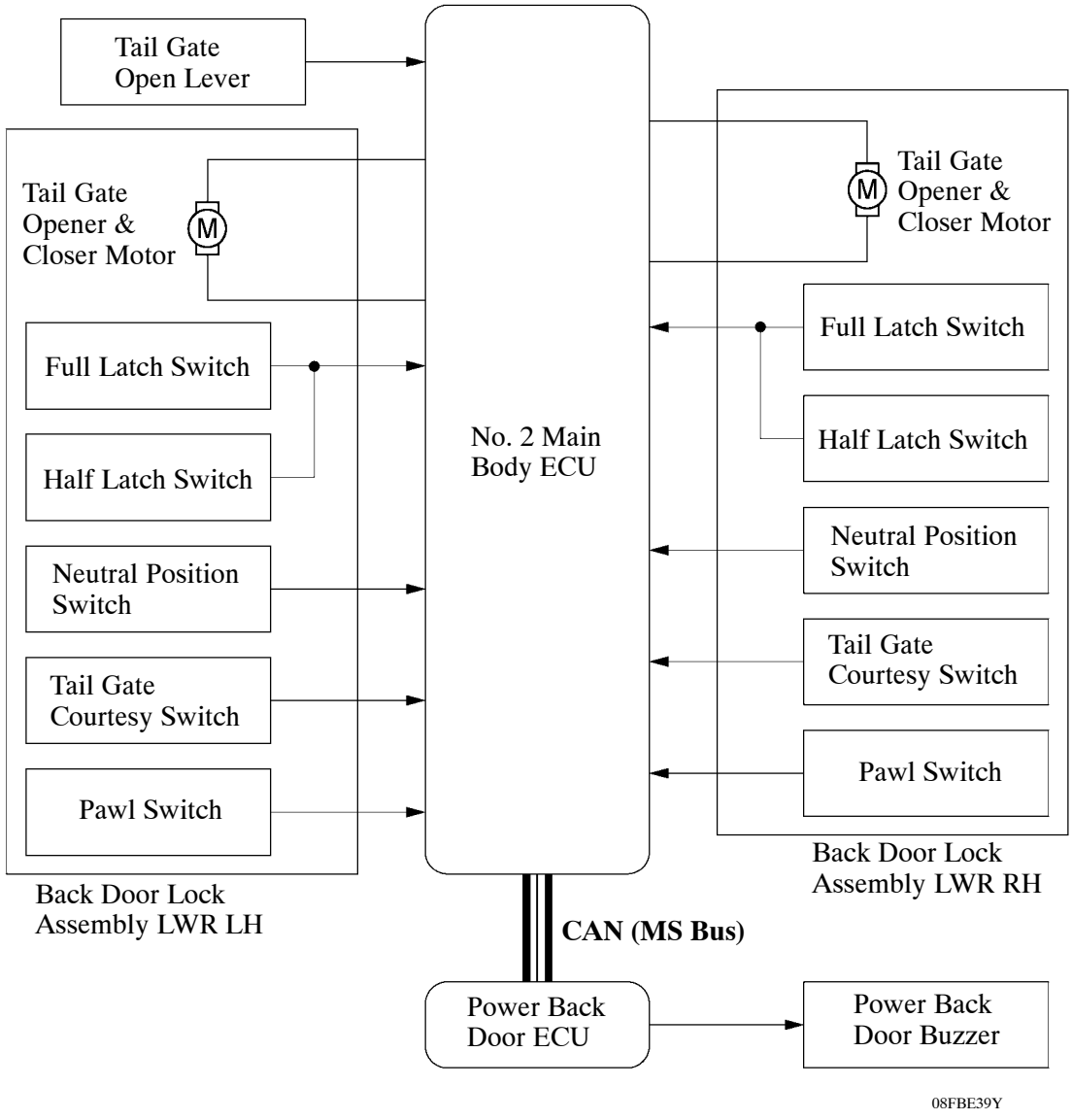
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TAIL GATE CLOSER SYSTEM

