

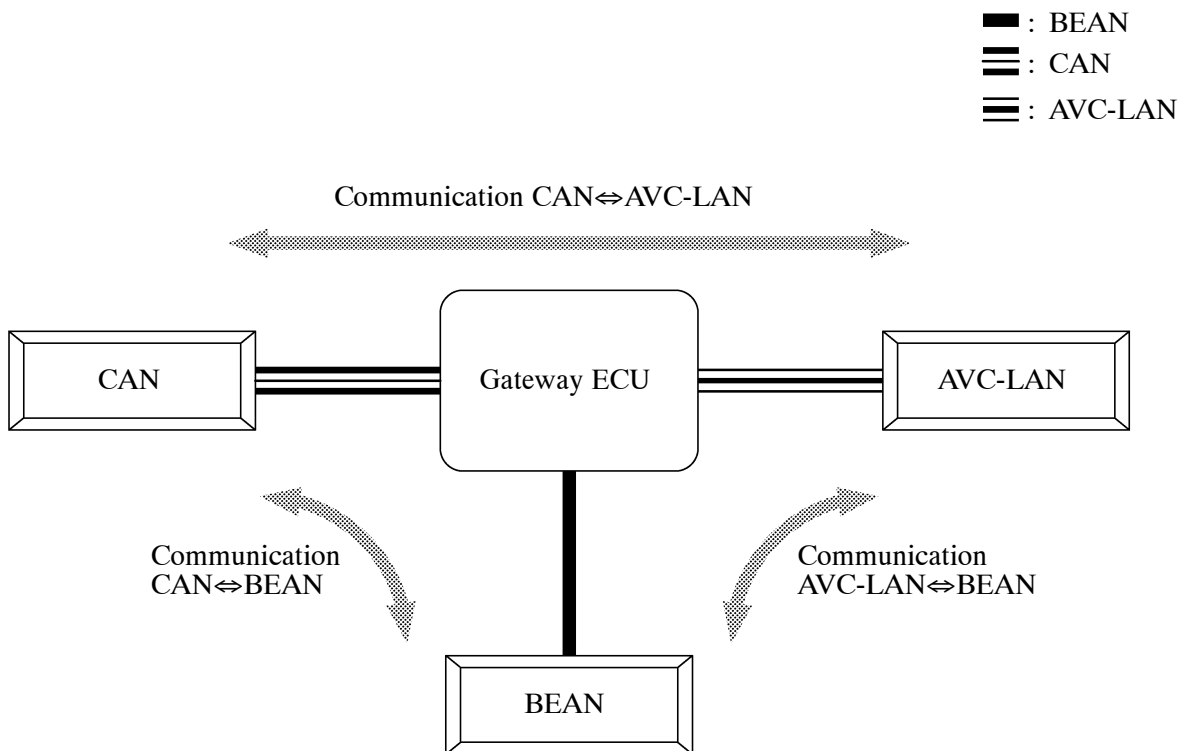
## BODY ELECTRICAL

### MULTIPLEX COMMUNICATION

#### ■ DESCRIPTION

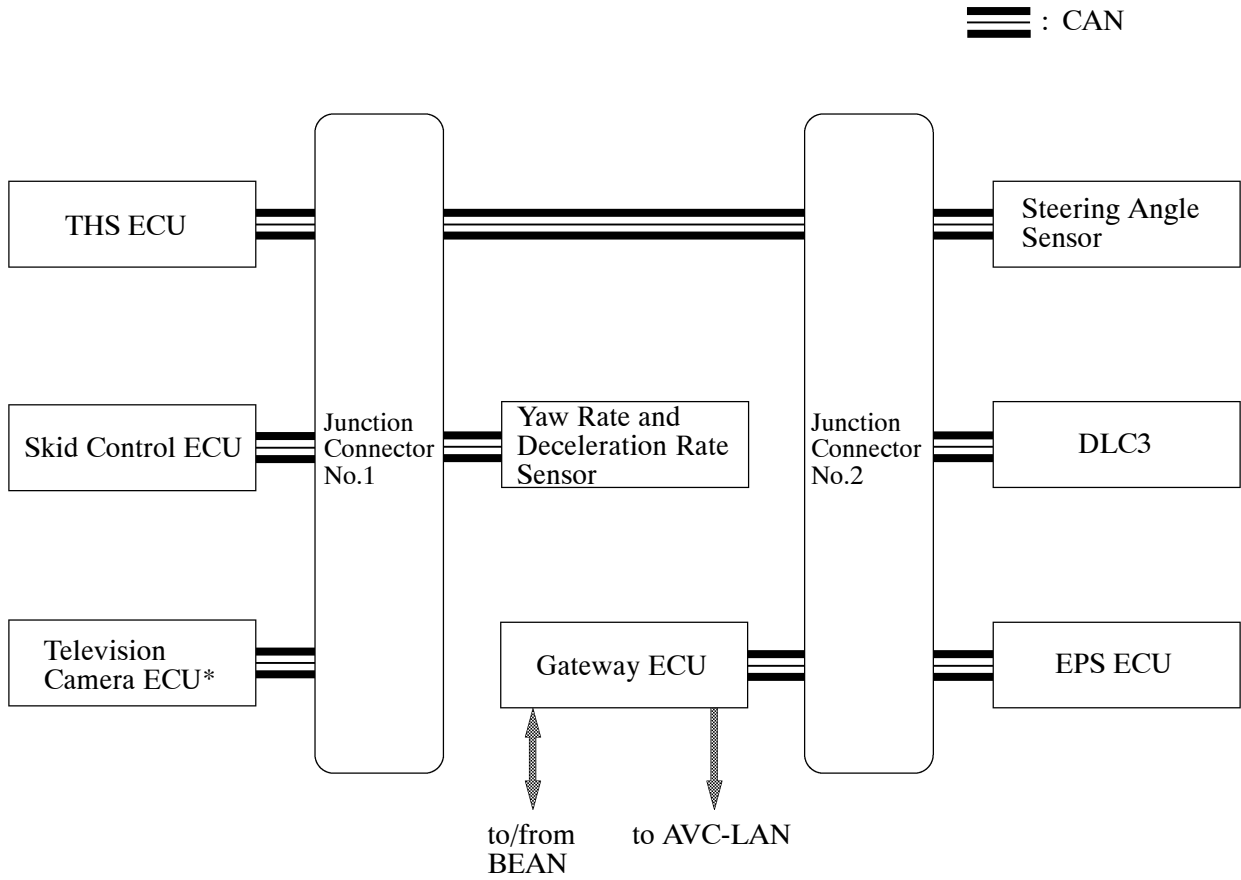
- The RX400h uses the three types of multiplex communication systems described below in order to achieve a slimmer wiring harness configuration.
  - CAN (Controller Area Network), which networks the vehicle control systems (engine electrical, chassis electrical, body electrical [LEXUS parking assist], and hybrid system) and maintains communication between the ECUs, is used.
  - BEAN (Body Electronics Area Network), which networks the ECUs of the body electric system control and maintains communication between the ECUs, is used.
  - AVC-LAN (Audio Visual Communication - Local Area Network), which networks the ECUs of the audio visual system and the audio visual devices, and maintains communication between the devices and the ECUs, is used.
- These three types of multiplex communication systems are connected to the gateway ECU. The gateway ECU, which is provided with communication circuits that support the three types of multiplex communication systems, enables communication among the multiplex communication systems that are connected to the gateway ECU.

For example, to enable air conditioner control, the air conditioner ECU receives the engine coolant temperature signal that is input into the THS ECU via CAN, gateway ECU, and BEAN. Thus, a slimmer wiring harness configuration can be realized.



- The CAN in the RX400h is established among the THS ECU, EPS ECU, skid control ECU, steering angle sensor, yaw rate and deceleration rate sensor, television camera ECU\*, gateway ECU and DLC3.

► CAN System Diagram ◀



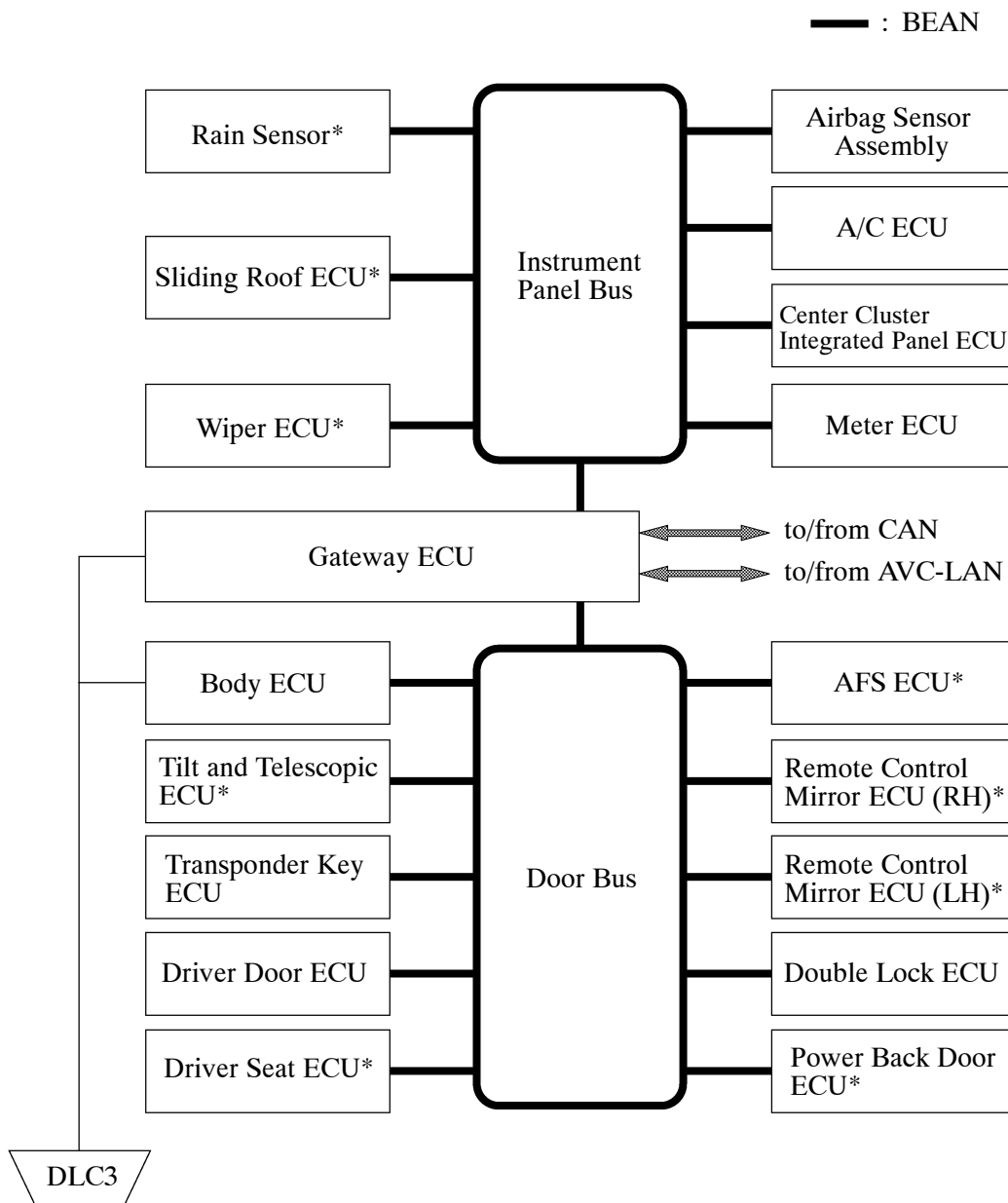
LHD Model

278BE01

\*: Optional Equipment

- On the RX400h, the BEAN system has been changed from the single bus configuration of the current RX300 to a dual bus configuration consisting of a door bus and an instrument panel bus.
- The BEAN (instrument panel bus) in the RX400h is established among the meter ECU, air conditioner ECU, airbag sensor assembly, sliding roof ECU\*, rain sensor\*, wiper ECU\*, center cluster integrated panel ECU, and gateway ECU.
- The BEAN (door bus) in the RX400h is established among the body ECU, remote control mirror ECU (LH), remote control mirror ECU (RH), driver door ECU, power back door ECU\*, driver seat ECU, transponder key ECU, double lock ECU, tilt and telescopic ECU\*, AFS ECU\* and gateway ECU.
- A customized body electronic system is used, enabling the control functions of the ECUs comprising the BEAN to be set using an intelligent tester II. For details, see [page BE-20](#) of the Customized Body Electronic system section.

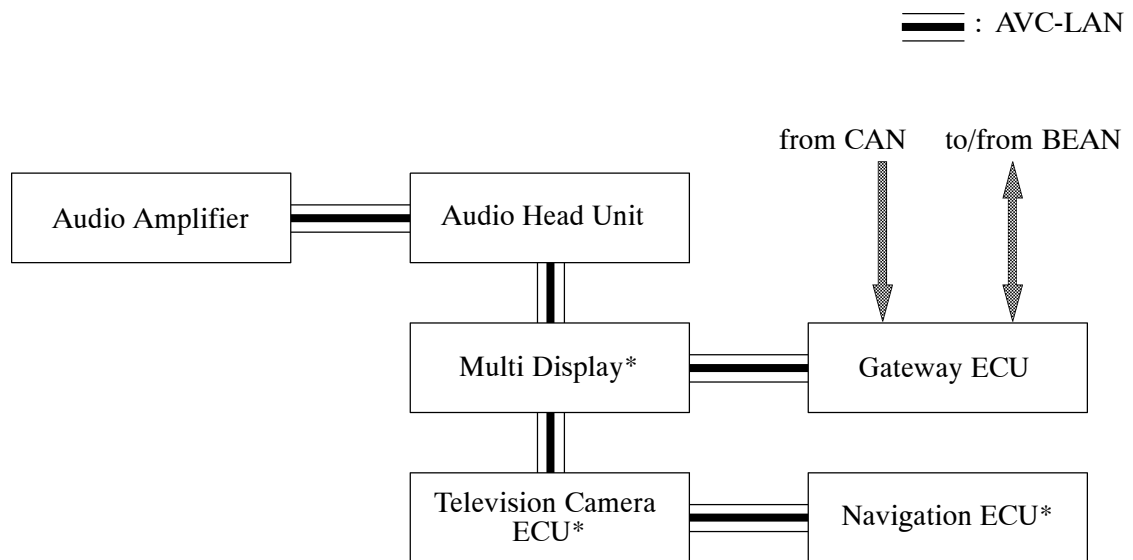
### ► BEAN System Diagram ◀



\*: Optional Equipment

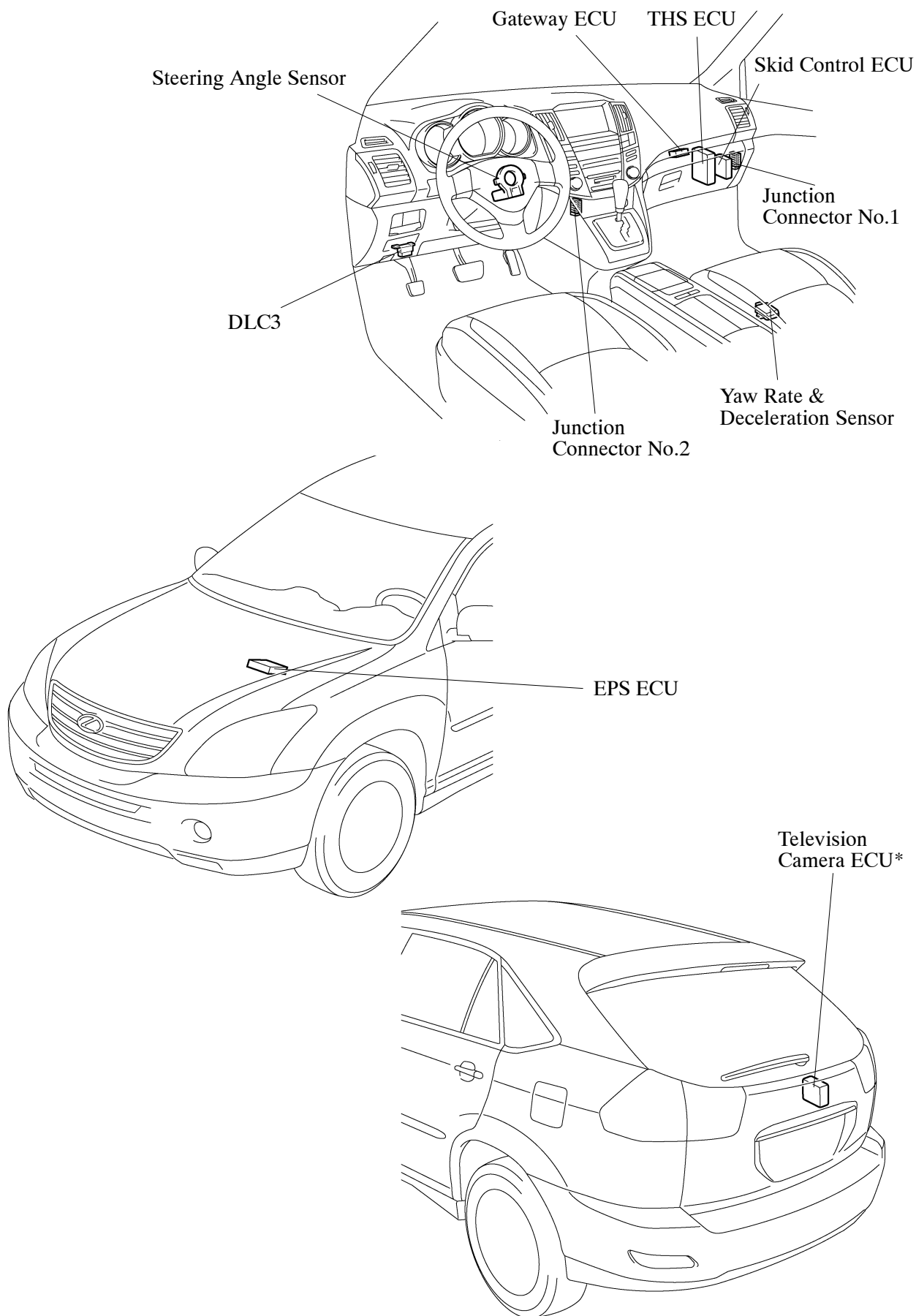
- The AVC-LAN is established among the gateway ECU, multi display, audio head unit, audio amplifier, television camera ECU\*, and navigation ECU\*.

► AVC-LAN System Diagram ◀



\*: Optional Equipment

277BE89

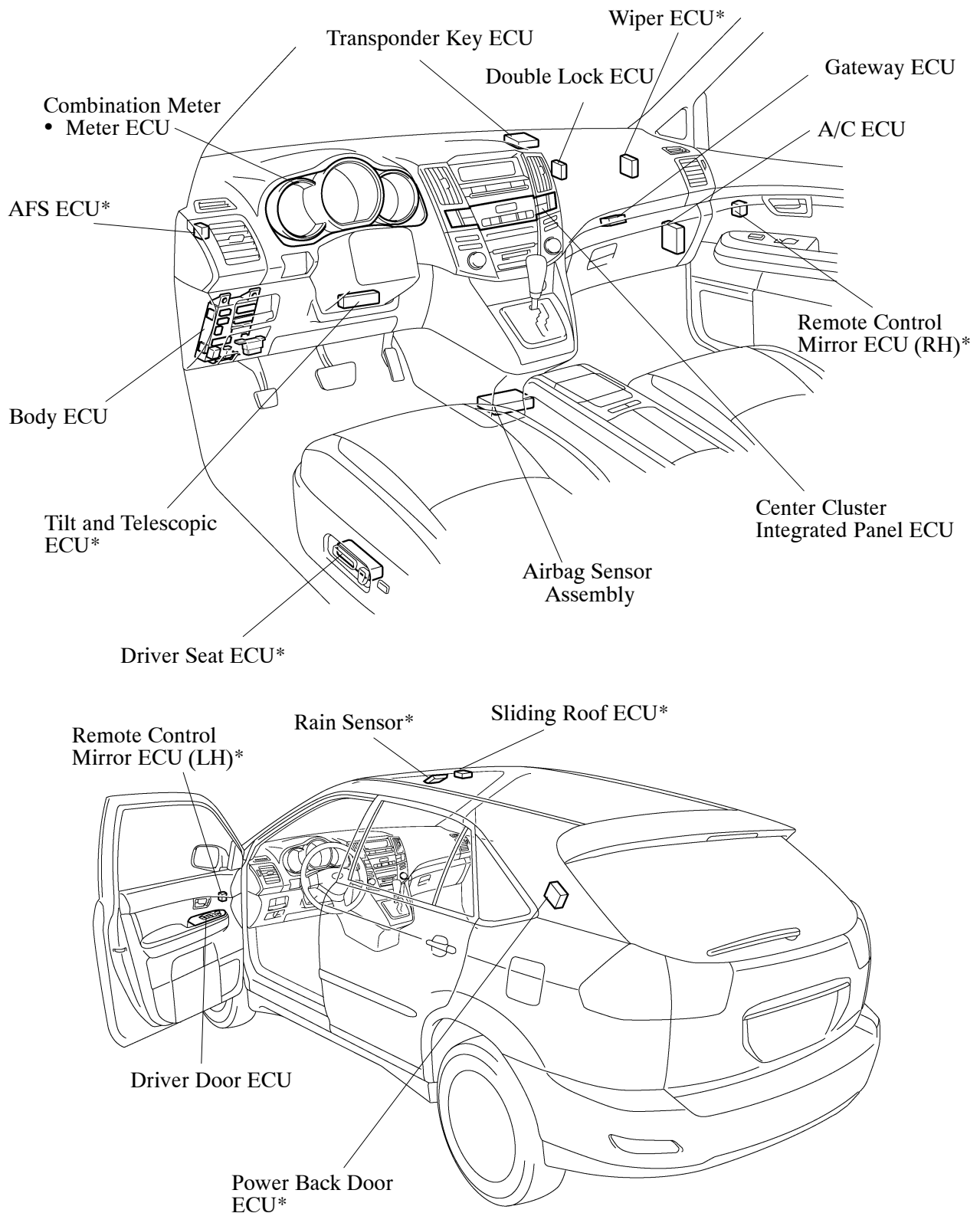
**■ LAYOUT OF CAN COMPONENTS**

\*: Only on Models with Parking Assist Monitor

**LHD Model**

278BE03

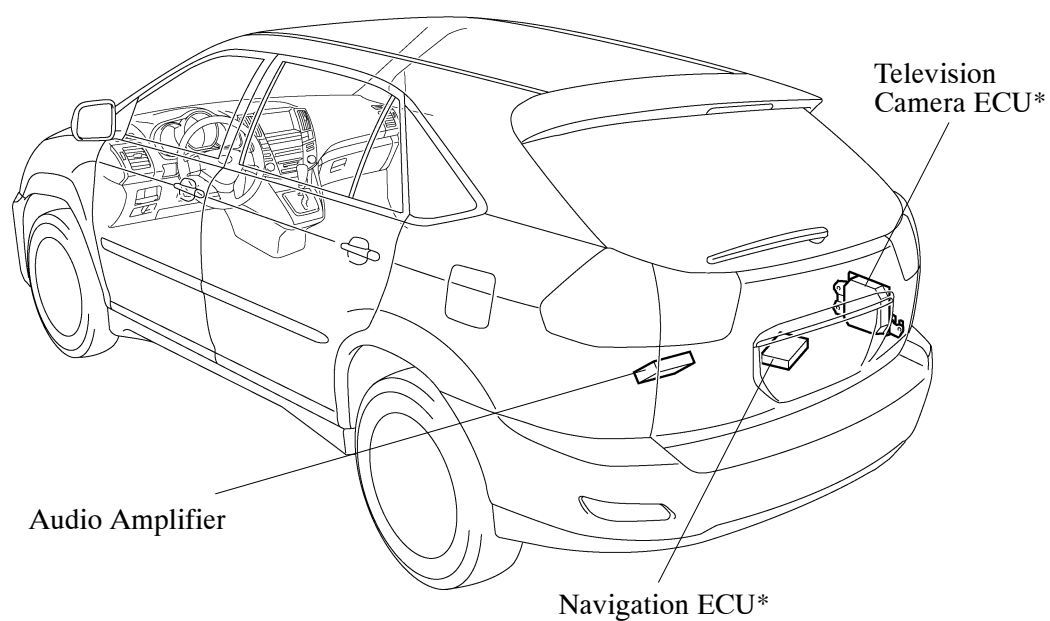
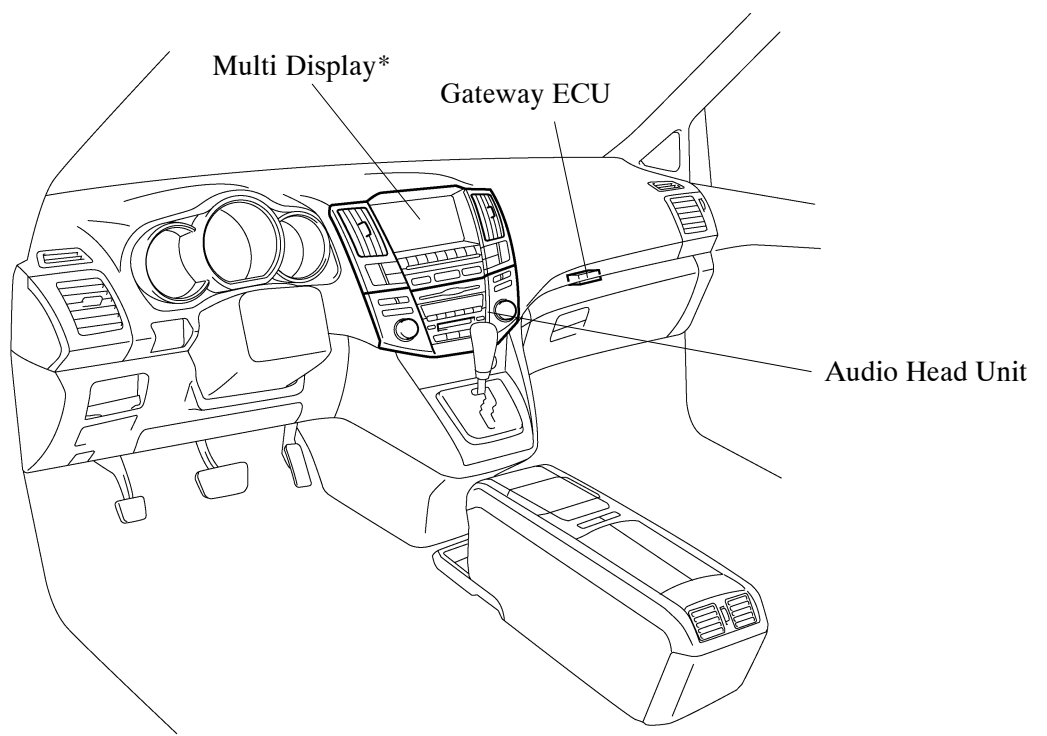
## ■ LAYOUT OF BEAN COMPONENTS



\*: Optional Equipment

LHD Model

278BE04

**■ LAYOUT OF AVC-LAN COMPONENTS**

\*: Optional Equipment

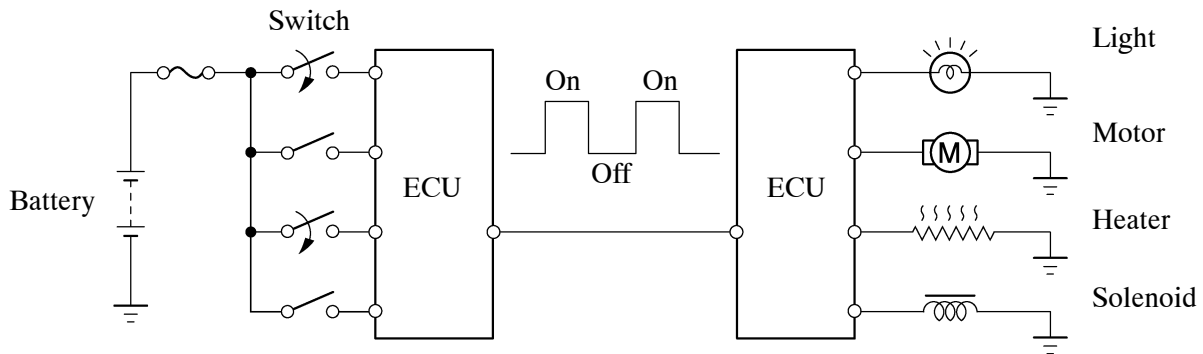
**LHD Model**

## ■ BASIC OF MPX (Multiplex Communication)

### 1. General

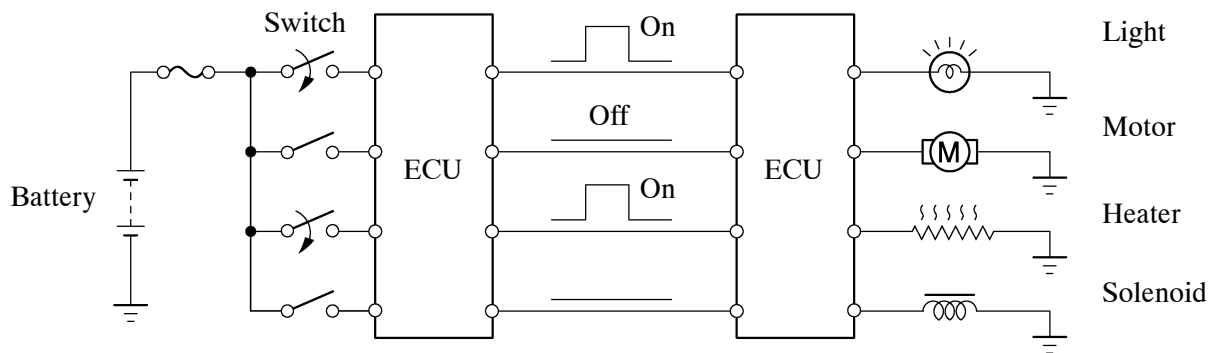
- In the conventional system, parallel communication is used to exchange information between ECUs. To transmit four pieces of information, for example, parallel communication requires four communication wires. In contrast, multiplex communication is used on serial communication, which converts multiple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

#### ► Conceptual Drawing ◀



240BE03

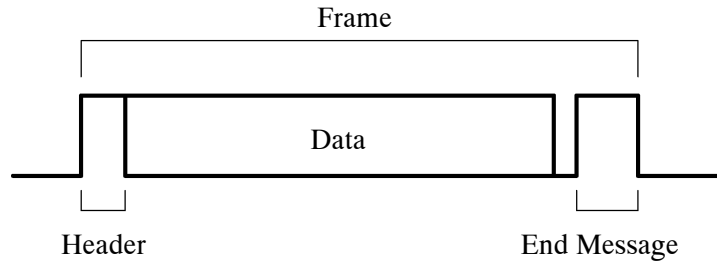
**Serial Communication**



240BE04

**Parallel Communication**

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



240BE05

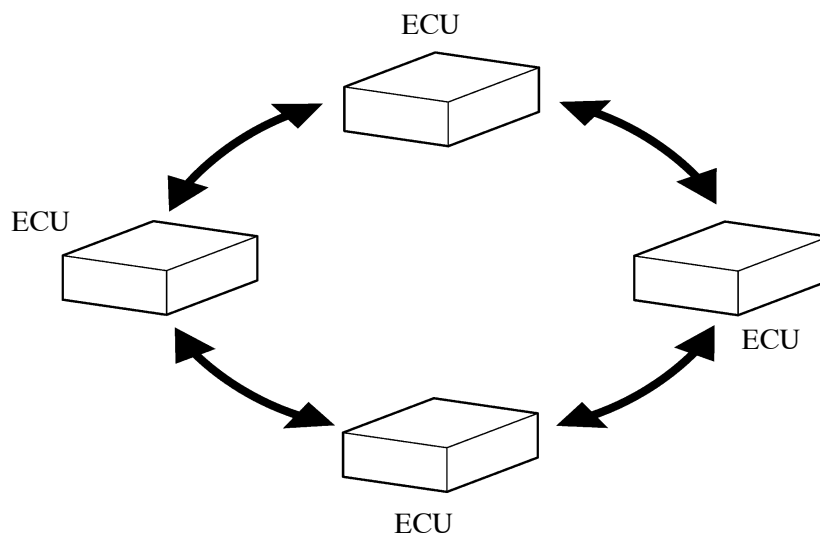
## 2. Network Style

### General

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

### Ring Style

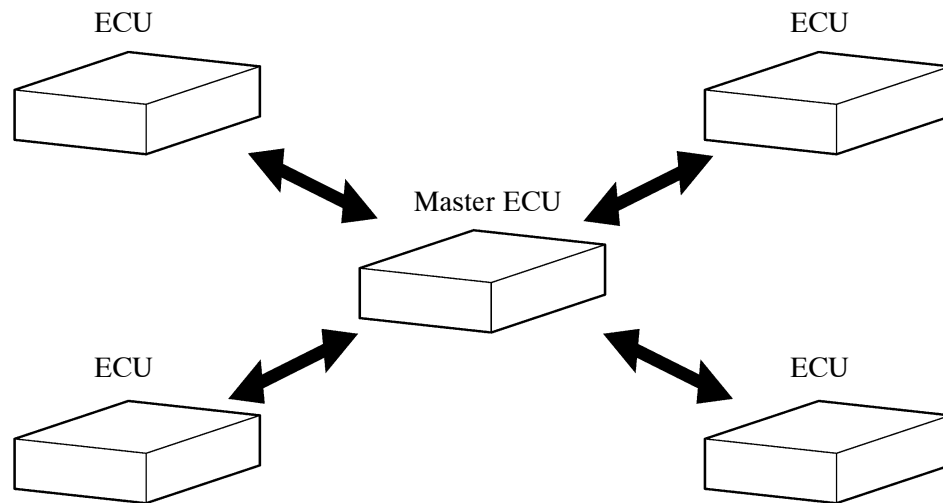
In this style of network, the ECUs are connected in a ring form. A feature of this style is that a signal that is output by a transmitting ECU circles the ring and returns to its original ECU.



240BE06

### Star Style

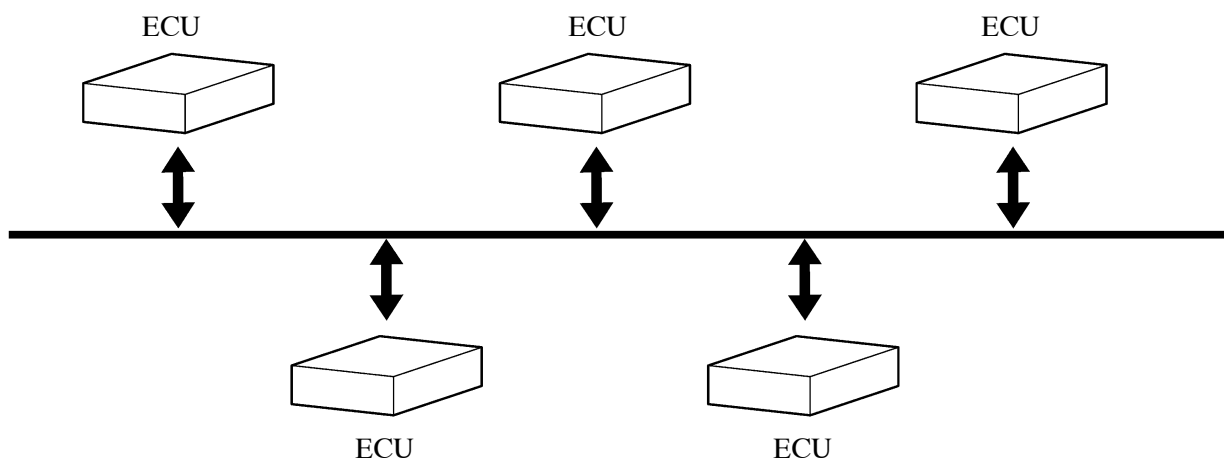
- This style is centered on a master ECU, which holds a central control function. The ECUs are connected in a star shape. The ECUs cannot establish communication with other ECUs without passing through the master ECU.
- The AVC-LAN in the RX400h uses a star style, which is centered on the audio head unit or multi display.



240BE07

### Bus Style

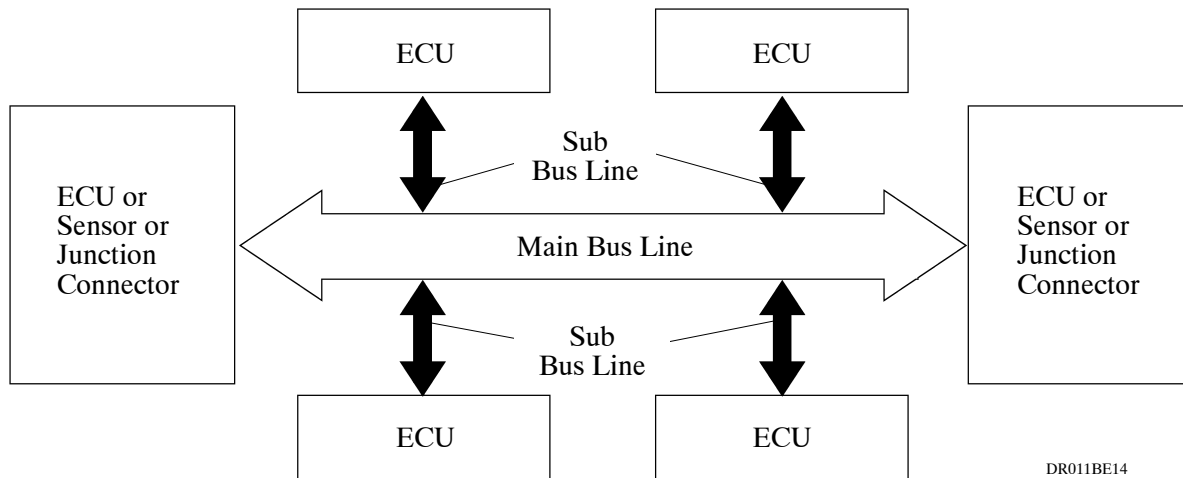
In this style of network, all ECUs are connected to a single common communication wire. The transmitting ECUs output signals through a common communication wire and the receiving ECUs input data through a common communication wire.



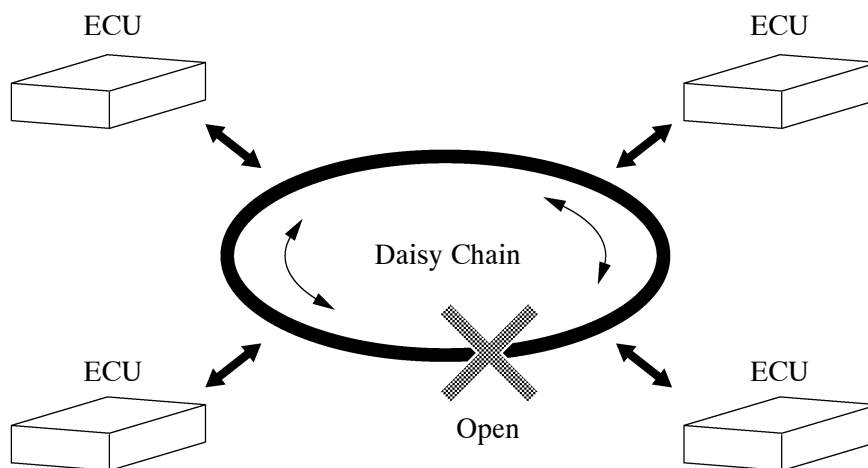
240BE08

## — REFERENCE —

- CAN communication uses the bus style network to connect ECUs. This network consists of a main bus line (comprising ECUs {or sensors or junction connectors} with resistors) and a sub bus line (comprising ECUs {or sensors} that are connected to the main bus line). This style enables communication among all the connected ECUs.



- The BEAN on the RX400h uses the ring and bus styles of networks to connect ECUs. This style of connection method is called a "Daisy Chain". In a daisy chain, communication can be maintained even if there is an area that has an open circuit.



3. Difference of CAN, BEAN and AVC-LAN

- The protocols, which are the rules for establishing data communication, differ between the CAN, BEAN and the AVC-LAN. If ECUs use different types of 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.

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

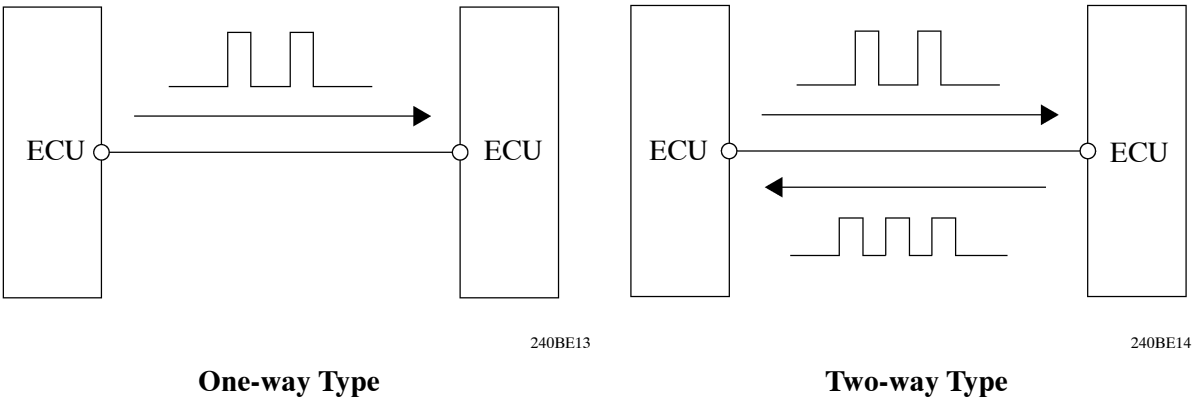
\*: bps: abbreviation for “Bits Per Second”, indicating the number of bits that can be transmitted per second.

- Although BEAN and AVC-LAN communicate at almost the same speed, the CAN communication speed is much faster than BEAN or AVC-LAN. When the vehicle control system uses BEAN or AVC-LAN, which has a slower communication speed than CAN, it means that the system control could be delayed by the slow speed. For this reason, the vehicle control system uses CAN, which can send and receive a large volume of data at one time, in addition to being able to transmit at a faster speed.
- The gateway ECU connects the CAN, BEAN, AVC-LAN and the DLC3, and manages the communication among them.

— REFERENCE —

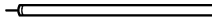
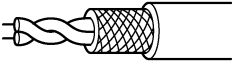
There are two types of BEAN communication methods: the one-way type and the two-way type. The new RX400h uses the two-way type, which is currently in the main stream.

BE

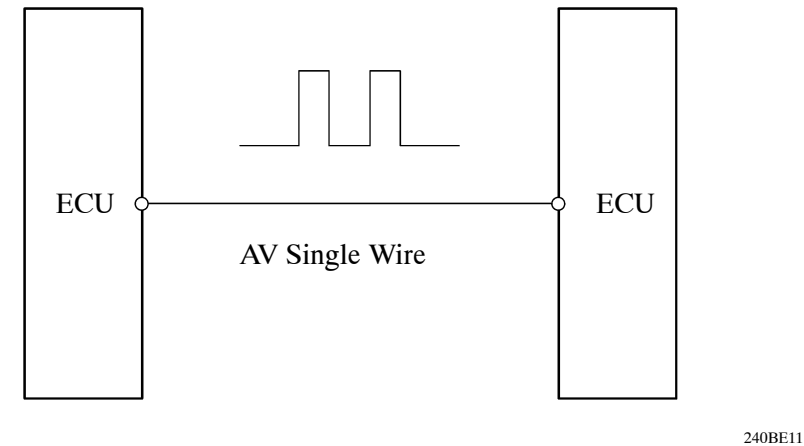


4. Communication Wire

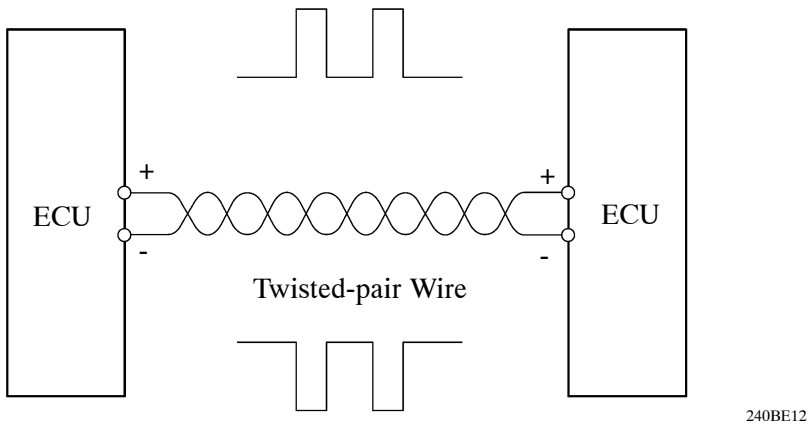
A single, AV (Automobile Vinyl) wire is used for BEAN communication. A twisted-pair wire is used for CAN and AVC-LAN communication.

| Communication Wire                                                                                                                                        | Outline                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div>AV Single Wire</div> <div></div> <div>240BE09</div>                 | <div>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”.</div>                                |
| <div>Twisted-pair Wire for AVC-LAN</div> <div></div> <div>241BE168</div> | <div>In this communication wire, a pair of lines is twisted. 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.</div>    |
| <div>Twisted-pair Wire for CAN</div> <div></div> <div>277BE102</div>     | <div>In this communication wire, a pair of lines is twisted. Communication is driven by applying 1.5 to 2.5 V and 2.5 to 3.5 V of voltage to the two lines in order to send a single signal. This system, which is called a “Differential Voltage Drive”, can reduce noise.</div> |

► Single Wire Voltage Drive ◀



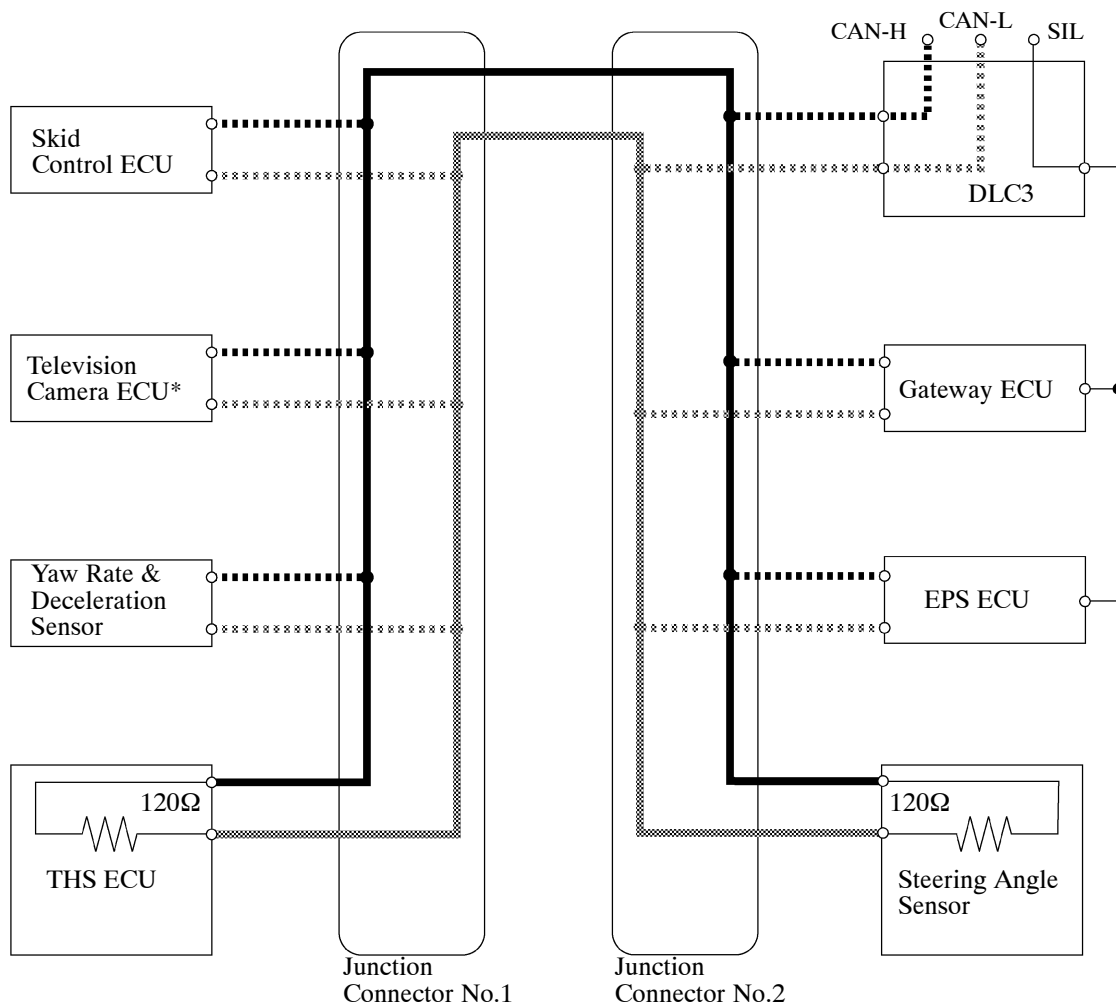
► Differential Voltage Drive ◀



## ■ CAN (Controller Area Network)

### 1. General

- CAN is a serial data communication system for real time application. It is a multiplex communication system to be equipped for a vehicle and has a high communication speed (500 kbps) and the function to detect malfunction.
- The CAN in the RX400h is connected to the skid control ECU, EPS ECU, THS ECU, gateway ECU, steering angle sensor, yaw rate & deceleration sensor, television camera ECU\* and DLC3.
- CAN uses a twisted-pair wire as the communication line, so the bus line has a high line (2.5 to 3.5 V of voltage is applied) and a low line (1.5 to 2.5 V of voltage is applied).
- The DTCs (Diagnostic Trouble Codes) associated with the engine control system and the hybrid system control are output by the THS ECU via CAN communication to the DLC3 connector (CAN-L and CAN-H terminals), then to an intelligent tester II. The DTCs associated with the brake control system are also output to the skid control ECU via CAN communication, and to the DLC3 connector.
- The DTCs associated with the EPS control system is output by the respective EPS ECU via a serial communication line (ISO9141) to the DLC3 connector (SIL terminal), then to an intelligent tester II.
- 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 on the main bus line by measuring the resistance value between these terminals. For details on CAN diagnosis, see page BE-18.



## ■ DIAGNOSIS

### 1. Diagnosis of CAN

- If the CAN has communication error at ECU or sensors, multiple DTCs (Diagnostic Trouble Codes) are output simultaneously to indicate the malfunction location.
- If a malfunction occurs on the CAN communication line, the ECU that is connected to the CAN communication line stores the DTCs (Diagnostic Trouble Codes) in its memory.
- The DTCs for CAN communication concerning the engine control, THS control and brake system control can be read by connecting an intelligent tester II (5-digit code).
- The DTCs for CAN communication concerning the steering control system can be read by connecting the SST 09843-18040 to the Tc and CG terminals of the DLC3 connector, and observing the blinking of the PS warning light (2-digit code) or by connecting an intelligent tester II (5-digit code).
- The details of a communication malfunction (such as the location of the malfunction) on the CAN communication line can be checked by connecting an intelligent tester II to the DLC3 connector. For details, see the LEXUS RX400h Repair Manual (Pub. No. RM1139E).
- If a communication malfunction occurs, the ECUs will perform the failsafe processes. For details, see the LEXUS RX400h Repair Manual (Pub. No. RM1139E).

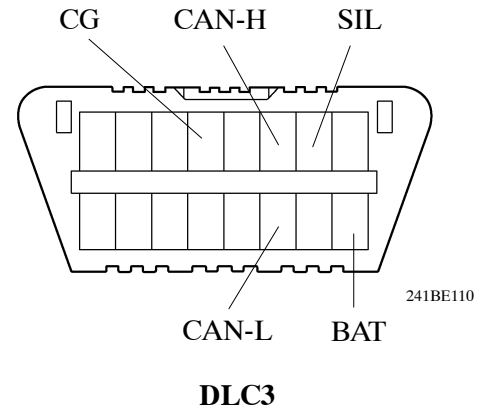
### ► DTC Chart ◀

| ECU              | DTC   | Detection Item                                                      |
|------------------|-------|---------------------------------------------------------------------|
| EPS ECU          | U0073 | Control Module Communication Bus Off                                |
|                  | U0121 | Lost Communication with Brake System Control Module                 |
|                  | U0105 | Lost Communication with Fuel Injector Control Module                |
|                  | U0121 | Lost Communication with Anti-Lock Brake System (ABS) Control Module |
| THS ECU          | U0100 | Lost Communication with ECM/PCM "A"                                 |
|                  | U0111 | Lost Communication with Battery Energy Control Module "A"           |
|                  | U0129 | Lost Communication with Brake System Control Module                 |
|                  | U0131 | Lost Communication with Power Steering Control Module               |
|                  | U0146 | Lost Communication with Gateway "A"                                 |
| Skid Control ECU | U0073 | Control Module Communication Bus Off                                |
|                  | U0123 | Lost Communication with Yaw Rate Sensor Module                      |
|                  | U0124 | Lost Communication with Lateral Acceleration Sensor Module          |
|                  | U0126 | Lost Communication with Steering Angle Sensor Module                |
|                  | U0293 | Lost Communication with Hybrid Vehicle Control System               |

- 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 on the main bus line by measuring the resistance value between these terminals. It is possible to determine if there is a short between the bus line - power supply/ground by measuring the resistance value between terminal CAN-H or CAN-L, and the BAT or CG terminal.
- For details of the CAN diagnosis system, see the LEXUS RX400h Repair Manual (Pub. No. RM1139E).