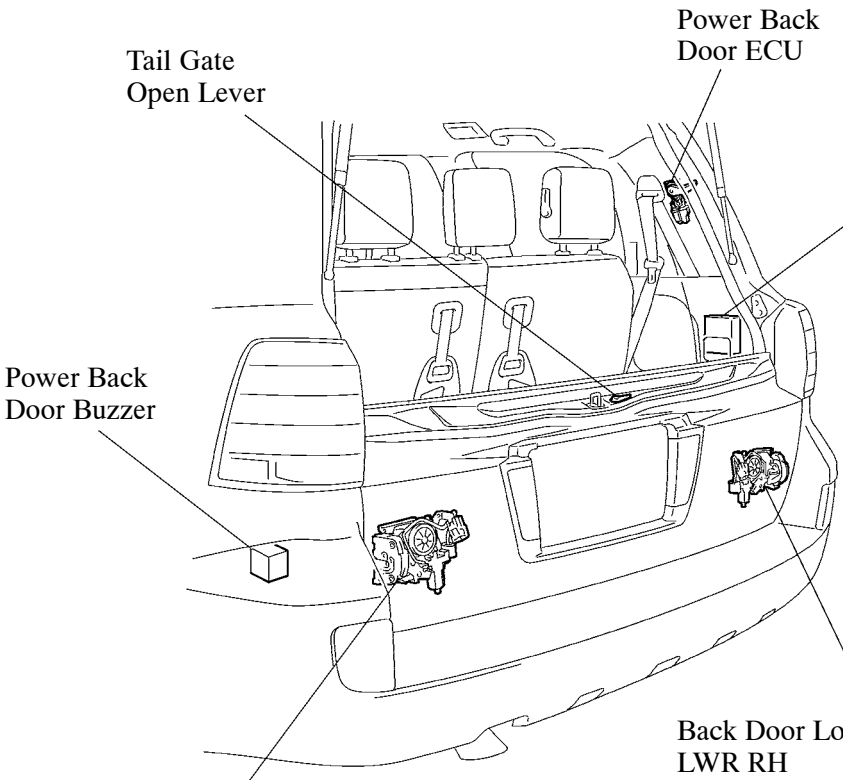
■ DESCRIPTION

- A tail gate closer system is optional equipment for the models with the power back door system. This system sounds the power back door buzzer for 0.8 seconds and operates the tail gate opener & closer motor to fully close the tail gate automatically when the tail gate becomes ajar.
- The tail gate closer system uses two single motors to perform its close control and release control, thus simplifying the system.
- This system is controlled by the No. 2 main body ECU.

▶ System Diagram ◀



■ LAYOUT OF MAIN COMPONENTS



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■ FUNCTION OF MAIN COMPONENTS

Component	Function	
Back Door Lock Assembly LWR	Tail Gate Opener & Closer Motor	Locks and unlocks the latch of the back door lock assembly LWR when actuated by the No. 2 main body ECU.
	Tail Gate Courtesy Switch	Detects whether the tail gate is opened or closed. This switch turns ON when the tail gate is opened or ajar and OFF when the tail gate is closed.
	Pawl Switch	Detects the fully closed position.
	Full Latch Switch	Detects the fully closed position in case that the pawl switch malfunctions.
	Half Latch Switch	Detects the ajar position of the latch, turns OFF in the half latch condition.
	Neutral Position Switch	Detects the initial (neutral) position of the sector gear of the tail gate opener & closer motor. The switch is ON when the tail gate lock operates to the release side, and OFF when it operates to the close side.
Tail Gate Open Lever		The tail gate opens when this lever is turned ON.
Power Back Door ECU		Sends a sounding request signal to the power back door buzzer when the tail gate starts to close.
Power Back Door Buzzer		Sounds for 0.8 seconds when the tail gate starts to close.
No. 2 Main Body ECU		Transmits lock/unlock control signals to the back door lock assembly LWR.

■ DIAGNOSIS

If the No. 2 main body ECU detects a malfunction in the tail gate closer system, the No. 2 main body ECU diagnoses the failed section and stores the DTC (Diagnostic Trouble Code) in the No. 2 main body ECU via the CAN. For details, see the LEXUS LX 570 Repair Manual (Pub. No. RM08G0E).

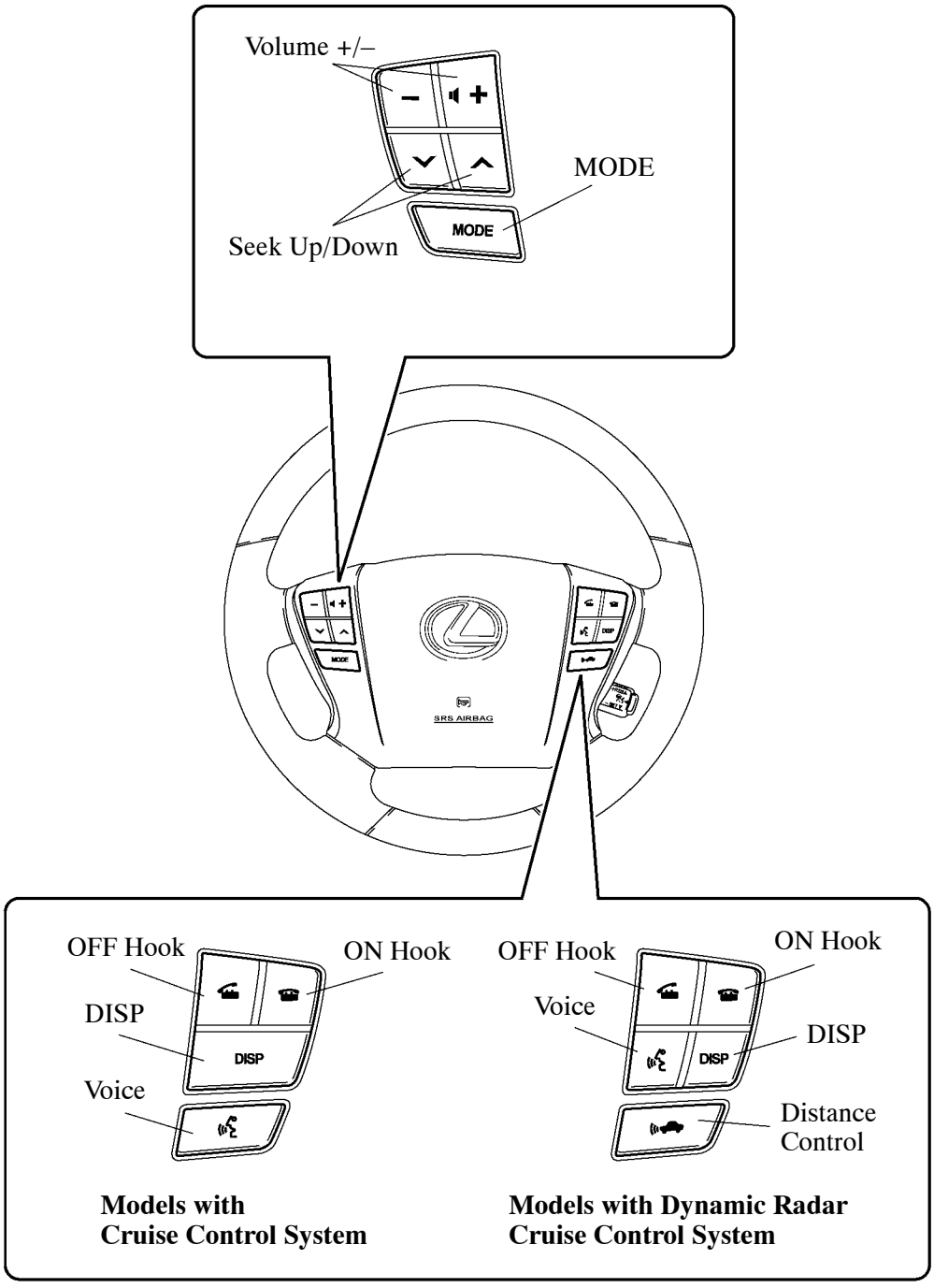
STEERING PAD SWITCH

■ DESCRIPTION

- Steering pad switches are standard equipment.
- The switches used frequently are located on the steering pad for easy use.
- The steering pad switches that are provided on the steering pad may vary by optional equipment, as indicated in the table below.

●: Provided —: Not provided