#### ► CAN-H - CAN-L Inspection ◀

| Resistance Value | Bus line condition                                                                                                                                                                                                 |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 54Ω ~ 69Ω        | <ul style="list-style-type: none"> <li>• Normal</li> <li>• Sub bus line open (except DLC3 bus line, DTC output)</li> <li>• Short between bus line ~ power supply/ground (Short in one area, DTC output)</li> </ul> |
| more than 69Ω    | <ul style="list-style-type: none"> <li>• Sub bus line open (only DLC3 bus line, No DTC output)</li> <li>• Main bus line open</li> </ul>                                                                            |
| less than 54Ω    | <ul style="list-style-type: none"> <li>• Short between bus line</li> </ul>                                                                                                                                         |



#### ► Inspection for short between bus line - power supply/ground ◀

| Inspection Item                                                                    | Resistance Value | Bus line condition                           |
|------------------------------------------------------------------------------------|------------------|----------------------------------------------|
| <ul style="list-style-type: none"> <li>• CAN-H~BAT</li> <li>• CAN-L~BAT</li> </ul> | more than 1MΩ    | No bus line malfunction if no DTC output     |
|                                                                                    | less than 1MΩ    | Short between bus line ~ power supply/ground |
| <ul style="list-style-type: none"> <li>• CAN-H~CG</li> <li>• CAN-L~CG</li> </ul>   | more than 1kΩ    | No bus line malfunction if no DTC output     |
|                                                                                    | less than 1kΩ    | Short between bus line ~ power supply/ground |

## 2. Diagnosis of BEAN

If a malfunction occurs in BEAN communication line, gateway ECU stored DTCs in its memory. The DTCs can be read by connecting an intelligent tester II to DLC3. For details, see the LEXUS RX400h Repair Manual (Pub. No. RM1139E).

## 3. Diagnosis of AVC-LAN

If a malfunction occurs in the AVC-LAN communication line, DTCs (Diagnostic Trouble Codes) are stored in the multi display memory in models with multi display. In models without multi display, they are stored in the audio head unit.

DTCs for AVC-LAN can be read on the diagnosis menu display on the multi display in models with multi display. In models without multi display, they can be read on the LCD of the audio head unit. For details, see the LEXUS RX400h Repair Manual (Pub. No. RM1139E).

## ■ CUSTOMIZED BODY ELECTRONICS SYSTEM

### 1. General

The customized body electronics system enables the control function settings of the ECUs to be changed through the use of an intelligent tester II.

However, this system can change the settings of only the ECUs that belong to the bus in which communication is centered on the Body ECU.

### 2. Operation

The specifications of the systems and functions that can be changed by operating an intelligent tester II.

| System                                   | Intelligent Tester II Display Content | Contents                                                                                                                                                      | Default | Selection |
|------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------|
| Wireless Door Lock Remote Control System | OPEN DOOR WARN                        | Function to make the buzzer sound for 10 seconds if the door is open when locking with the wireless door lock function.                                       | ON      | ON/OFF    |
|                                          | WIRELESS OPER                         | ON/OFF of the wireless door lock function.                                                                                                                    | ON      | ON/OFF    |
|                                          | AUTO LOCK DELAY                       | To change the time until re-locking after unlocking with the wireless door lock function.                                                                     | 30 s    | 60 s/30 s |
|                                          | HAZARD ANS BACK                       | Function to light up the all turn signal light once when pressing the transmitter lock button and twice when pressing the unlock button.                      | ON      | ON/OFF    |
|                                          | WIRLS BUZZ RESP                       | ON/OFF of the wireless buzzer response function.                                                                                                              | ON      | ON/OFF    |
| Door Lock Control System                 | ALL UNLK/OPN-CL                       | Function to unlock all the other doors when opening the driver's door within 10 seconds after turning the ignition OFF from ON.                               | OFF     | ON/OFF    |
| Theft Deterrent System                   | WARN BY HORN                          | Function to turn ON/OFF of the glass break sensor. This function is only effective for the vehicle with glass break sensor.                                   | ON      | ON/OFF    |
| Power Window System                      | UP/DOOR KEY                           | 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 the ignition switch is OFF.     | ON      | ON/OFF    |
|                                          | DOWN/DOOR KEY                         | 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 the ignition switch is OFF. | ON      | ON/OFF    |
|                                          | UP/WIRELESS                           | Function to make all the door windows up manually by pressing on the transmitter lock button for 2.5 seconds when ignition switch is OFF.                     | ON      | ON/OFF    |
|                                          | DOWN/WIRELESS                         | Function to make all the door windows down manually by pressing on the transmitter unlock button for 2.5 seconds when ignition switch is OFF.                 | ON      | ON/OFF    |

(Continued)

| System                   | Intelligent Tester II Display Content | Contents                                                                                                                                                                        | Default    | Selection                                            |
|--------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------------------------------------|
| Wiper System*1           | SPEED MODE                            | Function to change to the intermittent operation when the vehicle comes to a stop (0 vehicle speed) from running condition in case that the wiper switch is at the LO position. | Avail      | Not Avail/<br>Avail                                  |
|                          | AUTO WIPE                             | Function to operate the wiper automatically when it is raining.                                                                                                                 | Avail      | Not Avail/<br>Avail                                  |
|                          | REWIPE CONTROL                        | Function to change time until operating the wiper to prevent dropping after having used the washer.                                                                             | Speed Mode | Speed mode/<br>3 sec./<br>OFF                        |
| Illuminated Entry System | LIGHTING TIME                         | To change the lighting time after closing the door. (It will quickly fade out in case of turning the ignition ON.)                                                              | 15 s       | 7.5 s/<br>15 s/<br>30 s                              |
|                          | ILLUMI SYSTEM                         | Function to light up the step light, center console light and door inside handle light when one of the following occurs; ignition turn ON, door unlocked or door open.          | ON         | ON/OFF                                               |
|                          | LIGHT CONTROL                         | Function to light up the step light and door inside handle light when the ignition switch is ON and the shift position is not P.                                                | ON         | ON/OFF                                               |
|                          | I/L ON/UNLOCK                         | Function to light the interior light, etc. when the door is unlocked with a transmitter, door key or door lock control switch.                                                  | ON         | ON/OFF                                               |
|                          | I/L ON/ACC OFF                        | Function to light the interior light when the ignition switch is operated from “ACC” to “LOCK”.                                                                                 | ON         | ON/OFF                                               |
| Light Control            | SENSITIVITY                           | To adjust the sensitivity of the lighting illumination.                                                                                                                         | NORMAL     | LIGHT 2/<br>LIGHT 1/<br>NORMAL/<br>DARK 1/<br>DARK 2 |
|                          | DISP EX ON SEN                        | To change the brightness of lowering the lights such as the indicator light of the combination meter, A/C indicator light, clock.                                               | NORMAL     | LIGHT 2/<br>LIGHT 1/<br>NORMAL/<br>DARK 1/<br>DARK 2 |
|                          | DISP EX OFF 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     | LIGHT 2/<br>LIGHT 1/<br>NORMAL/<br>DARK 1/<br>DARK 2 |
|                          | DRL FUNCTION                          | ON/OFF of the DRL function.                                                                                                                                                     | ON         | ON/OFF                                               |

(Continued)

| System                          | Intelligent Tester II Display Content | Contents                                                                                                                                                                                                                         | Default | Selection                                        |
|---------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------------------------------------|
| Slide Roof System* <sup>2</sup> | OPEN/DOOR KEY                         | 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 ignition switch is OFF.                                         | ON      | ON/OFF                                           |
|                                 | CLOSE/DOOR KEY                        | 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 ignition switch is OFF.                                          | ON      | ON/OFF                                           |
|                                 | OPEN/WIRELESS                         | Function to open the sliding roof manually linking with the power window if pressing on the transmitter unlock button for 1.5 seconds or more when the ignition switch is OFF.                                                   | ON      | ON/OFF                                           |
|                                 | CLOSE/WIRELESS                        | Function to close the sliding roof manually linking with the power window if pressing on the transmitter lock button for 1.5 seconds or more when the ignition switch is OFF.                                                    | ON      | ON/OFF                                           |
|                                 | DOOR KEY OPER                         | 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 ignition switch is OFF. | SLIDE   | TILT/SLIDE                                       |
|                                 | WIRELESS OPER                         | 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 ignition switch is OFF.           | SLIDE   | TILT/SLIDE                                       |
| Air Conditioner                 | SET TEMP SHIFT                        | To control with the shifted temperature against the display temperature.                                                                                                                                                         | NORMAL  | +2 C/+1 C/<br>NORMAL/<br>-1 C/-2 C               |
|                                 | AIR INLET MODE                        | In case of turning the A/C ON when you desire to make the compartment cool down quickly, this is the function to change the mode automatically to RECIRCULATED mode.                                                             | AUTO    | MANUAL/<br>AUTO                                  |
|                                 | COMPRESSOR MODE                       | Function to turn the A/C ON automatically by pressing the AUTO button when the blower is ON and the A/C is OFF.                                                                                                                  | AUTO    | MANUAL/<br>AUTO                                  |
|                                 | COMPRS/DEF OPER                       | Function to turn the A/C ON automatically linking with the FRONT DEF button when A/C OFF.                                                                                                                                        | LINK    | NORMAL/<br>LINK                                  |
|                                 | BUTTON PRS BUZ                        | Function to sound a buzzer when a button is pressed.                                                                                                                                                                             | ON      | OFF/ON                                           |
|                                 | FOOT/DEF MODE                         | Function to turn the air flow from FOOT/DEF ON automatically when AUTO MODE is ON.                                                                                                                                               | ON      | OFF/ON                                           |
|                                 | AUTO BLOW UP                          | Function to switch the blower level automatically when the defroster is ON.                                                                                                                                                      | ON      | OFF/ON                                           |
|                                 | AMBIENT TMP SFT                       | To control with the shifted ambient temperature against the display ambient temperature.                                                                                                                                         | NORMAL  | +3 C/+2 C/<br>+1 C/<br>NORMAL/<br>-1 C/-2 C/-3 C |

(Continued)

| System                   | Intelligent Tester II Display Content | Contents                                                                            | Default  | Selection                               |
|--------------------------|---------------------------------------|-------------------------------------------------------------------------------------|----------|-----------------------------------------|
| Power Back Door System*3 | PBD SW OPER                           | Function to change the operation method of operating the PBD by pressing on PBD SW. | 0.8 s    | 0.8 s/0 s                               |
|                          | PBD BUZZ VOL                          | Function to adjust the volume of the buzzer during the PBD operation.               | OFF      | OFF/LARGE/<br>SMALL                     |
|                          | WIRELS PBD OPER                       | Function to change the operation method of operating the PBD by transmitter.        | 0.8 s PR | 1 TIME/<br>2 TIMES/<br>0.8 s PR/<br>OFF |
|                          | PBD ASSIST OPN                        | Function to open the door by assist operation of PBD.                               | OFF      | ON/OFF                                  |

\*1: Only for Models with Wiper System with a rain drop sensing function.

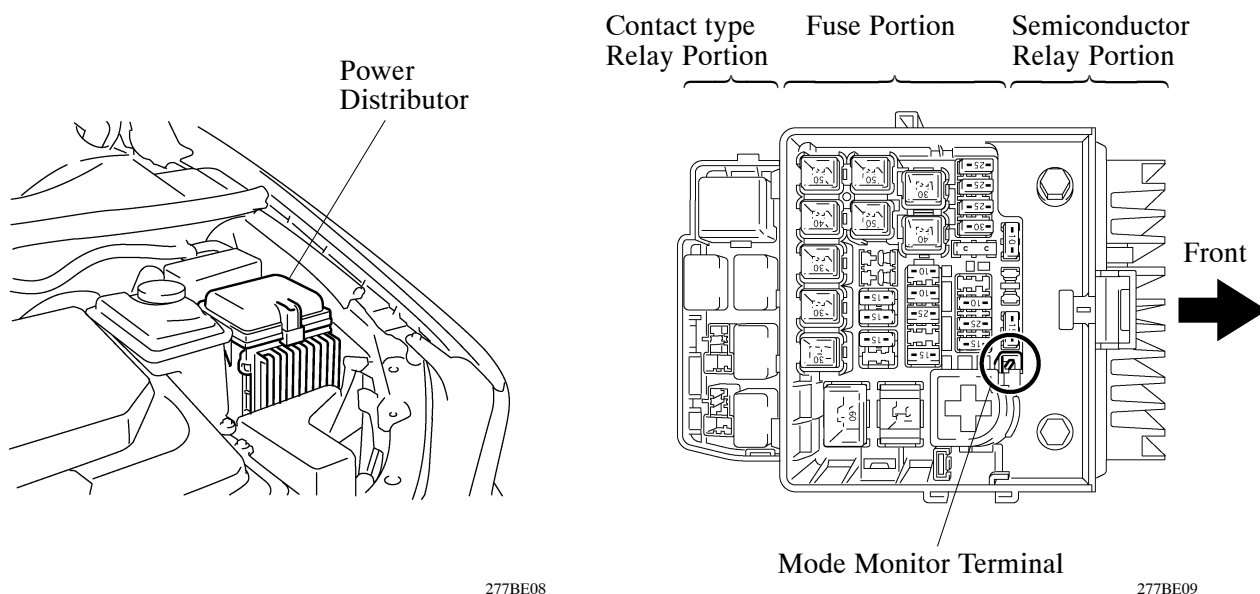
\*2: Only for Models with Sliding Roof System.

\*3: Only for Models with Power Back Door System.

## POWER DISTRIBUTOR

### DESCRIPTION

- As with the current RX300, the RX400h uses a power distributor. By using no-contact type semiconductor relays, the power distributor has been made more compact and lightweight than the previous relay box containing contact type relays.
- In addition to the function of the conventional relay box (Engine Room J/B), the Power Distributor has a function to protect the Power Distributor circuit if overcurrent is applied to the Power Distributor or overheating occurs. The Power Distributor also has a mode monitor terminal for external checking of the operating condition (normal or protect condition) of the Power Distributor.



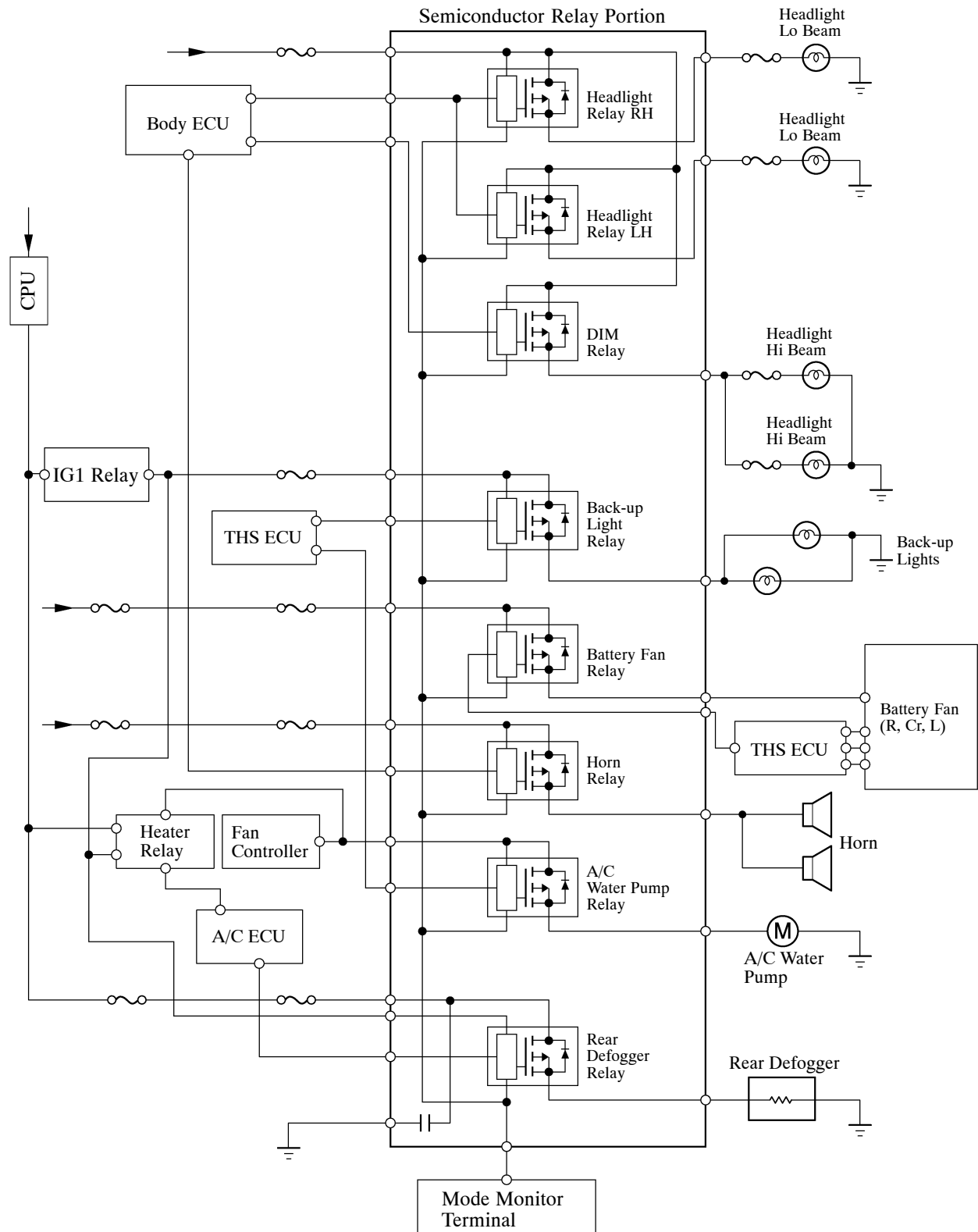
277BE08

277BE09

### ► Relay Type ◀

| Relay                 | Type          | Relay              | Type    |
|-----------------------|---------------|--------------------|---------|
| Head Light Relay (RH) | Semiconductor | IG1 Relay          | Contact |
| Head Light Relay (LH) | Semiconductor | RDI FAN No.1 Relay | Contact |
| DIM RLY               | Semiconductor | RDI FAN No.2 Relay | Contact |
| Rear Defogger Relay   | Semiconductor | IGCT Relay         | Contact |
| Back-Up Light Relay   | Semiconductor | BRK Relay          | Contact |
| Horn Relay            | Semiconductor | C/OPN Relay        | Contact |
| A/C Water Pump Relay  | Semiconductor | A/F Relay          | Contact |
| Battery Fan Relay     | Semiconductor |                    |         |

■ WIRING DIAGRAM



BE

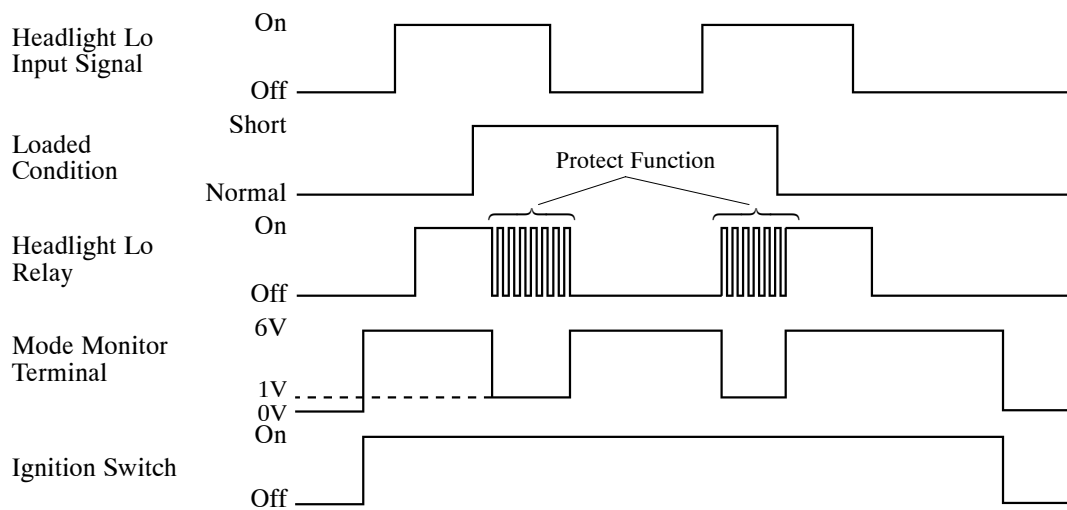
## ■ PROTECT FUNCTION

- If overcurrent is applied to the Power Distributor or overheating occurs, the Power Distributor stops the semiconductor relay function of the circuit where the load abnormality is occurring in order to protect the semiconductor relay circuit. The Power Distributor soon restores the semiconductor relay function, but if a load abnormality still continues at this time, the Power Distributor again stops the semiconductor relay function. The Power Distributor continues this ON/OFF operation (protect operation) at a fast cycle until the load abnormality is corrected.

This protect function is applied to all the semiconductor relays except for the rear defogger relay.

- The operating condition (normal or protect condition) of the semiconductor relay can be checked using the output voltage of the mode monitor terminal. When the semiconductor relay is operating normally, the mode monitor terminal outputs about 6 V. When the semiconductor relay operates in protect mode, the mode monitor terminal outputs about 1 V. However, the mode monitor terminal outputs for the overall operating condition of the Power Distributor, so it is not possible to identify an individual semiconductor relay during protect operation.

## ► Protect Function of Headlight Lo Relay Circuit ◀

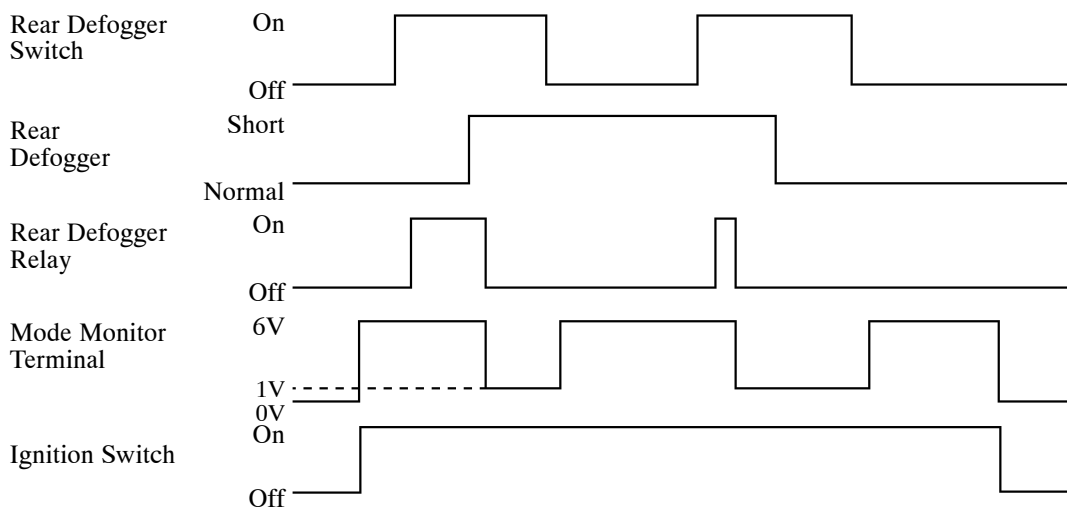


277BE103

- Protect operation of the rear defogger relay differs from the above protect operation. If a load abnormality occurs, the semiconductor relay function stops until the rear defogger switch turns ON again. When the rear defogger switch turns ON again, the semiconductor relay function recovers, but if the load abnormality is not corrected by this time, the Power Distributor again stops the semiconductor relay function. If the load abnormality is corrected, the semiconductor relay function recovers when the rear defogger switch turns ON again.

This relay protect function applies only to the rear defogger relay.

### ► Protect Function of Rear Defogger Relay Circuit ◀



277BE104

# LIGHTING

## ■ HEADLIGHT

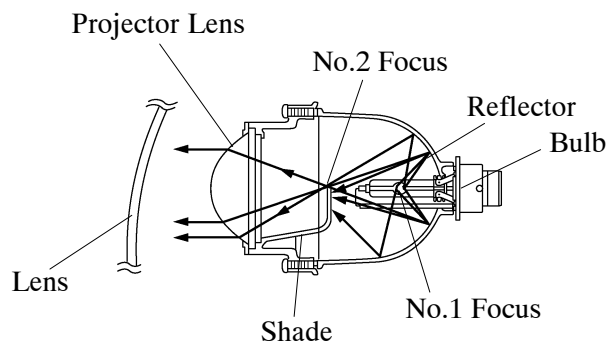
### 1. General

- Large headlights in which the high beam, low beam, clearance light and turn signal light are integrated is used on the RX400h.
- The HID (High Intensity Discharge) and the projector type headlights that produce light with a longer reach and wider distribution have been adopted for the low beams as standard equipment in order to improve visibility.

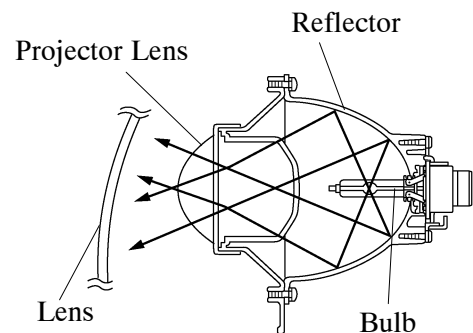
### 2. Projector Type Headlight (Low Beams)

The projector light has the bulb located at one of the two focal points (No.1 focus) while the beam collected at the other focal point (No.2 focus) by the oval-shaped reflector reflects the light, projecting it forward to the projection lens. With this type of light, the effective usage range of the incident beam striking the upper reflector is wide and ensures a sufficient level of light. Compared to the ordinary semi-sealed beam type lamp, this type can be made more compact and since the beam from the source of light is concentrated in a narrower range, the amount of light leaking away from the direction of projection is small.

#### ► Light Distribution Imaginary Diagram ◀



Side View



Top View

Cross Section

241BE164

### 3. HID HEADLIGHT SYSTEM

#### General

The HID headlight system applies high voltage to the electrodes on the light bulb to discharge arcs, the metal atoms that are enclosed in the bulb to emit light.

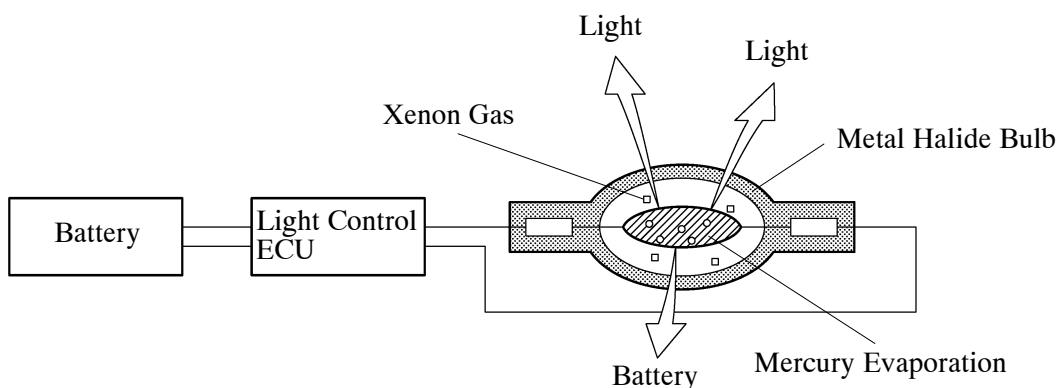
#### Construction and Operation

##### 1) General

The HID headlight system consists of metal halide bulbs and a light control ECU. The basic construction and operation are the same as in the current RX300.

##### 2) Metal Halide Bulb

- The metal halide bulb contains xenon gas, mercury, and metal halide.
- When high voltage (approximately 20,000 volts) is applied to the electrodes of the metal halide bulb, the xenon gas in the bulb emits light.
- As the temperature in the bulb rises, the mercury evaporates and causes arcs to be discharged.
- As the temperature in the bulb rises even further, the metal halide in the mercury arc separates into metal atoms and iodine atoms.
- The separated metal atoms discharge light, which causes the bulb to emit light.



151LBE15

#### CAUTION

The replacement of an HID (High Intensity Discharge) must be performed only by a LEXUS dealer. Never touch the glass portion or the electrode portion of the bulb because high voltage that is generated at those areas is very dangerous.

### 3) Light Control ECU

#### a. General

The light control ECU is an electronic control unit, which is necessary for illuminating the metal halide bulb. A light control ECU is located under each headlight unit. This ECU provides the functions Listed below.

- Generates the high voltage (approximately 20,000 volts), which is applied to the electrodes of the bulbs to enable the HID headlights to start to illuminate.
- Optimally controls the amperage and voltage in order to quickly provide an optimal amount of light immediately after the bulbs have been turned ON and to enable the bulbs to continue to illuminate in a stable manner.
- 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.

#### b. Fail-Safe Function

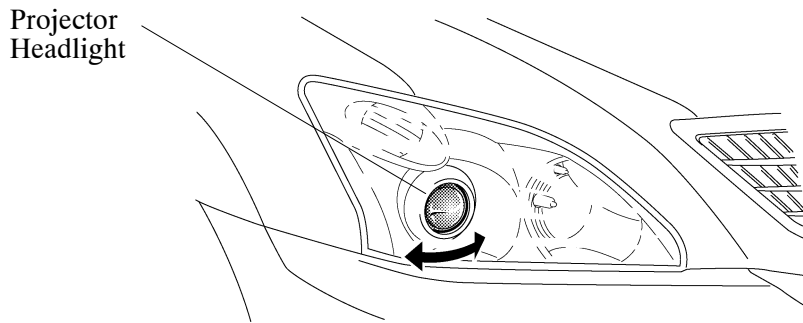
The light control ECU executes the fail-safe actions listed below in accordance with the item that has been detected.

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

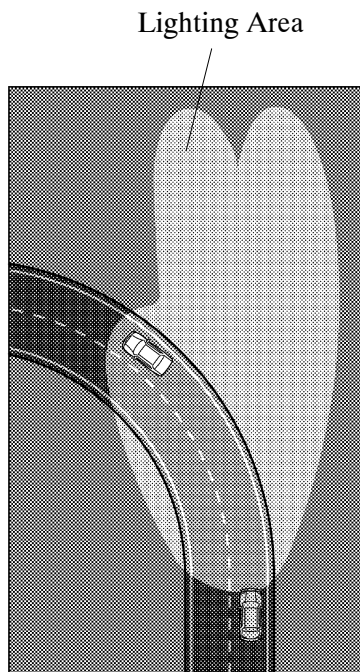
## ■ INTELLIGENT AFS (Adaptive Front-lighting System)

### 1. General

- An Intelligent AFS (Adaptive Front-lighting System) is available as optional equipment in order to ensure a wide range of the low beam lighted area and increase visibility during turning by swinging the projector headlight (for low beam) to the inner side of the cornering direction.
- This system is mainly comprised of 2 projector headlights (for low beam), the AFS ECU, 2 headlight swivel ECU, 2 headlight swivel actuators, steering angle sensor and rear wheel speed sensors.
- This system is controlled by the AFS ECU. The AFS ECU also controls the automatic headlight beam level control system. For details of the automatic headlight beam level control system, see [page BE-38](#).
- AFS ECU maintains communication with other ECUs through the BEAN (Body Electronics Area Network)

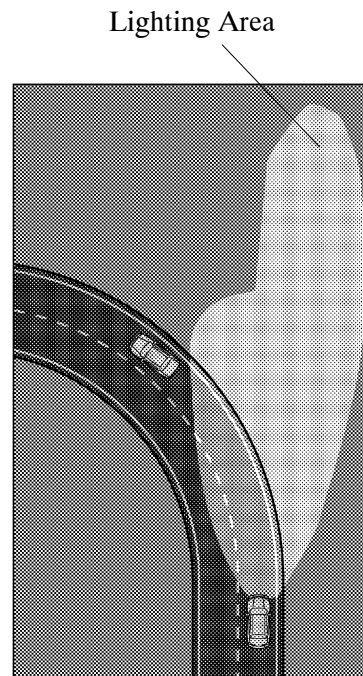


277BE11



241BE15

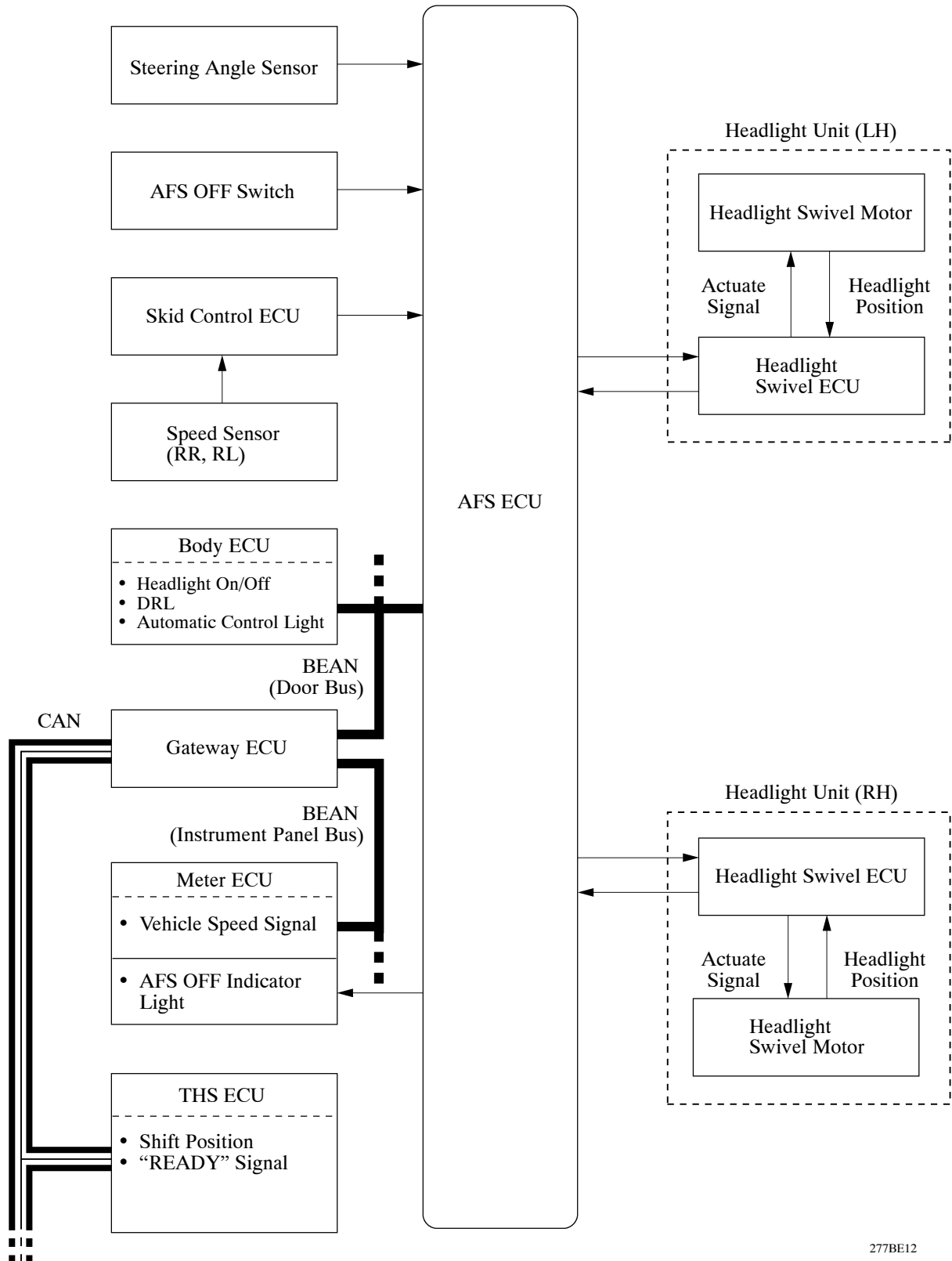
**LHD Models with  
Intelligent AFS**



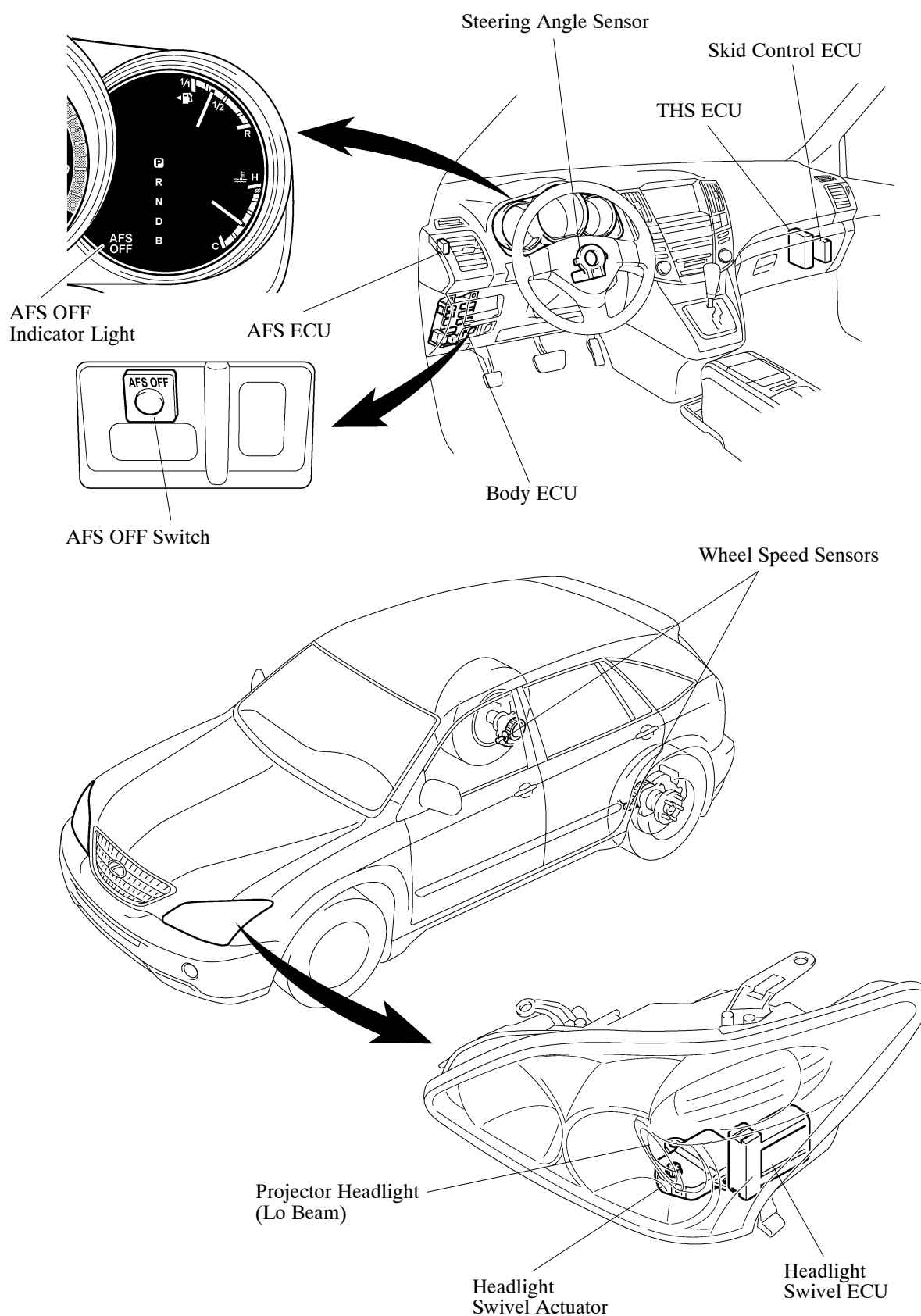
241BE16

**LHD Models without  
Intelligent AFS**

## 2. System Diagram



### 3. Layout of Main Components



#### 4. Function of Main Components

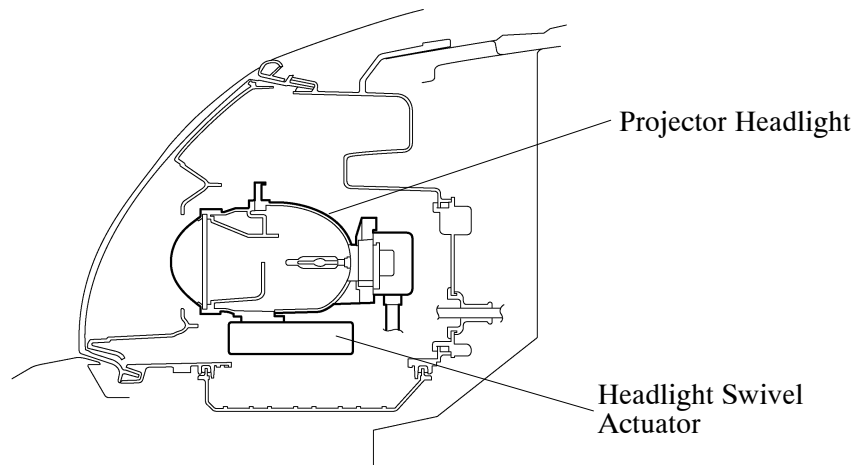
| Item                    |                           | Outline                                                                                                                                                                                                                                                    |
|-------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Headlight Unit          | Headlight Swivel Actuator | Driven by the headlight swivel ECU, the actuator moves the projector headlight (low beam) to the angle calculated by the AFS ECU.                                                                                                                          |
|                         | Headlight Swivel ECU      | Drives the headlight swivel actuator according to control signals from the AFS ECU.                                                                                                                                                                        |
| AFS ECU                 |                           | The AFS ECU effects the control of the system.                                                                                                                                                                                                             |
| Steering Angle Sensor   |                           | The AFS ECU receives the steering angle sensor signal and uses this information to calculate the headlight operation angle.                                                                                                                                |
| Wheel Speed Sensor      |                           | The AFS ECU receives the speed sensor signal from the skid control ECU and uses this information to calculate the headlight operation angle.                                                                                                               |
| AFS OFF Switch          |                           | Pressing this switch, it enables to cut off the operation of the AFS.                                                                                                                                                                                      |
| AFS Off Indicator Light |                           | <ul style="list-style-type: none"> <li>• When AFS control is stopped by the AFS OFF Switch, it is indicated by the AFS Off Indicator Light lighting up.</li> <li>• When the AFS ECU detects a malfunction, the AFS Off Indicator Light flashes.</li> </ul> |

## 5. Construction and Operation

### Headlight Unit

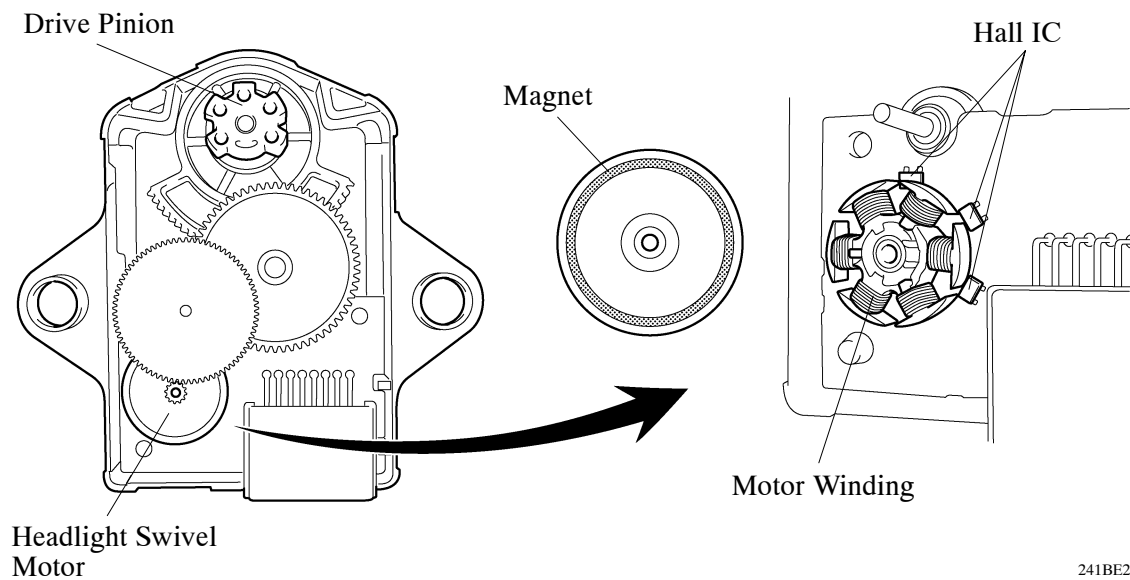
#### 1) Headlight Swivel Actuator

- The headlight swivel actuator is located under the projector headlight (for Lo beam) of the headlight unit, and it is comprised of the headlight swivel motor that moves the projector headlight (for Lo beam) to the left and right, and the 3 Hall ICs that detect the headlight swivel motor position. This actuator cannot be disassembled.
- The 3 Hall ICs detect changes in the magnetic flux density accompanying turning of the headlight swivel motor, and output to the headlight swivel ECU.



**Headlight Unit Cross Section**

241BE19

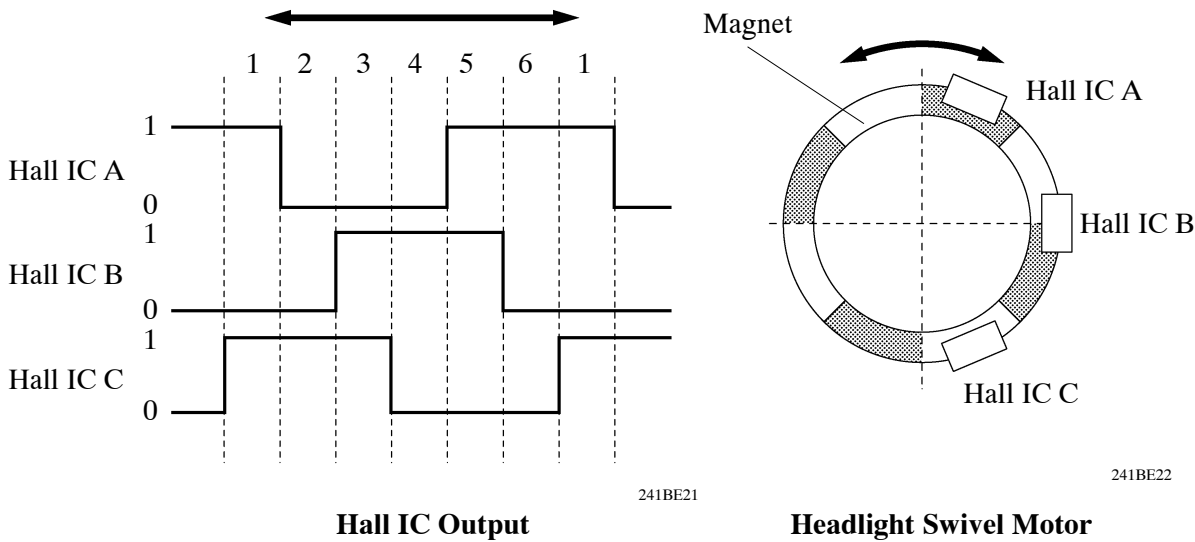


**Headlight Swivel Actuator**

241BE20

2) Headlight Swivel ECU

- The headlight swivel ECU performs drive control of the headlight swivel motor by control signals from the AFS ECU, and it judges the position and turning direction of the headlight swivel motor, then outputs to the AFS ECU.
- The headlight swivel ECU judges the position and turning direction of the headlight swivel motor from the combination of the 3 Hall IC signals from the headlight swivel actuator.



| Direction      | <div><div></div><div></div></div> |   |   |   |   |   |   |   |   |                |   |   |   |   |   |   |   |   |   |   |   |
|----------------|-----------------------------------|---|---|---|---|---|---|---|---|----------------|---|---|---|---|---|---|---|---|---|---|---|
| No.            | 1                                 |   |   | 2 |   |   | 3 |   |   | 4<br>(Neutral) |   |   | 5 |   |   | 6 |   |   | 1 |   |   |
| Hall IC Output | A                                 | B | C | A | B | C | A | B | C | A              | B | C | A | B | C | A | B | C | A | B | C |
|                | 1                                 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0              | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |

## AFS ECU

### 1) General

- The AFS ECU judges the steering angle and steering direction from the steering angle sensor signal, then calculates the lighting angle of the projector headlight (for Lo beam) from the steering angle information, and the vehicle speed and headlight swivel motor position signal from the headlight swivel ECU, then outputs a headlight swivel motor drive signal to each headlight swivel ECU.
- The AFS ECU performs Intelligent AFS control when all the following conditions are fulfilled:
  - Shift lever is not R and N position.
  - The vehicle speed\* is 30 km/h (19 mph) or more.
  - The steering angle\* is 12° or more.
  - The headlight Lo beam operates (but the DRL system is not operating)
  - AFS OFF switch is turned OFF.

\*: A swivel angle changes in accordance with the vehicle speed and steering angle. The minimum steering angle to change the swivel is 12° if the vehicle speed is high. While the minimum vehicle speed to change the swivel is 30 km/h (19 mph) if the steering angle is large.

- The AFS ECU controls the cornering direction projector headlights (for Lo beam) to swing toward the cornering direction inner side as shown in the table below.

| Driving Condition | Swivel Angle Range            |                               |
|-------------------|-------------------------------|-------------------------------|
|                   | Projector Headlight Unit (LH) | Projector Headlight Unit (RH) |
| Right Turn        | 0° Fixed                      | 0° ~ 5° to Right              |
| Left Turn         | 0° ~ 15° to Left              | 0° Fixed                      |

### Service Tip

- If the power to the AFS ECU is interrupted due to the removal of the battery or the AFS ECU, the neutral position data of the steering angle sensor becomes lost from the memory of the AFS ECU, thus stopping the operation of the Intelligent AFS. After the power to the AFS ECU has been restored, drive the vehicle approximately 100 meters at a speed between 20 km/h (12 mph) and 80 km/h (48 mph), in an area where few curves or traffic congestion exists. This enables the AFS ECU to start an automatic correction (AFS ECU initialization) of the steering neutral point, in order to automatically detect the neutral position of the steering angle sensor.
- In addition, after turning the power on to AFS ECU again, performing AFS OFF switch operation while the engine is running and the shift lever is in P position enables to do forced AFS ECU initialization. For details of AFS ECU initialization, refer to the LEXUS RX400h Repair Manual (Pub. No. RM1139E).
- DTC B2421 is output when the AFS ECU has not completed automatic correction of the steering neutral point. The operation of the Intelligent AFS is disabled while this DTC is being output.

## 2) Initial Set Control

When the ignition switch is turned ON, and the AFS ECU receives a “READY” signal from the THS ECU, the AFS ECU drives the headlight swivel motor and moves the projector headlight to the left and right operation limit. Then, it returns to the proper position. Thus, the AFS ECU assesses the position of the light beam that forms the reference for control.