Item	Switch	Equipment	
		Models With Cruise Control System	Models With Dynamic Radar Cruise Control System
Audio	● Volume +/– ● Seek Up/Down ● MODE	●	●
Navigation	Voice	●	●
Telephone	● ON Hook ● OFF Hook ● Voice	●	●
Multi-information Display (Combination Meter)	DISP	●	●
Dynamic Radar Cruise Control	Distance Control	—	●


Volume +/–
MODE
Seek Up/Down
MODE
SRS AIRBAG
OFF Hook
ON Hook
DISP
Voice
DISP
OFF Hook
ON Hook
Voice
DISP
DISP
Distance
Control
Models with
Cruise Control System
Models with Dynamic Radar
Cruise Control System

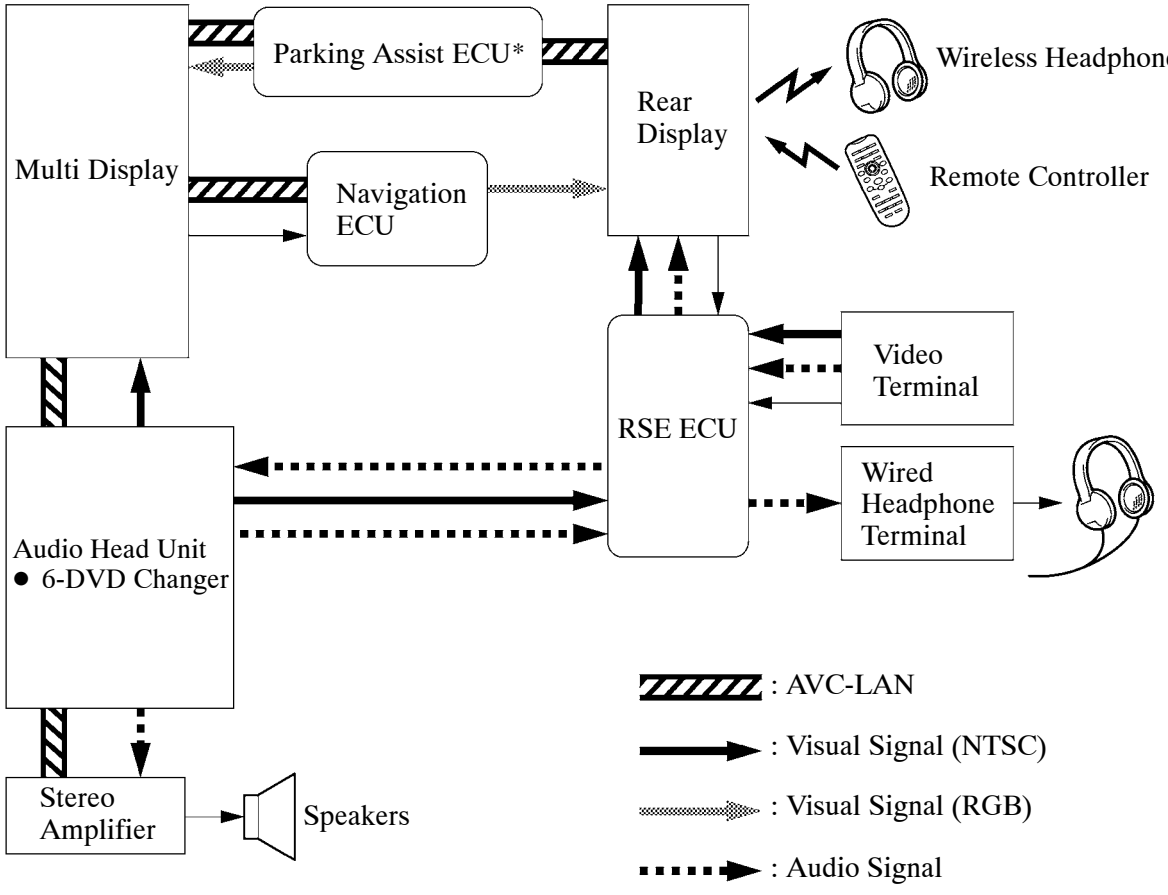
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RSES (REAR SEAT ENTERTAINMENT SYSTEM)