## 3) Fail-Safe

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

| Trouble Area                                     | Headlight Leveling Actuator                                                                                                                                    | Headlight Swivel Actuator                                                                               | AFS OFF Indicator Light |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------|
| Vehicle signal malfunction                       | Controlling continues                                                                                                                                          | Stops operation after returning to initial position                                                     | Blinks                  |
| Vehicle height signal malfunction                | Stops operation after returning to initial position (Fail at higher than initial position)<br>Stops at current condition (Fail at lower than initial position) | Stops operation after returning to initial position                                                     | Blinks                  |
| Leveling actuator Malfunction                    | Stops at current condition                                                                                                                                     | Stops operation after returning to initial position                                                     | Blinks                  |
| Steering sensor Malfunction                      | Lowers by 0.8° than initial position and then re-starts controlling                                                                                            | Stops at current condition and then returning to initial position                                       | Blinks                  |
| Communication signal malfunction                 | Controlling continues                                                                                                                                          | Stops operation after returning to initial position                                                     | Blinks                  |
| Swivel actuator voltage malfunction              | Controlling continues                                                                                                                                          | Stops operation after returning to initial position                                                     | Goes off                |
| Swivel actuator operation malfunction            | Lowers by 0.8° than initial position                                                                                                                           | Stops operation after returning to initial position (Stops at current condition when unable to operate) | Blinks                  |
| Swivel actuator communication signal malfunction | Lowers by 0.8° than initial position                                                                                                                           | Stops operation after returning to initial position (Stops at current condition when unable to operate) | Blinks                  |
| AFS ECU malfunction                              | Stops at current condition                                                                                                                                     | Stops at current condition and then returning to initial position                                       | Goes off                |

## 4) Diagnosis

- If the AFS ECU detects a malfunction in the AFS and automatic headlight beam level control system, the AFS ECU blinks the AFS OFF indicator light (1 Hz) that is provided in the combination meter in order to alert the driver.  
At the same time, the DTC (Diagnostic Trouble Code) are stored in memory.  
The DTC can be accessed the use of the intelligent tester II. For details, see the LEXUS RX400h Repair Manual (Pub. No. RM1139E).
- The table below indicates the DTCs that are associated with this system.

| DTC No. | Detection Item                                    | DTC No. | Detection Item                                            |
|---------|---------------------------------------------------|---------|-----------------------------------------------------------|
| B2410   | Headlight swivel ECU LH communication malfunction | B2416   | Height Control Sensor malfunction                         |
| B2411   | Headlight swivel ECU RH communication malfunction | B2417   | Headlight beam level control motor LH malfunction         |
| B2412   | Headlight swivel motor LH malfunction             | B2418   | Headlight beam level control motor RH malfunction         |
| B2413   | Headlight swivel motor RH malfunction             | B2419   | BEAN communication malfunction                            |
| B2414   | Steering position sensor malfunction              | B2420   | AFS ECU malfunction                                       |
| B2415   | Vehicle speed sensor malfunction                  | B2421   | Steering neutral point automatic correction incomplection |

## ■ AUTOMATIC HEADLIGHT BEAM LEVEL CONTROL SYSTEM

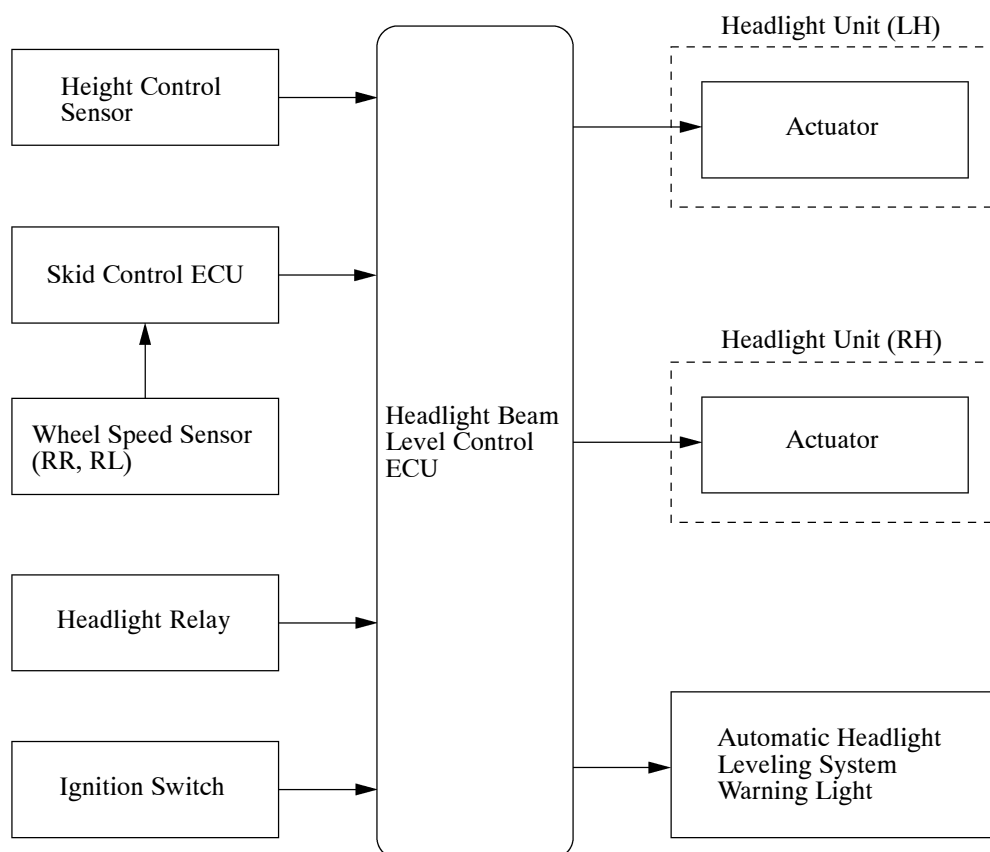
### 1. General

- The automatic headlight beam level control system regulates the orientation of the reflectors of the headlights in relation to the posture of the vehicle that has been detected by sensor. Thus, it is a system that maintains the headlight beams to a constant level while the vehicle is being driven.  
This system is optional equipment.
- This system has the differences shown in the table below for models with Intelligent AFS and without Intelligent AFS. However, basic operation is the same for both models.

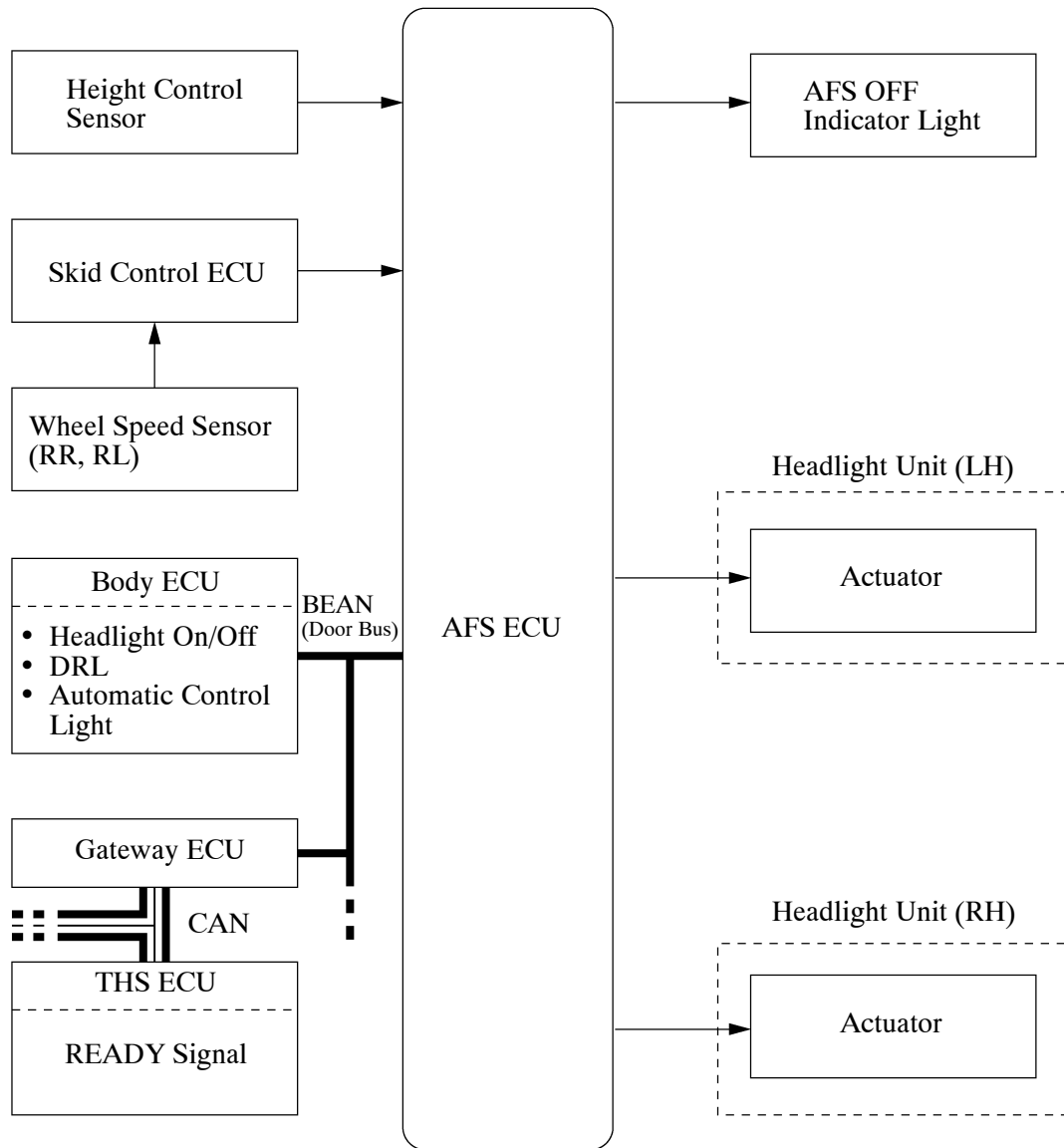
| System                       | without Intelligent AFS                                                                                                                                                                            | with Intelligent AFS                                                                                                                                                             |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Headlight Beam Level Control | Reflector is driven up and down by 1 actuator (step motor type)                                                                                                                                    | ←                                                                                                                                                                                |
| Vehicle Height Detection     | Height Control Sensor                                                                                                                                                                              | ←                                                                                                                                                                                |
| System Control               | Headlight Beam Level Control ECU                                                                                                                                                                   | AFS ECU                                                                                                                                                                          |
| Operation in System abnormal | <ul style="list-style-type: none"> <li>• Lights up the master warning light</li> <li>• Displays a warning message on the combination meter.</li> <li>• System control in fail-safe mode</li> </ul> | <ul style="list-style-type: none"> <li>• AFS OFF indicator light flashing</li> <li>• System control in fail-safe mode</li> <li>• DTC (Diagnostic Trouble Code) output</li> </ul> |

### 2. System Diagram

#### ► Models without Intelligent AFS ◀

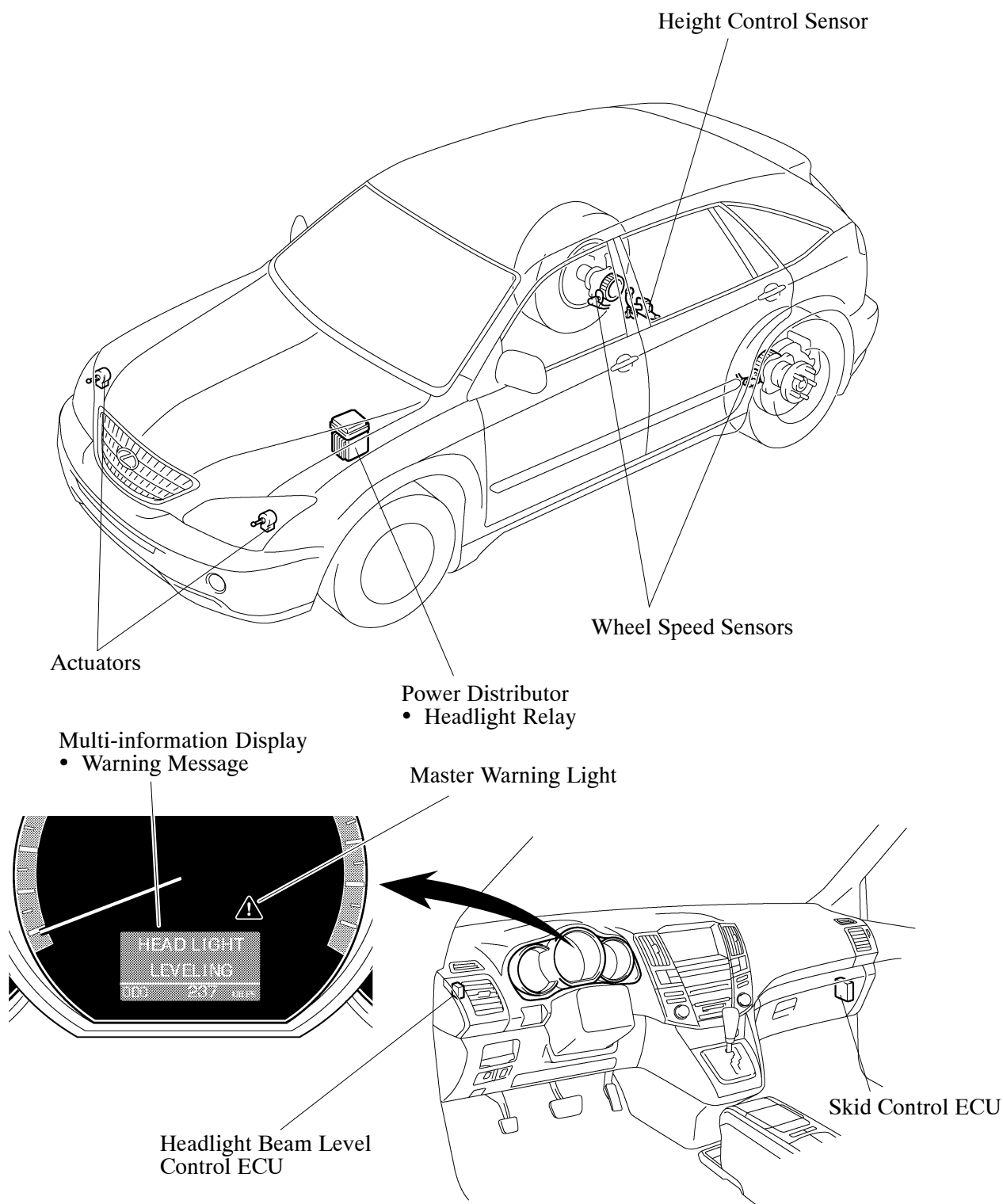


► Models with Intelligent AFS ◀



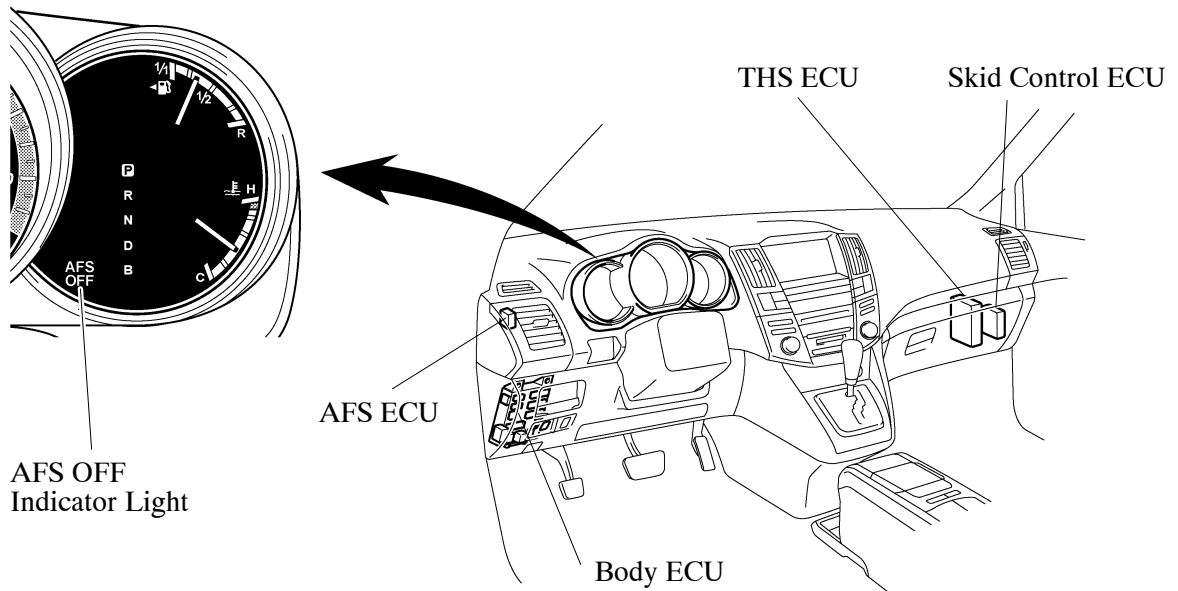
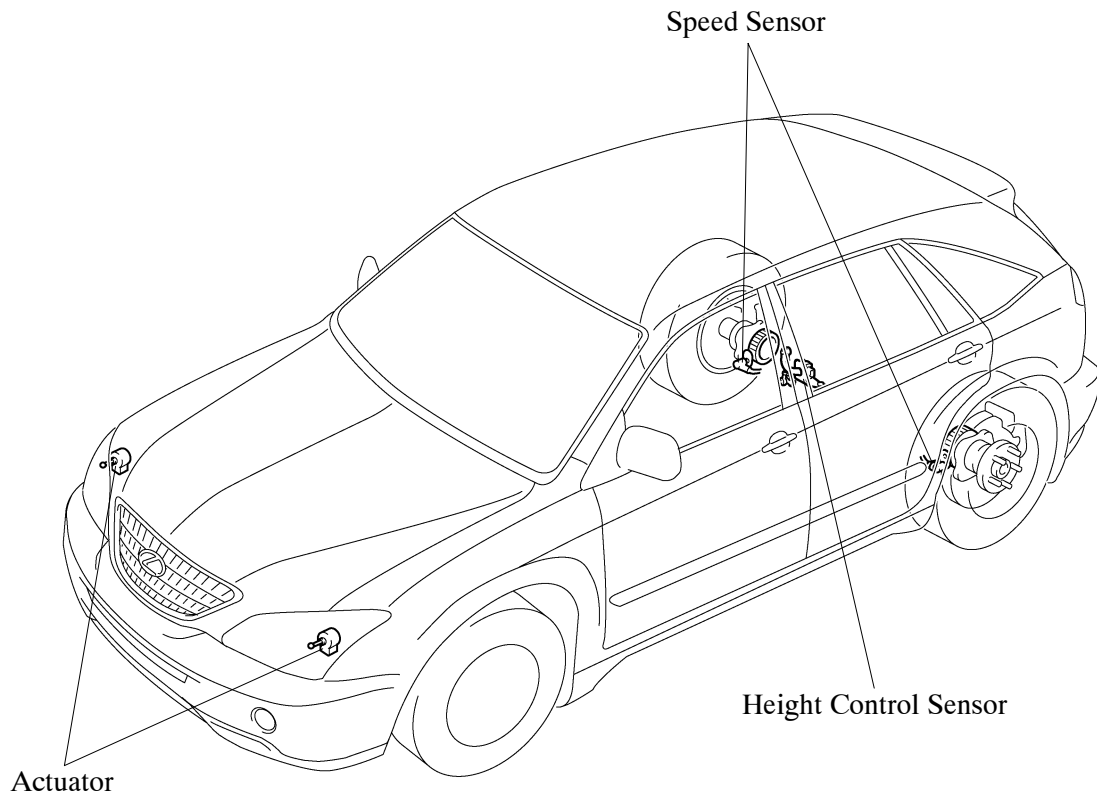
### 3. Layout of Main Components

#### ► Models without Intelligent AFS ◀



**LHD Model**

► Models with Intelligent AFS ◀



BE

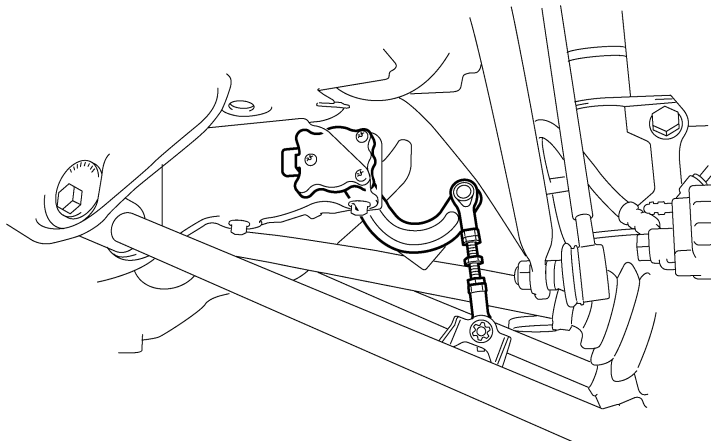
## 4. Construction

### AFS ECU/Headlight Beam Level Control ECU

- This system is controlled by the AFS ECU in models with Intelligent AFS. In models without Intelligent AFS, this system is controlled by the headlight beam level control ECU, the same as in the current RX300. However, basic operation of both ECUs is the same.
- Based on the signals that are transmitted by the rear height control sensor and the skid control ECU, this ECU detects the amount of variance of the vehicle posture. Based on the detected value, this ECU outputs control signals to the actuator.
- The headlight beam level control ECU provides initial set control and a fail-safe function. In addition to this function, the AFS ECU also outputs the DTC for malfunction locations.

### Height Control Sensor

- The rear height control sensor detects the amount of variance of the vehicle height while the vehicle is being driven, and output this amount in the form of signals to the AFS ECU/headlight beam level control ECU.



241BE27

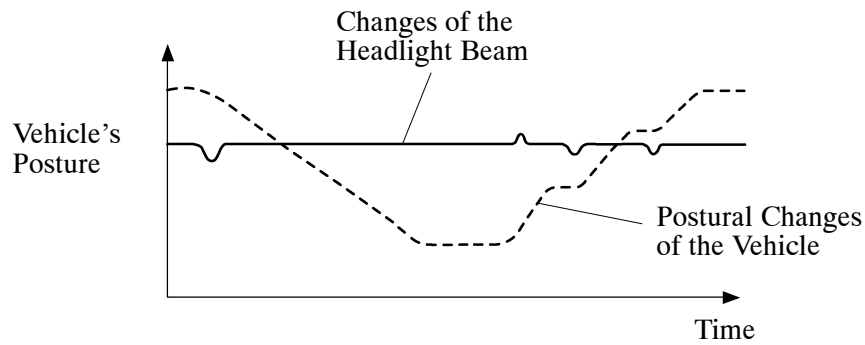
### Actuator

Based on the signals received from the AFS ECU (models with Intelligent AFS)/headlight beam level control ECU (models without Intelligent AFS), each actuator moves the reflector in the headlight to vary its beam. This actuator uses a step motor to precisely regulate the angle of the reflector.

## 5. Operation

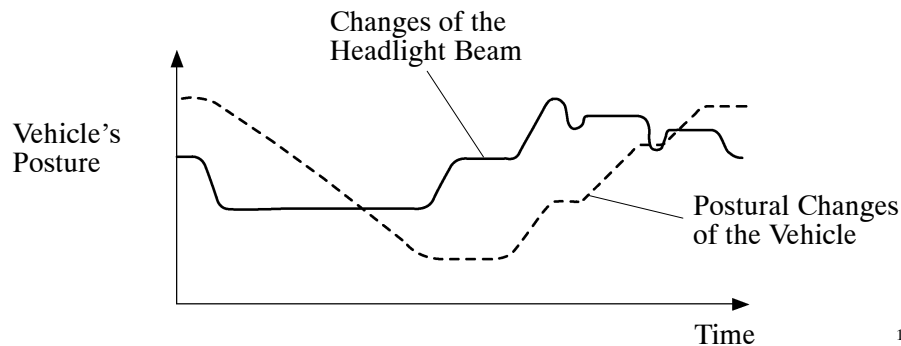
The AFS ECU (models with Intelligent AFS)/the headlight beam level control ECU (models without Intelligent AFS) is input the vehicle speed signal from the skid control ECU and the posture change signal of the vehicle from the height control sensor.

Based on these signals, the AFS ECU (models with Intelligent AFS)/the headlight beam level control ECU (models without Intelligent AFS) calculates the vehicle's pitch angle change and controls the actuator in accordance with that change amount, and then operates the reflector of the headlight.



**with Automatic Headlight Beam Level Control**

151LBE21



**without Automatic Headlight Beam Level Control**

151LBE20

## 6. Initial Set Control

When the AFS ECU (models with Intelligent AFS) receives a “READY” signal from the THS ECU, or the headlight beam level control ECU (models without Intelligent AFS) receives an ON signal from the ignition switch, this control operates the actuator to lower the light beams to the lowest end.

Then, it returns to the proper position. Thus, AFS ECU (models with Intelligent AFS)/the headlight beam level control ECU (models without Intelligent AFS) assesses the position of the light beam that forms the reference for control.

## 7. Fail-Safe Function

The AFS ECU (models with Intelligent AFS)/the headlight beam level control ECU (models without Intelligent AFS) operates in the fail-safe mode if an abnormal condition such as those listed below has been detected, and blinks the AFS OFF indicator light (models with Intelligent AFS)/illuminates the automatic headlight leveling system warning light (models without Intelligent AFS).

### ► Models with Intelligent AFS ◀

| Trouble Area                                     | Headlight Leveling Actuator                                                                                                                                    | Headlight Swivel Actuator                                                                               | AFS OFF Indicator Light |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------|
| Vehicle speed sensor signal malfunction          | Controlling continues                                                                                                                                          | Stops operation after returning to initial position                                                     | Blinks                  |
| Vehicle height signal malfunction                | Stops operation after returning to initial position (Fail at higher than initial position)<br>Stops at current condition (Fail at lower than initial position) | Stops operation after returning to initial position                                                     | Blinks                  |
| Leveling actuator Malfunction                    | Stops at current condition                                                                                                                                     | Stops operation after returning to initial position                                                     | Blinks                  |
| Steering sensor Malfunction                      | Lowers by 0.8° than initial position and then re-starts controlling                                                                                            | Stops at current condition and then returning to initial position after 10 seconds                      | Blinks                  |
| Communication signal malfunction                 | Controlling continues                                                                                                                                          | Stops operation after returning to initial position                                                     | Blinks                  |
| Swivel actuator action malfunction               | Lowers by 0.8° than initial position                                                                                                                           | Stops operation after returning to initial position (Stops at current condition when unable to operate) | Blinks                  |
| Swivel actuator communication signal malfunction | Lowers by 0.8° than initial position                                                                                                                           | Stops operation after returning to initial position (Stops at current condition when unable to operate) | Blinks                  |

### ► Models without Intelligent AFS ◀

| Trouble Area                                                   | Condition               | Automatic Headlight Leveling System Warning Light |
|----------------------------------------------------------------|-------------------------|---------------------------------------------------|
| Headlight leveling actuator circuit is open                    | Stop leveling operation | Light up                                          |
| Headlight leveling actuator circuit is short                   | Stop leveling operation | Light up                                          |
| Vehicle speed sensor signal error                              | Controlling continues   | Light up                                          |
| Height control sensor signal level error                       | Stop leveling operation | Light up                                          |
| Headlight leveling actuator high voltage                       | Stop leveling operation | Goes off                                          |
| Pitch angle calculation error (only for air suspension models) | Stop leveling operation | Light up                                          |

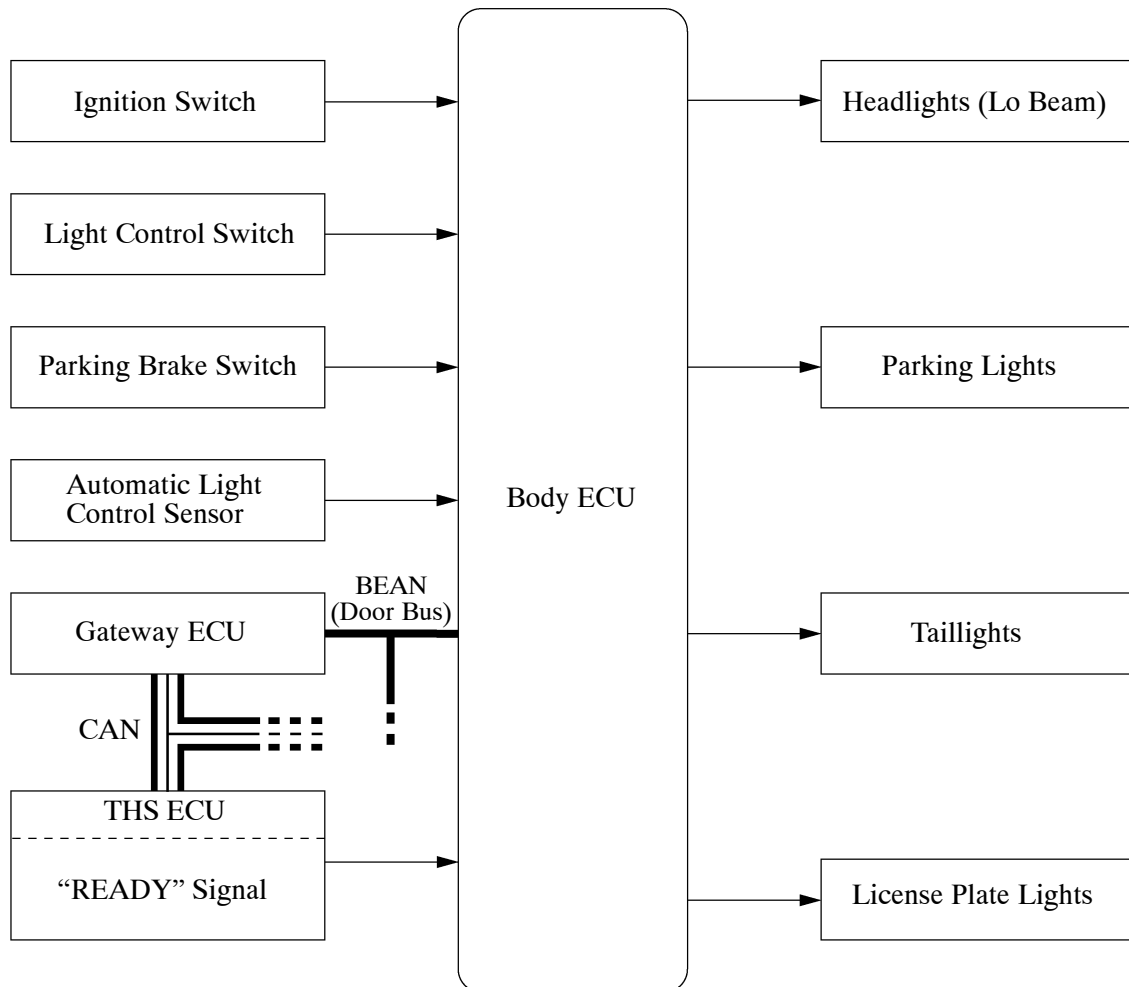
## 8. Diagnosis (models with Intelligent AFS)

- When the AFS ECU detects a malfunction in the automatic headlight beam level control system, the AFS ECU sets a DTC (Diagnostic Trouble Code) and stores it in memory.
- The DTC can be accessed the use of the intelligent tester II. For details, see the LEXUS RX400h Repair Manual (Pub. No. RM1139E).

## ■ DAYTIME RUNNING LIGHT SYSTEM

- The daytime running light system is provided as standard equipment on all models.
- This system is designed to automatically activate the headlights (Low beam), parking lights, license plate lights and taillights during the daytime to keep the car highly visible to other vehicles.  
This system is controlled by the Body ECU.
- This system is enabled when the conditions given below are met.
  - Ignition switch ON condition
  - Parking brake switch OFF condition
  - Light control switch OFF or AUTO condition (only when headlights-on control is not performed by the automatic light control system).
  - Hybrid system “READY” signal input (Hybrid system stand by condition)

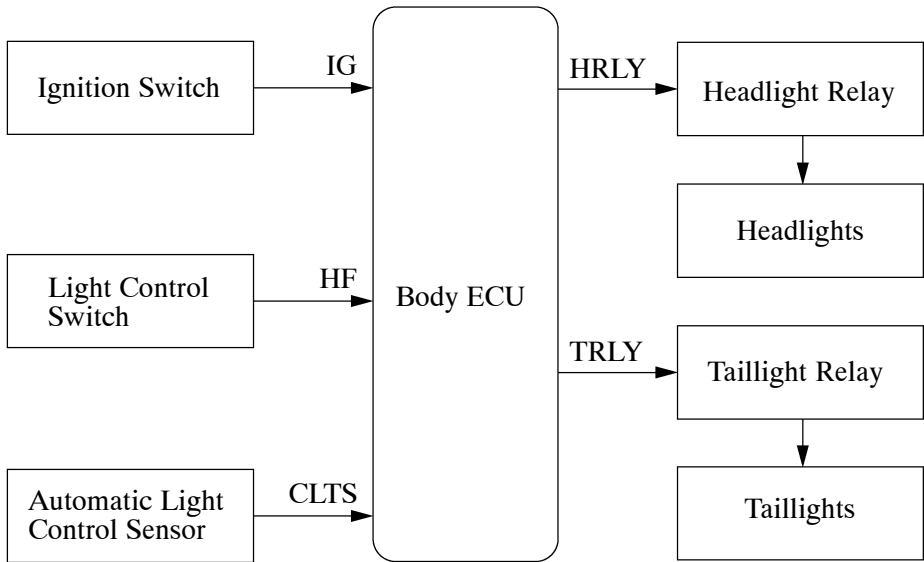
### ► System Diagram ◀



**■ AUTOMATIC LIGHT CONTROL SYSTEM**

- When the light control switch at the AUTO position, the automatic light control sensor detects the ambient light and automatically turns the headlights and taillights ON or OFF accordingly.
- The automatic light control sensor is integrated with the solar sensor that is used in the automatic air conditioning system.
- This system is controlled by the Body ECU.

**► System Diagram ◀**



277BE19

**■ LIGHT AUTO TURN-OFF SYSTEM**

The operation of the light auto turn-off system varies by light control switch position as shown in the table below. This system is controlled by the Body ECU.

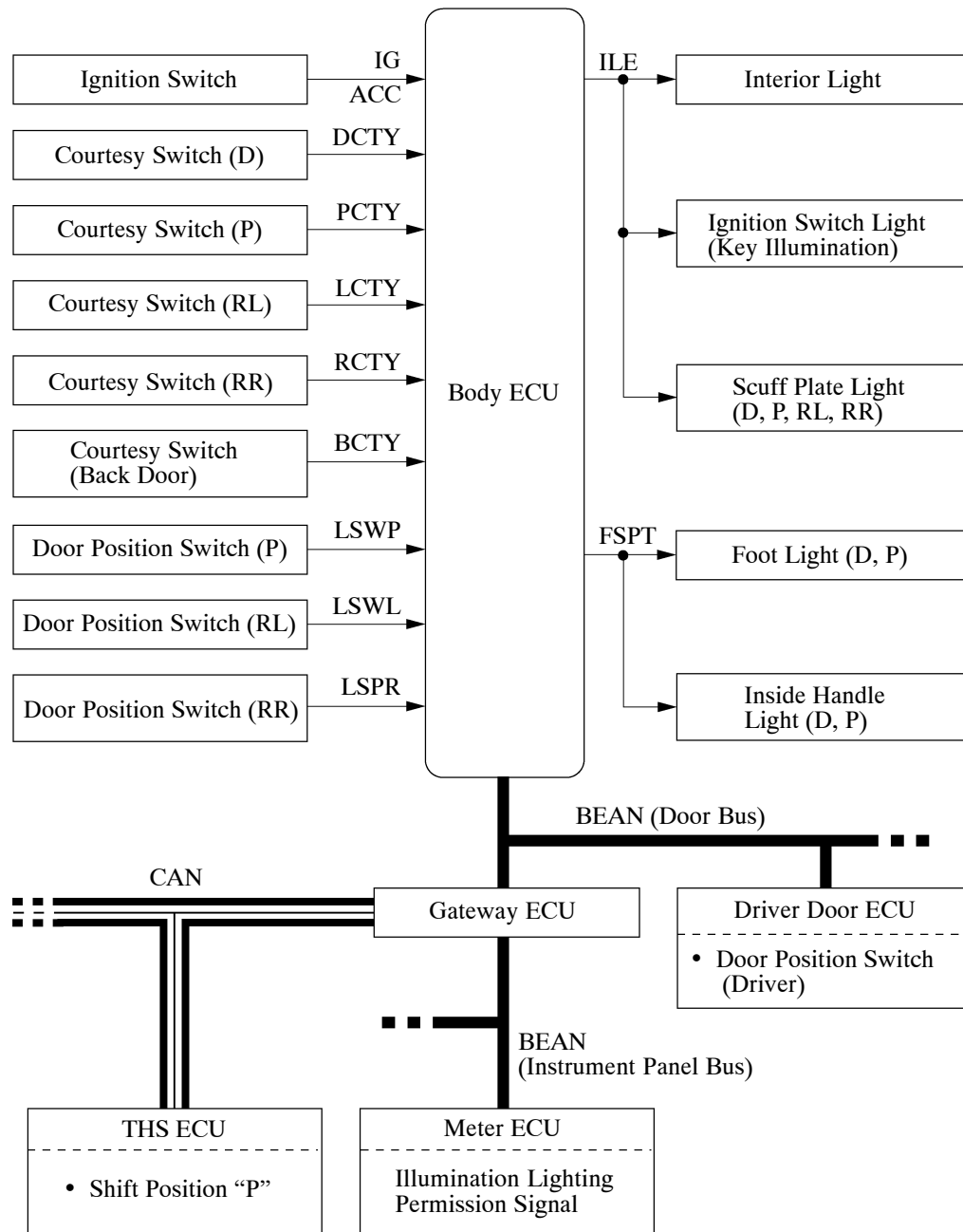
| Switch Position |      |      | Outline                                                                                                                                                                                                                  |
|-----------------|------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TAIL            | HEAD | AUTO |                                                                                                                                                                                                                          |
| —               | —    | ○    | While the lights (headlights, front fog lights, rear fog lights, and taillights) are turned ON, this system automatically turns them OFF when the ignition switch is turned OFF and the driver's door is opened.         |
| ○               | ○    | —    | While the lights (headlights, front fog lights, rear fog lights, and taillights) are turned ON, this system automatically turns OFF only the headlights and the front fog lights when the ignition switch is turned OFF. |

## ■ ILLUMINATED ENTRY SYSTEM

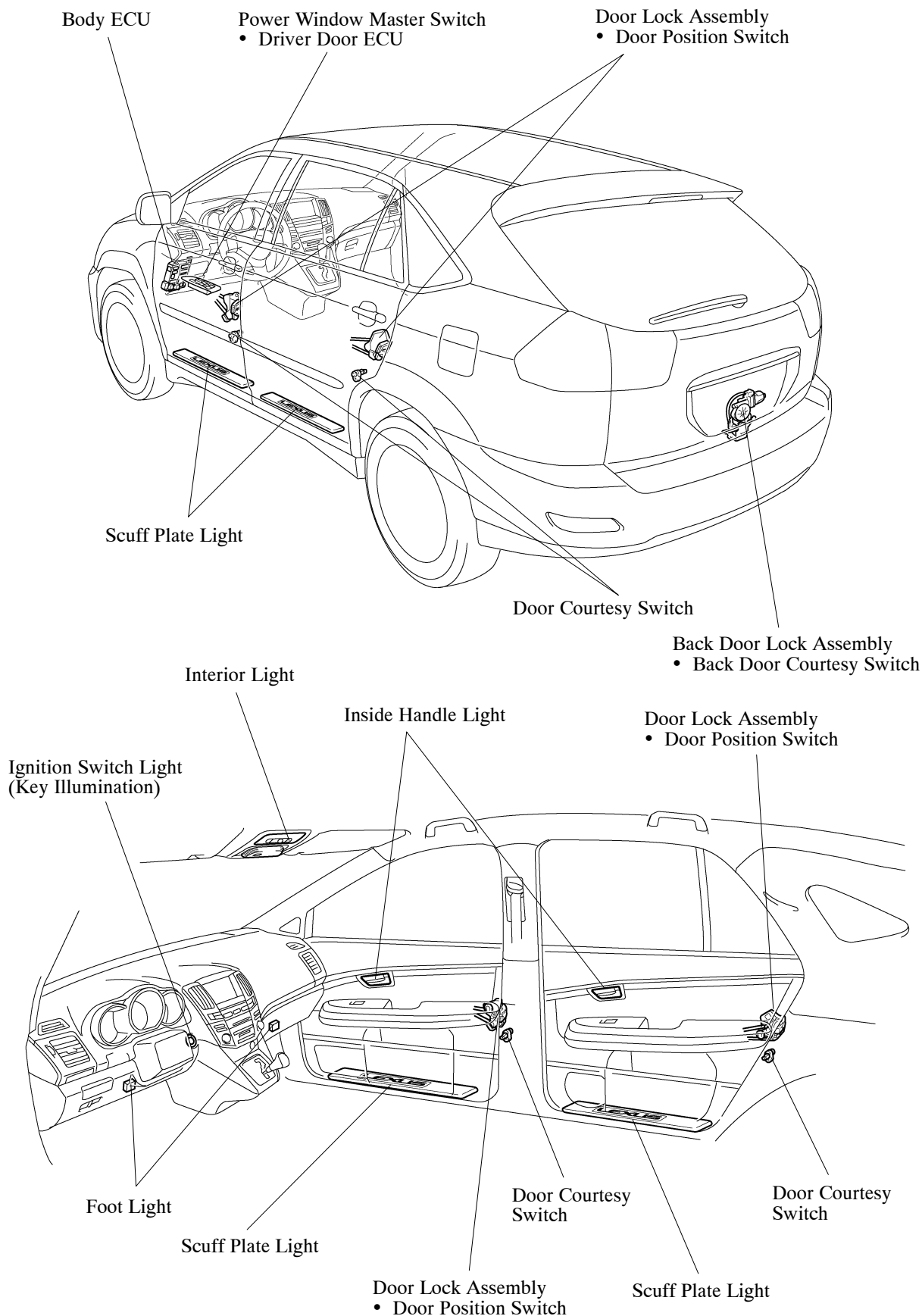
### 1. General

- The illuminated entry system of the RX400h controls 5 kinds of light: interior light, key illumination, scuff plate light, inside handle light and foot light.
- This system is controlled by the Body ECU.

#### ► System Diagram ◀



## 2. Layout of Main Components

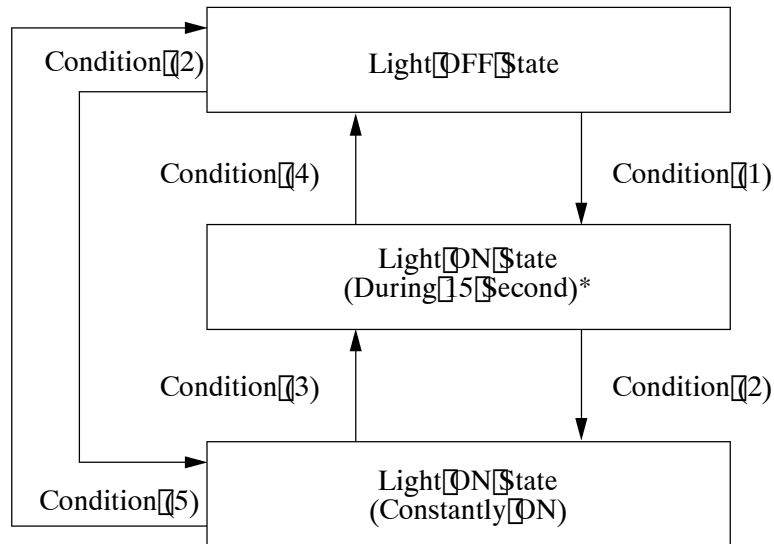


278BE27

LHD Model

### 3. Interior Light Control (including Ignition switch light and scuff plate light)

- The Interior light control (including Ignition switch light and scuff plate light) consists primarily of the fade-in/fade-out function and timer illumination function.
- The Interior light control (including Ignition switch light and scuff plate light) activates as described in the diagram below when one of items place in the respective state.



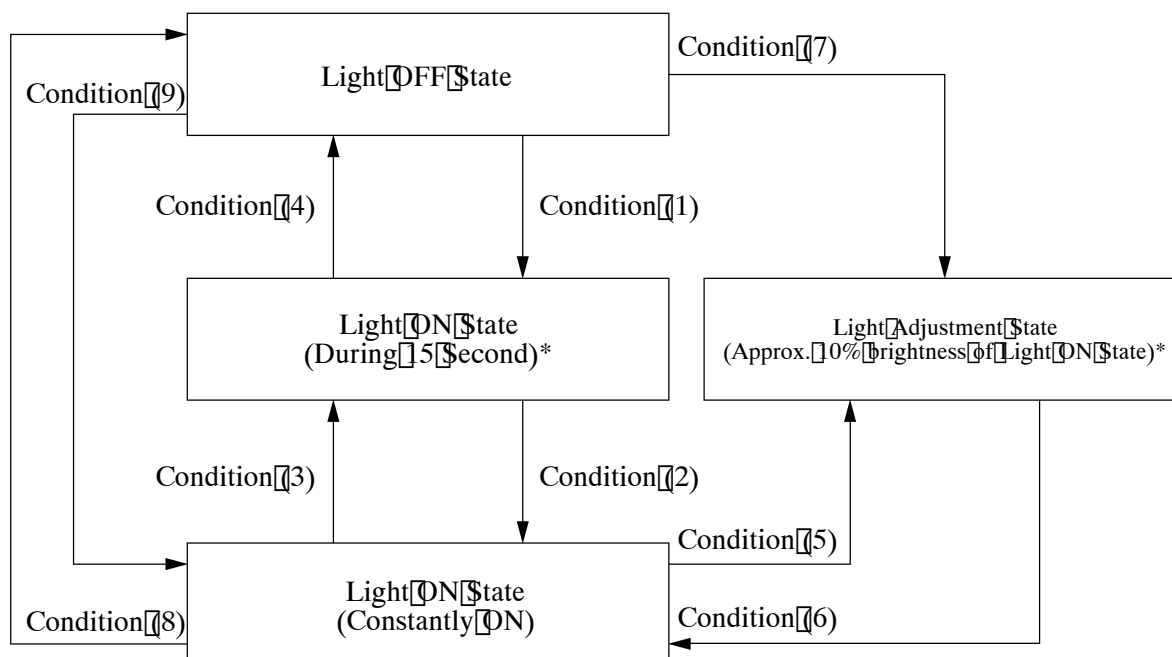
241BE32

| Condition     | Item                                                                                                                                                                                                                                                                       |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Condition (1) | <ul style="list-style-type: none"> <li>• With Ignition switch off and all doors closed, any door is unlocked.</li> <li>• With all doors closed, Ignition switch is turned from ACC to OFF position.</li> </ul>                                                             |
| Condition (2) | <ul style="list-style-type: none"> <li>• Any door is open.</li> </ul>                                                                                                                                                                                                      |
| Condition (3) | <ul style="list-style-type: none"> <li>• With Ignition switch off, all doors are closed.</li> </ul>                                                                                                                                                                        |
| Condition (4) | <ul style="list-style-type: none"> <li>• Ignition switch is at ACC or ON position.</li> <li>• More than 15 seconds have elapsed since the Light ON State (15 second duration)*.</li> <li>• With Ignition switch off and all doors closed, all doors are locked.</li> </ul> |
| Condition (5) | <ul style="list-style-type: none"> <li>• With Ignition switch at ACC or ON, all doors are closed.</li> <li>• With Ignition switch off and all doors closed, all doors are locked.</li> </ul>                                                                               |

\*: The setting of function can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on [page BE-20](#).

#### 4. Foot Light and Inside Handle Light Control

- The foot light and inside handle light control consists primarily of the fade-in/fade-out function and timer illumination function.
- The foot light and inside handle light control activates as described in the diagram below when one of items place in the respective state.



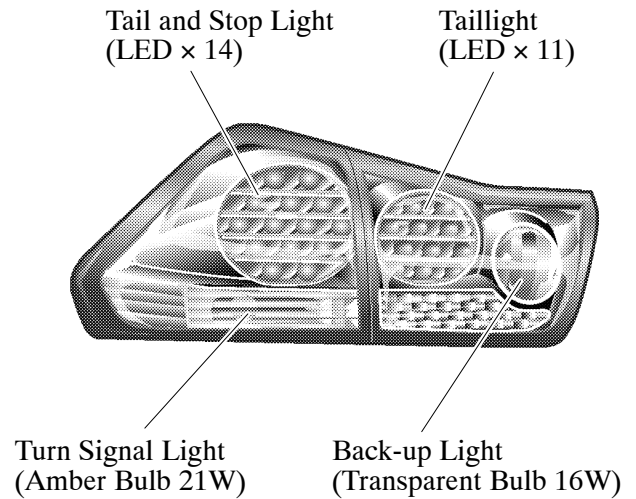
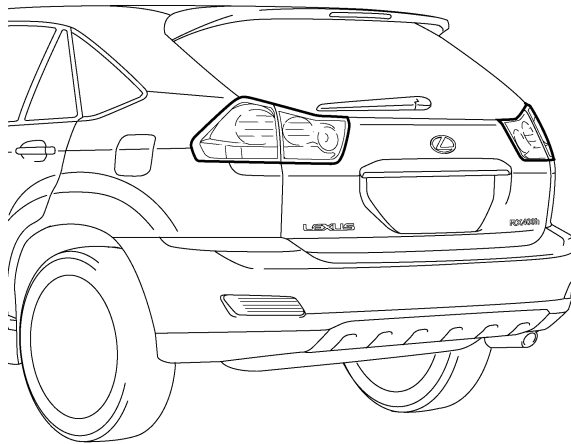
241BE33

| Condition     | Item                                                                                                                                                                                                                            |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Condition (1) | <ul style="list-style-type: none"> <li>• With ignition switch off and all doors closed, any door is unlocked.</li> </ul>                                                                                                        |
| Condition (2) | <ul style="list-style-type: none"> <li>• Any door is open.</li> <li>• With shift lever at P position, ignition switch is turned on.</li> </ul>                                                                                  |
| Condition (3) | <ul style="list-style-type: none"> <li>• With ignition switch off, all doors are closed.</li> <li>• With all doors closed, ignition switch is switched from on to off position.</li> </ul>                                      |
| Condition (4) | <ul style="list-style-type: none"> <li>• More than 15 seconds have elapsed since start of the Light ON State (15 seconds duration)*.</li> <li>• With ignition switch off and all doors closed, all doors are locked.</li> </ul> |
| Condition (5) | <ul style="list-style-type: none"> <li>• Shift lever is put at other than P position with ignition switch at ON position.</li> </ul>                                                                                            |
| Condition (6) | <ul style="list-style-type: none"> <li>• With ignition switch at ON position, shift lever is put at P position.</li> </ul>                                                                                                      |
| Condition (7) | <ul style="list-style-type: none"> <li>• With shift lever at other than P position, ignition switch is turned ON.</li> </ul>                                                                                                    |
| Condition (8) | <ul style="list-style-type: none"> <li>• With ignition switch off and all doors locked, all doors are closed.</li> </ul>                                                                                                        |
| Condition (9) | <ul style="list-style-type: none"> <li>• Any door is open.</li> <li>• With shift lever at P position, the ignition switch is turned on.</li> </ul>                                                                              |

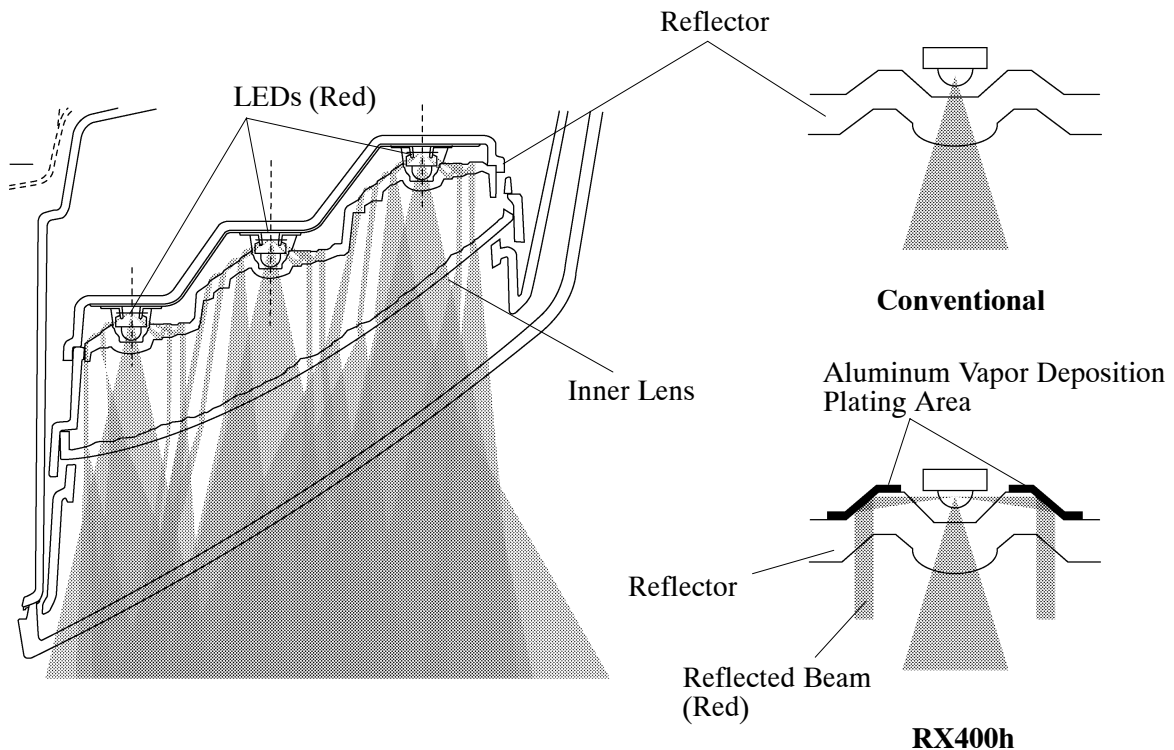
\*: The setting of function can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on [page BE-20](#).

## ■ REAR COMBINATION LIGHT

- The stop light bulbs and tail light bulbs have been changed to LEDs (Red). Accordingly, the power consumption of the stop lights and tail light have been reduced.
- The back of the reflector, which is placed in front of the LEDs, has been partially plated through aluminum vapor deposition. As a result, the entire stoplight and the taillight sparkle evenly, due to the light directly lit by the LEDs and the light reflected by the plated area.



277BE22



BE

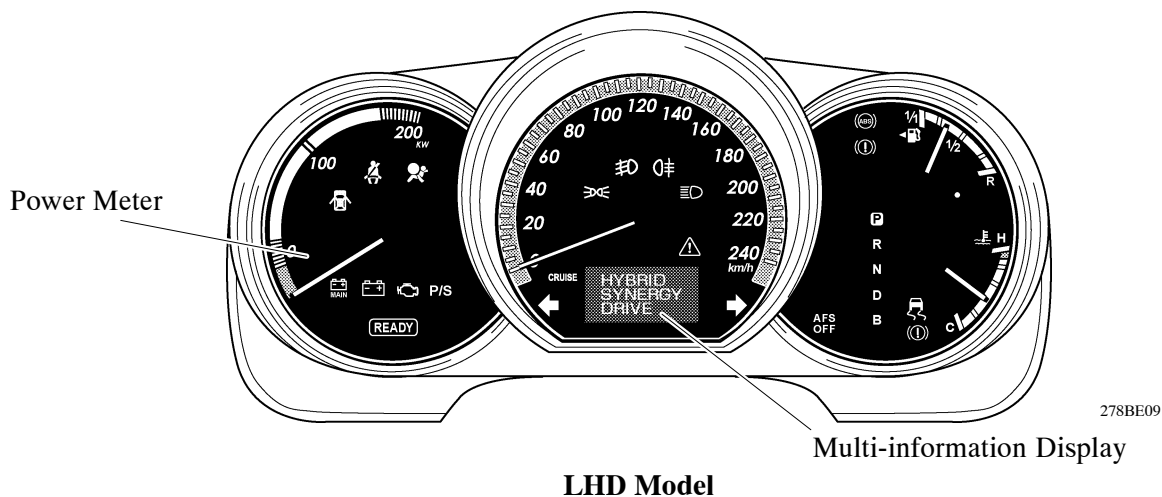
277BE23

## METER

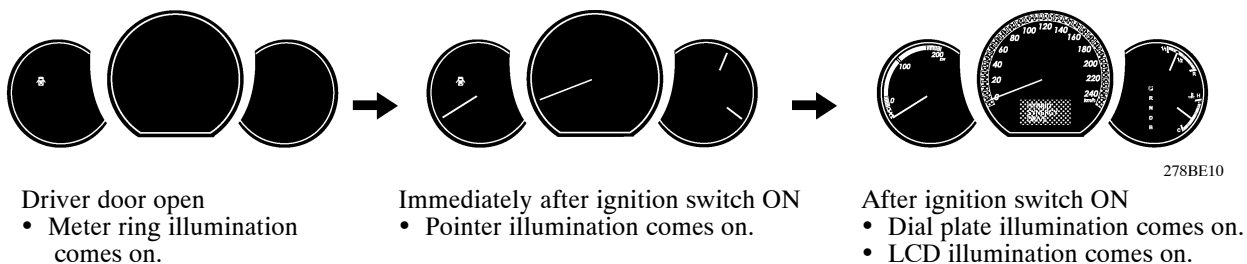
### ■ COMBINATION METER

#### 1. General

- An optitron display type combination meter is used. The optitron display type meter realizes excellent visibility through the use of smoke acylic in the protective panel, and LEDs (Light Emitting Diodes) that is very bright and has high contrast for illuminating the indicator and the dial.
- A new power meter has been provided, in order to indicate the total of the engine output and motor output.
- A multi-information display has been provided on the speedometer, in order to display an energy monitor and a warning message. The indication on the multi-information display can be changed by pressing the DISP switch provided on the steering pad.
- READY indicator light, master warning light and ECB warning light have been provided in the combination meter.
- A meter ECU and buzzer are enclosed in the combination meter. This ECU maintains communication with other ECUs through the BEAN (Body Electronics Area Network). In addition, this ECU maintains communication with other ECUs or devices comprising the CAN and AVC-LAN networks, via the gateway ECU.
- A function is used to control the combination meter illumination (combination meter ring illumination, and illumination of meter pointers, dial plates and odometer/trip meter) linked to opening of the driver door.
- The movement for actuating the indicator of the speedometer, the fuel gauge, the water temperature gauge and the power meter is used a step-motor type.



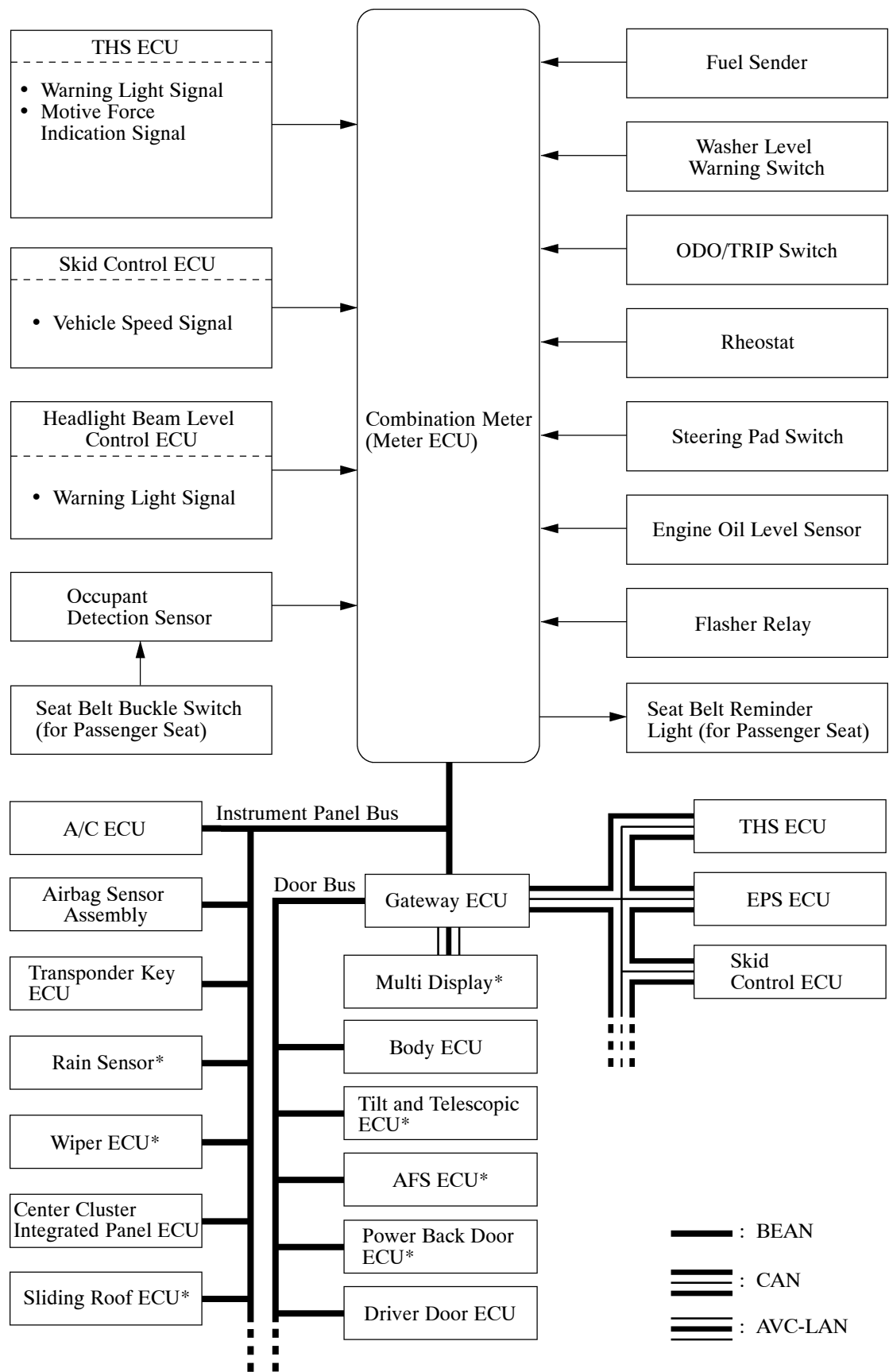
#### ► Combination Meter Illumination ◀



#### Service Tip

If the LEDs malfunction, it must be replaced as a combination meter assembly. Refer to the LEXUS RX400h Repair Manual (Pub. No. RM1139E).

2. System Diagram



\*: Optional Equipment

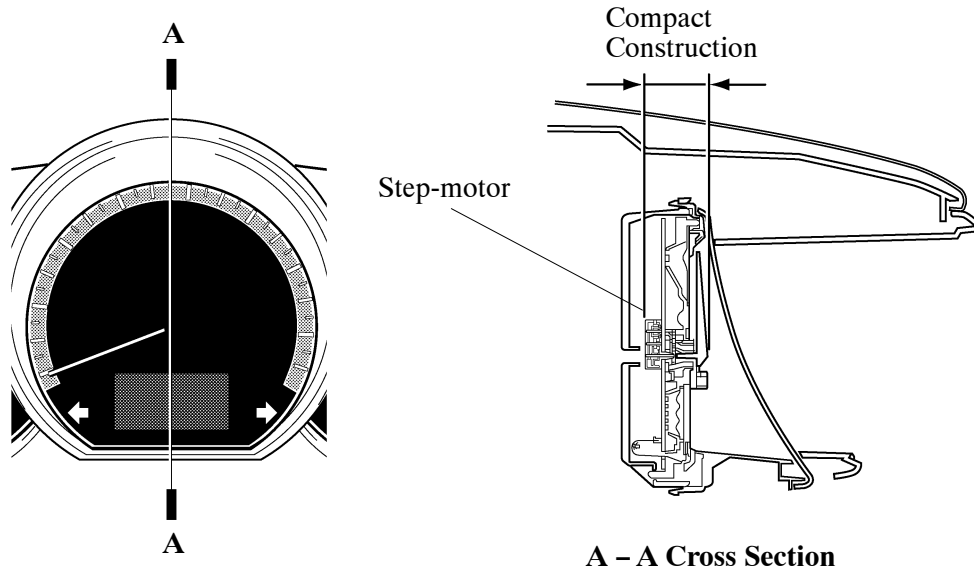
## ► MPX Communication ◀

| Protocol                       | ECU                                 | Signals Exchanged with Combination Meter (Meter ECU)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BEAN<br>(Instrument Panel Bus) | A/C ECU                             | <ul style="list-style-type: none"> <li>• Transmits ambient Temp. signal</li> <li>• Receives vehicle speed signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                | Airbag Sensor Assembly              | <ul style="list-style-type: none"> <li>• Transmits Driver's buckle switch signal</li> <li>• Transmits airbag warning light illumination or blinking signal</li> <li>• Receives vehicle speed signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                | Transponder Key ECU                 | <ul style="list-style-type: none"> <li>• Receives vehicle speed signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                | Rain Sensor*                        | <ul style="list-style-type: none"> <li>• Receives vehicle speed signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                | Wiper ECU*                          | <ul style="list-style-type: none"> <li>• Receives vehicle speed signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                | Sliding Roof ECU*                   | <ul style="list-style-type: none"> <li>• Receives vehicle speed signal</li> <li>• Transmit sliding roof warning message signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                | Center Cluster Integrated Panel ECU | <ul style="list-style-type: none"> <li>• Transmits a trip information operation signal</li> <li>• Receives trip information display signal</li> <li>• Receives vehicle speed signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| BEAN<br>(Door Bus)             | Body ECU                            | <ul style="list-style-type: none"> <li>• Transmits a meter illumination light dim request signal</li> <li>• Transmits door courtesy switches signal</li> <li>• Transmits all door courtesy switch signal</li> <li>• Transmits a headlight illumination signal</li> <li>• Transmits a tail light illumination signal</li> <li>• Transmits front fog light illumination signal</li> <li>• Receives vehicle speed signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                | Tilt and Telescopic ECU*            | <ul style="list-style-type: none"> <li>• Receives vehicle speed signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                | Driver Door ECU                     | <ul style="list-style-type: none"> <li>• Receives vehicle speed signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                | AFS ECU*                            | <ul style="list-style-type: none"> <li>• Transmits an AFS OFF indicator light illumination or blinking signal</li> <li>• Receives vehicle speed signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                | Power Back Door ECU*                | <ul style="list-style-type: none"> <li>• Receives vehicle speed signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| CAN                            | THS ECU                             | <ul style="list-style-type: none"> <li>• Transmits a shift position signal (P,R,N,D,B). (for shift position indicator light)</li> <li>• Transmits a READY indicator light illumination or blinking signal</li> <li>• Transmits a buzzer sounding request signal</li> <li>• Transmits a CHARGE warning light (for auxiliary battery) illumination signal</li> <li>• Transmits a MAIN BATTERY warning light illumination signal</li> <li>• Transmits a multi-information display warning message indication request signal</li> <li>• Transmits a HV energy flow information (for multi-information display)</li> <li>• Transmits a SOC data signal (for multi-information display)</li> <li>• Transmits an engine speed signal</li> <li>• Transmits a fuel injection volume signal</li> <li>• Transmits an engine coolant Temp. signal (for calculating engine coolant Temp. meter)</li> <li>• Transmits a cruise indicator light illumination or blinking signal</li> <li>• Receives fuel tank volume signal</li> </ul> |
|                                | Skid Control ECU                    | <ul style="list-style-type: none"> <li>• Transmits a brake aystem warning light illumination signal</li> <li>• Transmits a warning light (ABS, ECB) illumination or blinking signal</li> <li>• Transmits a slip indicator light illumination or blinking signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                | EPS ECU                             | Transmits a P/S warning light illumination request signal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                |                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| AVC-LAN                        | Multi Display*                      | <ul style="list-style-type: none"> <li>• Transmits a trip information operation signal</li> <li>• Receives trip information display signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

\*: Optional Equipment

### 3. Construction

- The indicator of the speedometer, the fuel gauge, the engine coolant temperature gauge and the power meter use a step-motor type, actuator for movement.
- In the case of the step-motor type, when the power to the combination meter is turned ON through the reconnection of the battery terminal, the step-motor initializes once to recognize the zero point of the indicator in relation to the step-motor. However, if the ignition switch is turned ON after 60 seconds or more have elapsed after the initialization, the step-motor initializes again.

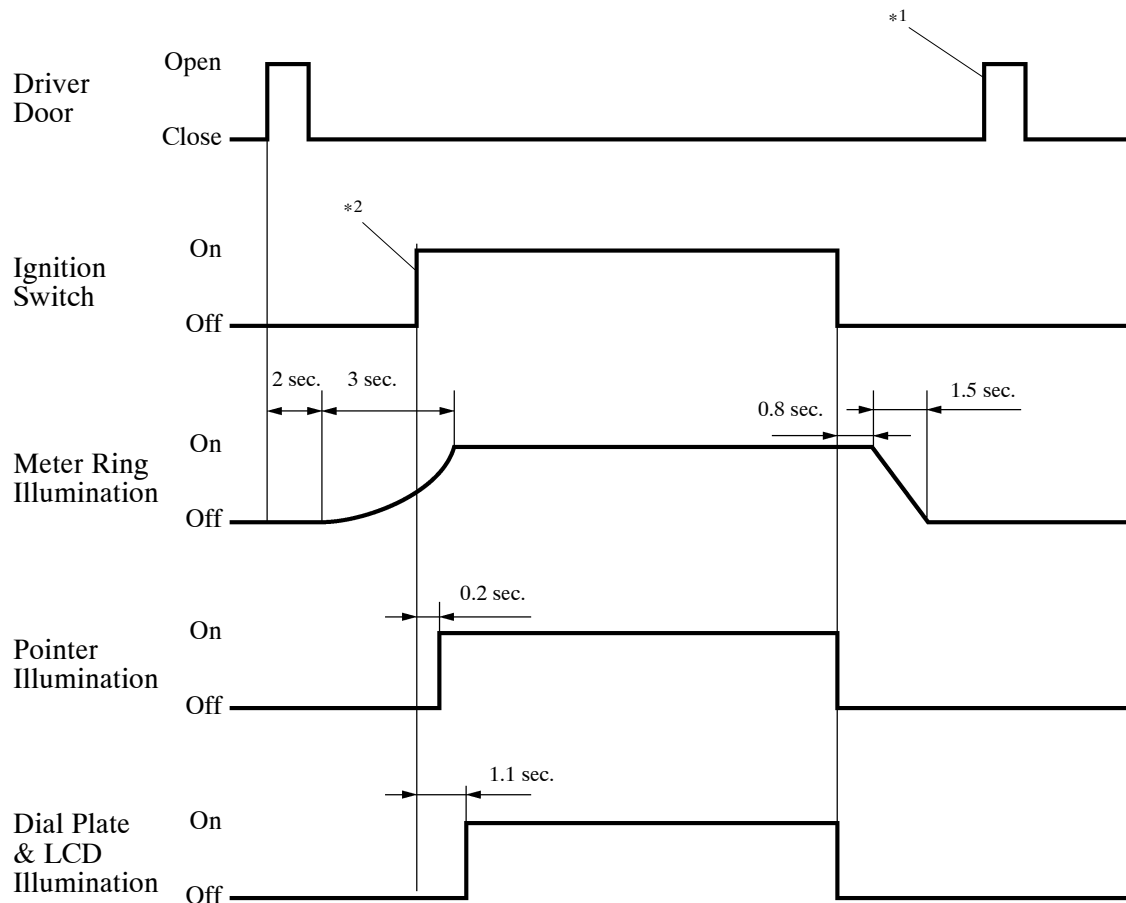


277BE94

#### 4. Combination Meter Illumination Control

- The meter ECU controls the lighting of the combination meter illumination (combination meter ring illumination, and illumination of meter pointers, dial plates and odometer/trip meter) in accordance with the driver door open/close condition, ignition switch condition, starter condition and engine running condition. The combination meter ring illumination has fade-in/fade-out control.
- The combination meter illumination is controlled based on the timing chart below.

##### ► Timing Chart ◀



277BE32

- \*1: Illumination control of the meter ring illumination by input of the driver door courtesy switch signal does not occur the first time after the ignition switch is turned off.
- \*2: If the ignition switch signal is not input to the meter ECU within 15 seconds after the meter ring illumination comes on, the meter ECU fades out the meter ring illumination until it is off.

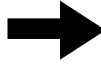
## 5. Indicator and Warning Light

### Ready Light

When the shift position is P, turning the ignition switch to START causes the “READY” light to flash and enables the vehicle to be driven. Then, this indicator illuminates and the buzzer sounds simultaneously.



Flashes when the ignition switch is turned to START.



Illuminates when the vehicle is ready to driven.

277BE27

#### Service Tip

If the indicator does not illuminate, the vehicle cannot be driven because one of the driving prohibition conditions listed below applies.

- Service plug discontinued.
- Hybrid system abnormality.
- Driving prohibition condition due to overload on MG1, MG2, MGR or inverter.
- Inverter unit cover is left open.
- THS ECU has detected a collision.

## Master Warning Light

The meter ECU illuminates or blinks the master warning light, and sounds the buzzer in accordance with the circumstances, as shown in the table below. At the same time, a warning message appears on the multi-information display on the speedometer.

| Master Warning Light | Buzzer | Warning Message             | Outline                                                                                                       |
|----------------------|--------|-----------------------------|---------------------------------------------------------------------------------------------------------------|
| Blink                | ○      | Shows the door that is open | When the vehicle is driven (5 km/h [3.1 mile/h] minimum) with any of the doors open.                          |
| Blink                | ○      | “PARK BRAKE”                | When the vehicle is driven (5 km/h [3.1 mile/h] minimum) without the parking brake being released.            |
| Illuminates          | ○      | “LOW ENGINE OIL LEVEL”      | When the level switch detects a low engine oil level continuously for 40 seconds with the ignition switch ON. |
| Illuminates          | ○      | “LOW WASHER FLUID”          | When the level switch detects a low washer fluid level with the ignition switch turned ON.                    |
| Illuminates          | ○      | “HEAD LIGHT LEVELING”       | When the headlight beam level control ECU detects a system failure with the ignition switch turned ON.        |
| Blink                | —      | “CHECK VSC SYSTEM”          | When the skid control ECU detects a failure in the VSC function with the ignition switch turned ON.           |
| Illuminates          | ○      |                             |                                                                                                               |
| Blink                | ○      | “LOW ENGINE OIL PRESSURE”   | When the oil pressure switch detects a low engine oil pressure with the ignition switch turned ON.            |
| Blink                | ○      | “WATER TEMP”                | When a water temperature failure is detected with the ignition switch turned ON.                              |
| Illuminates          | ○      | “CHECK HYBRID SYSTEM”       | When the THS ECU detects a system failure with the ignition switch turned ON.                                 |
| Illuminates          | ○      | “CHECK AWD SYSTEM”          | When the skid control ECU detects a 4WD system failure with the ignition switch turned ON.                    |
| Blink                | ○      | “MOON ROOF OPEN”*           | When the driver’s door is open with the ignition switch turned OFF and the sliding roof is open or tilted up. |
| Blink                | ○      | “SHIFT TO P RANGE”          | Shift position warning                                                                                        |

\*: Only on Models with Sliding Roof System

## 6. Multi-information Display (Combination Meter)

### General

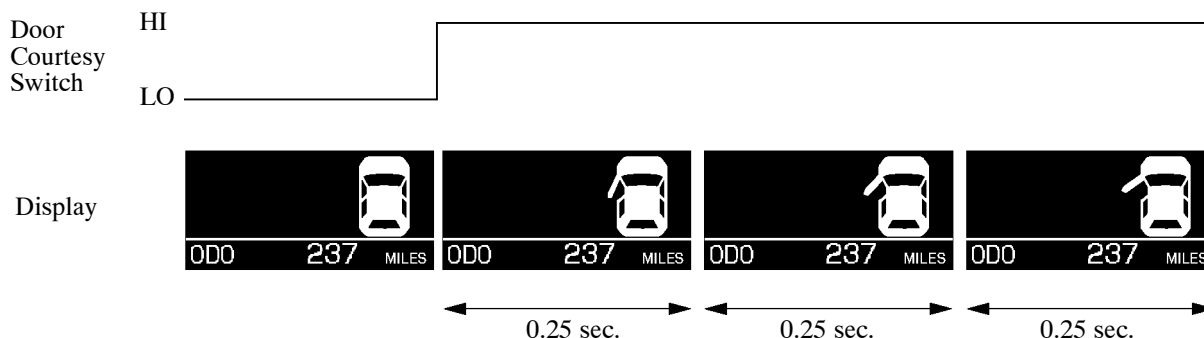
- The multi-information display has been located in the center of the combination meter.
- This display shows a message and animation for each of the functions described in the table below.

| Item                                   | Outline                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Door Warning                           | When a door (D, P, RL, RR, or Back) of the vehicle is opened or closed, this item displays a warning message and animation to inform the driver of the condition of the door.                                                                                                                                                                                                                                          |
| Odo/Trip Display                       | This display switches between odometer, trip meter A, and trip meter B in accordance with the operation of the odo/trip switch.                                                                                                                                                                                                                                                                                        |
| Energy monitor Display                 | <ul style="list-style-type: none"> <li>• Energy monitor indicates the energy transmission direction for checking the current drive method (engine, motor or both), the power generation status by the engine and status of regenerative energy use.</li> <li>• The SOC (State of Charge) of the battery can be checked on the meter with an 8-stage display, which is provided in the battery illustration.</li> </ul> |
| Outside Temp. Display                  | Displays the outside temperature in accordance with the ambient temperature signal from the A/C ECU.                                                                                                                                                                                                                                                                                                                   |
| Instant Fuel Consumption               | <ul style="list-style-type: none"> <li>• Displays the value that has been calculated by the meter ECU, which is based on the driven distance and the fuel consumption volume (fuel injection signal from No. 1 injector), provided that the ignition switch is turned ON.</li> <li>• The display updates every 0.5 seconds.</li> </ul>                                                                                 |
| Average Fuel Consumption               | <ul style="list-style-type: none"> <li>• Displays the value that has been calculated by the meter ECU, which is based on the driven distance and the fuel consumption volume after the INFO button has been pressed 0.8 seconds or longer.</li> <li>• The display updates every 10 seconds.</li> </ul>                                                                                                                 |
| Warning message                        | Illuminates or blinks the master warning light and displays a warning message for each type of system failure.<br>For details, see the master warning light on <a href="#">page BE-58</a> .                                                                                                                                                                                                                            |
| DTC (Diagnostic Trouble Codes) Display | Displays the DTCs pertaining to the VSC system.                                                                                                                                                                                                                                                                                                                                                                        |

### Door Warning Display

This display functions when a door courtesy light signal is received from the Body ECU as a result of a door being opened or closed. The meter ECU displays the location of the door that has been opened or closed and its state on the multi-information display using animation in four stages, and a message.

#### ► Display Example (Driver's Door) ◀



WIPER SYSTEM

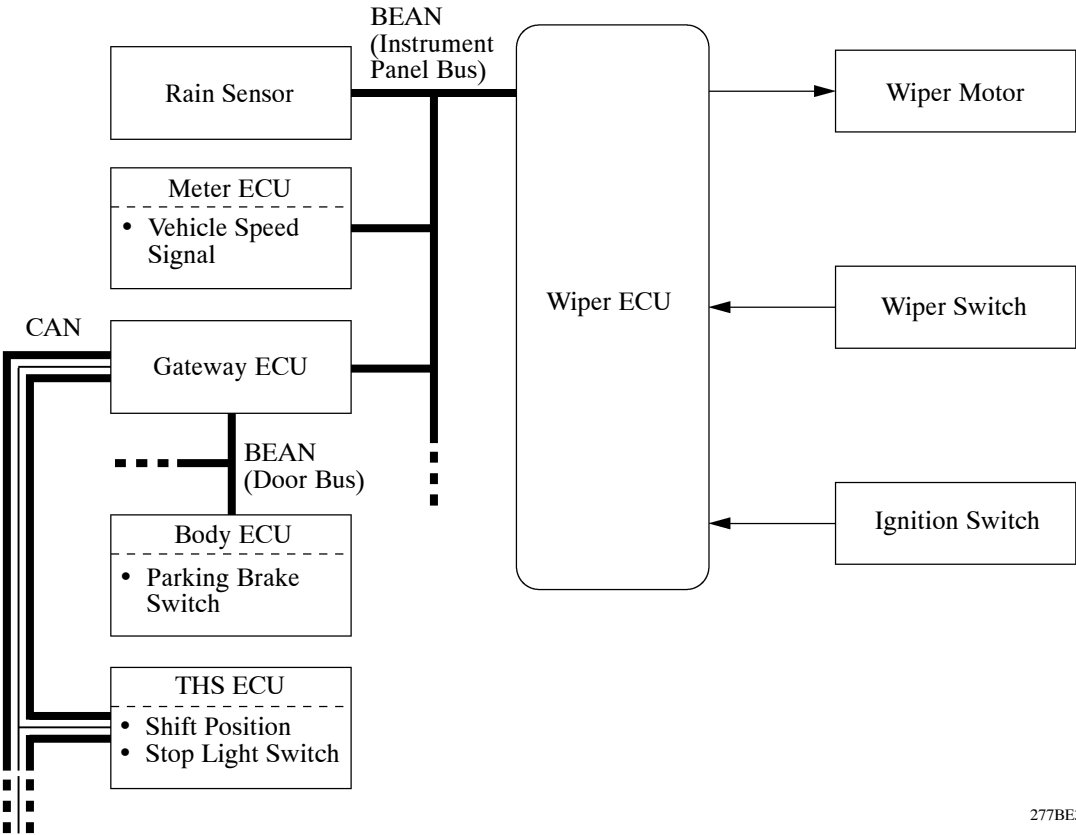
DESCRIPTION

- A wiper system with a raindrop sensing function is available as optional equipment.
- As a rule, the control of the wiper operation is effected by the wiper ECU. However, the control of the rain drop sensing function is effected by the rain sensor.
- This system has the following function.

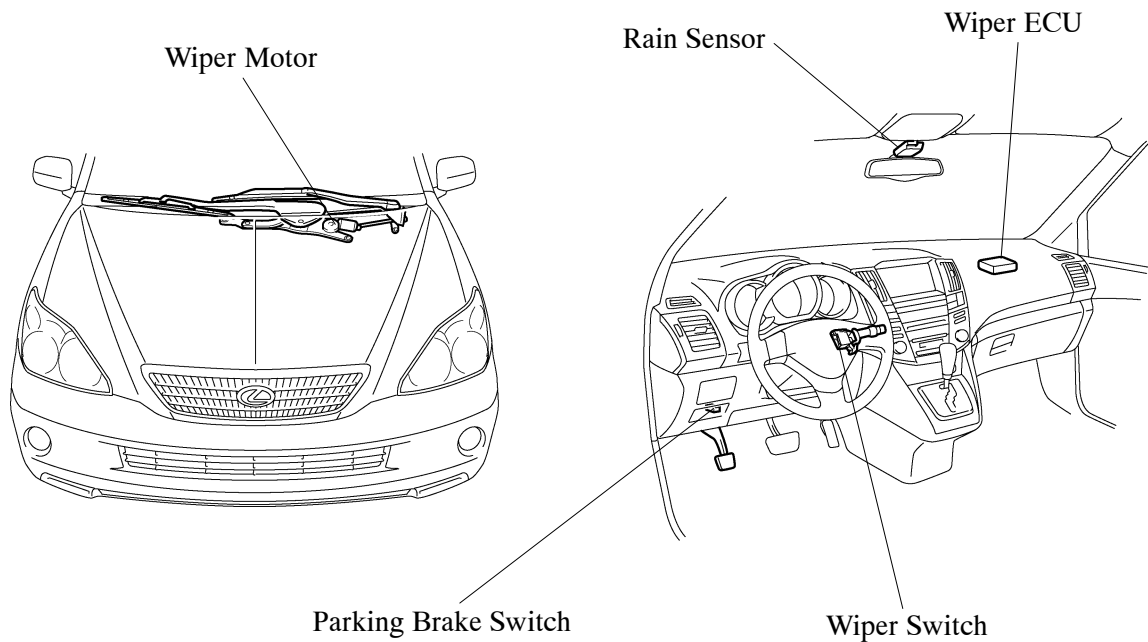
| Function                                                   | Outline                                                                                                                                                               |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vehicle Speed-Sensing, Adjustable Interval (INT) Function* | This function controls the wiper interval time in accordance with the vehicle speed when the wiper switch is in the AUTO position.                                    |
| Vehicle Speed Switching Function*                          | This function automatically switches the operating condition of the wipers while the vehicle is stopped or starting off, when the wiper switch is in the LO position. |
| Washer-Linked Wiper with Drip-Preventive Function*         | 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.     |
| Raindrop Sensing Function                                  | This function controls the wiping timing in accordance with the amount of raindrops when the wiper switch is in the AUTO position.                                    |

\*: The setting of function can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-20.

System Diagram



## ■ LAYOUT OF MAIN COMPONENTS

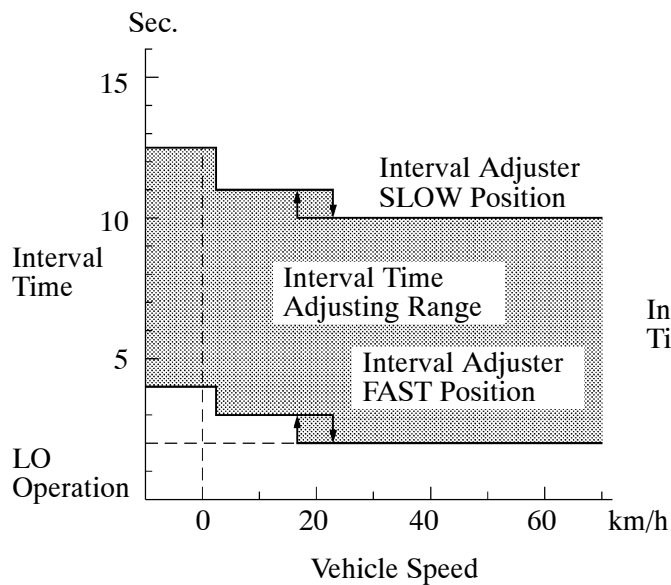


LHD Model

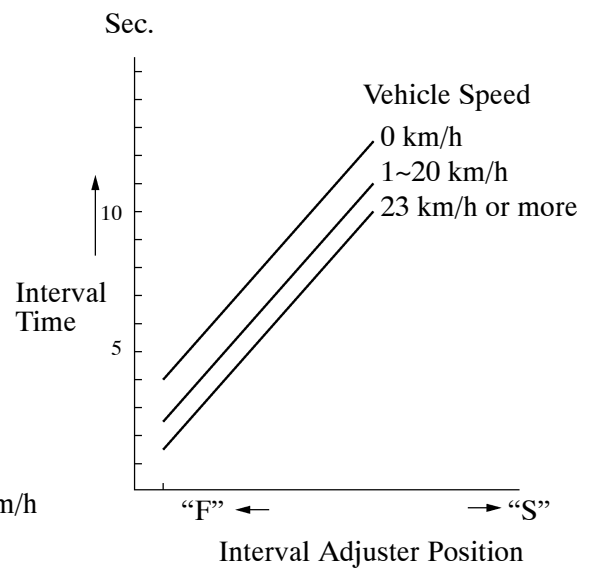
277BE99

## ■ VEHICLE SPEED-SENSING, ADJUSTABLE INTERVAL (INT) FUNCTION

This function controls the interval time of the wipers in accordance with the vehicle speed when the wiper switch is in the AUTO position. The interval time adjusting range consists of 3 steps, which can be selected by operating the interval adjuster. The interval time can be controlled steplessly within each range.



189BE87



229LC180

## VEHICLE SPEED SWITCHING FUNCTION

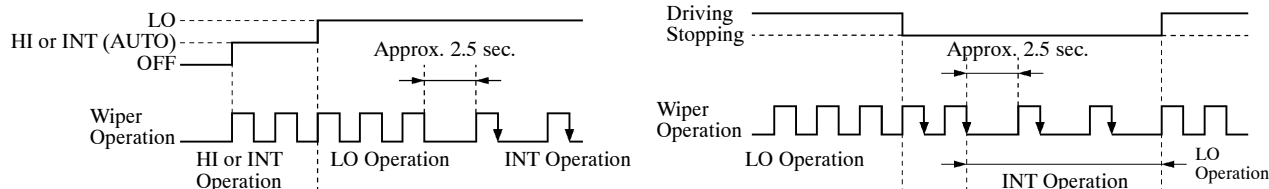
### 1. General

This function that automatically switches to the intermittent operation when the wiper switch is in the LO position and the vehicle is stopped. To perform this function, the stopping and driving conditions of the vehicle are determined as described below.

|                   |                                                                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Driving Judgment  | When the vehicle speed is other than 0 km/h, or the stop light and the parking brake are OFF and the shift lever is in a position other than P or N. |
| Stopping Judgment | When a condition other than the driving judgment has been detected.                                                                                  |

### 2. Operation

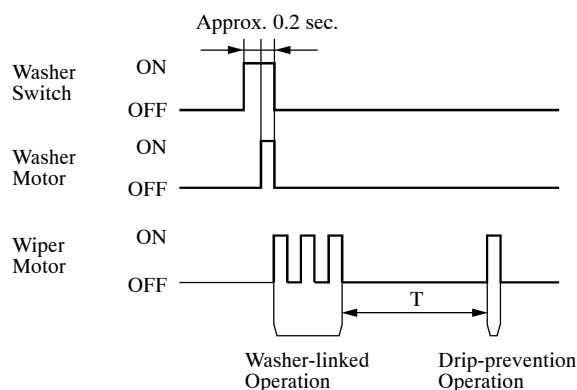
When the vehicle is stopped, operating the wiper switch from the AUTO or HI position to the LO position causes the wipers to operate 3 times at the low speed, and then automatically switch to intermittent operation with an interval time of approximately 2.5 seconds. When the vehicle is being driven and the switch is in the LO position, stopping the vehicle causes the wipers to operate twice, and then switch to intermittent operation with an interval time of approximately 2.5 seconds.



189BE89

## WASHER-LINKED WIPER WITH DRIP-PREVENTIVE FUNCTION

With this function, when the wiper switch is in the OFF or AUTO position, turning the washer switch ON for approximately 0.2 seconds or longer causes the washers to operate, and after the washer switch has been turned OFF, the wipers operate in unison 3 times at the low speed. Approximately 3 seconds (when the vehicle speed is between 0 to 59 km/h) after the low-speed operation of the wipers has been completed, the wipers operate once again to wipe off the washer fluid that has dripped. The drip prevention interval times are shown in the table below, according to the vehicle speed.



T: Varies according to the vehicle speed.

189BE91

| Vehicle Speed                        | Interval Time  | Vehicle Speed                         | Interval Time  |
|--------------------------------------|----------------|---------------------------------------|----------------|
| 0 to 59 km/h<br>(0 to 36.7 mph)      | Approx. 3 sec. | 120 to 159 km/h<br>(74.6 to 98.8 mph) | Approx. 5 sec. |
| 60 to 79 km/h<br>(37.3 to 49.1 mph)  | Approx. 5 sec. | 160 to 169 km/h<br>(99.4 to 105 mph)  | Approx. 3 sec. |
| 80 to 119 km/h<br>(49.7 to 73.9 mph) | Approx. 7 sec. | 170 km/h or more<br>(105.6 or more)   | No Operation   |

## ■ RAINDROP SENSING FUNCTION

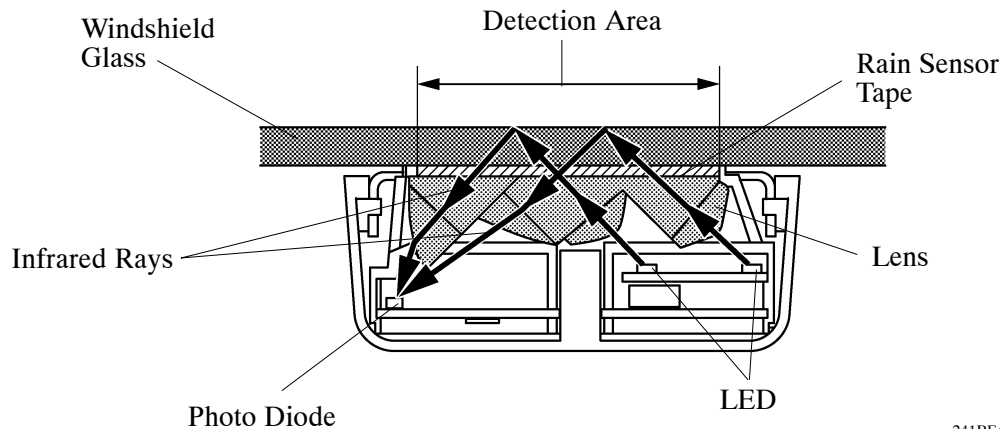
### 1. General

When the wiper switch is in the AUTO position, this function uses a rain sensor that is mounted on the front windshield glass to detect the amount of raindrops, and controls an optimal wiping timing accordingly.

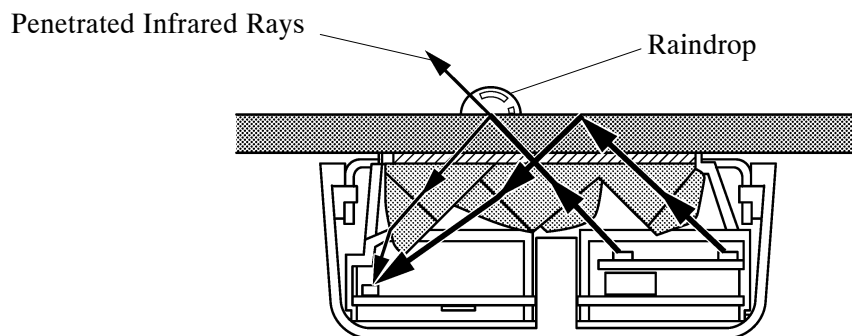
### 2. Construction and Operation

The rain sensor consists mainly of 4 LEDs (Light Emitting Diode) that emits infrared rays, and 2 photo diode that receives those rays. The detection method is based on the infrared rays that are reflected by the front windshield glass.

For example, if no raindrops are present in the detection area, the infrared rays emitted by the LED are all reflected from 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 with the change of index of reflection outward of the windshield glass via the raindrops, thus reducing the amount of infrared rays that are received by the photo diode. The amount of this reduction is then used to detect the amount of raindrops. Thus, this function controls the INT, LO, and HI operations in order to operate the wipers at an optimal wiping timing.



If no raindrops are present



If raindrops are present

#### Service Tip

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

## AIR CONDITIONER

### ■ DESCRIPTION

#### 1. General

The air conditioner system in the new RX400h has the following features:

- A new ES27 type electric inverter compressor is used on the new RX400h. This compressor is driven by the alternating current that is supplied by the A/C inverter, which is integrated with the compressor. As a result, the air conditioner system is actuated without depending on the operation of the engine, thus realizing a comfortable air conditioner system and low fuel consumption.
- A compact, lightweight, and highly efficient electrical water pump is used in order to ensure the proper heater performance while the engine is stopped.
- A left/right independent temperature control and neural network control has been adopted to make air conditioner control available to suit the perception of the person in the driver seat and in the passenger seat. Automatic air conditioner is standard in all models.
- A semi-center location air conditioner unit, in which the evaporator and heater core are placed in the vehicle's longitudinal direction, is used.
- A compact, lightweight, and highly efficient straight flow (full-path flow) aluminum heater core is used.
- A revolutionary slim structure evaporator is used.
- A humidity sensor function has been added to the room temperature sensor in order to optimize the amount of dehumidification effort during the operation of the air conditioner system.
- A deodorizing function that eliminates the exhaust gas smell that enters the cabin from the outside has been added to the conventional clean air filter.
- The air conditioner ECU is equipped with a self-diagnosis function. If there is a malfunction in the system, it stores the DTCs (Diagnostic Trouble Codes) in its memory.

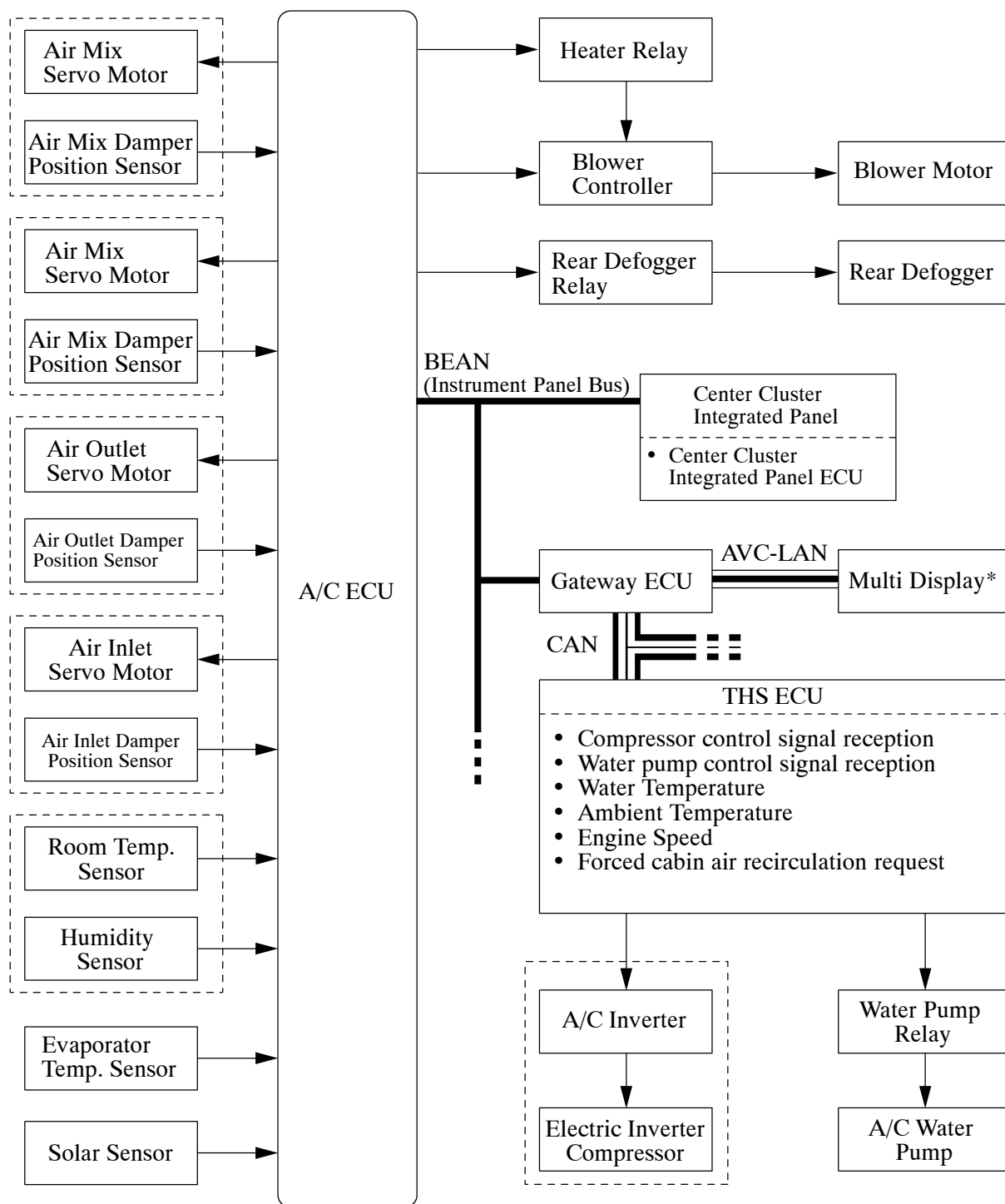
► Performance ◀

| Model           |                                   | New RX400h | Current RX300 |
|-----------------|-----------------------------------|------------|---------------|
| Heater          | Heat Output W                     | 5,750      | ←             |
|                 | Air Flow Volume m <sup>3</sup> /h | 340        | ←             |
|                 | Power Consumption W               | 210        | ←             |
| Air conditioner | Cooling Capacity W                | 5,900      | 5,800         |
|                 | Air Flow Volume m <sup>3</sup> /h | 530        | ←             |
|                 | Power Consumption W               | 260        | ←             |

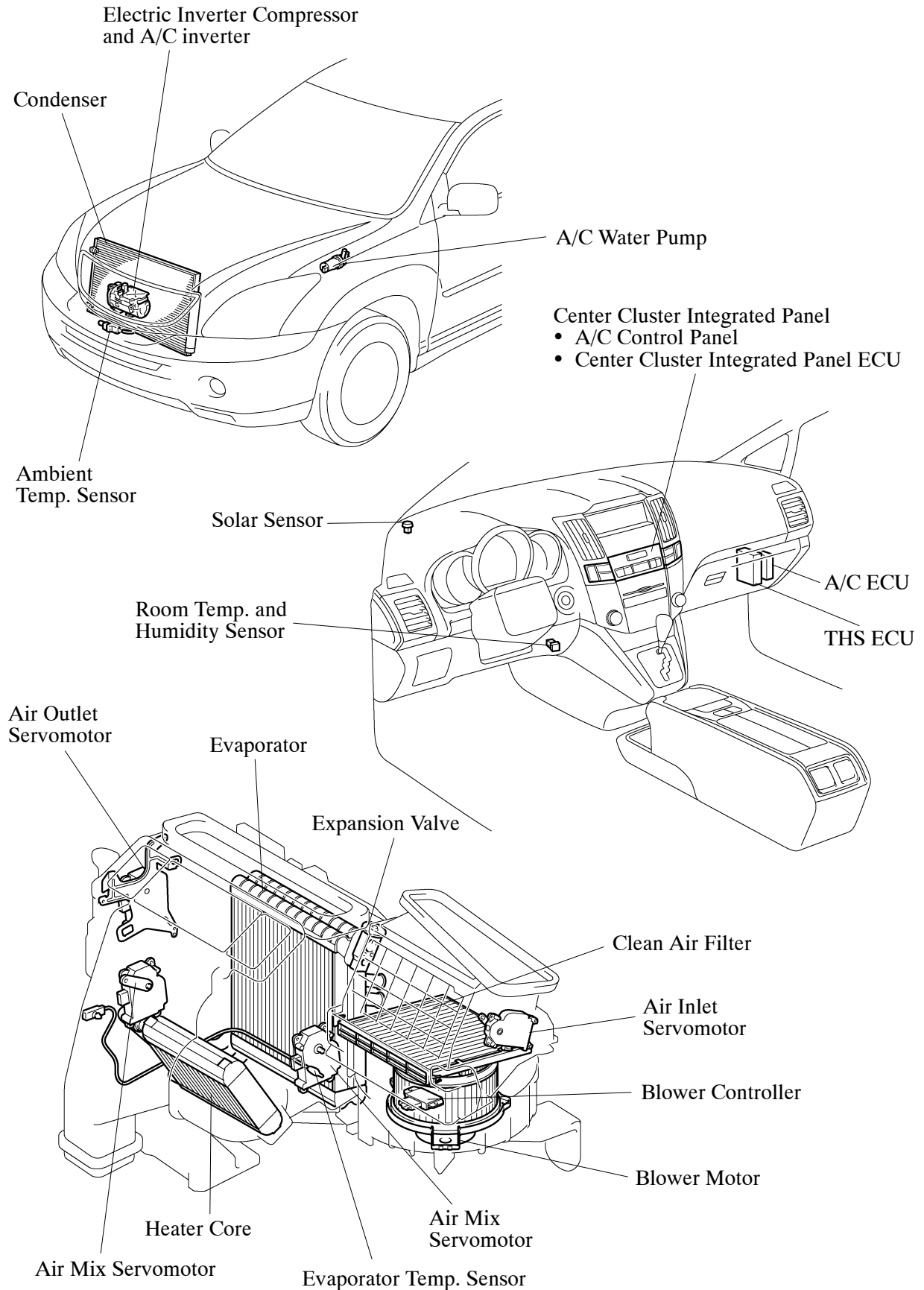
► Specifications ◀

| Model                       |             |                            | New RX400h                          | Current RX300 |
|-----------------------------|-------------|----------------------------|-------------------------------------|---------------|
| Ventilation and Heater Core | Heater Core | Type                       | Straight Flow (Full-path Flow)      | ←             |
|                             |             | Size W × H × L mm (in.)    | 222.4 × 150 × 27 (8.8 × 5.9 × 1.1)  | ←             |
|                             |             | Fin Pitch mm (in.)         | 1.8 (0.07)                          | ←             |
|                             | Blower      | Motor Type                 | S80Fs-12.5T                         | ←             |
|                             |             | Fan Type                   | Shroud Fan                          | ←             |
|                             |             | Fan Size Dia. × H mm (in.) | 150 × 75 (5.9 × 3.0)                | ←             |
| Air Conditioner             | Condenser   | Type                       | Multi-flow (Sub-cool)               | ←             |
|                             |             | Size W × H × L mm (in.)    | 670 × 492 × 16 (26.4 × 19.4 × 0.6)  | ←             |
|                             |             | Fin Pitch mm (in.)         | 3.95 (0.16)                         | ←             |
|                             | Evaporator  | Type                       | Revolutionary Slim Structure        | ←             |
|                             |             | Size W × H × L mm (in.)    | 266.3 × 251 × 38 (10.5 × 9.9 × 1.5) | ←             |
|                             |             | Fin Pitch mm (in.)         | 3.0 (0.12)                          | ←             |
|                             | Compressor  | Type                       | ES27                                | 10S17         |
|                             | Refrigerant | Type                       | HFC134a (R134a)                     | ←             |
|                             |             | Volume g                   | 600 ± 50                            | ←             |

## 2. System Diagram

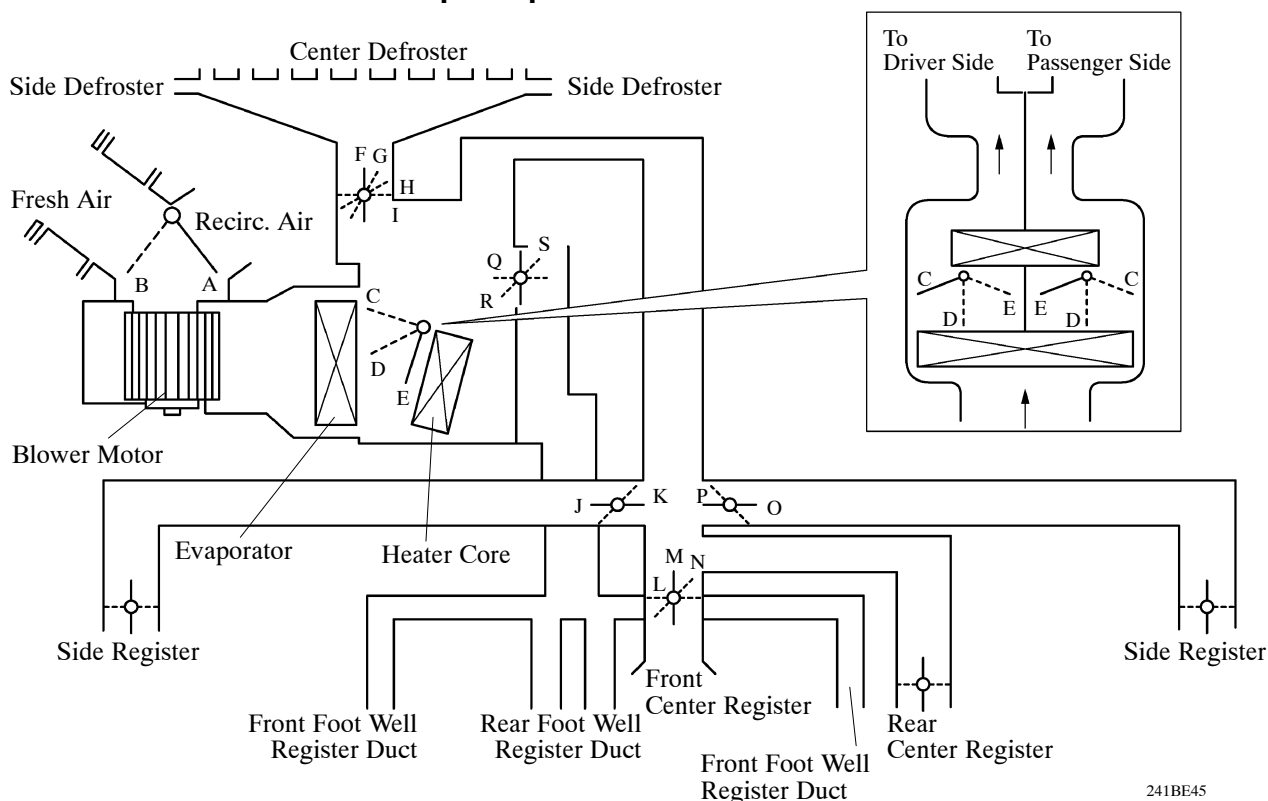


### 3. Layout of Main Components



BE

#### 4. Mode Position and Damper Operation



241BE45

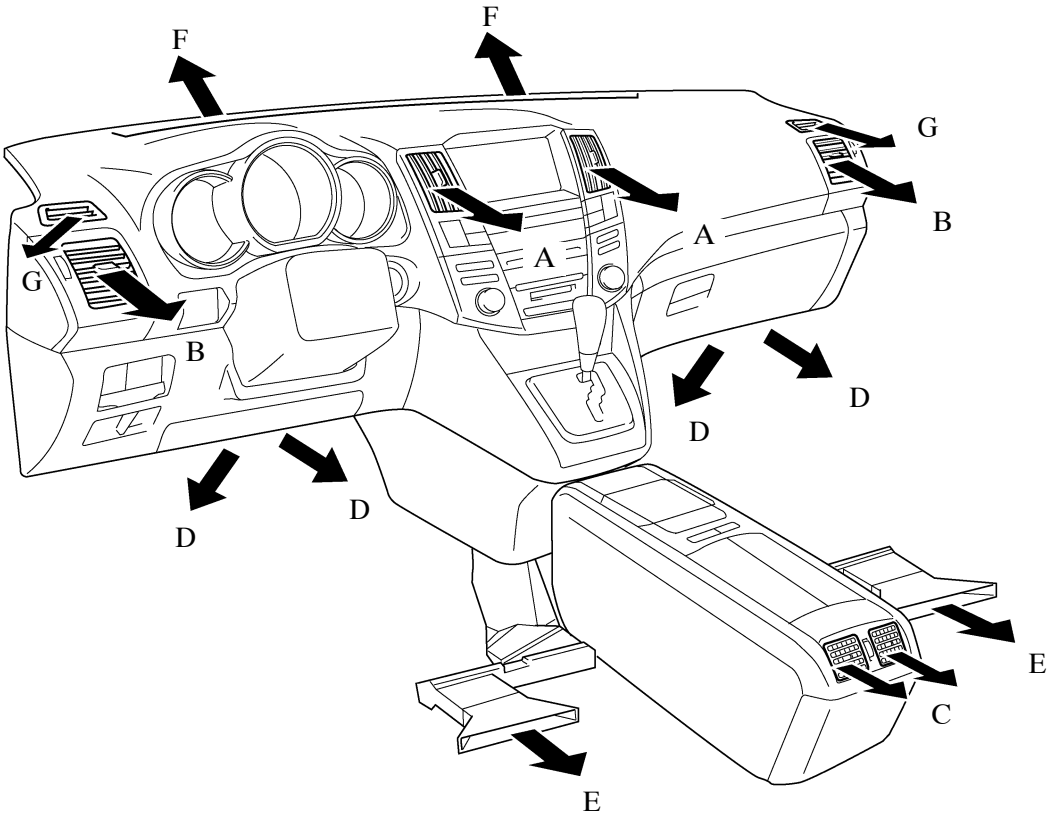
#### ► Function of Main Damper ◀

| Control Damper                                          | Control Position                                                                             |         | Damper Position      | Operation                                                                                                                                                                                                                   |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------|---------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Air Inlet Control Damper                                |  FRESH    | 187BE23 | A                    | Brings in fresh air.                                                                                                                                                                                                        |
|                                                         |  RECIRC   | 187BE41 | B                    | Recirculates internal air.                                                                                                                                                                                                  |
| Air Mix Control Damper (Left/Right Independent Control) | MAX COLD - MAX HOT<br>TEMP. SETTING<br>{18°C (65°F) - 32°C (85°F)}                           |         | C ~ D ~ E            | Varies the mixture ratio of the cool air and the warm air in order to regulate the temperature continuously from HOT to COLD.                                                                                               |
| Mode Control Damper                                     |  DEF      | 187BE28 | F, K, L, P, S        | Defrosts the windshield through the center defroster, side defroster, side register and rear center register.                                                                                                               |
|                                                         |  FOOT/DEF | 187BE27 | G, K, L, P, Q        | Defrosts the windshield through the center defroster, side defroster, side register and rear center registers, while air is also blown out from the front and rear foot well register ducts.                                |
|                                                         |  FOOT     | 187BE26 | H*1, I*2, K, L, P, Q | Air blows out of the front and rear foot well register ducts, side register, and rear center registers. Furthermore, when the damper is set to FOOT in the AUTO mode, a slight amount of air also flows from the defroster. |
|                                                         |  BI-LEVEL | 187BE25 | I, K, N, P, R        | Air blows out of the front and rear center registers, side registers, and front and rear foot well register ducts.                                                                                                          |
|                                                         |  FACE     | 187BE24 | I, J, M, O, S        | Air blows out of the front and rear center registers, and side register.                                                                                                                                                    |

\*1: Auto FOOT Mode

\*2: Manual FOOT Mode

5. Air Outlets and Air Volume Ratios



LHD Model

277BE35

| Air Outlet Position Symbol |                  |  | A           | B         | C         | D          | E         | F                | G              |
|----------------------------|------------------|--|-------------|-----------|-----------|------------|-----------|------------------|----------------|
| Air Outlet Mode            | Air Mix Position |  | Center Face | Side Face | Rear Face | Front Foot | Rear Foot | Center Defroster | Side Defroster |
| FACE                       | Max Cool         |  | ○           | ○         | ○         | —          | —         | —                | —              |
| BI-LEVEL                   | Center           |  | ○           | ○         | ○         | ○          | ○         | —                | —              |
| FOOT                       | Max Hot          |  | —           | ○         | ○         | ○          | ○         | ○                | ○              |
| FOOT/DEF                   | Max Hot          |  | —           | ○         | ○         | ○          | ○         | ○                | ○              |
| DEF                        | Max Hot          |  | —           | ○         | ○         | —          | —         | ○                | ○              |

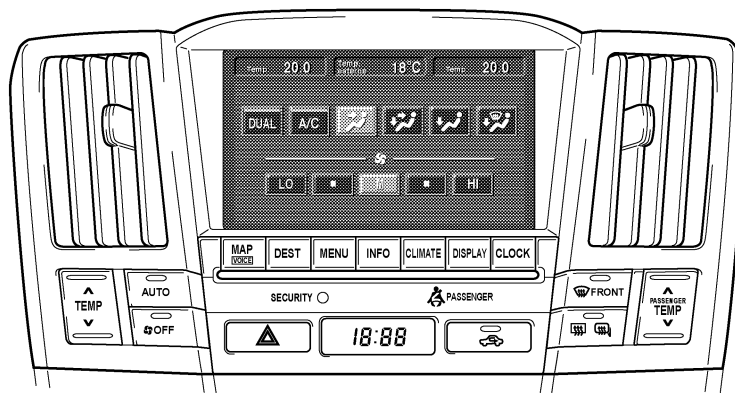
The size of the circle ○ indicates the proportion of airflow volume.