■ DESCRIPTION

- The RSES (Rear Seat Entertainment System) is available as optional equipment.
- This system consists of RSE ECU, multi display, remote controller, 6-DVD changer, rear display, audio head unit, stereo amplifier, wired headphone and wireless headphone.
- The RSES is controlled by the RSE ECU.
- The RSES uses a 9-inch rear display to provide impressive video images to the rear seat occupants.
- The RSES supports the DVD-V, DVD-A, video-CD, CD-DA, dts CD, CD-TEXT, MP3 (MPEG Audio Layer-3) and WMA (Windows Media Audio).
- The maximum opening angle of the rear display is 120°, which dramatically increases the viewing range in the downward direction.
- The rear display can be opened, closed or tilted by using the remote controller. The display can be tilted at 4 angles: 90°, 100°, 110° and 120°.
- When the RSES is ON and the engine switch is turned OFF, the RSES will also turn OFF. When the engine switch is turned from OFF to ON (ACC) or ON (IG), the RSES will automatically turn ON. At this time, the RSES can resume playing the video image from the point the engine switch was turned OFF.
- A child lock function is provided to disable the operation of the RSES through the remote controller. Turning ON the “Rear System Lock” displayed on the multi display activates this function.

▶ System Diagram ◀

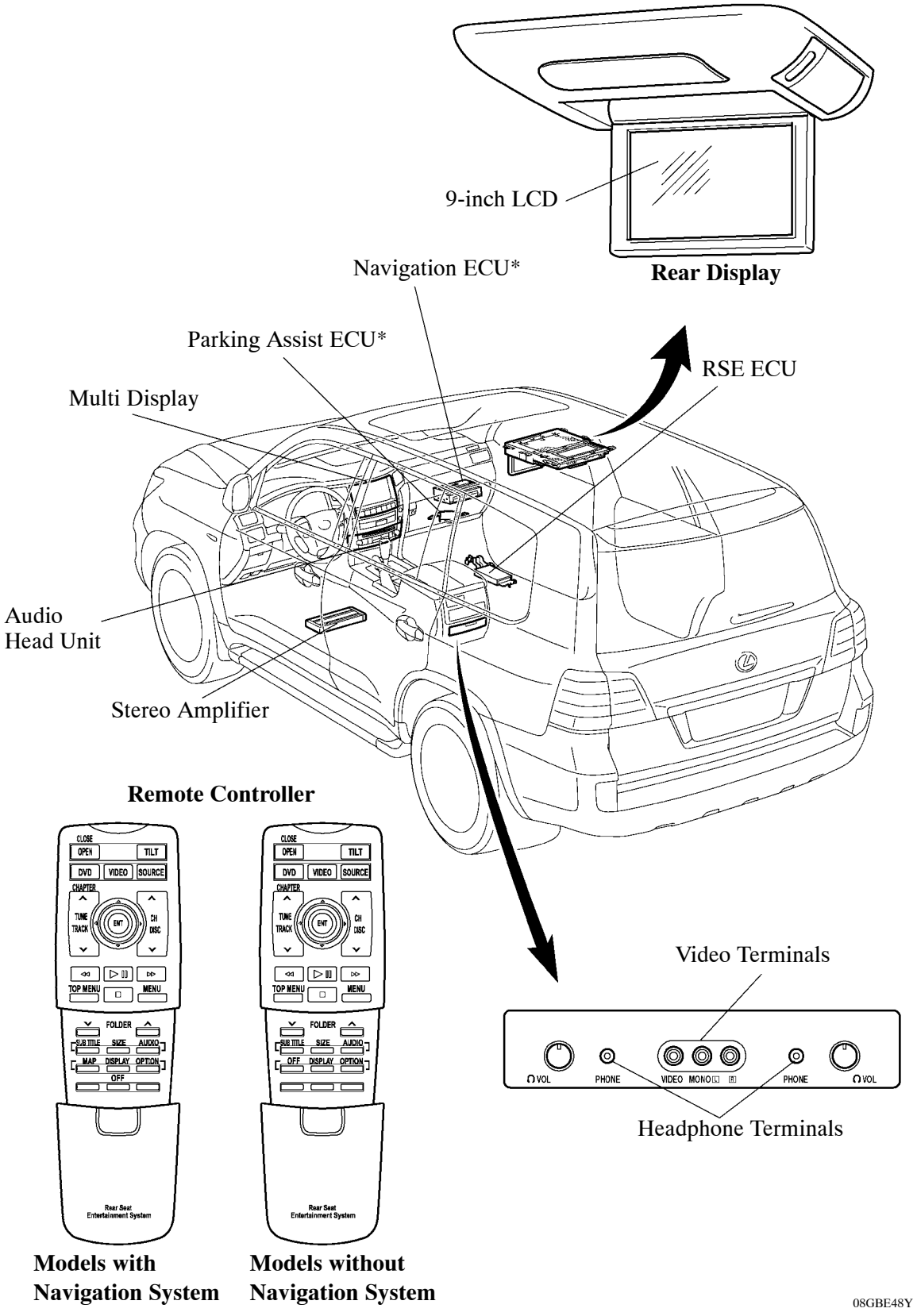


*: Models with Parking Assist Monitor System

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■LAYOUT OF MAIN COMPONENTS



*: Models with Parking Assist Monitor System

LHD Model

■FUNCTION OF MAIN COMPONENTS

Component	Function