277BE36

## ■ CONSTRUCTION AND OPERATION

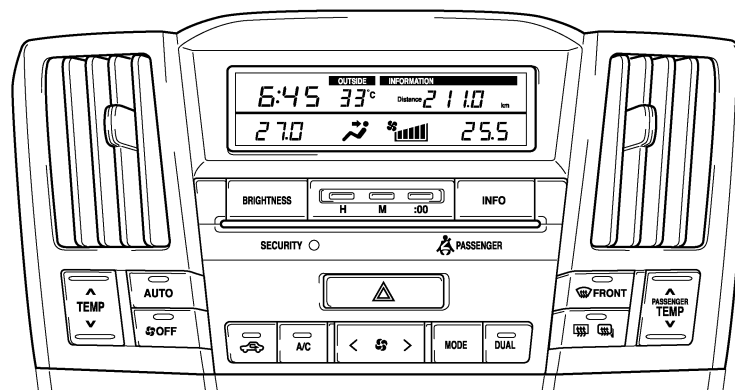
### 1. Air Conditioner Control Panel

- As in the current RX300, an easy-to-use, push-button type center cluster panel is used. There are two types of control panels, depending on the setting of the multi-display.
- On the models without a multi display, the air conditioner status is displayed on an LCD (Liquid Crystal Display) panel. On the models with multi display, the air conditioner status is displayed on the multi display.
- The independent temperature control switches for the driver and the front passenger have been located closer to the respective seats to enhance their ease of use.



**LHD Models with Multi Display**

278BE12



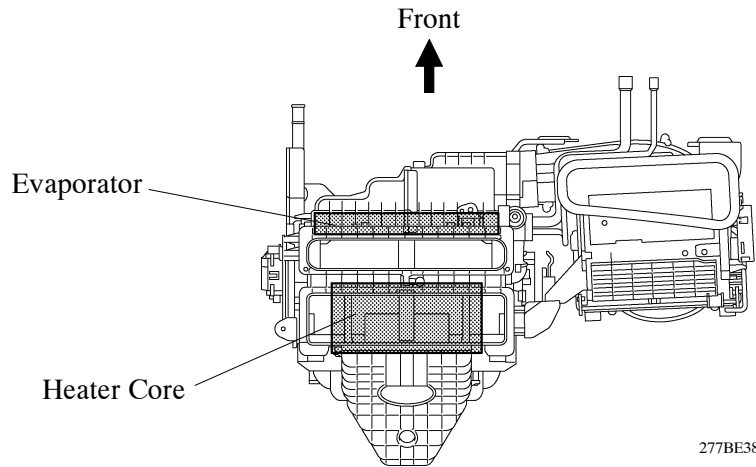
**LHD Models without Multi Display**

242BE18

## 2. Air Conditioner Unit

### General

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

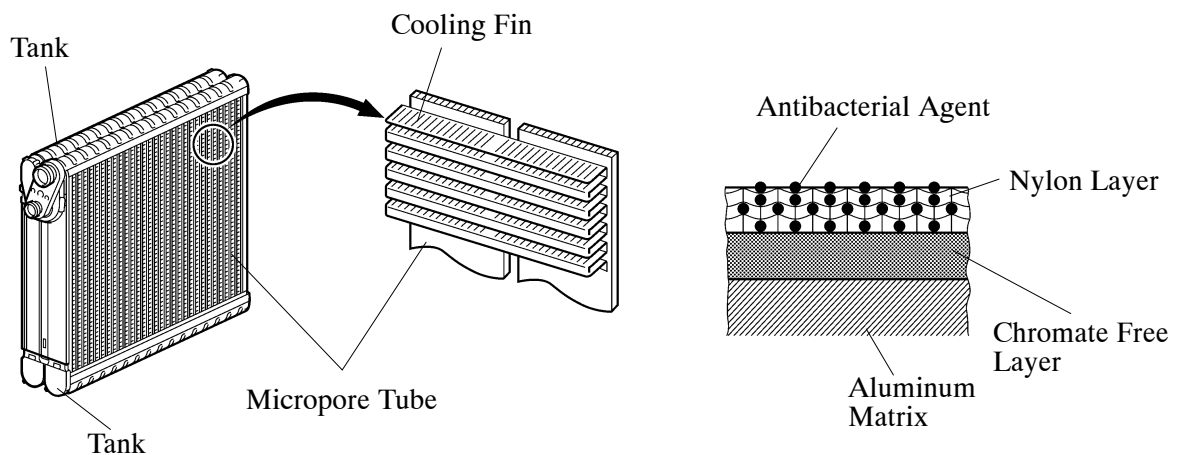


277BE38

### LHD Models

### Evaporator

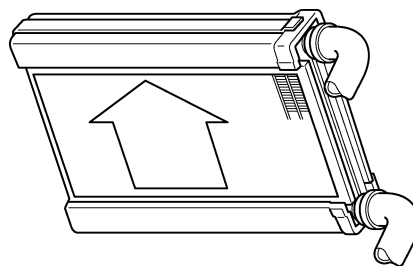
- A revolutionary slim structure evaporator is used.
- By placing the tanks at the top and the bottom of the evaporator unit and using a micropore tube construction, the following effects have been realized:
  - a) The heat exchanging efficiency has been improved.
  - b) The temperature distribution has been made more uniform.
  - c) The evaporator has been made thinner.
- The evaporator body has been coated with a type of resin that contains an antibacterial agent in order to minimize the source of foul odor and the propagation of bacteria. The substrate below this coating consists of a chromate-free layer to help protect the environment.



232BE19

## Heater Core

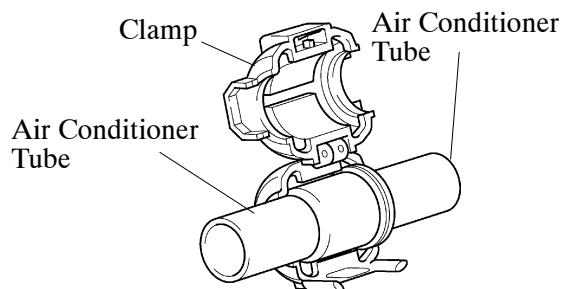
A compact, lightweight, and highly efficient straight flow (full-path flow) aluminum heater core is used.



152BE21

## 3. Quick Joint

A clamp type quick joint is used to connect the high pressure and low pressure tubes of the air conditioner unit. As a result, the ease of operation and service has been improved.



160CM04

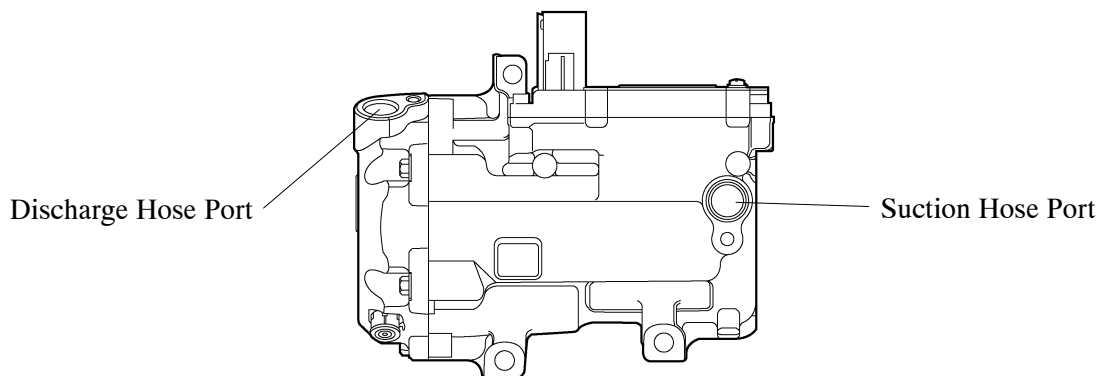
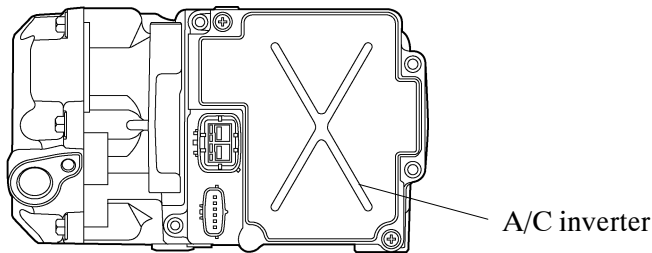
### Service Tip

Use the appropriate SST to remove the quick joint (for high pressure tube: 09870-00025, for low pressure tube: 09870-00015). For details, see the LEXUS RX400h Repair Manual (Pub No. RM1139E).

## 4. Compressor

### General

- Along with the installation of the Hybrid Unit on the new RX400h, an S27 electric inverter compressor that is driven by a motor is used. The basic construction and operation of this compressor are the same as the ordinary scroll compressor, except that it is driven by an electric motor.
- The A/C inverter has been integrated with the compressor.
- The electric motor is actuated by the alternating current (288V) supplied by the A/C inverter. As a result, the air conditioner control system on the RX400h is actuated without depending on the operation of the engine, thus realizing a comfortable air conditioner system and low fuel consumption.
- Due to the use of an electric inverter compressor, the compressor speed can be controlled at the required speed calculated by the A/C ECU. Thus, the cooling and dehumidification performance and power consumption have been optimized.
- Low-moisture permeation hoses are used for the suction and discharge hoses at the compressor in order to minimize the entry of moisture into the refrigeration cycle.
- The compressor uses high-voltage alternating current. If a short or open circuit occurs in the compressor wiring harness, the THS ECU will cut off the A/C inverter circuit in order to stop the power supply to the compressor.
- For details on the Electric Inverter Compressor control effected by the A/C ECU, see page BE-81.



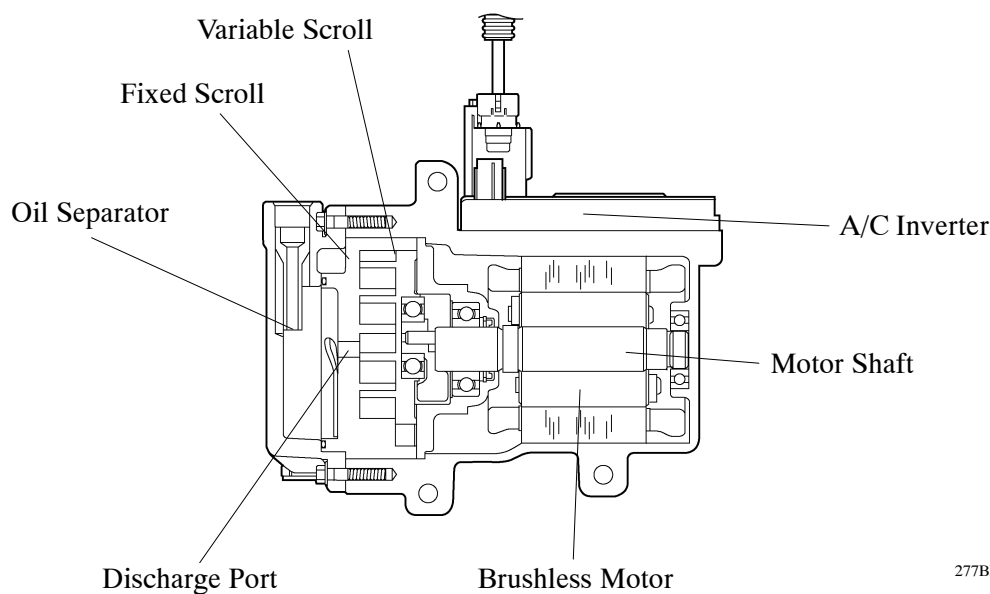
277BE37

### Service Tip

In order ensure the proper insulation of the internal high-voltage portion of the compressor and the compressor housing, the RX400h has adopted a compressor oil (ND11) with a high level of insulation performance. Therefore, never use a compressor oil other than the ND11 type compressor oil or its equivalent.

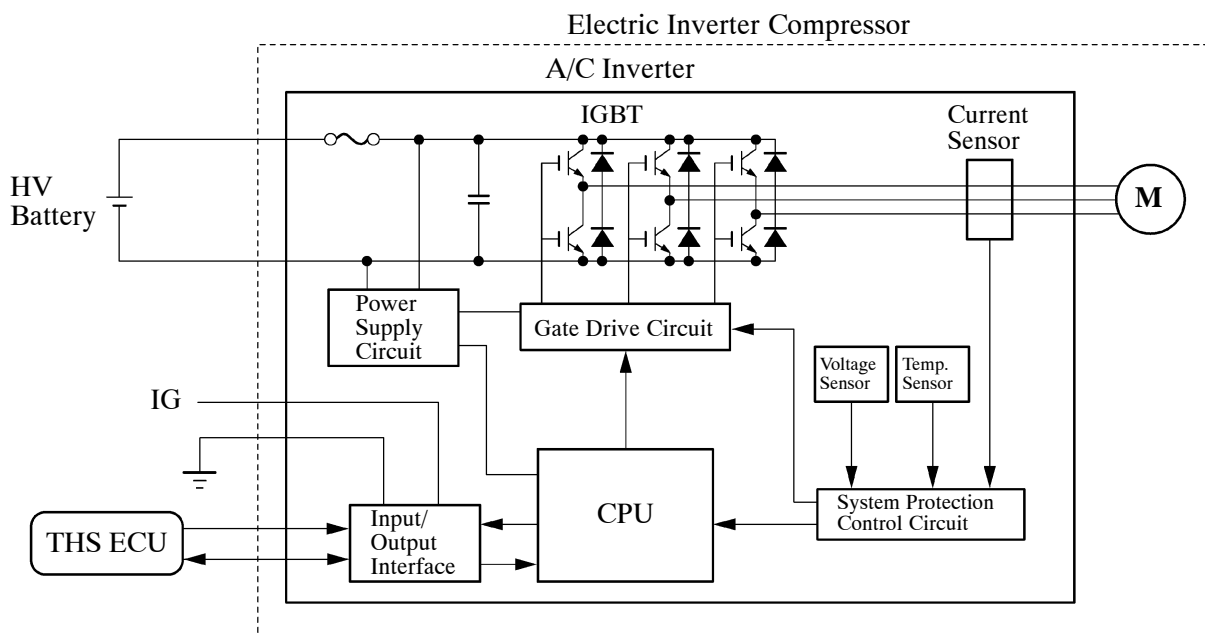
## Construction

- The Electric Inverter Compressor consists of a spirally wound fixed scroll and variable scroll that form a pair, a brushless motor, an oil separator, a motor shaft and A/C inverter.
- The fixed scroll is integrated with the housing. Because the rotation of the shaft causes the variable scroll to revolve while maintaining the same posture, the volume of the space that is partitioned by both scrolls varies to perform the suction, compression, and the discharge of the refrigerant gas.
- Locating the suction port directly above the scrolls enables direct suction, thus realizing improved suction efficiency.
- Containing a built-in oil separator, this compressor is able to separate the compressor oil that is intermixed with the refrigerant and circulates in the refrigeration cycle, thus realizing a reduction in the oil circulation rate.
- This inverter converts the HV battery's nominal voltage of DC 288V into AC 288 V and supplies power to operate the compressor.



277BE39

## ► System Diagram ◀



277BE40

## Operation

### 1) Suction

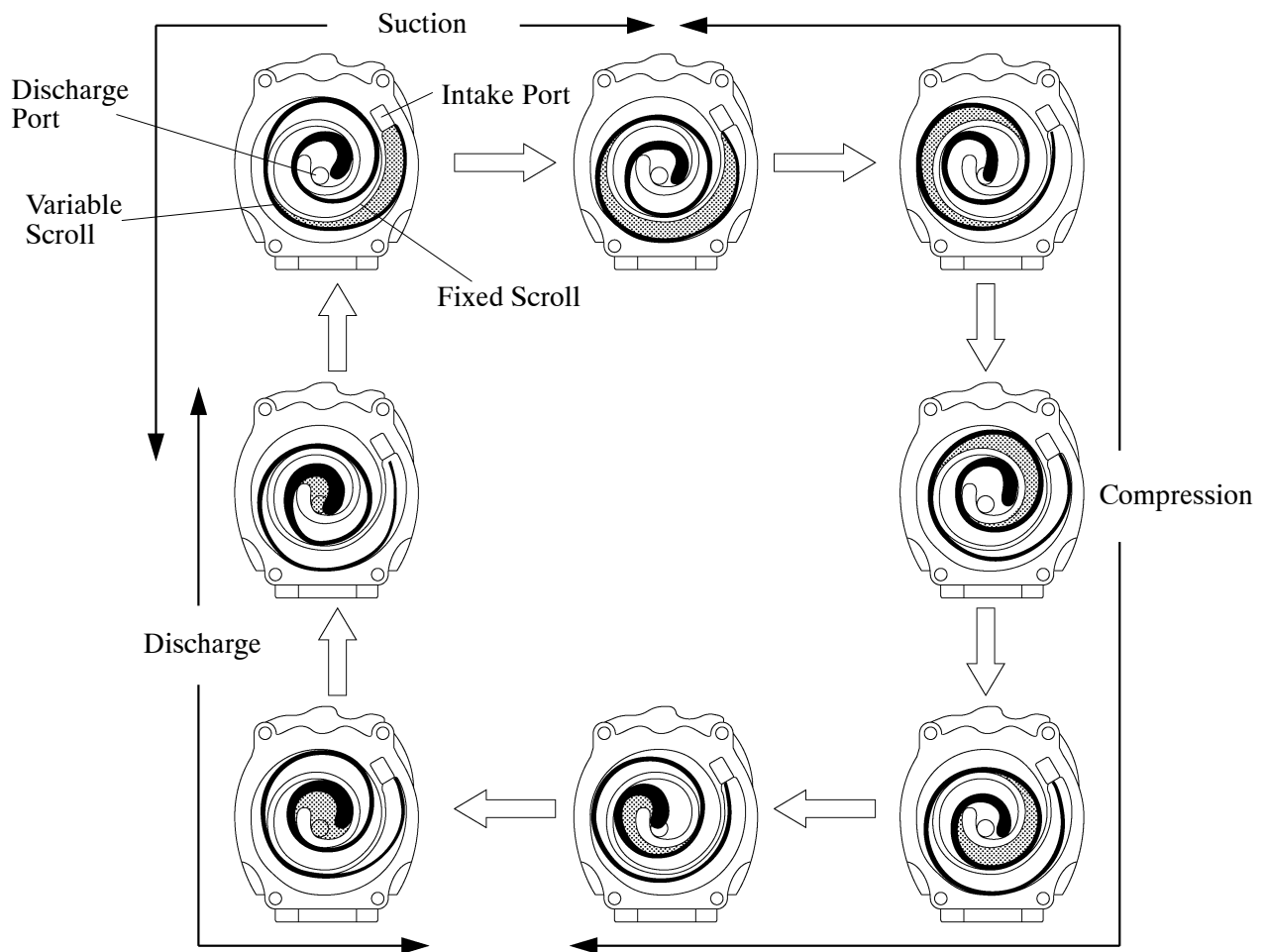
As the capacity of the compression chamber, which is created between the variable scroll and the fixed scroll, increases in accordance with the revolution of the variable scroll, refrigerant gas is drawn in from the intake port.

### 2) Compression

From the state at which the suction process has been completed, as the revolution of the variable scroll advances further, the capacity of the compression chamber decreases gradually. Consequently, the refrigerant gas that has been drawn in becomes compressed gradually and is sent to the center of the fixed scroll. The compression of the refrigerant gas is completed when the variable scroll completes approximately 2 revolutions.

### 3) Discharge

When the compression of the refrigerant gas is completed and the refrigerant pressure becomes high, the refrigerant gas discharges through the discharge port located in the center of the fixed scroll by pushing the discharge valve.



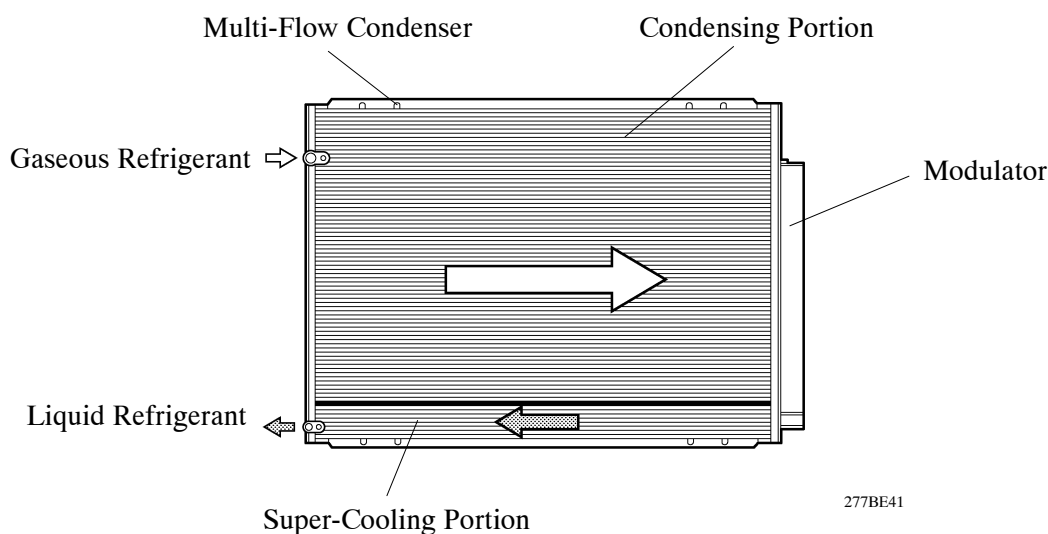
## 5. Condenser

### General

The new RX400h uses sub-cool condenser. This is a multi-flow condenser consisting of two cooling portions: a condensing portion and 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.

### Sub-Cool Cycle

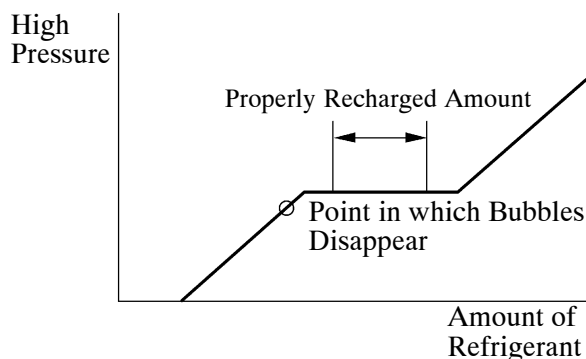
In the sub-cool cycle, after the refrigerant passes through the condensing portion of the condenser, both the liquid refrigerant and the gaseous refrigerant that could not be liquefied, are cooled again in the super-cooling portion. Thus, the refrigerant is sent to the evaporator in an almost completely liquefied state.



277BE41

### Service Tip

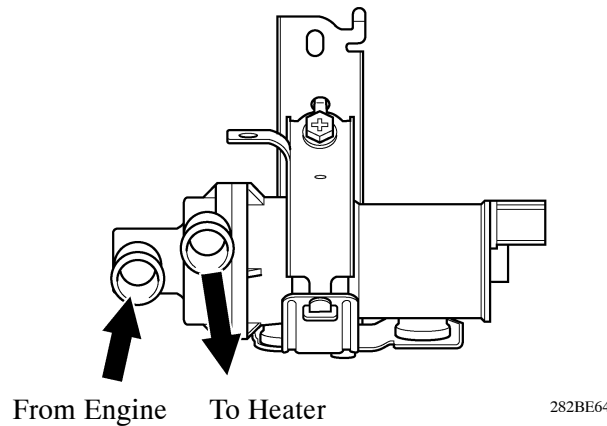
The point at which the air bubbles disappear in the refrigerant of the sub-cool cycle is lower than the proper amount of refrigerant with which the system must be filled. Therefore, if the system is recharged with refrigerant based on the point at which the air bubbles disappear, the amount of refrigerant 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 to recharge the system with refrigerant, see the LEXUS RX400h Repair Manual (Pub. No. RM1139E).



241BE169

## 6. Water Pump

- The new RX400h uses an electric water pump for air conditioning. This provides a stable heater performance even if the engine is stopped because of a function of the THS-II.
- The RX400h uses a new type of electrical water pump in which the water flow resistance has been reduced.

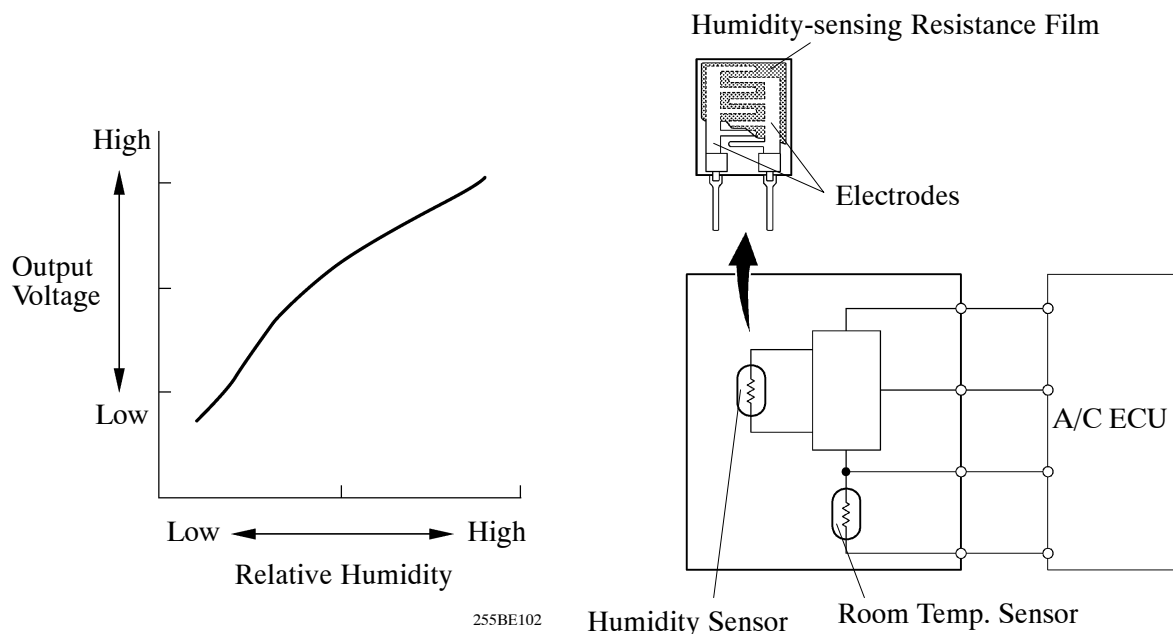


From Engine To Heater

282BE64

## 7. Room Temp. and Humidity Sensor

- A humidity sensor function has been added to the room temperature sensor. By enabling the detection of humidity in the vehicle interior, this function optimizes the amount of dehumidification effort during the operation of the air conditioner system. As a result, the power consumption of the compressor has been reduced and a comfortable level of humidity has been realized in the vehicle interior.
- The humidity-sensing resistance film that is built into the humidity sensor absorbs and releases the humidity in the vehicle interior. During the absorption and releasing processes, the humidity-sensing resistance film expands (during the absorption of humidity) and contracts (during drying). The clearance between the carbon particles in the humidity-sensing resistance film expands and contracts during absorption and drying, thus changing the resistance between the electrodes. The A/C ECU determines the humidity in the vehicle interior through the changes in the output voltage of the humidity sensor that are caused by the resistance between the electrodes.



255BE102

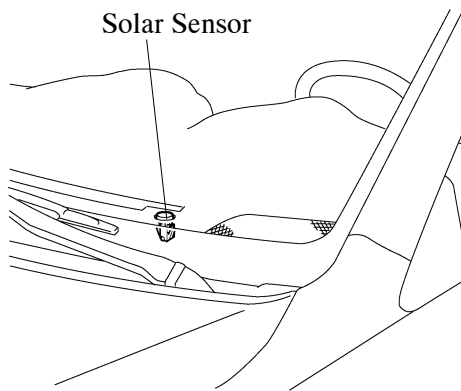
Humidity Sensor

Room Temp. Sensor

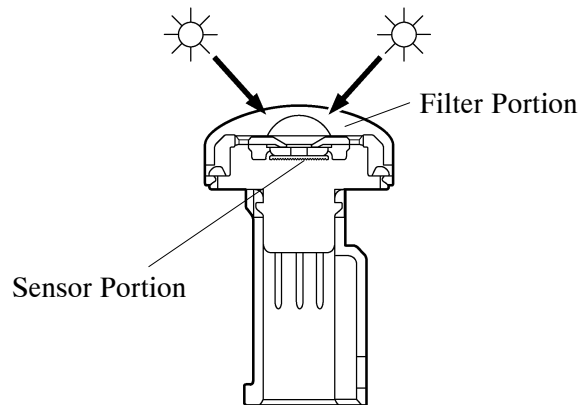
255BE103

## 8. 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 at the driver and front passenger sides (2 directions) and outputs them to the air conditioner ECU.
- This sensor is integrated with the automatic light control sensor that is used in the automatic light control system.
- This sensor is located in the driver side above the instrument panel.



241BE50

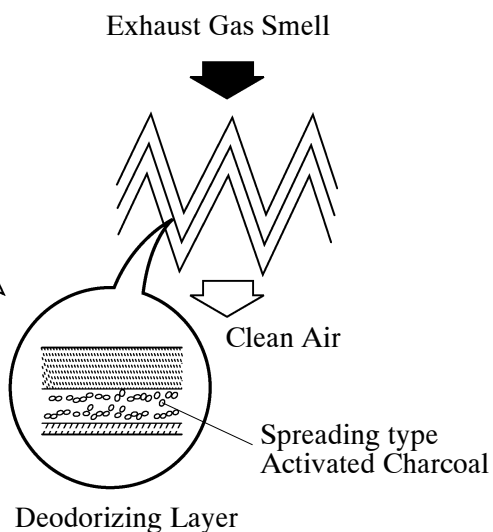
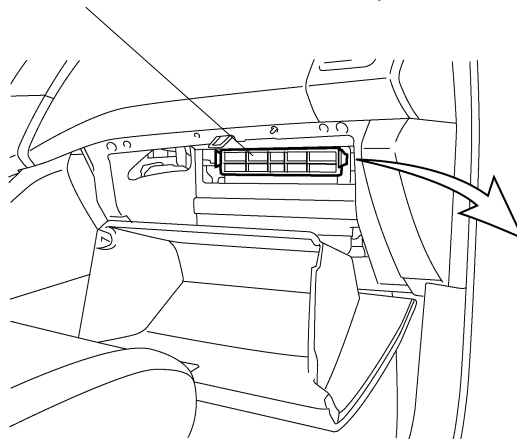


199BE65

## 9. Clean Air Filter

- A clean air filter (high efficiency type combination filter) is used.
- A deodorizing function that eliminates the exhaust gas smell that enters the cabin from the outside has been added to the conventional clean air filter. This clean air filter uses spreading type activated charcoal in the deodorizing layer to eliminate the exhaust gas (include acetaldehyde) smell.

Clean Air Filter  
(high efficiency type combination filter)



241BE51

### Service Tip

- Do not wash the clean air filter (high efficiency type combination filter) with water or use an air blower to clean it because the clean air filter (high efficiency type combination filter) contains spreading type activated charcoal.
- The clean air filter (high efficiency type combination filter) should be changed at 15,000 km. However, it varies with the use conditions (or environment).

## 10. Air Conditioner ECU

### General

The air conditioner ECU has following control.

| Control                              |                          | Outline                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Neural Network Control               |                          | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Outlet Air Temp. Control             |                          | In compliance with the temperature set at the temperature control switch, the neural network control calculates the outlet temperature based on the input signals from various sensors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                      |                          | The temperature setting for the driver and front passenger is controlled independently in order to provide a separate vehicle interior temperature for the right and left side. Thus, air conditioner 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 outlets in accordance with the outlet mode ratio that has been calculated by the neural network control based on the input signals from various sensors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                      |                          | In accordance with the engine coolant temperature, outside air temperature, amount of sunlight, required blower outlet temperature, and vehicle speed conditions, this control automatically switches the blower outlet to the FOOT/DEF mode to prevent the window from becoming fogged when the outside air temperature is low.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Air Inlet Control                    |                          | Automatically controls the air inlet control damper in accordance with the calculation of the required outlet air temperature.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                      |                          | Drives the servomotor (for air inlet) according to the operation of the air inlet control switch and fixes the dampers in the FRESH or RECIRC position.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Electric Inverter Compressor Control | Compressor Speed Control | <ul style="list-style-type: none"><li>• The A/C ECU calculates the target speed of the compressor based on the target evaporator temperature (which is calculated by the room temperature sensor, humidity sensor, ambient temperature sensor, and the solar sensor) and the actual evaporator temperature that is detected by the evaporator temperature sensor in order to control the compressor speed.</li><li>• The A/C ECU calculates the target evaporator temperature, which includes corrections based on the vehicle interior humidity (which is obtained from the humidity sensor) and the windshield glass inner surface humidity (which is calculated from the humidity sensor, solar sensor, room temperature sensor, mode damper position, and wiper operation condition). Accordingly, the A/C ECU controls the compressor speed to an extent that would not inhibit the proper cooling performance or defogging performance.</li></ul> |
| Electric Water Pump Control          |                          | When the blower motor is ON and the engine has been stopped by the hybrid control, the A/C ECU turns ON the electric water pump in accordance with the judgment of the air mix damper opening.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Rear Window Defogger Control         |                          | Switches the rear defogger, outside rear view mirror heaters and front wiper deicer* <sup>1</sup> , on for 15 minutes when the rear defogger switch is switched on.<br>Switches them off if the switch is pressed while they are operating.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Outer Temperature Indication Control |                          | Based on the signals from the ambient temperature sensor, this control calculates the outside temperature, which is then corrected in the air conditioner ECU, and shown in the multi information display* <sup>2</sup> /multi display* <sup>3</sup> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Self-Diagnosis                       |                          | Checks the sensor in accordance with operation of the air conditioner switches, then heater control panel display portion a DTC (Diagnosis Trouble Code) to indicate if there is a malfunction or not (sensor check function).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                      |                          | Drives the actuators through a predetermined sequence in accordance with the operation of the air conditioner switches (actuator check function).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

\*1: Optional Equipment

\*2: Models without Multi Display

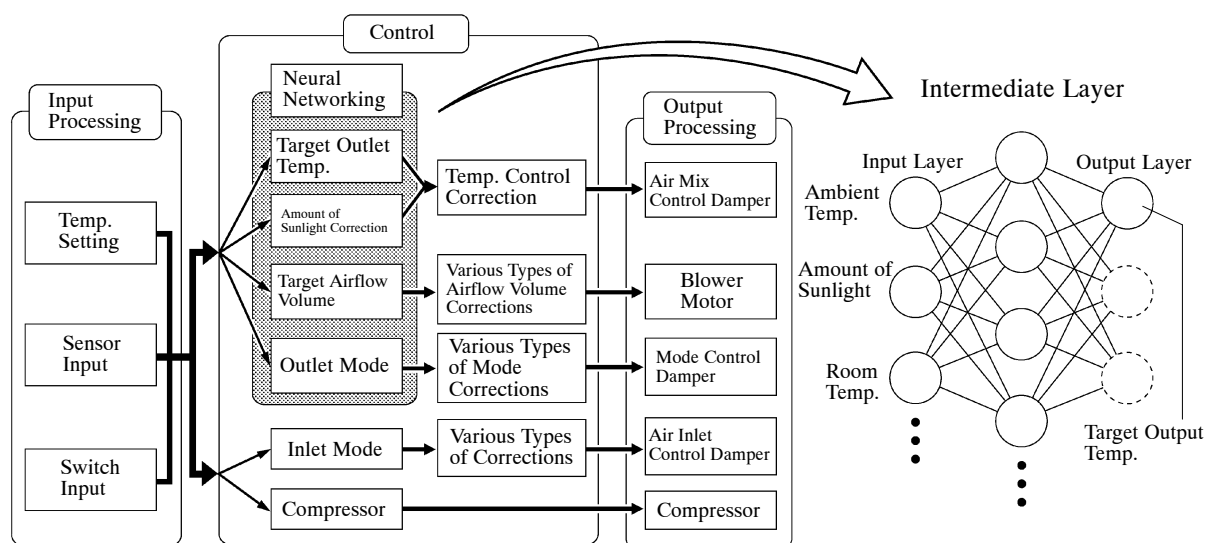
\*3: Models with Multi Display

## Neural Network Control

- In the previous automatic air conditioner system, the ECU 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 sensors 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 conditioner system. With this technique, the data that has been collected under varying environmental conditions is stored in the ECU, which effects control to provide enhanced air conditioner 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 conditioner ECU controls the servo motors and blower motor in accordance with the control volumes that have been calculated by the neural network control.

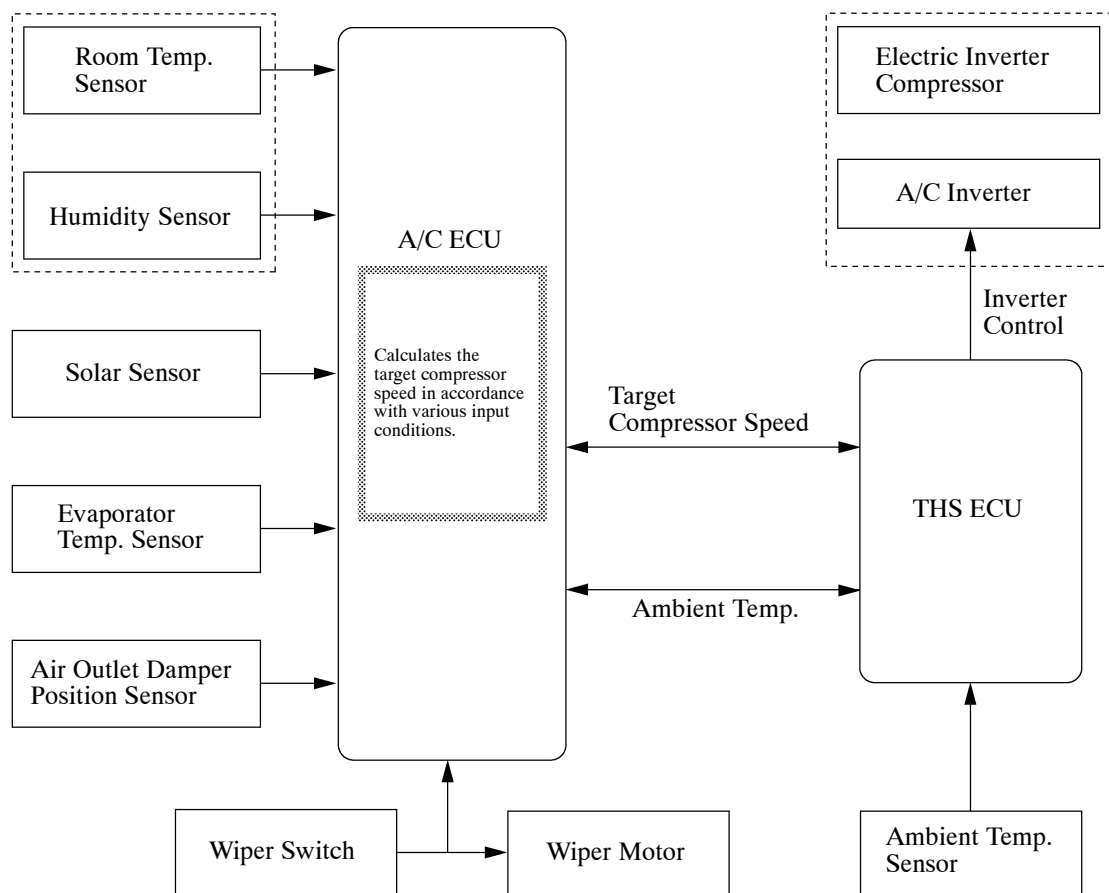


189BE109

## Electric Inverter Compressor Control

### 1) Compressor Speed Control

- The A/C ECU calculates the target compressor speed based on the target evaporator temperature (calculated from the room temperature sensor, humidity sensor, ambient temperature sensor, and solar sensor) and the actual evaporator temperature detected by the evaporator temperature sensor. Then, the A/C ECU transmits the target speed to the THS ECU. The THS ECU controls the A/C inverter based on the target speed data in order to control the compressor to a speed that suits the operating condition of the air conditioner system.
- The A/C ECU calculates the target evaporator temperature, which includes corrections based on the vehicle interior humidity (which is obtained from the humidity sensor) and the windshield glass inner surface humidity (which is calculated from the humidity sensor, solar sensor, room temperature sensor, mode damper position, and wiper operation condition). Accordingly, the A/C ECU controls the compressor speed to an extent that does not inhibit the proper cooling performance or defogging performance. As a result, comfort and low fuel consumption can be realized.



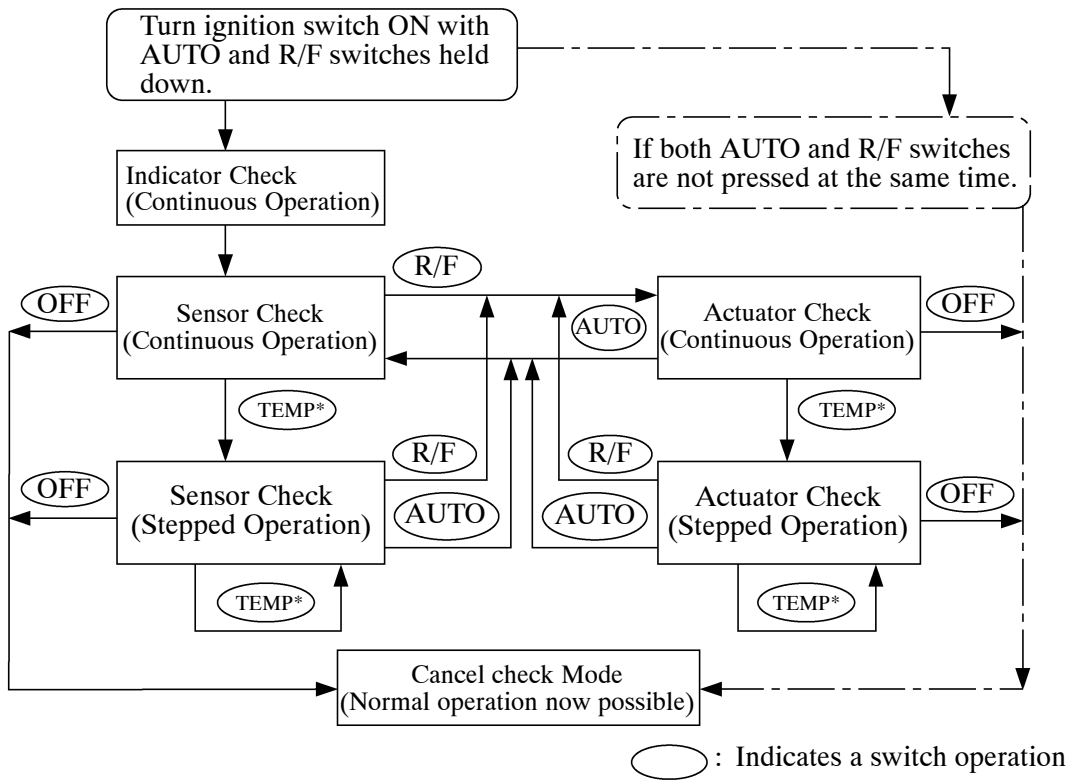
Self-Diagnosis

- The air conditioner ECU has a self-diagnosis function. It stores any operation failures in the air conditioner system memory in the form of a malfunction code. By operating the air conditioner control switches, the stored malfunction codes are displayed on the multi display on models with the multi display, and displayed on the air conditioner control panel LCD for models without multi display. Since diagnostic results are stored directly by electric power from the battery, they are not cleared even when the ignition switch is turned off.

► Functions ◀

| Function        | Outline                                                                                                                                       |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Indicator Check | Checks mode and temperature setting display.                                                                                                  |
| Sensor Check    | Checks the past and present malfunctions of the sensors, and clearing the past malfunction data.                                              |
| Actuator Check  | Checks against actuator check pattern if blower motor, servomotors and magnetic clutch are operating correctly according to signals from ECU. |

- The check function can be started by the following procedure shown below.



\*: Driver side TEMP UP switch

241BE167

- For details on the indicator check, sensor check, actuator check function, and clearing DTC of this system, refer to the LEXUS RX400h Repair Manual (Pub. No. RM1139E).

## MULTI DISPLAY

### ■ DESCRIPTION

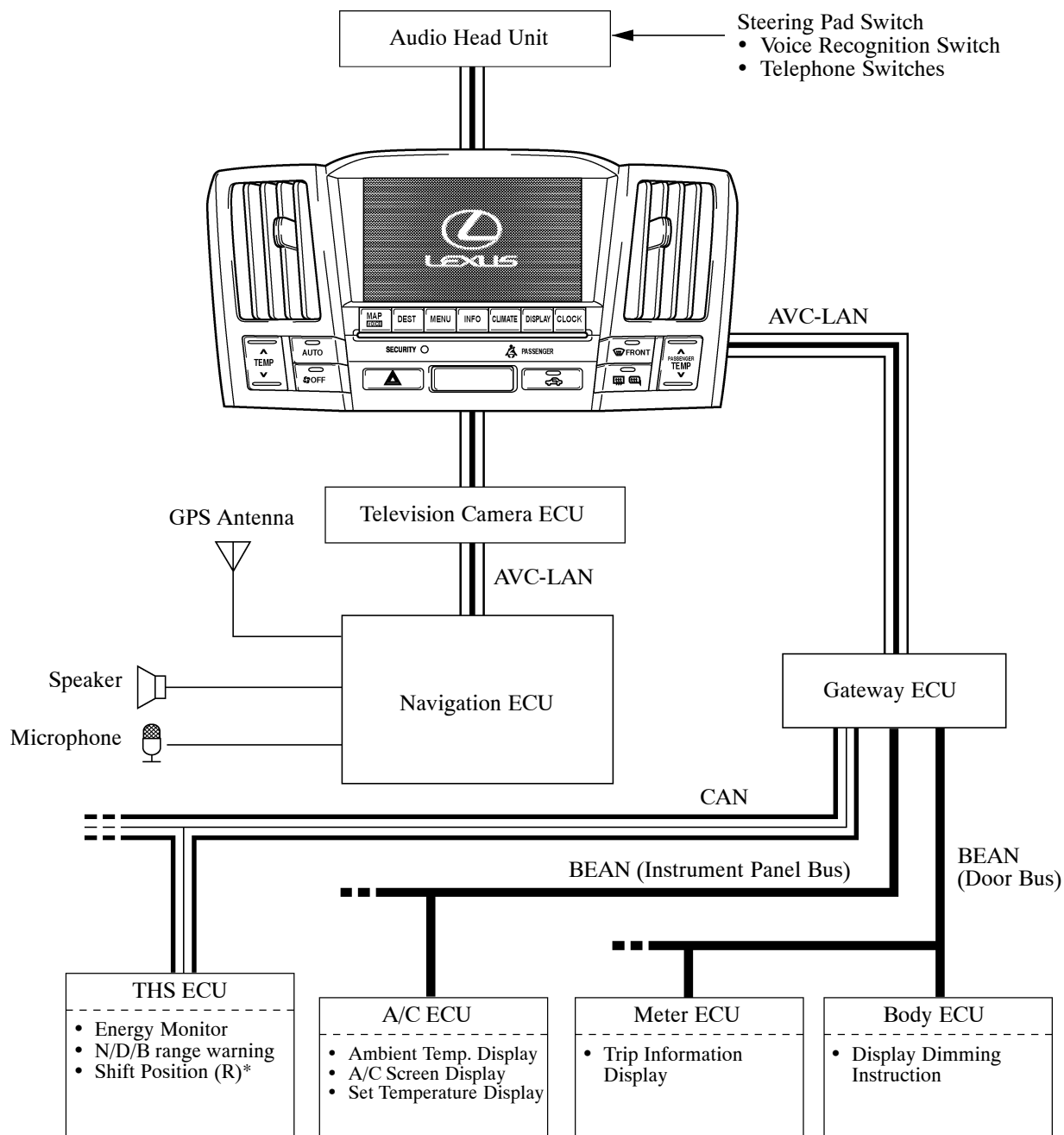
- A multi display has been provided on the center cluster panel as optional equipment. The display, which consists of a wide 7.0-inch LCD (Liquid Crystal Display) screen with a pressure sensitive touch panel, offers improved ease of use.
- A GPS (Global Positioning System) voice navigation is offered as an option.
- A voice recognition function has been adopted in the GPS voice navigation system.
- Upon receiving the operation information from the A/C ECU that is transmitted by the gateway ECU, trip information from the meter ECU that is transmitted by the gateway ECU, and the navigation information from the navigation ECU, multi display displays these data on the display.
- The energy monitor, which appears on the multi-information display on the combination meter, also appears on the multi display.
- A hands-free function for a Bluetooth-compatible\* cellular telephone is used.
- A language selector screen is used.

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

### ► Specifications ◀

|                                              |                                |                                                                       |
|----------------------------------------------|--------------------------------|-----------------------------------------------------------------------|
| Display                                      | Wide 7.0-inch LCD              |                                                                       |
|                                              | Pressure Sensitive Touch Panel |                                                                       |
| Navigation System                            | GPS                            |                                                                       |
| Languages Supported                          | Voice Guidance                 | English, German, French, Dutch, Italian, Danish, Swedish, and Spanish |
|                                              | Voice Recognition              | English, German                                                       |
| Map Data Media                               | DVD                            |                                                                       |
| Gyro Sensor<br>(Including in Navigation ECU) | Piezoelectric Ceramic Piece    |                                                                       |

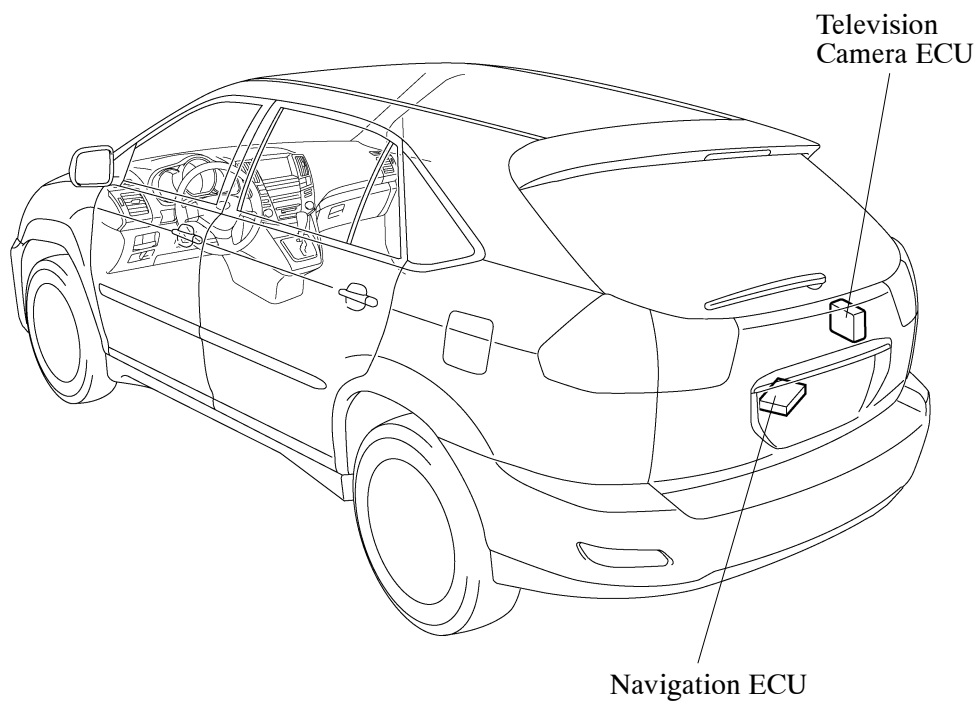
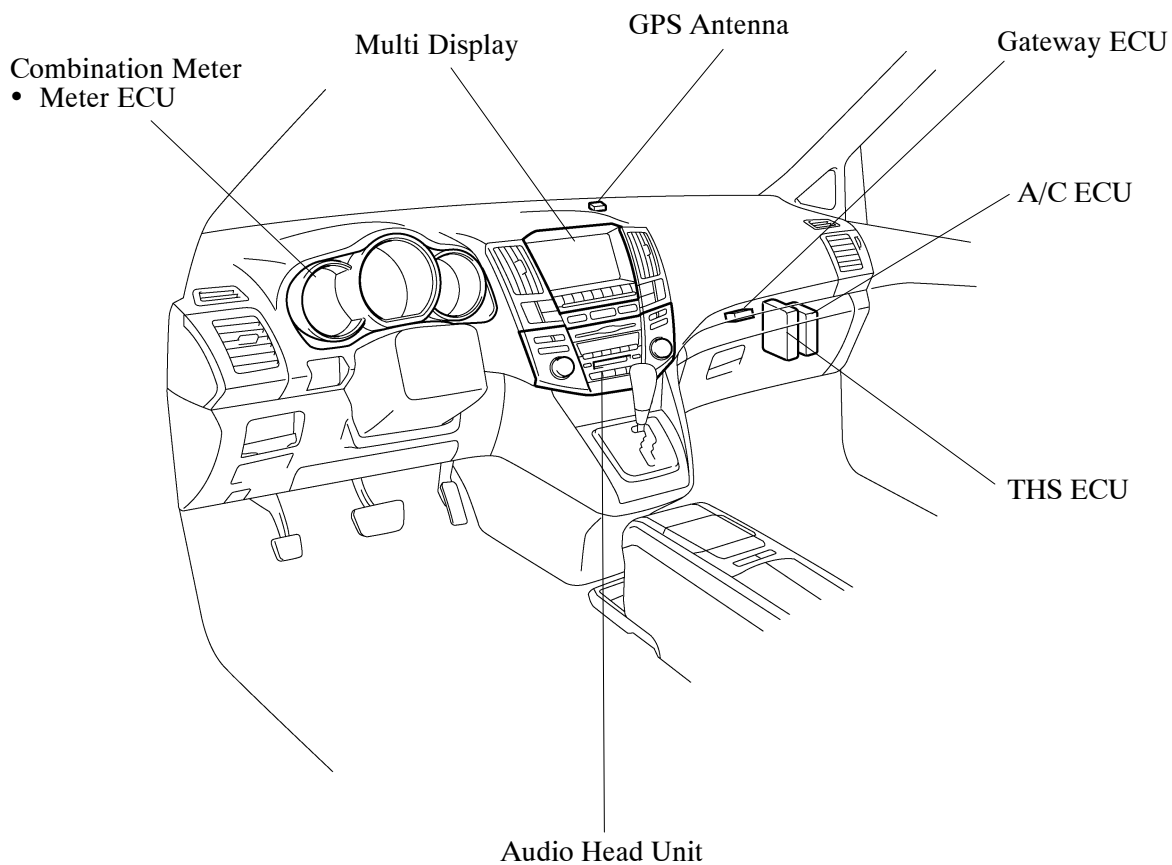
### ► System Diagram ◀



278BE34

\*: Rotates the wheels in reverse on the vehicle information display.

## ■ LAYOUT OF MAIN COMPONENTS



BE

LHD Model

278BE35

## ■ CONSTRUCTION AND OPERATION

### 1. General

Items listed below are the main functions of the multi-display.

| Function                              |                                 | Outline                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| On-screen Display                     |                                 | <ul style="list-style-type: none"> <li>• Display the operating condition of the air conditioner.</li> <li>• Display the outside temperature.</li> <li>• The operation and control of the air conditioner system can be effected through the use of the automatic air conditioner display of the multi-display and the touch switch that appears on the display.</li> </ul> |
| Navigation Screen Display             |                                 | Through the use of the GPS (Global Positioning System) and map data in a DVD, the navigation system analyzes the position of the vehicle and indicates that position on the map that is displayed on this screen.                                                                                                                                                          |
| Information Display                   | Energy Monitor Screen Display   | <p>The following pieces of information are displayed in accordance with the signals from the THS ECU (and meter ECU).</p> <ul style="list-style-type: none"> <li>• Energy Transmission Direction</li> <li>• HV Battery State of Charge Display</li> <li>• Outside Temp. Display</li> <li>• Instant Fuel Consumption</li> </ul>                                             |
|                                       | Fuel Consumption Screen Display | <p>The following pieces of information are displayed in accordance with the signals from the meter ECU (and THS ECU).</p> <ul style="list-style-type: none"> <li>• Instant Fuel Consumption</li> <li>• Driven Distance</li> <li>• Average Fuel Consumption</li> <li>• Regenerated Energy Display</li> <li>• Outside Temp. Display</li> </ul>                               |
| Warning Screen Display                |                                 | Displays a range warning message when the READY light is illuminated, the shift lever is in the N position, and the HV battery is discharged.                                                                                                                                                                                                                              |
| Air Conditioner Screen Display        |                                 | <ul style="list-style-type: none"> <li>• Display the outside temperature.</li> <li>• 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.</li> </ul>                                                                  |
| Telephone Operation Screen Display    |                                 | When a Bluetooth-compatible cellular telephone is registered on 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.                                                                                                                                           |
| Language Selector Screen Display      |                                 | The text displayed on the multi-display and the voice guidance in the GPS voice navigation system can be selected from 8 languages: English, German, French, Dutch, Italian, Danish, Swedish, and Spanish.                                                                                                                                                                 |
| Adjustment Screen Display             |                                 | <ul style="list-style-type: none"> <li>• Changes screen color (green, blue, gray, and beige).</li> <li>• Image quality adjustment screen indication.</li> </ul>                                                                                                                                                                                                            |
| Parking Assist Monitor System Display |                                 | Displays the rear view of the vehicle has been captured by the television camera mounted on the back door when the shift lever is moved to the reverse position. For details, <a href="#">see page BE-96</a> .                                                                                                                                                             |
| Diagnosis Screen Display              |                                 | <p>This contains the following 4 items:</p> <ul style="list-style-type: none"> <li>• Service Check Menu.</li> <li>• Display Check.</li> <li>• Navigation Check.</li> <li>• Camera Check.</li> </ul>                                                                                                                                                                        |

## 2. Navigation Screen Display

Based on the map data on the DVD, signal from the GPS satellites, signals from the built-in gyro sensor, and signals from the vehicle's speed sensor, the vehicle's present position, direction of travel, and driven distance are calculated and displayed on the navigation display. This screen has the display functions listed 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 head up during route guidance.      |
|                    | Map Color Change                              | Automatically changes the map display color by season.                                              |
|                    | Front Wide                                    | Displays a map in the direction of travel of the vehicle in an enlarged form. (Heading up only)     |
|                    | 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 marks on the map.                                                        |
|                    | Taillight-interlocked Map Color Change        | Changes the displayed color on the map screen 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 | RDS-TMC* Information Indication               | Receives FM multiplex broadcasts and displays traffic information on the map screen.                |
|                    | Whole Route Function                          | Changes the display scale of the map screen and displays the whole route.                           |
|                    | 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.                                            |
|                    | Intersection Search                           | By specifying two streets, the point at which they intersection is set as the destination point.    |
|                    | Emergency Search                              | Performs a specific search for hospitals, police stations and dealers.                              |
|                    | Freeway Entrance/Exit Search                  | Searches for the destination by the name of the street that connects to a freeway entrance/exit.    |
|                    | Coordinate Search                             | Searches a destination by latitude and longitude.                                                   |
|                    | Telephone Number Search                       | Searches a facility by its telephone number.                                                        |

\*: Radio Data System - Traffic Message Channel

(Continued)

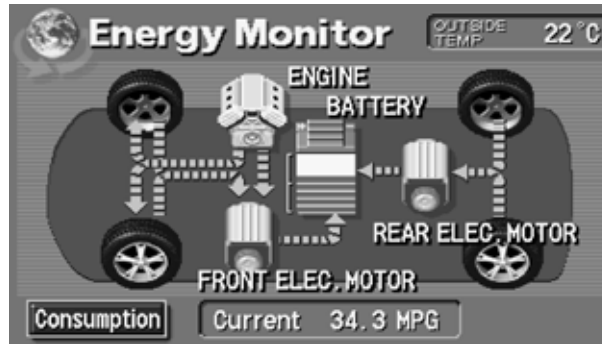
|              | Item                                         | Function                                                                                                                                                                                                                      |
|--------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 while considering regulated roads.                                                                                                                                                                            |
|              | Avoidance Area                               | Avoids a designated area and searches a route.                                                                                                                                                                                |
|              | Route Search Considering Traffic Information | Searches routes avoiding congested areas based on traffic information provided by RDS-TMC.                                                                                                                                    |
| 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.                                                                                                                                                               |
|              | Freeway Direction of Travel Guidance         | Voice guidance to instruct the direction of travel to take on the freeway.                                                                                                                                                    |
|              | Distance Display Destination                 | Displays the distance from the present location to the destination.                                                                                                                                                           |
|              | Freeway Branch Type Specimen Guidance        | Type specimen for guidance to a freeway branch.                                                                                                                                                                               |
|              | Intersection Zoom-in Display                 | Zoom-in display when approaching an intersection.                                                                                                                                                                             |
|              | Turn List Display                            | Displays a turn list on the right side of the two-screen display when approaching an intersection.                                                                                                                            |
|              | Freeway mode screen                          | Displays the distance to the next junction and exit, or POIs in the vicinity of the freeway exit.                                                                                                                             |
| Others       | Border List Guidance                         | Displays a border mark when crossing a border.                                                                                                                                                                                |
|              | Voice Recognition                            | <ul style="list-style-type: none"> <li>Recognizes pre-programmed system commands voiced by the driver to operate the navigation system.</li> <li>It recognizes voice commands in two languages: English and German</li> </ul> |
|              | RDS-TMC* Voice Guidance                      | In case there are some traffic events on guidance route, system guides them with voice.                                                                                                                                       |
|              | RDS-TMC* Text Information                    | <ul style="list-style-type: none"> <li>System can show text information.</li> <li>While vehicle driving, this function is not available.</li> </ul>                                                                           |
|              | Calendar                                     | Anniversary or appointment dates can be input and displayed.                                                                                                                                                                  |

\*: Radio Data System - Traffic Message Channel

### 3. Information Display

#### Energy Monitor Screen Display

The energy monitor screen is displayed as illustrated below. This screen has the display functions listed below.

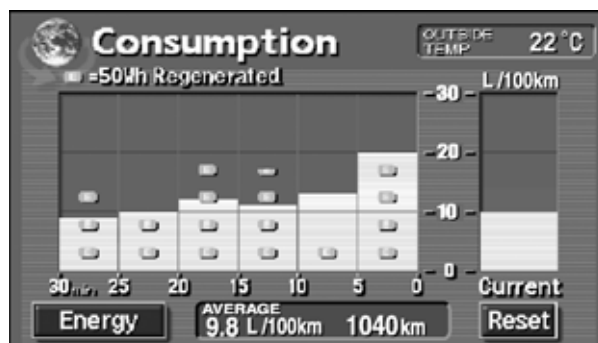


278TH04

| Item                     | Outline                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Outside Temp. Display    | Displays the outside temperature that is output by the air conditioner ECU.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Energy Monitor Display   | <ul style="list-style-type: none"> <li>• Energy monitor display indicates the energy transmission direction for checking the current drive method (engine, motor or both), the power generation status by the engine and status of regenerative energy use.</li> <li>• The SOC (State of Charge) of the battery can be checked on the meter with an 8-stage display, which is provided in the battery illustration.</li> <li>• Displays the energy monitor status that has been calculated by the THS ECU.</li> <li>• The energy monitor status is calculated by the THS ECU.</li> </ul> |
| Instant Fuel Consumption | <ul style="list-style-type: none"> <li>• Displays the value that has been calculated by the meter ECU, which is based on the driven distance and the fuel consumption volume (fuel injection signal from No. 1 injector), provided that the ignition switch is turned ON.</li> <li>• The display updates every 0.5 seconds.</li> </ul>                                                                                                                                                                                                                                                   |

## Fuel Consumption Screen Display

The fuel consumption screen is displayed as illustrated below. This screen has the display functions listed below.



278BE24

| Item                     | Outline                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Outside Temp. Display    | Displays the outside temperature that is output by the air conditioning ECU.                                                                                                                                                                                                                                                                                                                                          |
| Instant Fuel Consumption | <ul style="list-style-type: none"> <li>Displays the value that has been calculated by the meter ECU, which is based on the driven distance and the fuel consumption volume (fuel injection signal from No. 1 injector), provided that the ignition switch is turned ON.</li> <li>The meter ECU displays the instant fuel consumption value on a bar graph.</li> <li>The display updates every 0.5 seconds.</li> </ul> |
| Average Fuel Consumption | <ul style="list-style-type: none"> <li>Displays the value that has been calculated by the meter ECU, which is based on the driven distance and the fuel consumption volume (fuel injection signal from No. 1 injector) after the INFO button has been pressed 0.8 seconds or longer.</li> <li>The display updates every 10 seconds.</li> </ul>                                                                        |
| Driven Distance          | <ul style="list-style-type: none"> <li>Displays the driven distance that is output by the meter ECU after the INFO button has been pressed 0.8 seconds or longer.</li> <li>The display updates every 10 seconds.</li> </ul>                                                                                                                                                                                           |
| Recovered Energy         | <ul style="list-style-type: none"> <li>The recovered energy is shown in 5 minutes is indicated.</li> <li>The recovered energy status is calculated by the THS ECU.</li> </ul>                                                                                                                                                                                                                                         |

#### 4. Telephone Operation Screen Display

- A hands-free Bluetooth system has been provided on the multi display as an option. This system enables the user to make and receive calls or talk hands-free on the cellular telephone by operating the switches on the screen display or on the steering pad.
- The hands-free Bluetooth system consists of the multi display, a microphone located in the overhead console, and steering pad switches.
- Bluetooth is a high-speed wireless data communication system that uses the 2.4 GHz frequency band prescribed by the Bluetooth SIG (Special Interest Group), with communication at a speed of 1 Mbps. Accordingly, if the user merely brings a Bluetooth-compatible telephone that is registered in the multi display into the vehicle, wireless data communication will be established between the telephone and the multi display. As a result, the user will be able to utilize the hands-free function, without needing to connect the telephone to a hands-free connecting device as in the past.
- This screen has the display functions listed below.

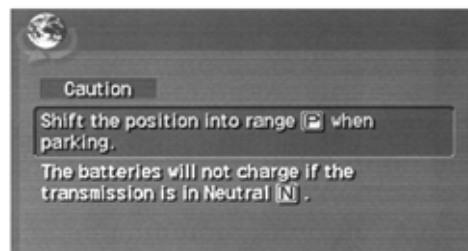
| Item                          | Outline                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incoming Call Screen          | If a call comes in to the telephone that is registered on the multi display, this screen appears. The user can receive the call by operating the incoming call button that appears on the screen or the incoming switch on the steering pad.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Call Dialing Screen           | <ul style="list-style-type: none"> <li>• The user can press the numeric key pad that appears on this screen to enter the telephone number and press the call button that appears on this screen or the call switch on the steering pad to make a call.</li> <li>• This function is disabled when the vehicle is in motion.</li> </ul>                                                                                                                                                                                                                                                                                                                                                       |
| Telephone Directory Screen    | <ul style="list-style-type: none"> <li>• This screen shows telephone directory data stored in the multi display memory, which has a maximum capacity of 500x2 numbers. The user can make a call by selecting a telephone number from this directory and pressing the call switch on this screen or the call switch on the steering pad.</li> <li>• This function is disabled when the vehicle is in motion.</li> </ul>                                                                                                                                                                                                                                                                      |
| Redial Screen                 | <ul style="list-style-type: none"> <li>• This screen shows redial data stored in the multi display memory, which has a maximum capacity of 5 numbers. The user can make a call by selecting a telephone number from the redial list and pressing the call switch on this screen or the call switch on the steering pad.</li> <li>• This function is disabled when the vehicle is in motion.</li> </ul>                                                                                                                                                                                                                                                                                      |
| Call History Screen           | <ul style="list-style-type: none"> <li>• This screen shows incoming call history data stored in the multi display memory, which has a maximum capacity of 5 numbers. The user can make a call by selecting a telephone number from this list and pressing the call switch on this screen or the call switch on the steering pad.</li> <li>• This function is disabled when the vehicle is in motion.</li> </ul>                                                                                                                                                                                                                                                                             |
| One-Touch Call Screen         | <ul style="list-style-type: none"> <li>• The user can select telephone numbers from the telephone directory or the incoming call history data and record them on this screen as one-touch call data, which has a maximum capacity of 17 numbers. The most recent redial data (one number) is always recorded as part of the one-touch call data.</li> <li>• The user can make a call by selecting a telephone number from the list of one-touch call numbers and pressing the call switch on this screen or the call switch on the steering pad.</li> </ul>                                                                                                                                 |
| Point-of-Interest Info Screen | The user can make a call by selecting a telephone number that appears on the point-of-interest screen of the navigation system and pressing the call switch on this screen or the call switch on the steering pad.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Hands-Free Setup Screen       | <ul style="list-style-type: none"> <li>• The data from the telephone directory in the user's cellular telephone can be transferred to the telephone directory in the multi display. A maximum of 500x2 numbers can be transferred.</li> <li>• By registering the pass-key of the user's Bluetooth-compatible cellular telephone on this screen, the user can make and receive calls to the registered telephone numbers or talk hands-free by operating the switches on the multi display or the switches on the steering pad.</li> <li>• A maximum of 4 Bluetooth-compatible cellular telephones can be registered. However, only one cellular telephone can be used at a time.</li> </ul> |

## 5. Warning Screen Display

### N, D and B Range Warning

When the condition indicated below has been met, the master warning light blinks on the combination meter, a message appears on the multi-information display, and a warning message appears on the multi display.

- The READY light is illuminated, the shift position is in the N position, and the HV battery is discharged.



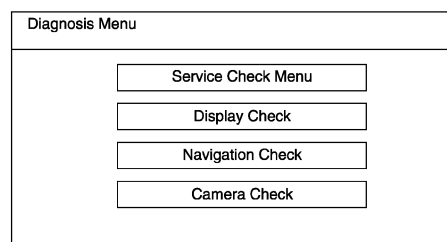
277TH94

## 6. Diagnosis Screen Display

The navigation display is equipped with a self-diagnosis system and can display the diagnosis menus shown on the right.

The diagnosis menu contains the following four items

- Service Check Menu
- Display Check
- Navigation Check
- Camera Check



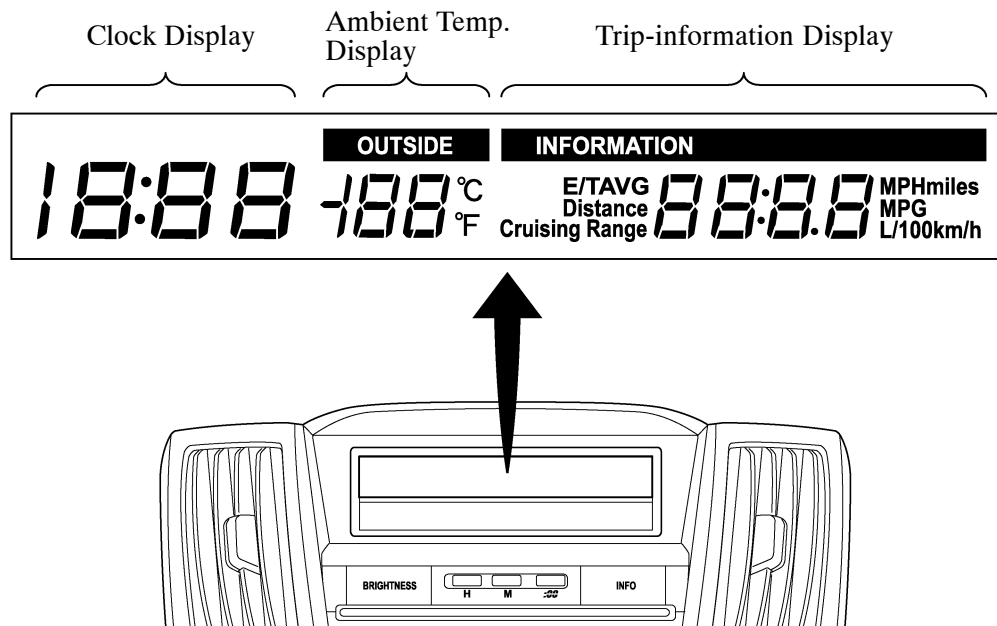
242BE27

See the LEXUS RX400h Repair Manual (Pub. No. RM1139E) for detail of Diagnosis Screen Start-up procedure.

## MULTI-INFORMATION DISPLAY (Center Cluster)

### DESCRIPTION

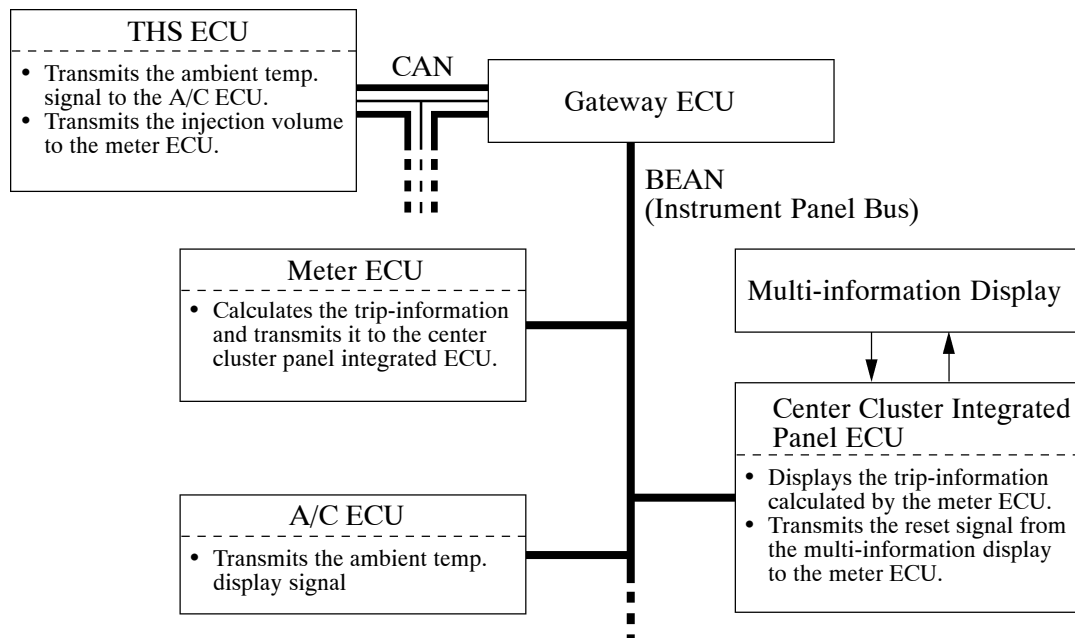
- In addition to the multi-information display on the combination meter, the new RX400h is provided with the same multi-information display in the center cluster as the one on the current RX300, as standard equipment. However, the details of this display differ from the current RX300.
- If a vehicle is provided with a multi display as optional equipment, it cannot have a multi-information display.
- The display functions can be switched by operating the INFO switch.
- The multi-information display shows four types of trip information that have been calculated by the meter ECU.



277BE93

BE

### ► System Diagram ◀

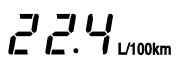
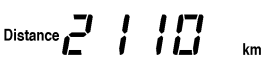


277BE47

## ■ FUNCTION OF MAIN COMPONENTS

### 1. Display Portion

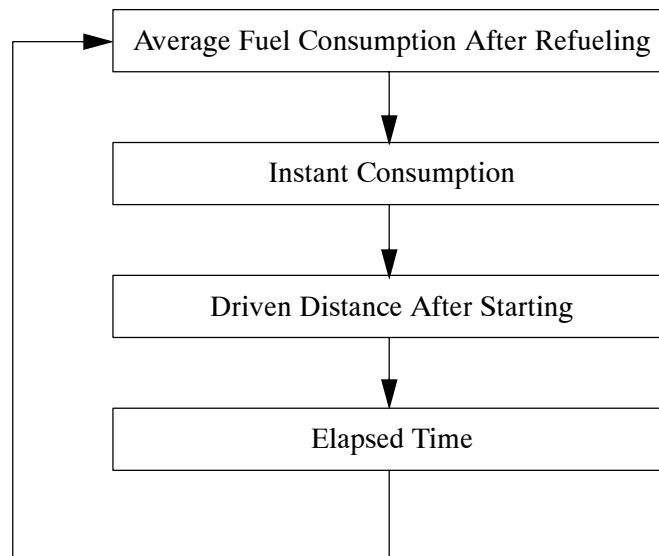
The multi-information display has following functions.

| Item                            |                          | Display Contents                                                                               | Outline                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|--------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Clock and Ambient Temp. Display |                          | <br>242BE21   | <ul style="list-style-type: none"> <li>• Clock Display</li> <li>• Displays ambient temperature in accordance with the ambient temperature sensor signal.</li> </ul>                                                                                                                                                                                |
| Trip-information Display        | Average Fuel Consumption | <br>242BE23   | <ul style="list-style-type: none"> <li>• Displays the value that has been calculated by the meter ECU, which is based on the driven distance and the fuel consumption volume (fuel injection signal from No. 1 injector) after the INFO button has been pressed 0.8 seconds or longer.</li> <li>• The display updates every 10 seconds.</li> </ul> |
|                                 | Instant Fuel Consumption | <br>242BE24   | <ul style="list-style-type: none"> <li>• Displays the value that has been calculated by the meter ECU, which is based on the driven distance and the fuel consumption volume (fuel injection signal from No. 1 injector), provided that the ignition switch is turned ON.</li> <li>• The display updates every 0.5 seconds.</li> </ul>             |
|                                 | Driven Distance          | <br>278BE41 | <ul style="list-style-type: none"> <li>• Displays the driven distance that is output by the meter ECU after the ignition switch has been turned ON or the INFO button has been pressed 0.8 seconds or longer.</li> <li>• The display updates every 10 seconds.</li> </ul>                                                                          |
|                                 | Elapsed Time             | <br>241BE63 | Displays the length of time that has elapsed from the time the ignition switch has been turned ON after the battery terminals have been connected.                                                                                                                                                                                                 |

## 2. Switch

- The contents of a trip-information display can be changed by pressing an INFO switch while the ignition switch is ON.
- Pressing the INFO switch 0.8 seconds or longer resets the display contents of average vehicle speed mode and driven distance mode.

### ► Sequence for Switching the Contents of a Trip-Information Display ◀



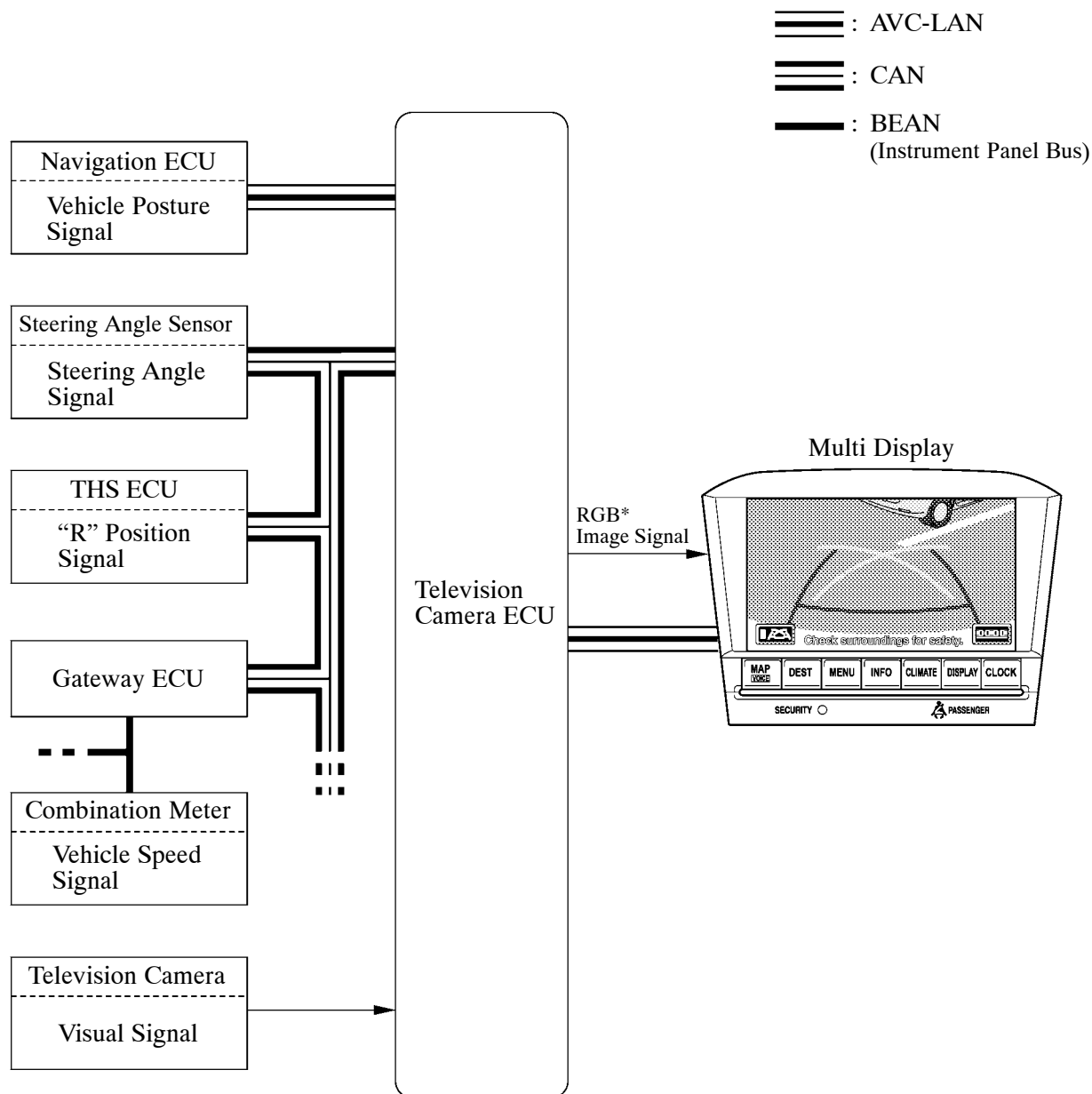
## LEXUS PARKING ASSIST SYSTEM

### ■ PARKING ASSIST MONITOR

#### 1. General

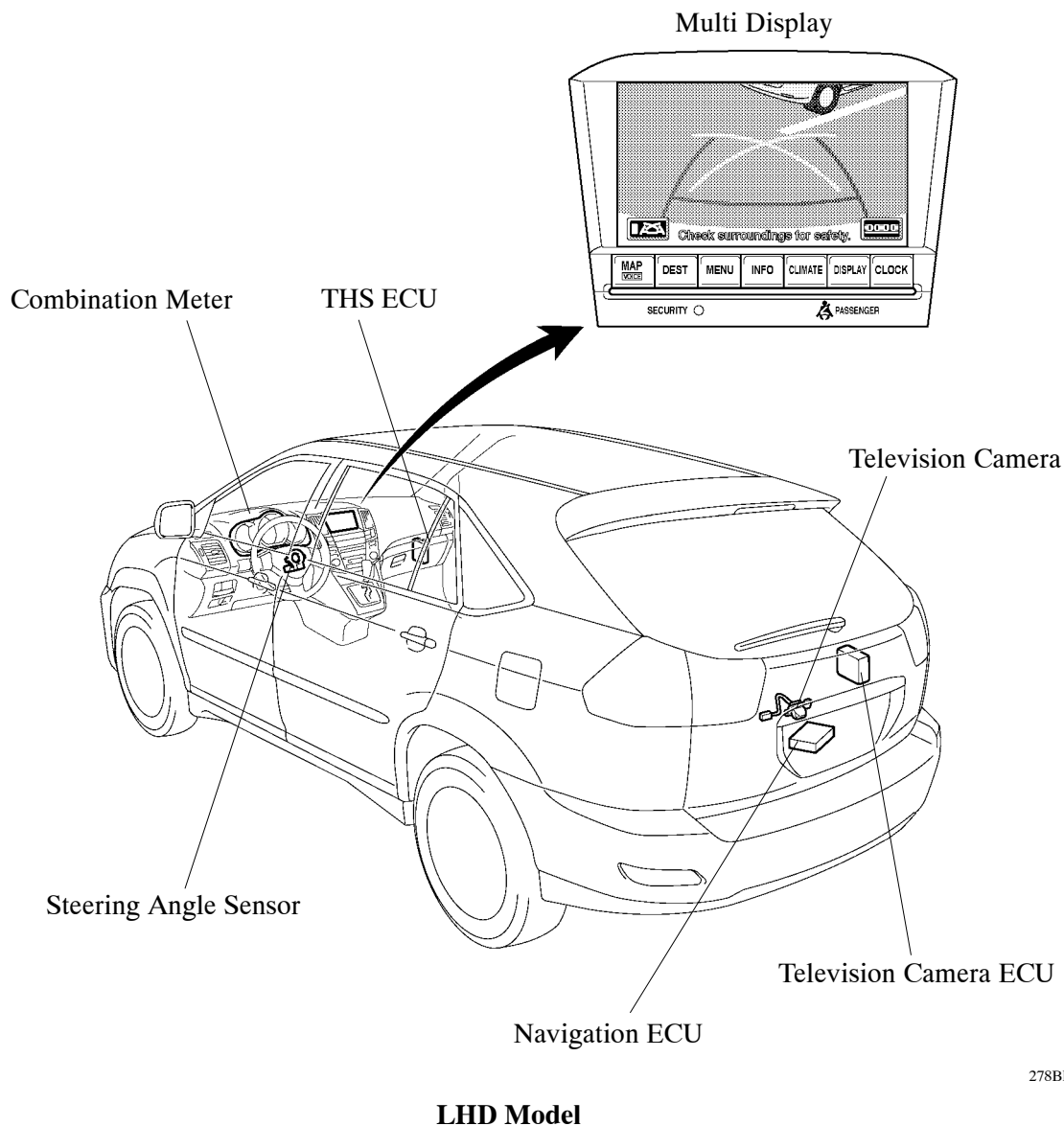
- A set consisting of the parking assist monitor and the multi display is available as an option.
- This system has a television camera mounted on the back door to display the rearview of the vehicle on the display panel of the multi display. The display panel also shows a composite view consisting of the rearview and parking guidelines to assist the driver in parking the vehicle by monitoring the rearview.
- With the ignition switch ON, if the driver shifts the shift lever to reverse, the display panel of the multi display switches to operate this system.
- This system consists of the following: television camera ECU, television camera, multi display, steering angle sensor, and navigation ECU.
- This system is equipped with a self-diagnosis system, which is operated on a dedicated window that appears on the display panel, just as in the navigation system.

#### ► System Diagram ◀



\*: RGB (Red Green Blue)

## 2. Layout of Main Components



### 3. Construction

#### General

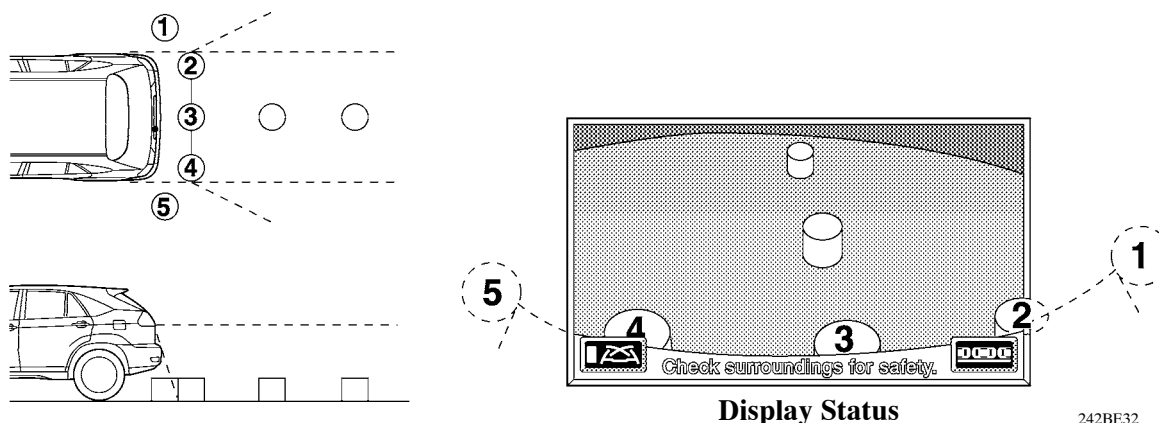
The television camera ECU controls the system by using information from the following sources: steering angle sensor signal, vehicle posture from the navigation ECU, vehicle speed signal, and shift position signal.

#### ► Function of Component ◀

| Item                  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Television Camera     | <ul style="list-style-type: none"> <li>Mounted on the back door to transmit the rearview of the vehicle to the television camera ECU.</li> <li>A color video camera that uses a CCD (Charge Coupled Device) and a wide-angle lens.</li> </ul>                                                                                                                                                                                                                                                               |
| Television Camera ECU | <ul style="list-style-type: none"> <li>Transmits video signals, which contain a composite of the rearview of the vehicle taken with the television camera and the parking assist guidelines, to the multi display. Furthermore, it effects overall control of the system by receiving the signal from the sensors and the navigation ECU.</li> <li>The television camera ECU sets a language display of the parking assist monitor using the language setup information from the navigation ECU.</li> </ul> |
| Multi Display         | Receives video signals containing a composite of the rearview of the vehicle and the parking assist guideline signals from the television camera ECU, and displays them on the display panel.                                                                                                                                                                                                                                                                                                               |
| Navigation ECU        | <ul style="list-style-type: none"> <li>Use the yaw rate detected by the gyro sensor that is built into the navigation ECU to transmit the movement of the vehicle to the television camera ECU.</li> <li>Transmits a status of the language settings, which is selected by the language selector of the navigation screen display, to the television camera ECU.</li> </ul>                                                                                                                                 |
| Steering Angle Sensor | To detect the angle of the steering wheel and send the resulting signals to the television camera ECU through CAN communication. This sensor is also shared by the VSC function.                                                                                                                                                                                                                                                                                                                            |
| Vehicle Speed Signal  | A vehicle speed signal transmitted by the combination meter.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| THS ECU               | Transmits the shift position signal received from the shift position sensor to the television camera ECU, via CAN communication.                                                                                                                                                                                                                                                                                                                                                                            |
| Shift Position Sensor | Transmits a reverse shift position signal to the THS 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 differs from the actual distance.



Display Status

242BE32

**NOTE:** 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 under bumper.

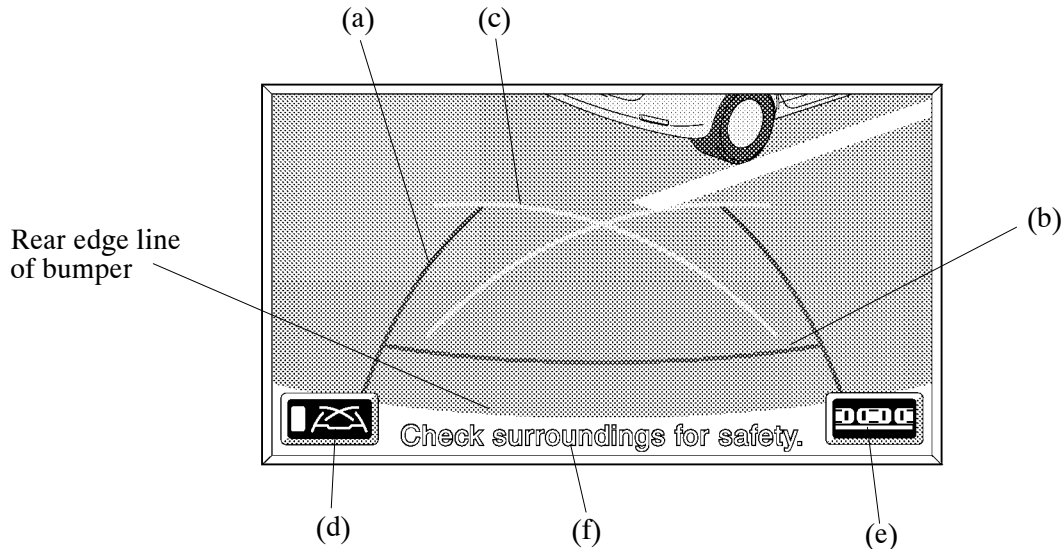
## Description of Display

### 1) General

- This system displays in the following two modes: the manual assist mode used for parking the vehicle in a garage or parking area, and the parallel parking assist mode, which assists the driver by providing the appropriate steering angle and timing during parallel parking.
- The driver can switch the system modes by pressing the touch switch, although the display is initially set to the parallel parking assist mode at the factory. The ECU stores in its memory the mode at the time the ignition switch is turned OFF. Therefore, the mode that is stored in the ECU appears when the ignition switch is subsequently turned ON.

### 2) Manual Assist Mode

- When the system operates in the manual assist mode, fixed guidelines appear with the rearview of the vehicle as illustrated below. These guidelines can be used to assist the driver while backing the vehicle.
- In this mode, the driver can press the ON/OFF switch to delete all the guidelines.

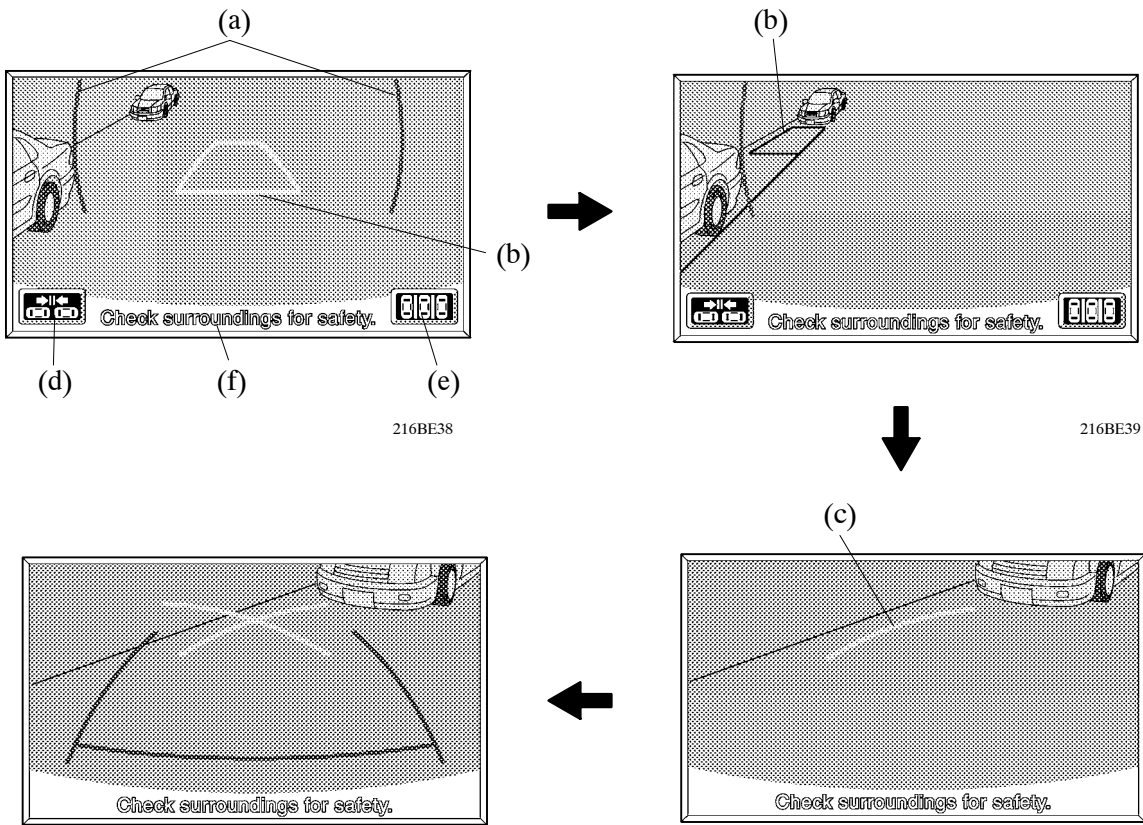


216BE37

| Item |                                           |                                     | Description of Display                                                                                                                                                |
|------|-------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a)  | Vehicle Width Extension Line (Dark Green) |                                     | A guideline for assisting the driver's assessment of the width of the vehicle.<br>{Length: 270 cm (8.9 ft.); Width: 187.5 cm (6.2 ft.)}                               |
| (b)  | Distance Guide Line (Red)                 |                                     | A guideline that serves as a reference for the driver to assess the distance from the rear of the vehicle.<br>{Approximately 50 cm (1.6 ft.) from rear end of bumper} |
| (c)  | Parking Guide Line (Light Green)          |                                     | A guideline indicating the prospective outer path of the vehicle when the steering is turned fully to the right or left end.                                          |
| (d)  | ON/OFF Switch                             |                                     | The display of the guidelines (a), (b), or (c) can be turned ON or OFF by pressing this switch.                                                                       |
| (e)  | Touch Switch                              | Manual Mode Switch                  | The system switches from the manual assist mode to the parallel parking assist mode by pressing this switch.                                                          |
|      |                                           | Parallel Parking Assist Mode Switch |                                                                                                                                                                       |
| (f)  | Warning Message Display Area              |                                     | Displays a warning message.                                                                                                                                           |

3) Parallel Parking Assist Mode

- In this mode used for parallel parking, the ECU switches the display of the guidelines in accordance with the parking maneuvers of the vehicle. This provides the driver with an appropriate steering angle and timing during parallel parking.

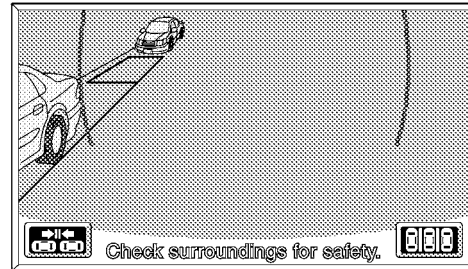
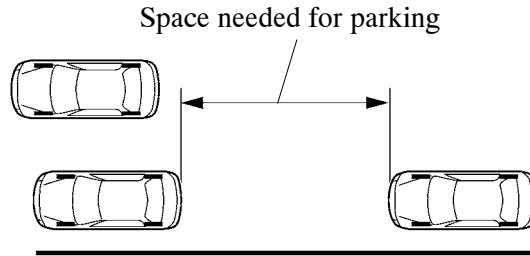


(Same guidelines are shown as in manual assist)

| Item |                                   |                                     | Description of Display                                                                                                                                                                                       |
|------|-----------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a)  | Green Vertical Line (Light Green) |                                     | A guideline that serves as a reference position for starting parallel parking.                                                                                                                               |
| (b)  | Green Outline (Light Green)       |                                     | A guideline that serves as a reference position for completing the intended parking. This guideline disappears once the vehicle starts moving backward.                                                      |
| (c)  | Parking Guide Line (Dark Green)   |                                     | A guideline indicating part of the prospective outer path of the vehicle when the steering is turned fully to the right or left end. This guideline appears only after the guidelines (a) and (b) disappear. |
| (d)  | Mode Select Switch                |                                     | Switches between the standard and narrow modes when this switch is pressed.                                                                                                                                  |
| (e)  | Touch Switch                      | Manual Mode Switch                  | The system switches from the parallel parking assist mode to the manual assist mode when this switch is pressed.                                                                                             |
|      |                                   | Parallel Parking Assist Mode Switch |                                                                                                                                                                                                              |
| (f)  | Warning Message Display Area      |                                     | Displays a warning message.                                                                                                                                                                                  |

- In the parallel parking assist mode, the driver can press the mode select switch to select the following two display modes: the standard mode and the narrow mode. The narrow mode is designed for situations in which the parking space is narrower than the standard mode. This system is set to the standard mode at the factory. The ECU stores in its memory the mode at the time the ignition switch is turned OFF. Therefore, the mode that is stored in the ECU appears when the ignition switch is subsequently turned ON.