Rear Display	● Displays video images in accordance with video signals from the RSE ECU. ● Displays a map screen in accordance with the signals from the multi display. ● Receives signals from the remote controller and outputs them to the RSE ECU. ● Outputs audio signals to the wireless headphones in the form of infrared signals. ● Displays the audio-visual control screen. ● Displays the adjustment screen. ● Displays the diagnosis screen.
Multi Display	● Outputs the map screen indication signal to the rear display. ● Outputs audio signals to the RSE ECU. ● For details of the multi display, see page BE-106 in the multi display section.
Audio Head Unit	● Outputs the operation signals of the 6-DVD changer to the multi display. ● Outputs audio and visual signals to the multi display. ● Outputs audio signals to the stereo amplifier.
RSE ECU	● Processes audio and visual signals from the video player, and outputs them to the rear display. ● Processes audio and visual signals from the 6-DVD changer, and outputs them to the rear display.
6-DVD Changer	Outputs audio and visual signals to the RSE ECU.
Headphone Terminal	● Outputs audio signals to the wired headphones that are connected. ● Adjusts the volume of the wired headphones in accordance with volume control.
Remote Controller	Outputs various control signals of the RSES to the rear display in the form of infrared signals.
Wireless Headphone	● Receives the audio signals from the rear display in the form of infrared signals. ● Volume adjustment of the wireless headphone can be done by using the volume equipped on the wireless headphone.
Video Terminal	This terminal is for connecting the video player's video and audio output terminals.