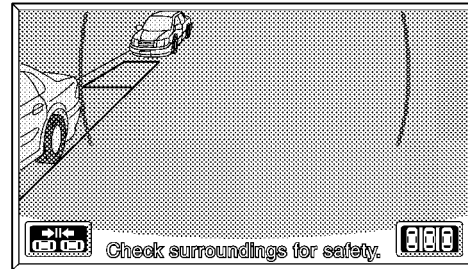
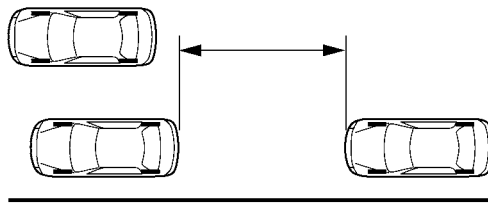
#### ► Standard Mode ◀



Display Status

216BE42

#### ► Narrow Mode ◀



Display Status

216BE43

### 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 navigation screen display (from among English, Danish, Dutch, French, German, Italian, Spanish and Swedish).

#### ► Messages appearing at the Bottom of the screen ◀

| Warning Message                | Outline                                                                                                                                                                                                                                                               |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Checks surroundings for safety | This message always appears during system operation.                                                                                                                                                                                                                  |
| System initializing            | This message appears when the system is restarted if the television camera ECU detects that a battery terminal has been disconnected and subsequently reconnected.                                                                                                    |
| Guidance Unavailable           | This message is displayed when the vehicle is moved back furthermore, even through a message, "Steering wheel turned too far, Please return.", is displayed in the center of the display and also the system judges it is impossible to perform the assist operation. |

#### ► Messages appearing at 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 | <p>This message is displayed when the system cannot perform the assist operation under the following situations:</p> <ul style="list-style-type: none"> <li>When the vehicle starts in the parallel parking assist mode, the distance between your vehicle and the other parked vehicles is not approximately 1 m (3.3 ft.) (too far or too close).</li> <li>The steering wheel is turned too far.</li> </ul> |

## 4. Operation

Listed below are some examples of operating the system in the manual assist mode and parallel parking assist mode.

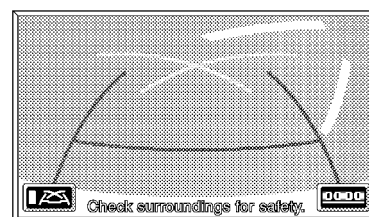
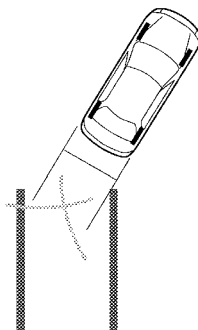
### CAUTION

- 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 actual conditions. If you back up while looking only at the screen, you may hit a vehicle or have an unexpected accident. When backing up, be sure to check visually behind and all around the vehicle, both directly and with mirrors, before proceeding.

### Manual Assist Mode

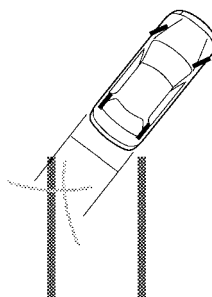
To use the manual assist mode to park the vehicle in the parking space illustrated on the left, perform the following procedure:

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

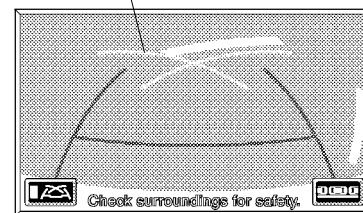


216BE45

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

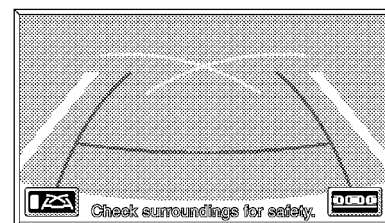
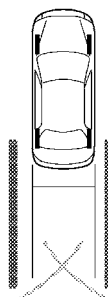


Parking Guide Line



216BE46

- 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.

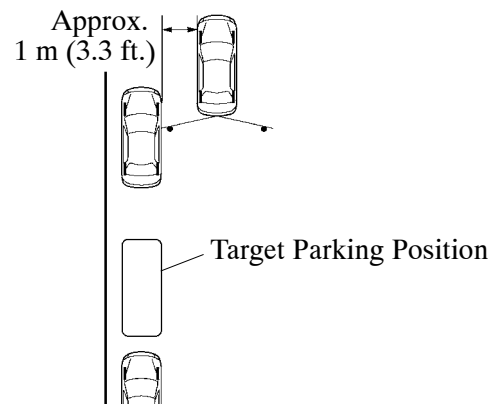


216BE47

## Parallel Parking Assist Mode

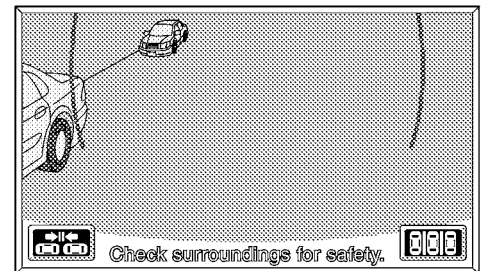
To use the parallel parking assist mode to park the vehicle in the parking space illustrated on the left, perform the following procedure:

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



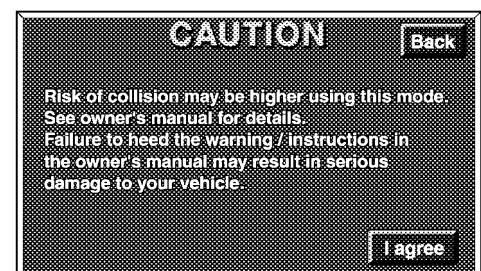
216BE48

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



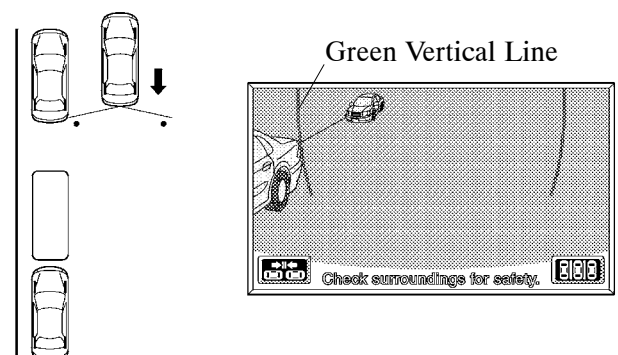
216BE49

- Press the mode select switch to select either the standard mode or narrow mode. The message shown on the right appears if the narrow mode is selected. When the driver agrees to this message, the display changes to the narrow mode.



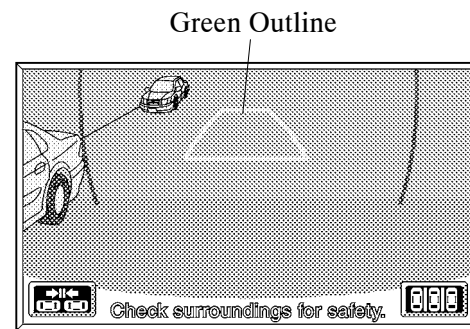
242BE33

- 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.



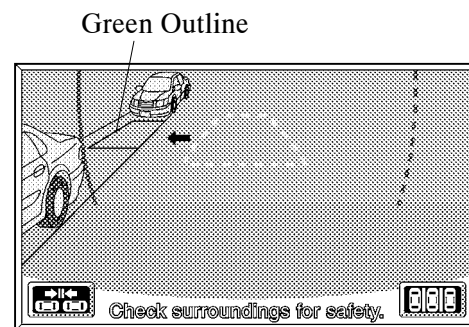
216BE51

- The green outline appears on the screen after 3 seconds elapse from the time the shift lever is moved to reverse, or if the steering wheel is turned with the vehicle at a standstill.



216BE52

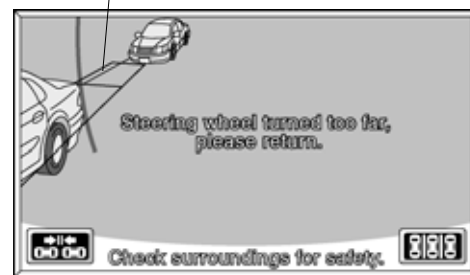
- Continue turning the steering wheel, and the green outline will move in the direction of the target parking position, while the outline changes into a shape as illustrated on the right.  
Keep turning the steering wheel until the green outline reaches the target parking position.  
At this time, the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



216BE53

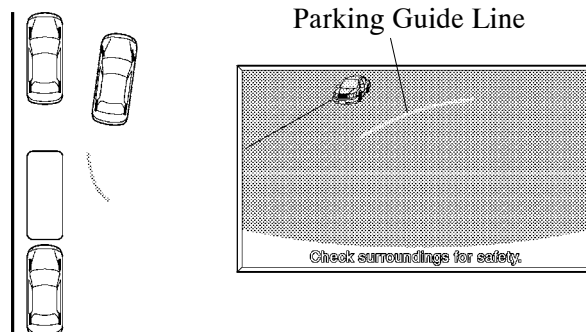
- However, if the steering wheel is turned too much, the message as shown in the right illustration is displayed and the green outline change to red to inform the driver that the assist operation is not capable.  
Also, when your vehicle is away from the shoulders too much, the same condition will occur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

The green outline changes to red



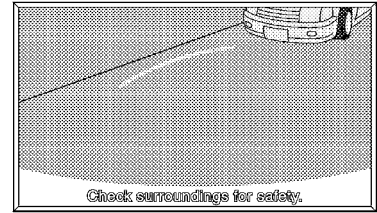
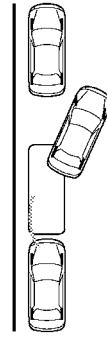
216BE62

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



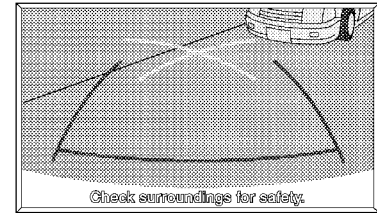
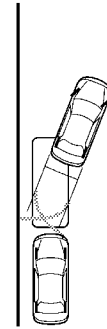
216BE54

- 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.



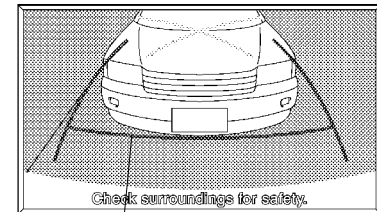
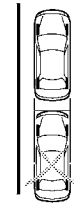
216BE55

- With the vehicle at a standstill, fully turn the steering wheel in the opposite direction. Then, as illustrated on the right, the same guideline appears as in the manual assist mode.



216BE56

- 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.



Parking Guide Line

216BE57

### 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 television camera ECU.

Therefore, if the television camera ECU detects that a battery terminal has been disconnected and the system is operated again by subsequently 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:

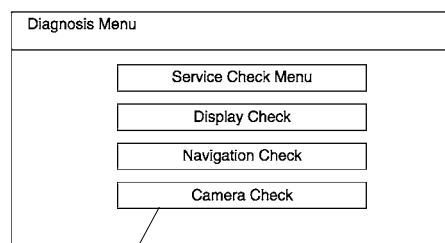
- With the ignition switch ON and the vehicle at a standstill, fully turn the steering wheel to the right, then fully turn it to the left (this procedure can be started either with a right or left turn).
- Drive the vehicle for approximately 5 minutes on a road with a minimal number of curves.

## 5. Initialize Function During Part Replacement

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

| Parts Name            | Condition                                                                                                                                                                                      | Initialize Item                                                                                                                                                                                                                                                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Television Camera     | <ul style="list-style-type: none"> <li>• Camera position has shifted.</li> <li>• Removal and reassembly</li> <li>• Replacement</li> <li>• Deformed when the mounted area is struck.</li> </ul> | Camera Position Adjustment<br>- Vertical Position<br>- Horizontal Position<br>- Roll Angle, Pan Angle, Tilt Angle                                                                                                                                                                                                                                    |
| Television Camera ECU | Replacement                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>• Neutral steering point in memory</li> <li>• Maximum side-to-side steering angle in memory</li> <li>• Camera Position Adjustment               <ul style="list-style-type: none"> <li>- Vertical Position</li> <li>- Horizontal Position</li> <li>- Roll Angle, Pan Angle, Tilt Angle</li> </ul> </li> </ul> |
| Steering Angle Sensor | <ul style="list-style-type: none"> <li>• Replacement</li> <li>• Removal and reassembly</li> </ul>                                                                                              | Neutral steering point in memory                                                                                                                                                                                                                                                                                                                     |

- The initialize function described above is performed on the diagnosis menu screen.
- The method for starting the diagnosis menu screen is the same as in the navigation system.



Select this menu

242BE27

- Refer to the LEXUS RX400h Repair Manual (Pub. No. RM1139E) for detailed instructions for operating the diagnosis menu screen and the initialize function.

## 6. Fail-Safe Function

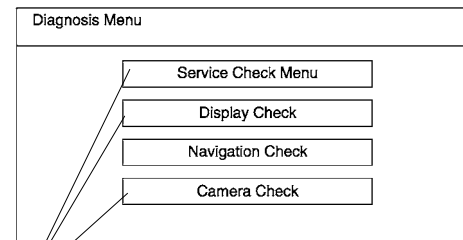
The table below indicates the conditions of detecting malfunctions in the sensors and ECUs in this system.

| Malfunction Parts     | Detection Item                                                                                                                                   | Function                                         |                                                   |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------|
|                       |                                                                                                                                                  | Manual Assist Mode                               | Parallel Parking Assist Mode                      |
| Steering Angle Sensor | <ul style="list-style-type: none"> <li>• Transmission of sensor malfunction signal</li> <li>• Open circuit in sensor signal</li> </ul>           | —                                                | Switching to the manual assist mode automatically |
|                       | Transmission of signal of incompletion of neutral steering point correction                                                                      | —                                                | Displays “System initializing”                    |
|                       | Communication malfunction between the steering angle sensor and television camera ECU                                                            | —                                                | Manual Assist Mode                                |
| Television Camera     | Transmission of television camera malfunction signal                                                                                             | Stop signal reception and displays a dark screen |                                                   |
| Television Camera ECU | Malfunction of television camera ECU unit                                                                                                        | Stops system operation                           |                                                   |
| Navigation ECU        | <ul style="list-style-type: none"> <li>• No response from navigation ECU</li> <li>• Transmission of navigation ECU malfunction signal</li> </ul> | —                                                | Switching to the manual assist mode automatically |

## 7. Self-Diagnosis Function

- The parking assist monitor system is equipped with a self-diagnosis system and can display the diagnosis menus shown on the right. The diagnosis menu that pertains to this system contains the following three Items:

- Service Check Menu
- Display Check
- Camera Check



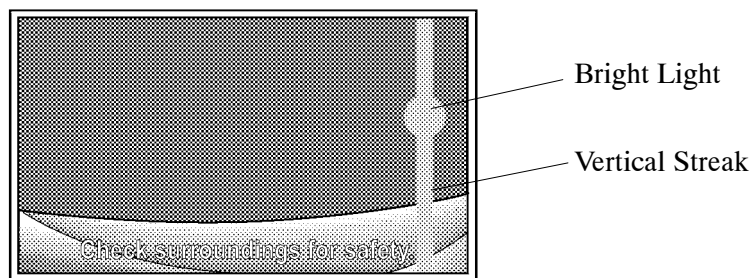
These Menu

242BE27

- The method for starting the diagnosis menu screen is the same as in the navigation system.
- For details, refer to the LEXUS RX400h Repair Manual (Pub. No. RM1139E).

## 8. Handling Precaution

- The television camera uses a wide-angle lens. The perceived distance from images that appear on the screen differs from the actual distance.
- In the following cases, it may become difficult to see the images on the screen, but this is not a malfunction.
  - In the dark (for example, at night)
  - When the temperature near the lens is very high or low
  - When water droplets are adhering to the television camera, or when humidity is high. (for example, when it rains)
  - When foreign matter (for example, mud) is adhering to 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 the CCD camera, may occur.



**Smear Effect**

241BE68

### — REFERENCE —

**\*: Smear effect**

*A phenomenon that occurs when a bright light is picked up by the television camera; when transmitted by the television camera, the light source appears to have a vertical streak above and below it.*

## POWER WINDOW SYSTEM

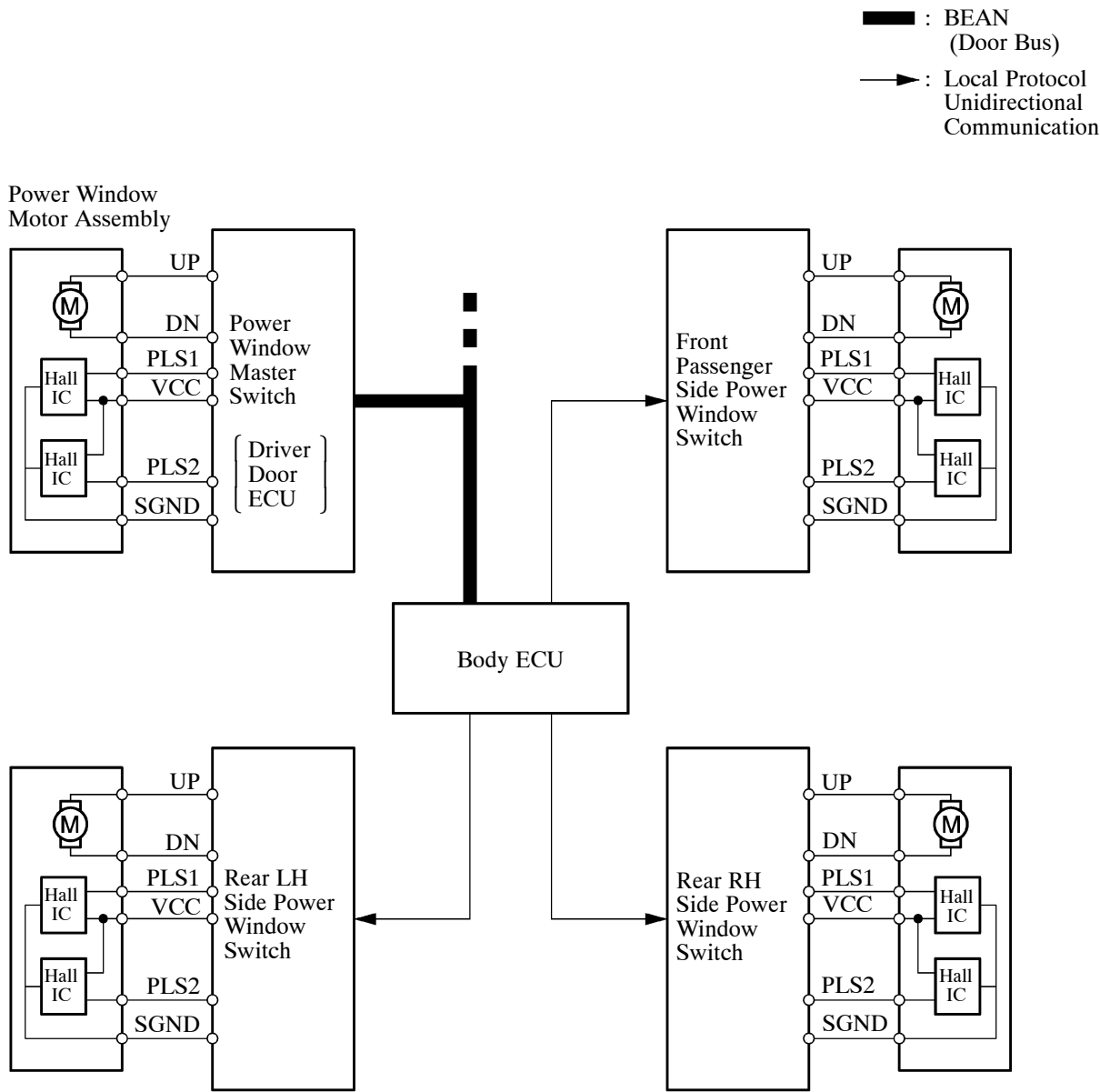
### DESCRIPTION

The power window system has the following functions:

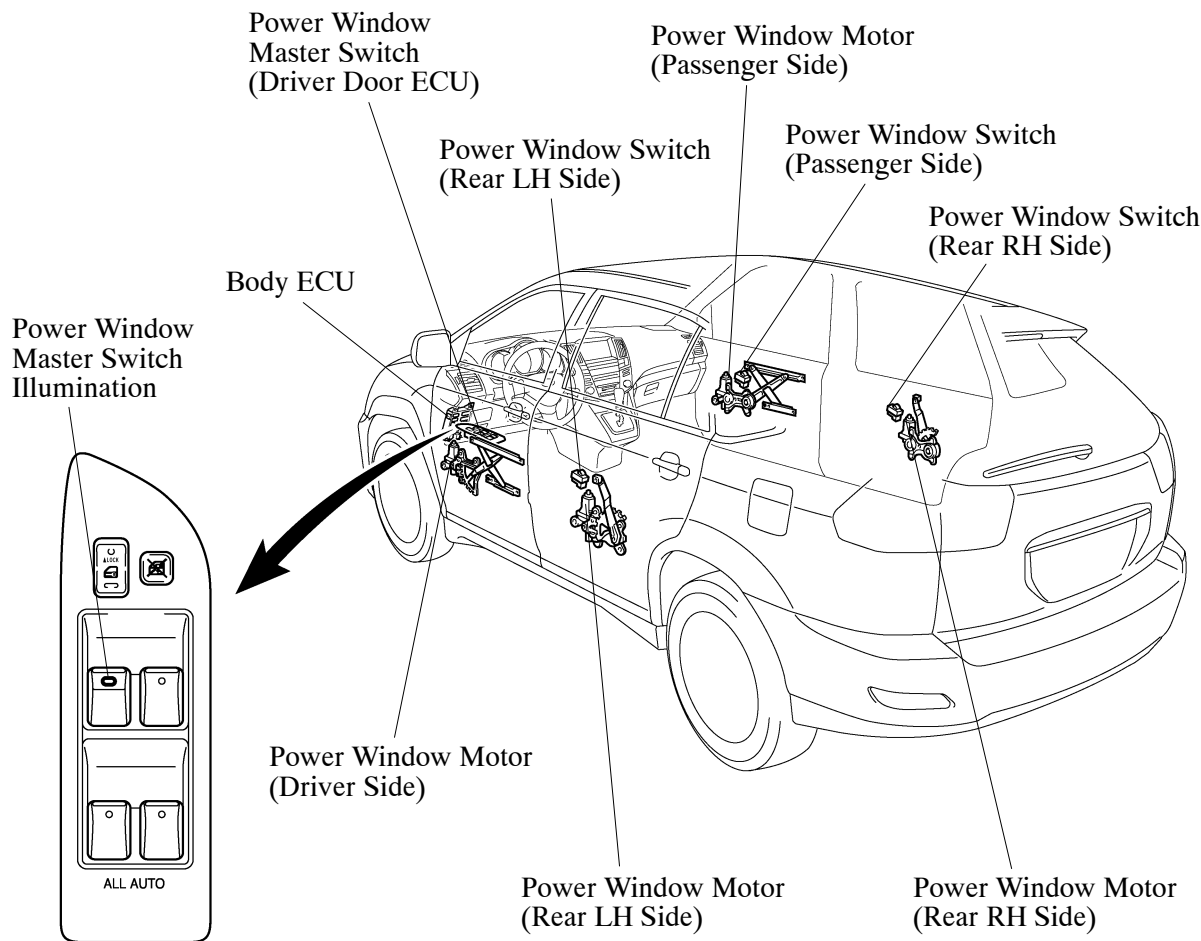
| Function                                 | Outline                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manual up-and-down function              | This function causes the window to open or close while the power window switch is being pulled halfway up or pushed halfway down. The window stops as soon as the switch is released.                                                                                                                                                                                                                                                                                                           |
| One-touch auto up-and-down function      | The one-touch auto up-and-down function enables the window of all doors to be fully opened or closed at a touch of the power window switch.                                                                                                                                                                                                                                                                                                                                                     |
| Jam protection function                  | A jam protection function automatically stops the power window and moves it downward if a foreign object gets jammed in any door window during one-touch auto-up operation.                                                                                                                                                                                                                                                                                                                     |
| Remote control function                  | The up-and-down operations of the front passenger door window and the rear door windows can be controlled by operating the power window master switch.                                                                                                                                                                                                                                                                                                                                          |
| Key-off operation function               | The driver's door key-off operation function makes it possible to operate the power window for 43 seconds after the ignition switch is turned to the ACC or LOCK position, if the driver's door is not opened.                                                                                                                                                                                                                                                                                  |
| Key-linked up-and-down function*         | When the ignition key is not in the key cylinder, 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 driver door ECU activates the power window motor to raise the all-door windows 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 all-door windows to be lowered. |
| Transmitter linked up-and-down function* | When the body ECU receives an lock/unlock signal from the transmitter continuously for longer than 2.5 seconds, the door ECUs control their power window motors in accordance with the signal to close/open the windows.                                                                                                                                                                                                                                                                        |
| Diagnosis                                | When the power window master switch detects a malfunction in the power window system, the power window master switch makes a diagnosis the failed section. Furthermore, the power window master switch illumination illuminates or links to inform the driver. For details, refer to the LEXUS RX400h Repair Manual (Pub. No. RM1139E).                                                                                                                                                         |
| Fail-Safe                                | If the hall IC in the power window motor malfunctions, the power window functions will be prohibited for the fail-safe: <ul style="list-style-type: none"> <li>All door one-touch auto up-and-down function and the remote control function are prohibited.</li> <li>The manual operation is possible by each power window switch.</li> </ul>                                                                                                                                                   |

\*: The setting of function can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-20.

► System Diagram ◀



■ LAYOUT OF MAIN COMPONENTS



Power Window Master Switch

LHD Model

277BE110

## ■ JAM PROTECTION FUNCTION

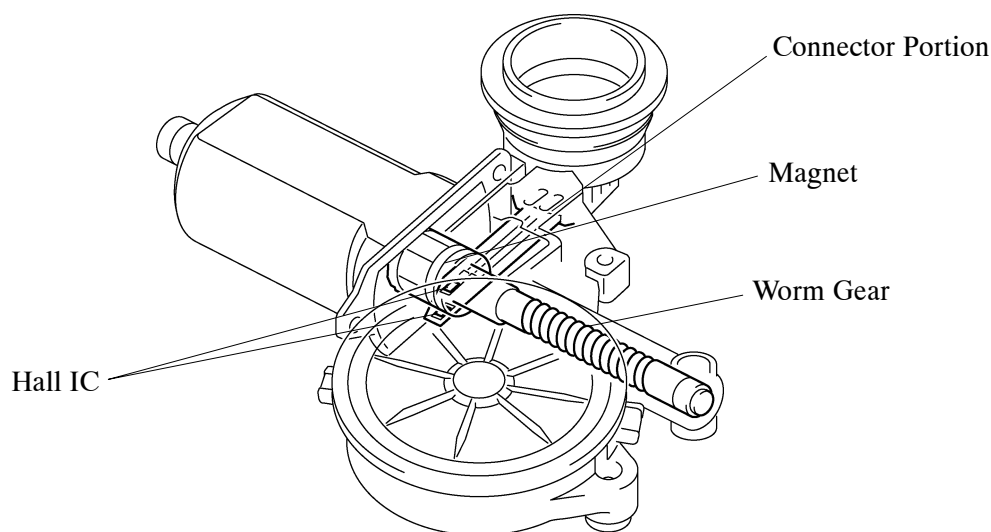
### 1. General

- A jam protection function automatically stops the power window and moves it downward if a foreign object gets jammed in the door window during one-touch auto-up operation.
- On the previous model, the jamming of the power window was detected by the limit switch and pulse sensor. On the new model, this has been changed to the two hall ICs that are integrated in the all door's power window motor.
- The activation of the jam protection function is described below.

| Door Window Position from Full Close | Operation of Jam Protection Function                                               |
|--------------------------------------|------------------------------------------------------------------------------------|
| 200 mm (7.87 in.) or more            | Down operation of 50 mm (1.97 in.) or 1 sec.                                       |
| 200 mm (7.87 in.) or less            | Down operation until door window opening of 200 mm (7.87 in.) is reached or 5 sec. |

### 2. Jammed Window Detection Mechanism

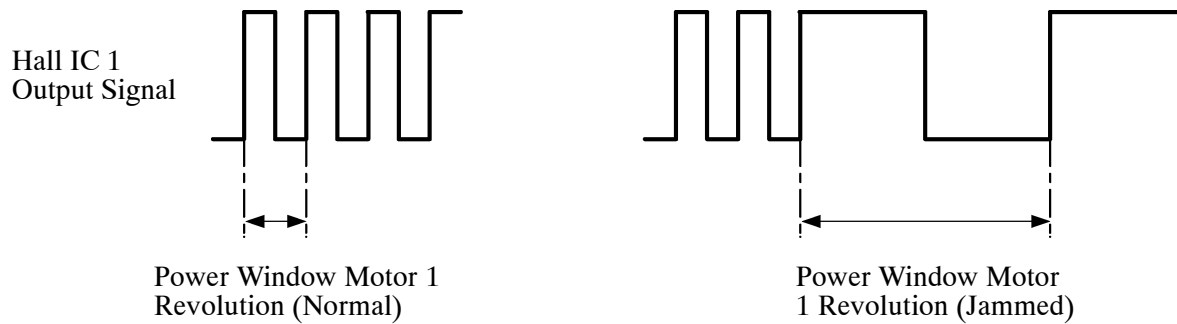
- The jammed window detection mechanism consists of a magnet that is provided on the worm gear of the power window motor assembly and the two Hall IC that are provided on the connector.



**Power Window Motor Assembly**

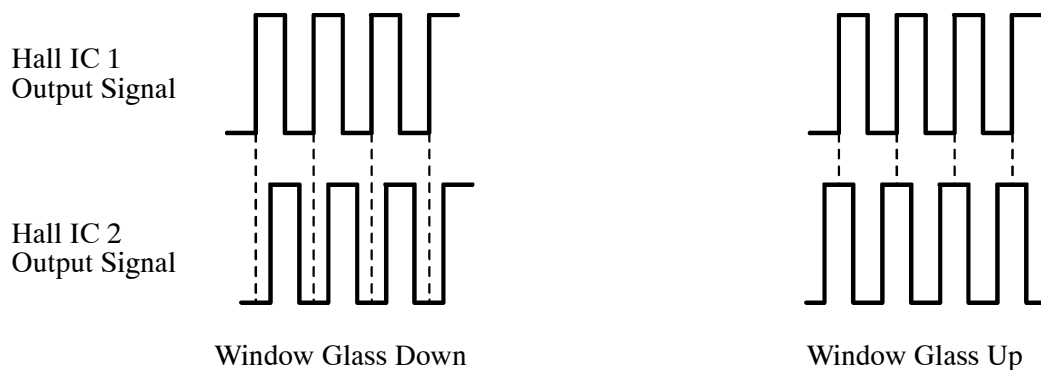
- The Hall IC converts the changes in the magnetic flux that occur through the rotation of the worm gear into pulse signals and outputs them to the power window master switch/power window switch.
- To control the jam protection function, the power window master switch/power window switch determines the amount of movement and the jamming of the window glass from the pulse signals from the Hall IC1; and the moving direction of the window glass from the phase difference between the pulses from the Hall IC1 and Hall IC2.

### ► Judgment of Amount of Movement and Jamming of Window Glass ◀



232BE34

### ► Judgment of Window Glass Moving Direction ◀



232BE35

#### Service Tip

The power window master switch and each power window switch memorize the initial position of the each door window. This data will be lost if a battery terminal, fuse, or each power window switch is disconnected, allowing only a manual operation. Therefore, after reconnecting the battery terminal, fuse, or each power window switch initialize the system by performing the steps described below.

- (1) Open the door window a minimum of 1/4.
- (2) Pull and hold the power window switch UP. By keeping the switch pulled UP for approximately 1 second after the door window is fully closed, the power window master switch memorizes the initial position of the door window.

For details, refer to the LEXUS RX400h Repair Manual (Pub. No. RM1139E).

## DOOR LOCK CONTROL SYSTEM

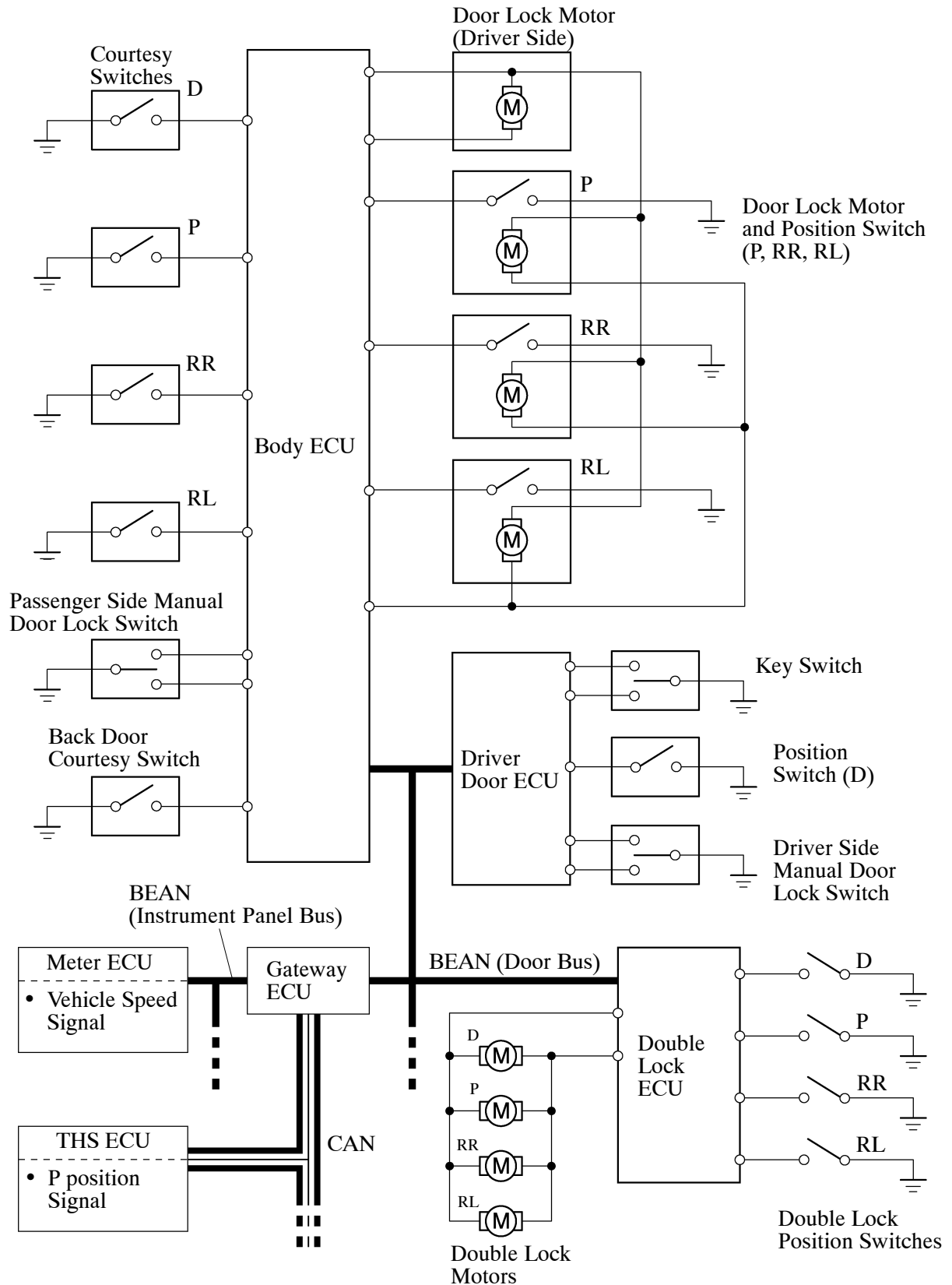
### ■ DESCRIPTION

- This system is controlled by the Body ECU. The Body ECU outputs signals to the respective door lock motors.
- The door lock control system in the new RX400h has the following functions:

| Function                             | Outline                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manual Lock and Unlock               | This function can lock or unlock all doors by the door lock control switch operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Key-linked lock and Unlock* function | This function, which is linked with the key cylinder, can lock or unlock all the doors when a lock or unlock operation is effected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Key confine prevention function      | When the key is inserted in the ignition key cylinder with the driver's door open and if you perform the door lock operation, all the doors will be unlocked.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Manual unlock prohibition function   | Performing the door lock operation with a transmitter or an ignition key will prohibit the unlock operation by the door lock control switch.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Double Locking System                | <ul style="list-style-type: none"> <li>• The double locking system also prevents the doors from being opened through the operation of the inside door knobs. Thus, the doors cannot be opened either from the inside or the outside of the vehicle.</li> <li>• To lock the doors with this system, pressing the transmitter's LOCK switch, then pressing it again within 5 seconds activates the double locking system. However, as an emergency unlocking maneuver, only the driver's door can be unlocked with a key.</li> </ul> <p><b>CAUTION:</b><br/>Never activate the double locking system when there are people in the vehicle because the doors cannot be opened from the inside of the vehicle.<br/>If locking the doors by accident, press "UNLOCK" button of the transmitter.</p> |
| Collision door lock release          | If the SRS airbag system has been deployed, and the body ECU has detected the signal that is output by the airbag sensor assembly, the body ECU unlocks all the doors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

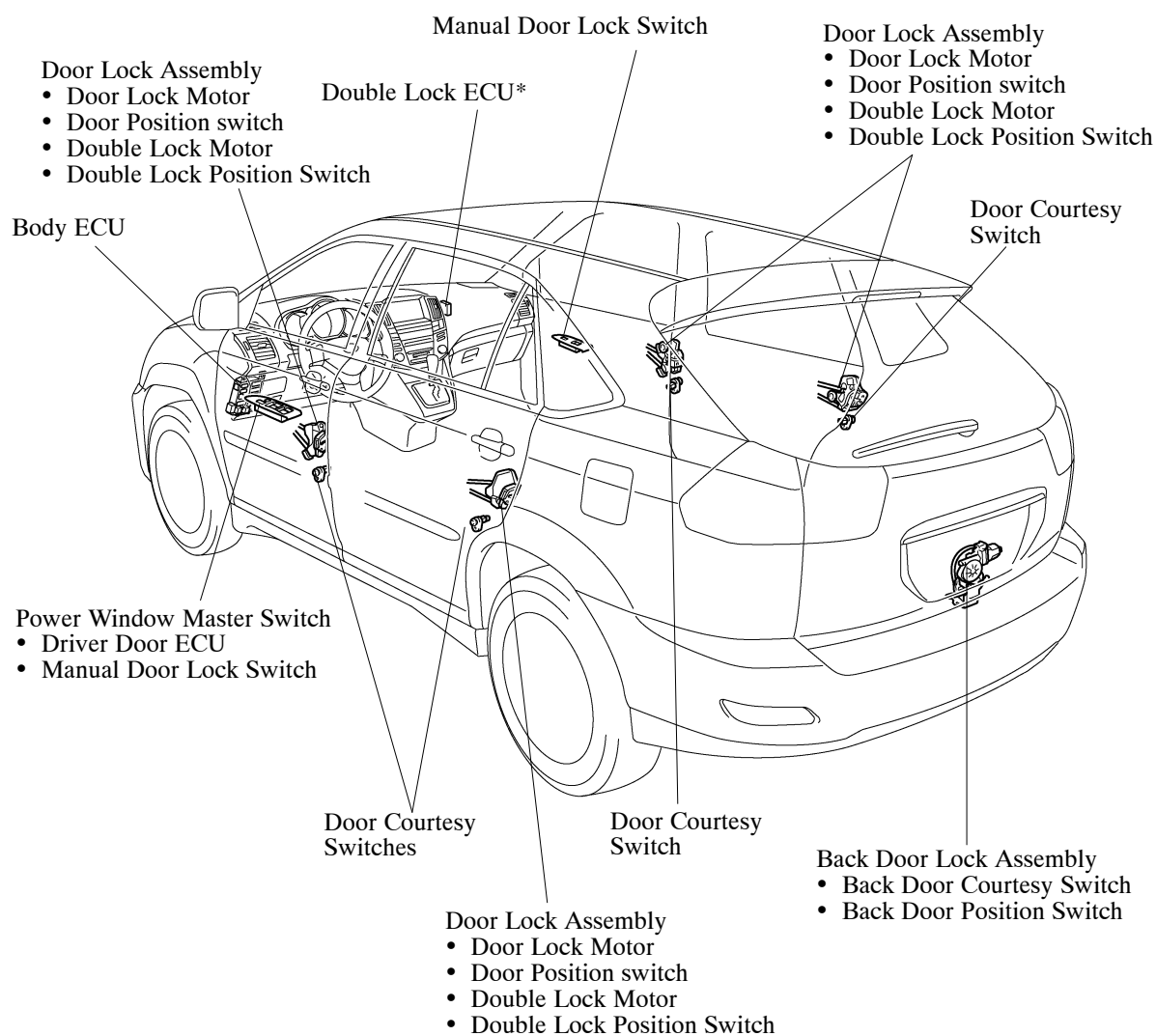
\*: On the models with the double locking system, when the double locking system is operating, all doors can be locked through the key-linked function, but they cannot be unlocked. Only the driver's door can be unlocked.

► System Diagram ◀



BE

## ■ LAYOUT OF MAIN COMPONENTS



**LHD Model**

278BE26

# WIRELESS DOOR LOCK REMOTE CONTROL SYSTEM

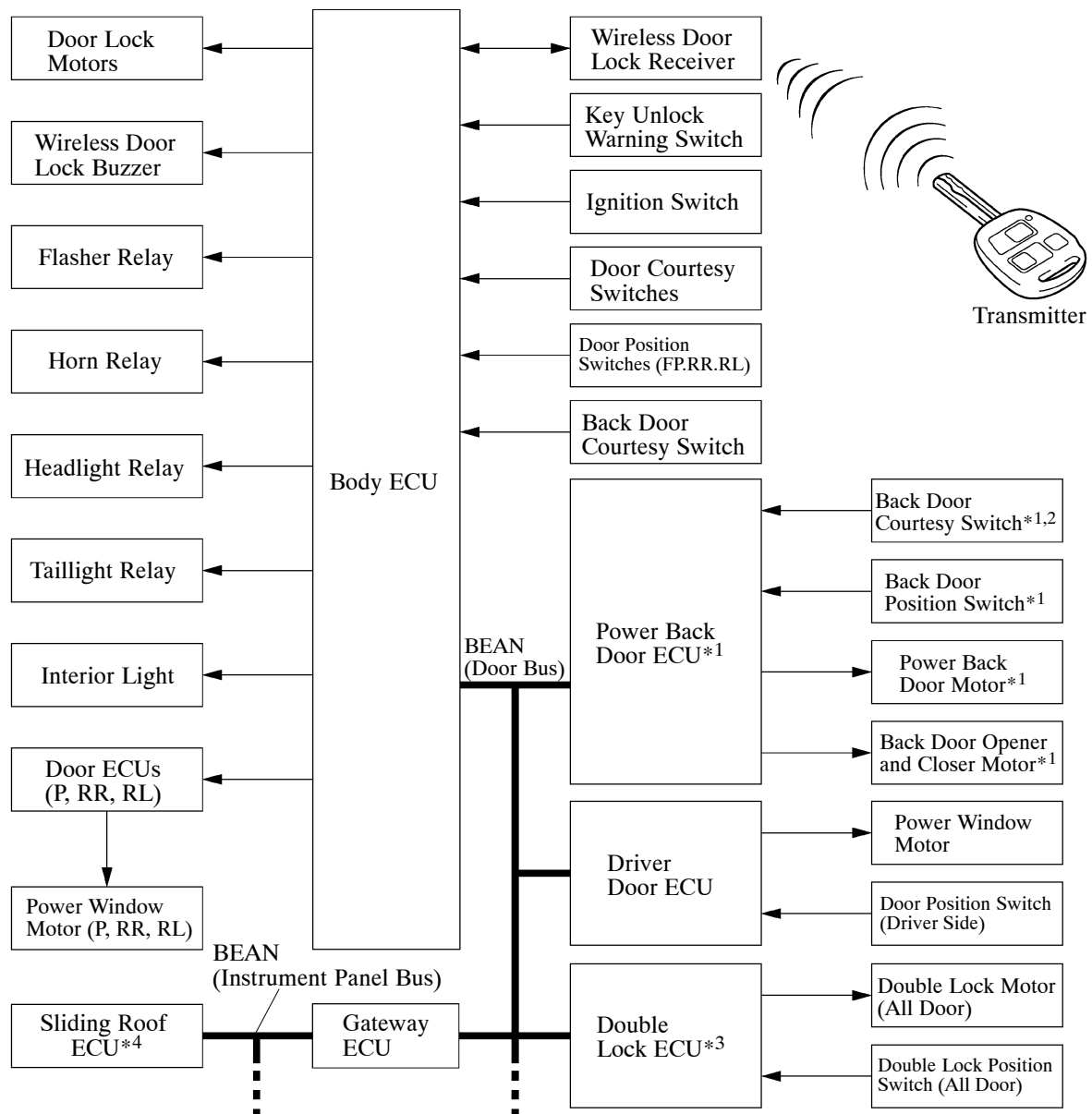
## DESCRIPTION

The wireless door lock remote control system has been provided as standard equipment.

This system is a convenient system for locking and unlocking all the doors, at a distance. This system in the new RX400h has the following features:

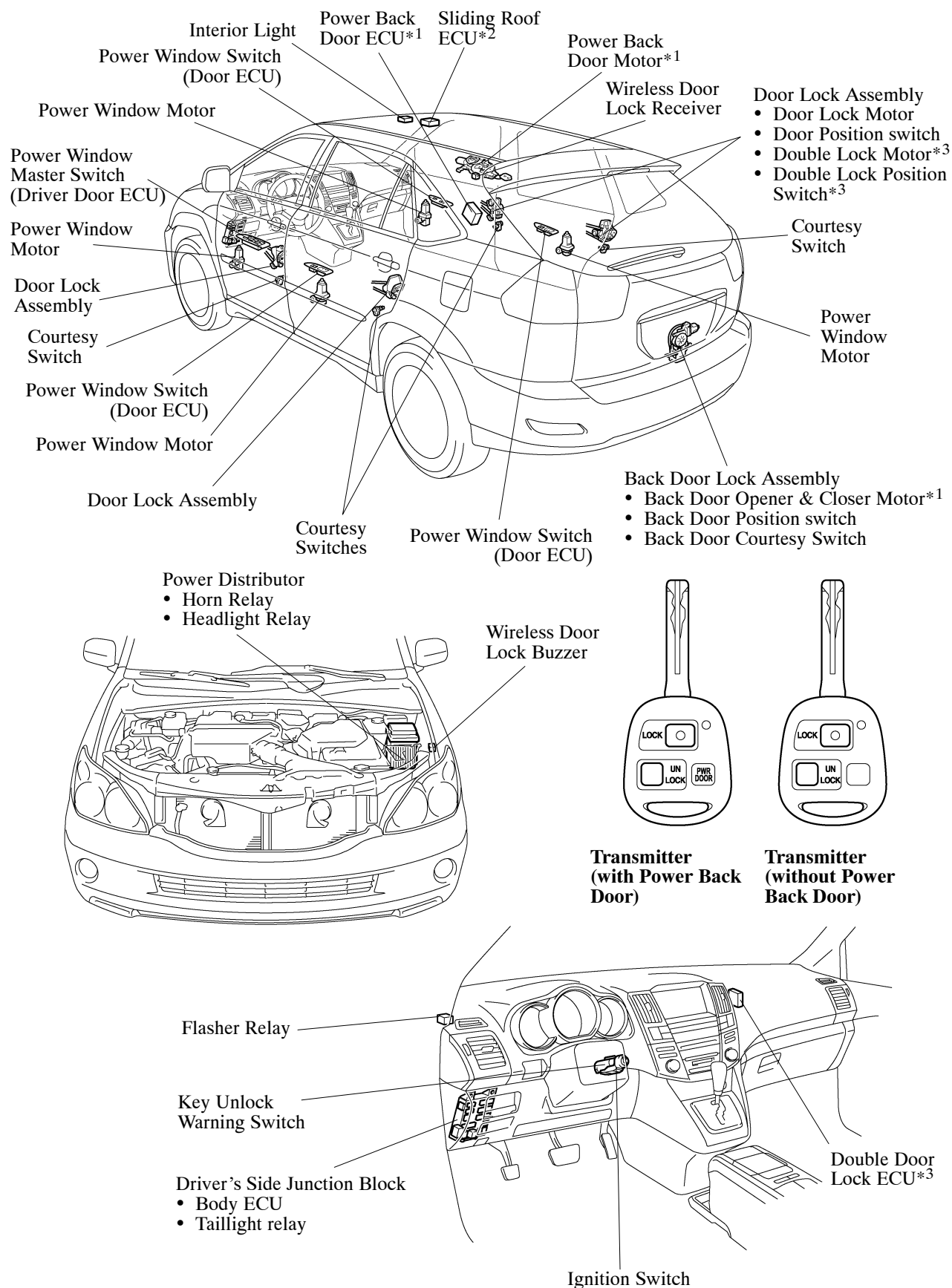
- In this system, the wireless door lock receiver performs the code identification process and the body ECU effects the door lock control. Serial data link is provided for communication between the wireless door control receiver and the body ECU.
- A rolling code system, in which the signal configuration changes each time when a signal is transmitted by the transmitter, is used.
- A key-integrated type transmitter is used, and it contains the following three switches: the door lock switch, door unlock switch, and power back door switch (models with power back door system).

## System Diagram



- \*1: Models with Power Back Door  
 \*2: For Power Back Door Control  
 \*3: Models with Double Locking System  
 \*4: Models with Sliding Roof

## ■ LAYOUT OF MAIN COMPONENTS



**LHD Model**

\*1: Models with Power Back Door

\*2: Models with Sliding Roof

\*3: Models with Double Locking System

## FUNCTION

### 1. General

The wireless door lock remote control system in the new RX400h has the following functions.

| Function                                           | Outline                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All Doors Lock* <sup>1</sup>                       | Pressing the door lock switch of the transmitter locks all doors.                                                                                                                                                                                                                                                                                                                                                                   |
| All Doors Unlock* <sup>1</sup>                     | Pressing the UNLOCK button of the transmitter unlocks all doors and recognizes the electronic luggage/back door outside handle operation.                                                                                                                                                                                                                                                                                           |
| Double Locking System Operation                    | <ul style="list-style-type: none"> <li>Pressing the LOCK button, then pressing it again within 3 seconds activates the double locking system.</li> <li>Pressing the UNLOCK button releases the double locking system.</li> </ul>                                                                                                                                                                                                    |
| Power Back Door* <sup>2</sup> Open/Close           | Keeping the power back door switch of the transmitter pressed longer than about 3 second opens or closes the back door.                                                                                                                                                                                                                                                                                                             |
| Power Window Open Operation* <sup>1</sup>          | Keeping the unlock switch of the transmitter pressed longer than about 3 seconds opens the all door power windows and sliding roof* <sup>2</sup> . With this function, the buzzer sounds when control is started.                                                                                                                                                                                                                   |
| Power Window Close Operation* <sup>1</sup>         | Keeping the lock switch of the transmitter pressed longer than about 3 seconds closes the all door power windows and sliding roof* <sup>2</sup> . With this function, the buzzer sounds when control is started.                                                                                                                                                                                                                    |
| Answer Back Operation* <sup>1</sup>                | <p>The hazard light is flashed once when locking, and the hazard light is flashed twice when unlocking, to inform that the operation has been completed.</p> <p>When the transmitter is used for opening or closing the power back door*<sup>2</sup>, or a power window is operated, this function sounds the buzzer once/for power window, twice/for power back door to inform the user that the operation has been completed.</p> |
| Automatic Lock Function* <sup>1</sup>              | If one of the doors are opened within 30 seconds after they are unlocked by the wireless door lock remote control, all the doors are locked again automatically.                                                                                                                                                                                                                                                                    |
| Repeat Function                                    | If a door is not locked in response to the locking operation of the transmitter, the body ECU will output a lock signal after the 1 second.                                                                                                                                                                                                                                                                                         |
| Illuminated Entry Function                         | When all the doors are locked, pressing the door unlock switch causes the interior lights to illuminate simultaneously with the unlock operation.                                                                                                                                                                                                                                                                                   |
| Security Function                                  | Sends an operation signal as a rolling code.                                                                                                                                                                                                                                                                                                                                                                                        |
| Door Ajar Warning Function* <sup>1</sup>           | If any door is open or ajar, pressing the "door lock" switch of the transmitter will cause the wireless door lock buzzer to sound for about 10 seconds.                                                                                                                                                                                                                                                                             |
| Transmitter Recognition Code Registration Function | Enables the registering (writing and storing) of 4 types of transmitter recognition codes in the EEPROM that is contained in the body ECU.                                                                                                                                                                                                                                                                                          |

\*1: The setting of function can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-20.

\*2: Optional Equipment

## **2. Transmitter Recognition Code Registration Function**

The table below shows the 4 special coded ID registration function modes through which up to 4 different codes can be registered. The codes are electronically registered (written to and stored) in the EEPROM. For details of the recognition code registration procedure, refer to the LEXUS RX400h Repair Manual (Pub. No. RM1139E) to register the codes correctly.

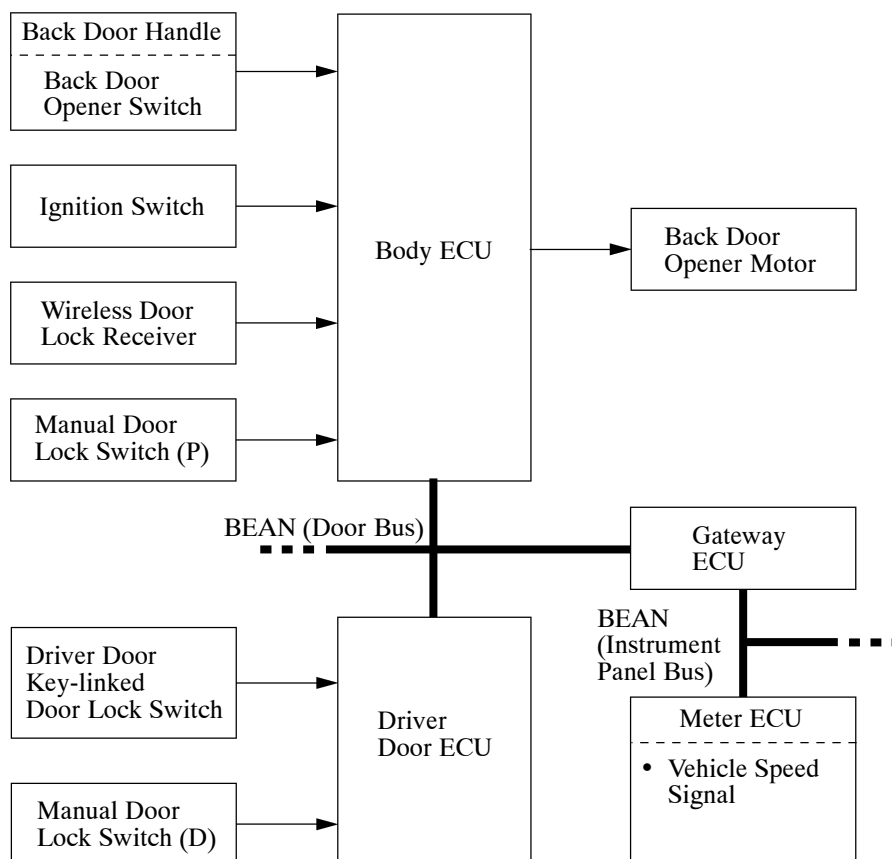
| Mode          | Function                                                                                                                                                                                                    |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rewrite Mode  | Erases all previously registered codes and registers only the newly received codes. This mode is used whenever a transmitter or the Body ECU is replaced.                                                   |
| Add Mode      | Adds a newly received code while preserving any previously registered codes. This mode is used when adding a new transmitter. If the number of codes exceeds 4, the oldest registered code is erased first. |
| Confirm Mode  | Confirms how many codes are currently registered. When adding a new code, this mode is used to check how many codes already exist.                                                                          |
| Prohibit Mode | To delete all the registered codes and to prohibit the wireless door lock function.<br>This mode is used when the transmitter is lost.                                                                      |

## ELECTRICAL BACK DOOR OUTSIDE HANDLE SYSTEM

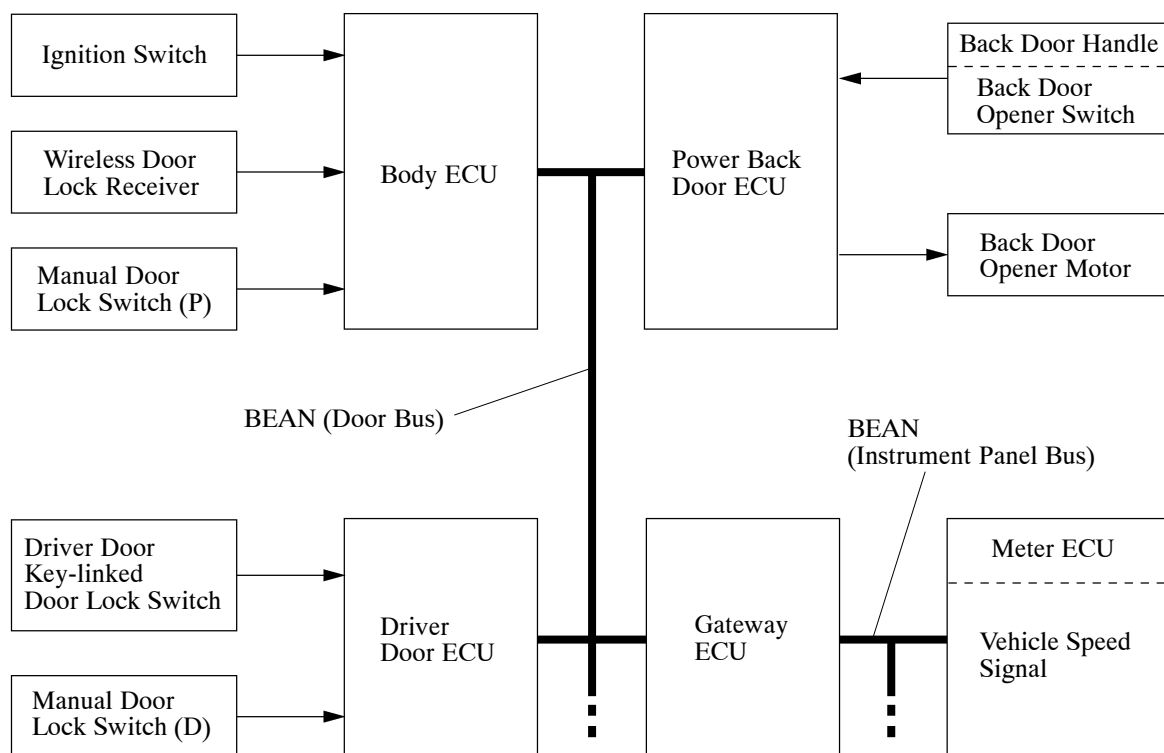
### DESCRIPTION

- This system is provided on new RX400h with a switch on the back door outside handle to open the back door electrically.  
The key cylinder and the opener for the back door have been discontinued.
- 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 assembly.
- On models without a power back door, this system is controlled by the Body ECU. On models with a power back door, it is controlled by the power back door ECU.
- This system activates when the following two conditions are met:
  - 1) Vehicle speed is less than 5 km/h (3 mph).
  - 2) An unlock signal is input into the Body ECU (models without power back door)/power back door ECU (models with power back door) from the respective doors in accordance with the wireless door lock remote control, key, or door lock control.

### System Diagram



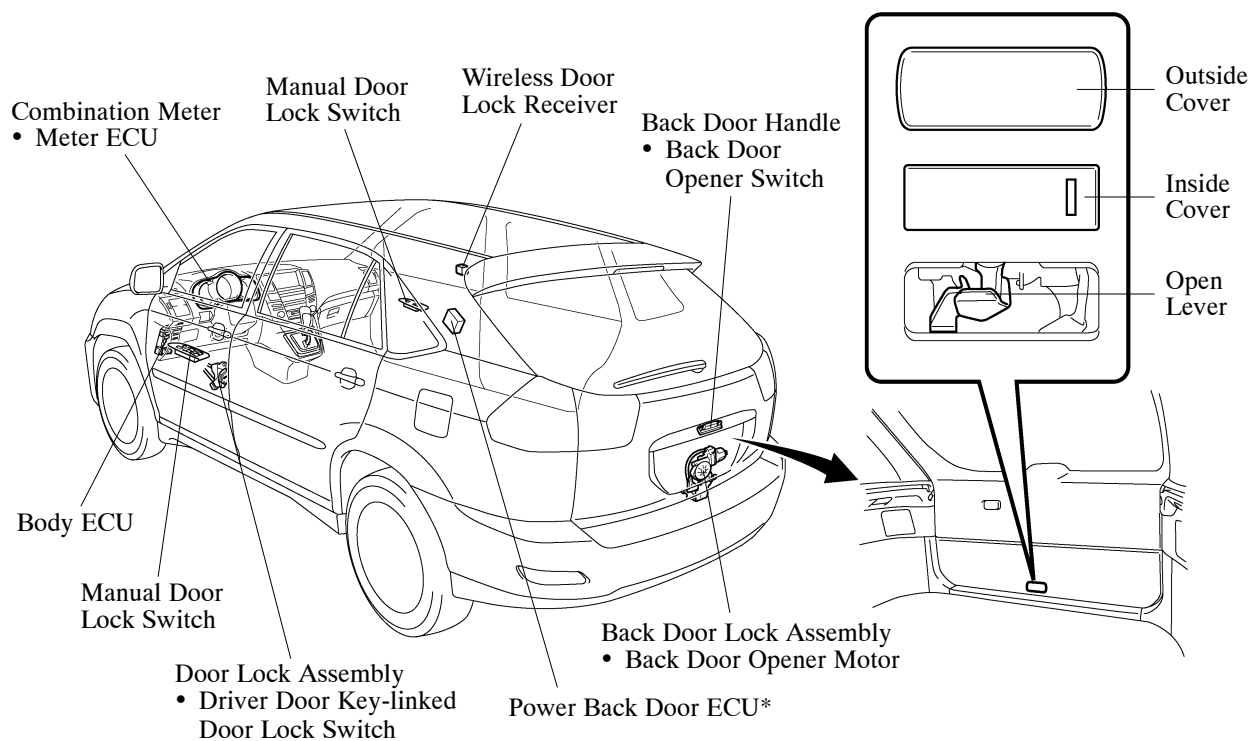
**BE**



277BE91

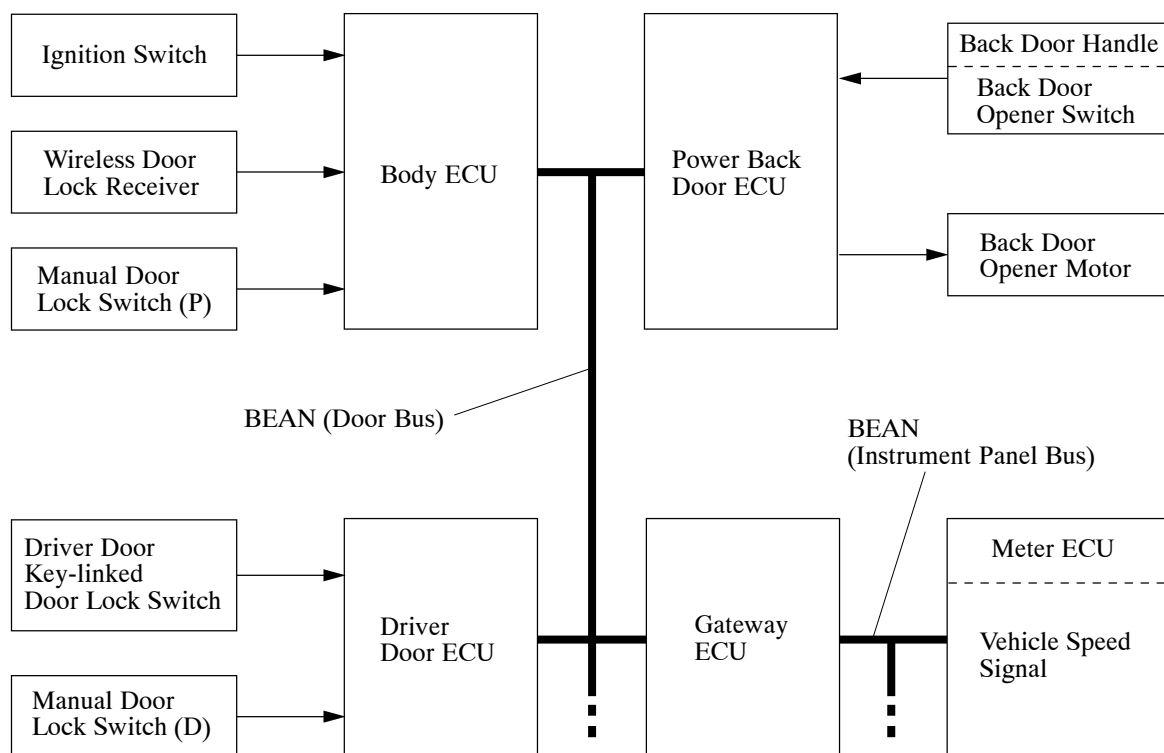
### Models with Power Back Door

## ■ LAYOUT OF MAIN COMPONENTS



242BE61

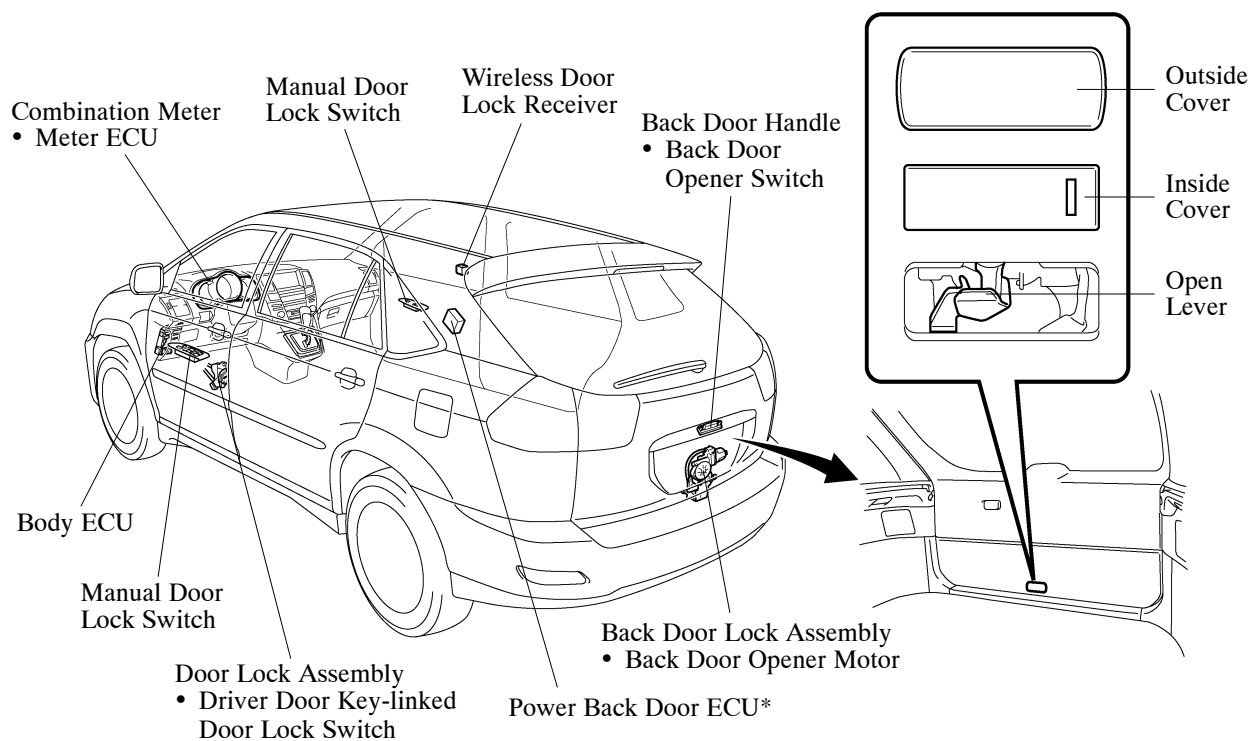
\*: Models with Power Back Door



277BE91

### Models with Power Back Door

## ■ LAYOUT OF MAIN COMPONENTS



242BE61

\*: Models with Power Back Door

## POWER BACK DOOR SYSTEM

### DESCRIPTION

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 switch of the transmitter.

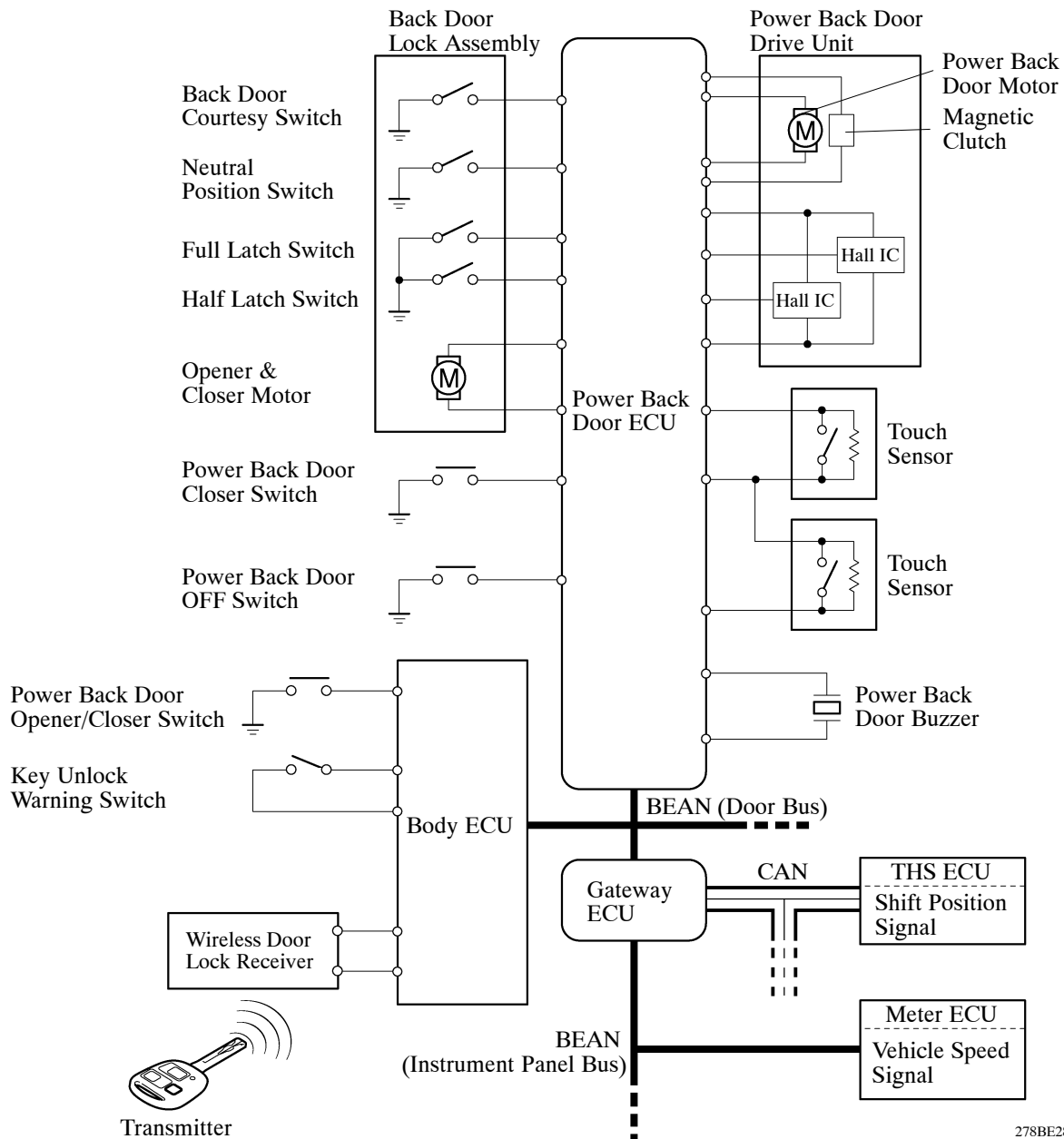
In addition, a power back door closer switch has been provided at the back door for convenience.

- This system is optional equipment on all models.
- This system, which is controlled by the power back door ECU, operates when the conditions indicated below have been met.

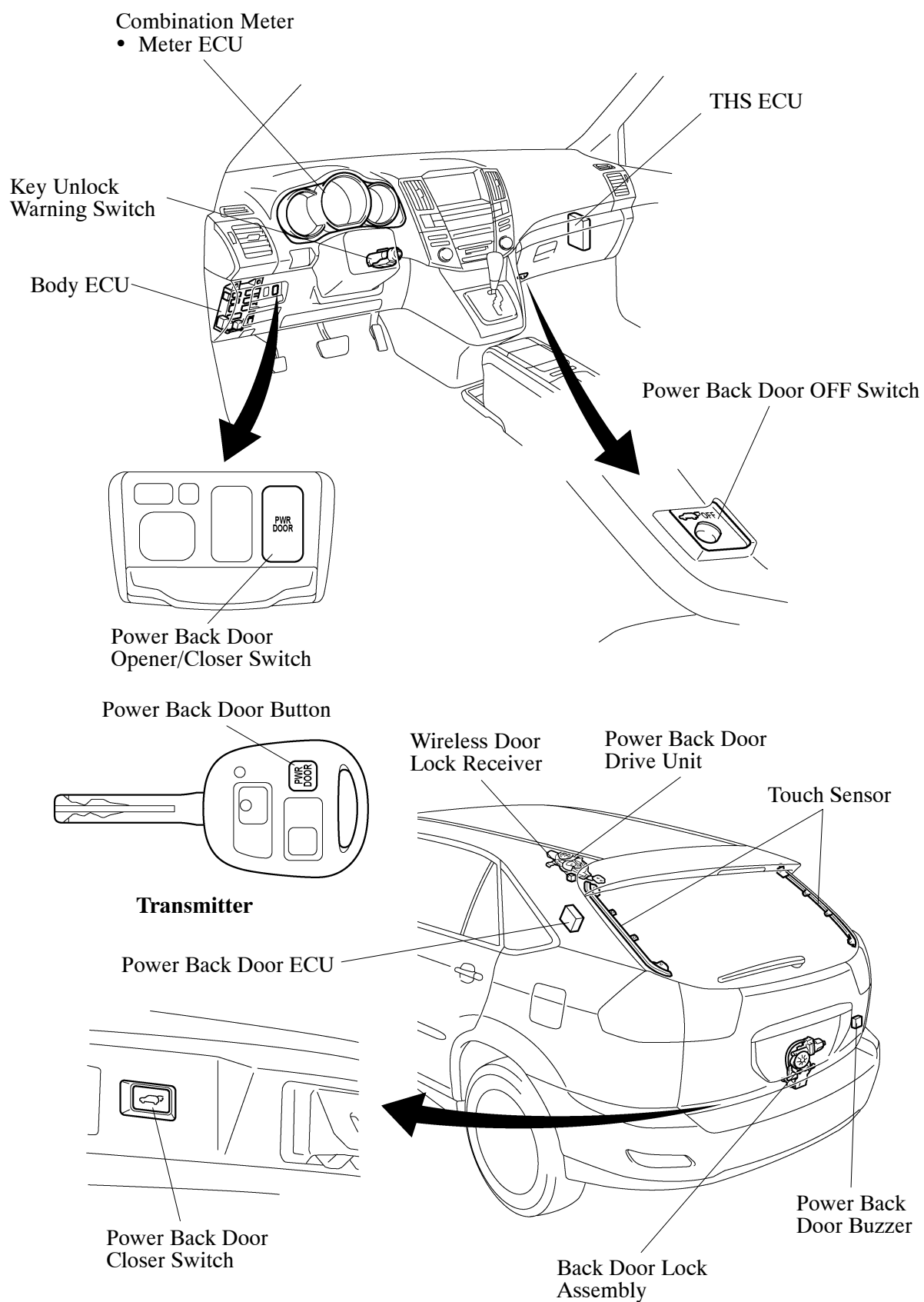
|                      |                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Conditions | <ul style="list-style-type: none"> <li>• The power back door OFF switch is in ON condition*.</li> <li>• The shift lever is in P position.</li> <li>• The power back door opener/closer switch is pressed a minimum of 1 second, the power back door button on the transmitter is pressed a minimum of 1 second or the power back door closer switch is pressed.</li> </ul> |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

\*: The state in which the switch is pressed.

### System Diagram



## ■ LAYOUT OF MAIN COMPONENTS



**LHD Model**

## FUNCTION OF MAIN COMPONENTS

| Components                           |                           | Function                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power Back Door Drive Unit           | Power Back Door Motor     | Opens and closes the back door when actuated by the power back door ECU.                                                                                                                                                                                                                                                                                          |
|                                      | Magnetic Clutch           | Transmits the rotation of the power back door motor to the driven gear.                                                                                                                                                                                                                                                                                           |
|                                      | Hall IC                   | Detects the back door position and the opening and closing speed of the back door.                                                                                                                                                                                                                                                                                |
| Back Door Lock Assembly              | Opener & Closer Motor     | Locks and unlocks the latch of the back door lock when actuated by the power back door ECU.                                                                                                                                                                                                                                                                       |
|                                      | Back Door Courtesy Switch | Detects whether the back door is opened or closed. This switch turns ON when the back door is opened or ajar and OFF when the back door is closed.                                                                                                                                                                                                                |
|                                      | Neutral Position Switch   | Detects the initial (neutral) position of the driven 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.                                                                                                                                                           |
|                                      | Full Latch Switch         | Detects the fully closed position of the latch, turns on in the overlatch condition.                                                                                                                                                                                                                                                                              |
|                                      | 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.                                                                                                                                                                                                                                                                                                                  |
| Power Back Door Buzzer               |                           | The buzzer sounds to inform the driver that the system is in operation when the power back door system starts to operate. The buzzer also sounds if a malfunction in the system is detected.                                                                                                                                                                      |
| Power Back Door OFF Switch           |                           | <ul style="list-style-type: none"> <li>Setting this switch to OFF condition* prohibits system operation.</li> <li>In case that this switch is in OFF condition, 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.</li> </ul>                                                    |
| Power Back Door Opener/Closer Switch |                           | Setting this switch to ON opens or closes the back door from the cabin.                                                                                                                                                                                                                                                                                           |
| Power Back Door Closer Switch        |                           | The back door closes when this switch is turned ON from outside of the vehicle.                                                                                                                                                                                                                                                                                   |
| Transmitter                          |                           | The back door opens or closes when the power back door button on the transmitter is pressed outside of the vehicle.                                                                                                                                                                                                                                               |
| Back Door Opener Switch              |                           | <p>This switch releases the latch of the back door lock for manual opening of the back door. For details, see <a href="#">page BE-121</a> in the electrical back door outside handle system section.</p> <p>Pressing the back door opener switch during operation of the power back door system enables switching to manual operation of the power back door.</p> |
| Power Back Door ECU                  |                           | Controls the power back door system in accordance with the signals received from the switches and ECUs.                                                                                                                                                                                                                                                           |
| Body ECU                             |                           | The body ECU transmits back door lock/unlock control signal to the power back door ECU via the BEAN.                                                                                                                                                                                                                                                              |
| THS ECU                              |                           | The THS ECU transmits the shift position signal (P and N positions) to the power back door ECU via the gateway ECU, through CAN communication.                                                                                                                                                                                                                    |
| Combination Meter (Meter ECU)        |                           | The meter ECU transmits the vehicle speed signal to the power back door ECU via the gateway ECU, through BEAN communication.                                                                                                                                                                                                                                      |

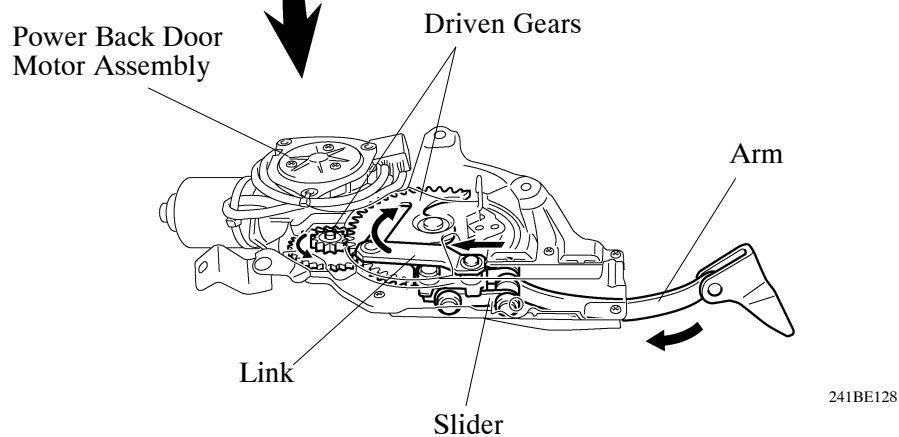
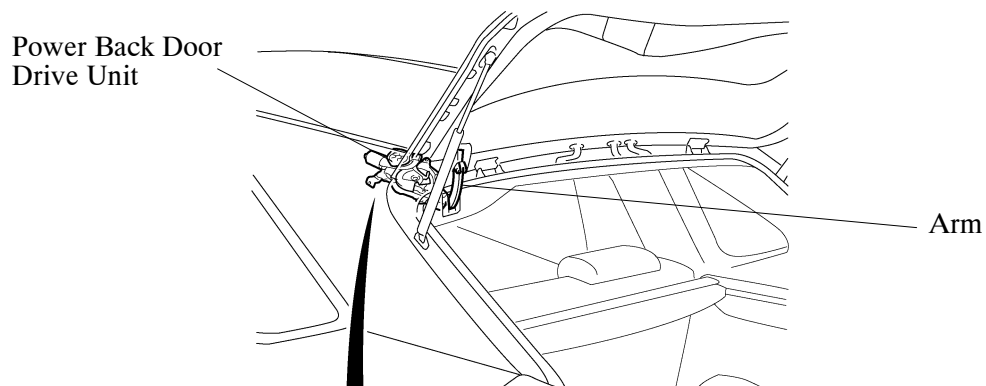
\*: The state in which the switch is not pressed.

## ■ CONSTRUCTION AND OPERATION

### 1. Power Back Door Drive Unit

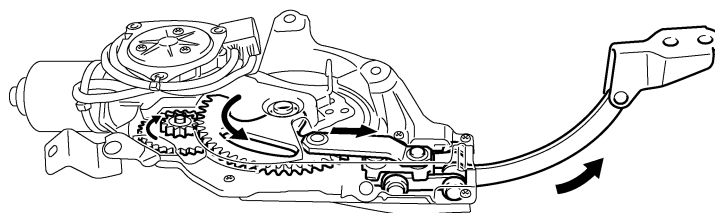
#### General

- The power back door drive unit comprises the power back door motor assembly, driven gear, link, slider and arm.
- Rotation of the power back door motor moves the arm forward and back via the driven gear, link mechanism and slider mechanism. The back door is opened and closed by movement of this arm.



241BE128

**Back Door Close**

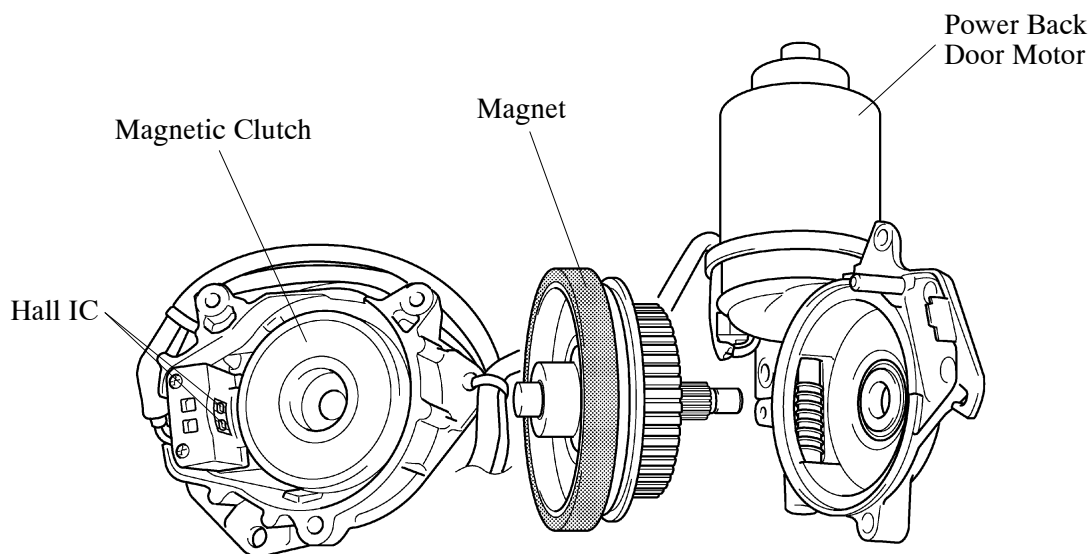


**Back Door Open**

241BE130

### Power Back Door Motor Assembly

- The power back door motor assembly is mainly comprised of the power door motor, magnetic clutch and 2 Hall ICs.
- The magnetic clutch transmits the rotation of the power back door motor to the driven gear. Normally, the magnetic clutch is disengaged to enable a manual open or close operation of the power back door.
- The rotation of the magnet located on the perimeter of the magnetic clutch creates changes in the magnetic flux. The 2 Hall ICs convert these changes into pulse signals and output them to the power back door ECU. Based on these signals, the power back door ECU detects the position of the back door, as well as its opening or closing speed, which determines whether the back door is jammed.



241BE131

#### Service Tip

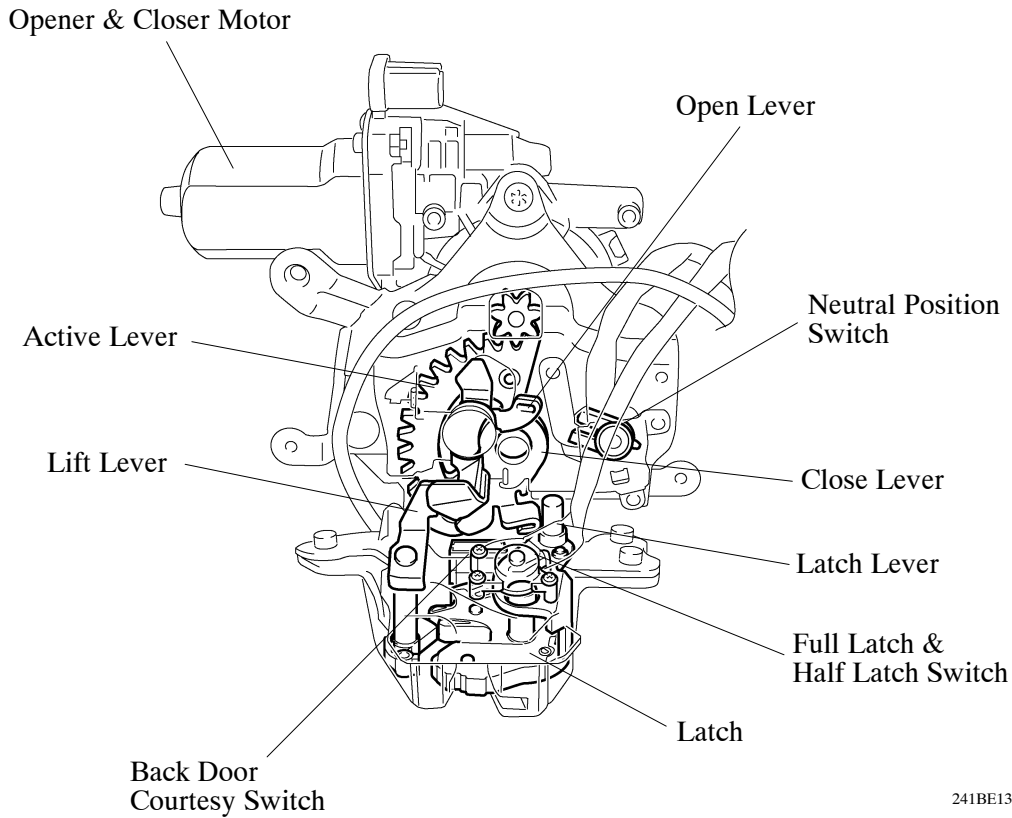
The power back door ECU memorizes the fully close and fully open positions of the back door. This data will be lost if a battery terminal, fuse, power back door ECU, or the power back door drive unit is removed and reinstalled.

For this reason, after the completion of any of the operations indicated above, turn the ignition switch ON and manually operate the back door once to the fully closed position. For details, refer to the LEXUS RX400h Repair Manual (Pub. No. RM1139E).

## 2. Back Door Lock Assembly

### Construction

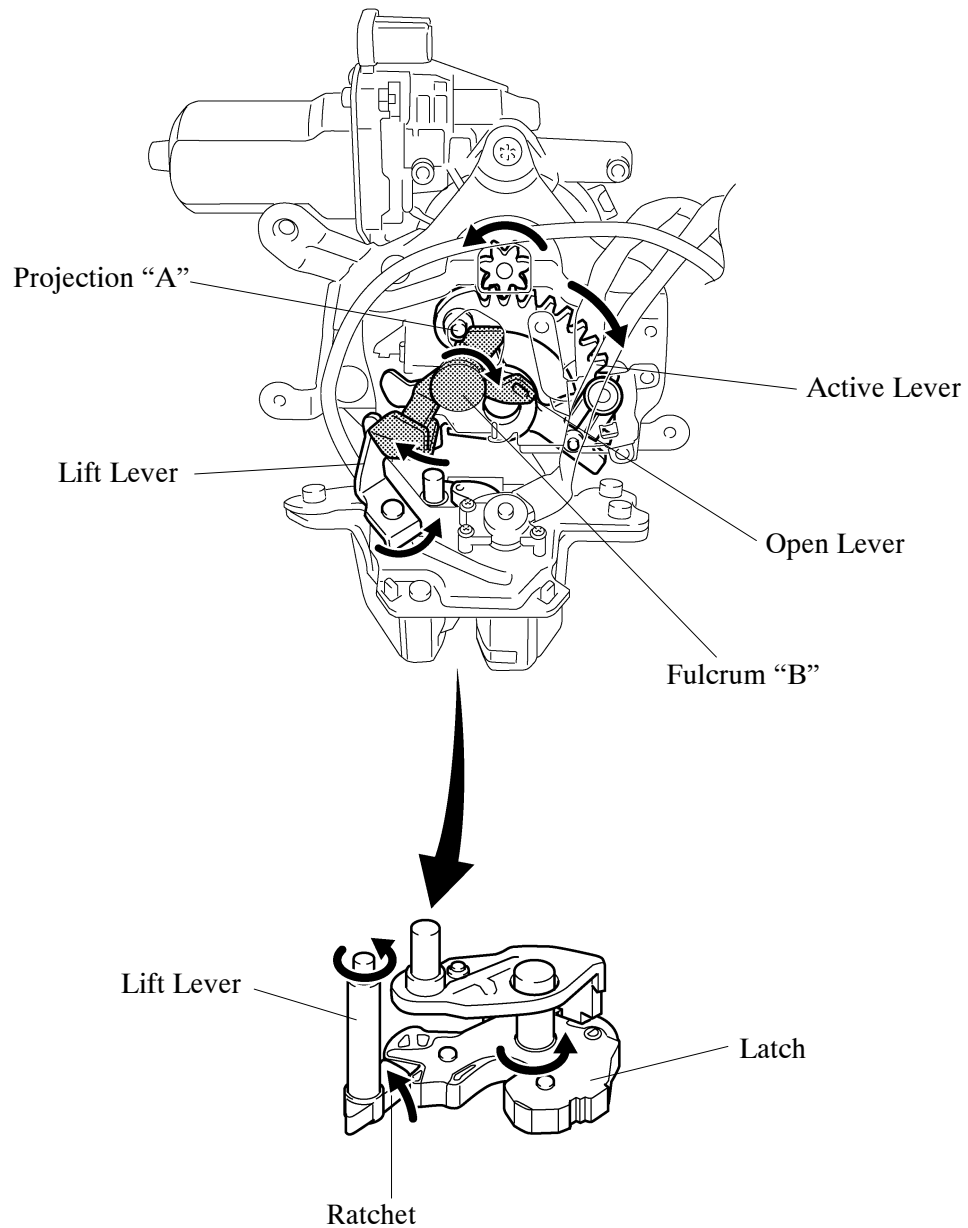
- The back door lock assembly consists of 4 position detection switches (full latch switch, half latch switch, neutral position switch and back door courtesy switch), 5 levers (active lever, open lever, close lever, lift lever and latch lever), latch, ratchet and opener & closer motor.
- The rotation of the opener & closer motor is transmitted to the close or open lever via the active lever. The operation of the open or close 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 assembly.



241BE132

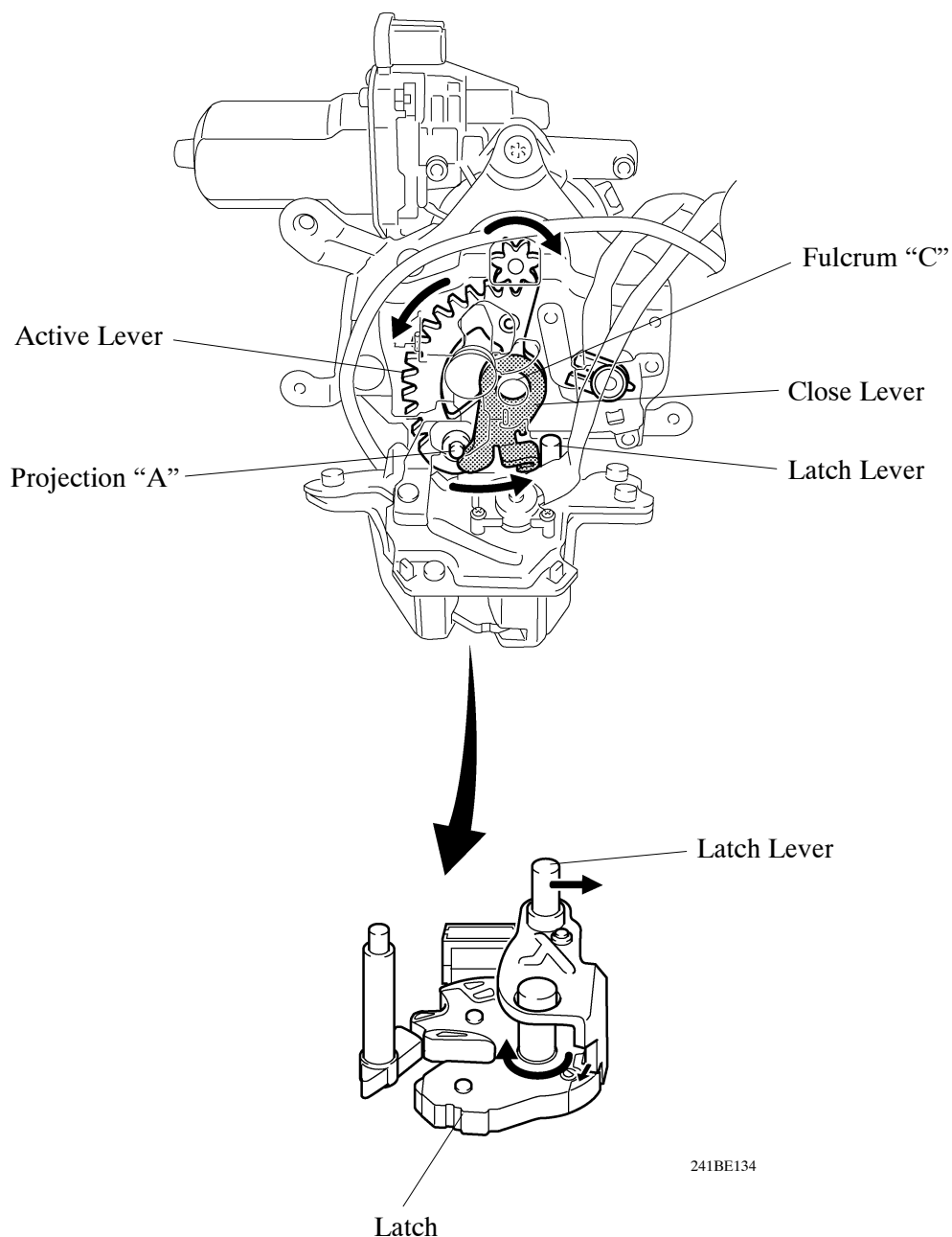
## Opener Operation

- When the opener and closer motor rotates in reverse, the active lever coupled to the opener and closer motor through a gear is driven to the right. This pushes projection “A” on the active lever against the open lever, and the open lever rotates clockwise through fulcrum “B”.
- The open lever turns the lift lever counterclockwise, releasing the ratchet located on the same axis, thus releasing the latch.



**Closer Operation**

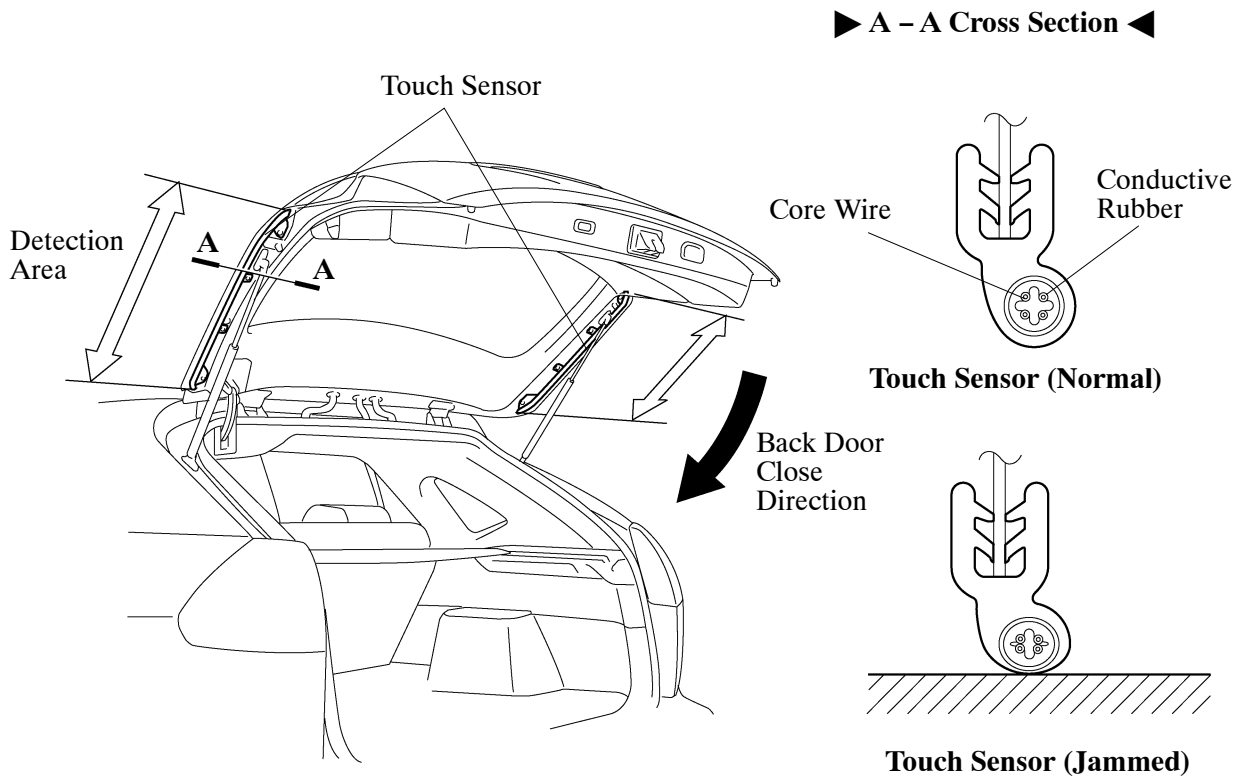
- When the opener and closer motor rotates forward, the active lever coupled to the opener and closer motor through a gear is driven to the left. This pushes projection “A” on the active lever against the close lever, and the close lever rotates counterclockwise through fulcrum “C”.
- The close lever moves the latch lever rightward. This causes the latch lever to move the latch in the close direction.



241BE134

### 3. Touch Sensor

While the back door is moving in the closing direction, if one of the touch sensors (right or left) 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.



## ■ SYSTEM CONTROL

### 1. General

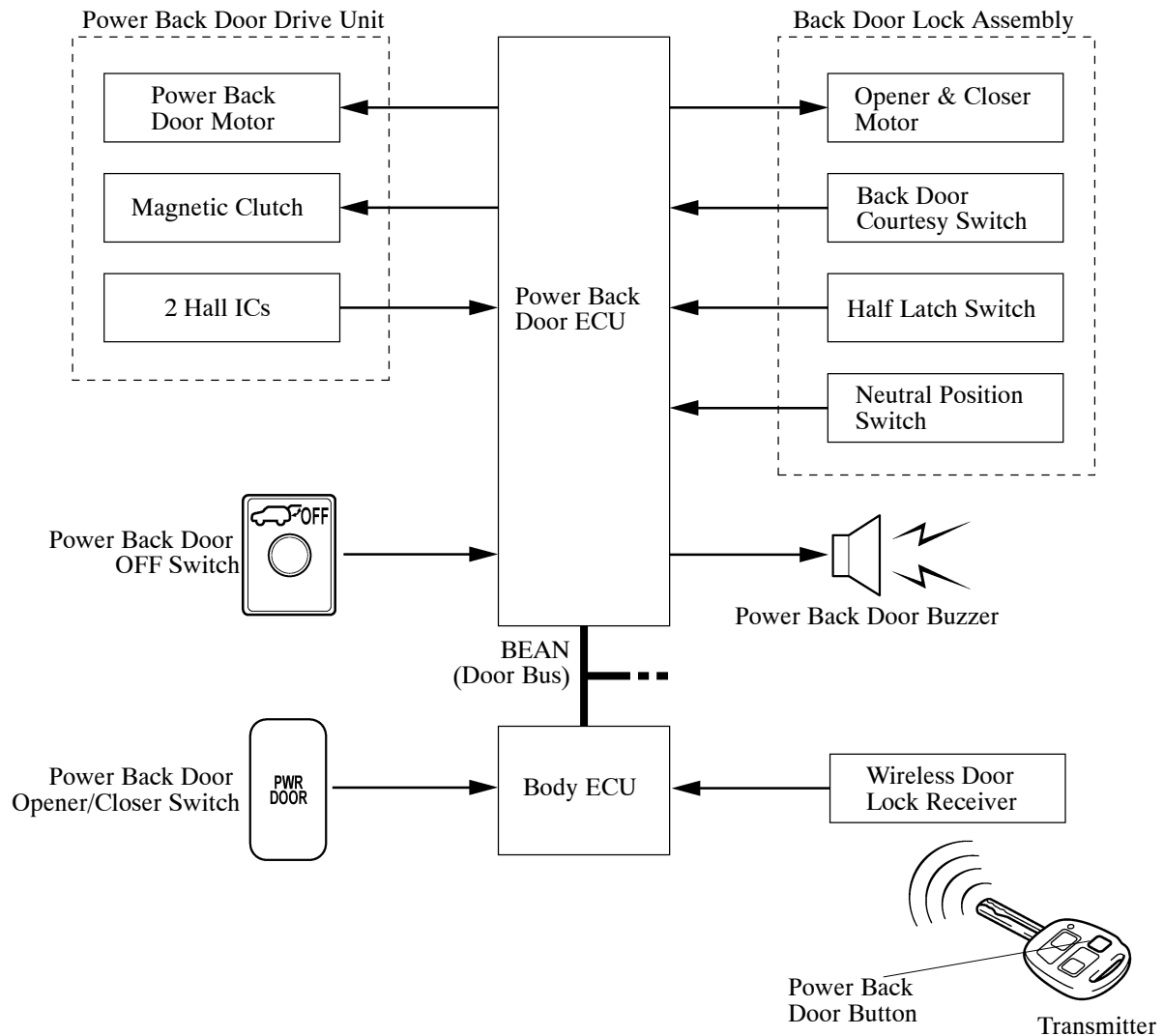
This system performs the functions listed below.

| Function                                    | Outline                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Opener Function                             | Upon receiving an ON signal from the power back door opener/closer switch or the power back door button on the transmitter, 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 back door. For details, <a href="#">see page BE-133</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Closer Function                             | Upon receiving an ON signal from the power back door opener/closer switch, power back door closer switch, or the power back door button on the transmitter, 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. For details, <a href="#">see page BE-134</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Jam Protection Function                     | 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. For details, <a href="#">see page BE-135</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Reverse Control Function                    | 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 transmitter, the power back door ECU sounds the power back door buzzer for approximately 0.1 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 Function | In accordance with the signals received from the Hall ICs, the power back door ECU effects the following controls: <ul style="list-style-type: none"> <li>• Reduces the closing speed from approximately 200 mm (7.9 inch) before the back door is fully closed, in order to reduce the jamming load.</li> <li>• Reduces the opening speed from approximately 80 mm (3.1 inch) before the back door is fully open, in order to reduce the shock that occurs when it is fully open.</li> </ul>                                                                                                                                                                                                                                                                                                                          |
| 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 body ECU via the BEAN (Body Electronics Area Network). For details, refer to LEXUS RX400h Repair Manual (Pub. No. RM1139E).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Fail Safe                                   | <ul style="list-style-type: none"> <li>• 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. <ul style="list-style-type: none"> <li>- Open in the touch sensor</li> <li>- The power back door motor is operated continuously for 30 sec or more.</li> <li>- Abnormal back door position signal (Hall IC signal)</li> <li>- Abnormality with position switches on back door lock assembly.</li> </ul> </li> <li>• 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 failsafe operation.</li> </ul> |

## 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 transmitter is turned ON for a minimum of 1 second.
2. The power back door buzzer sounds.
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.

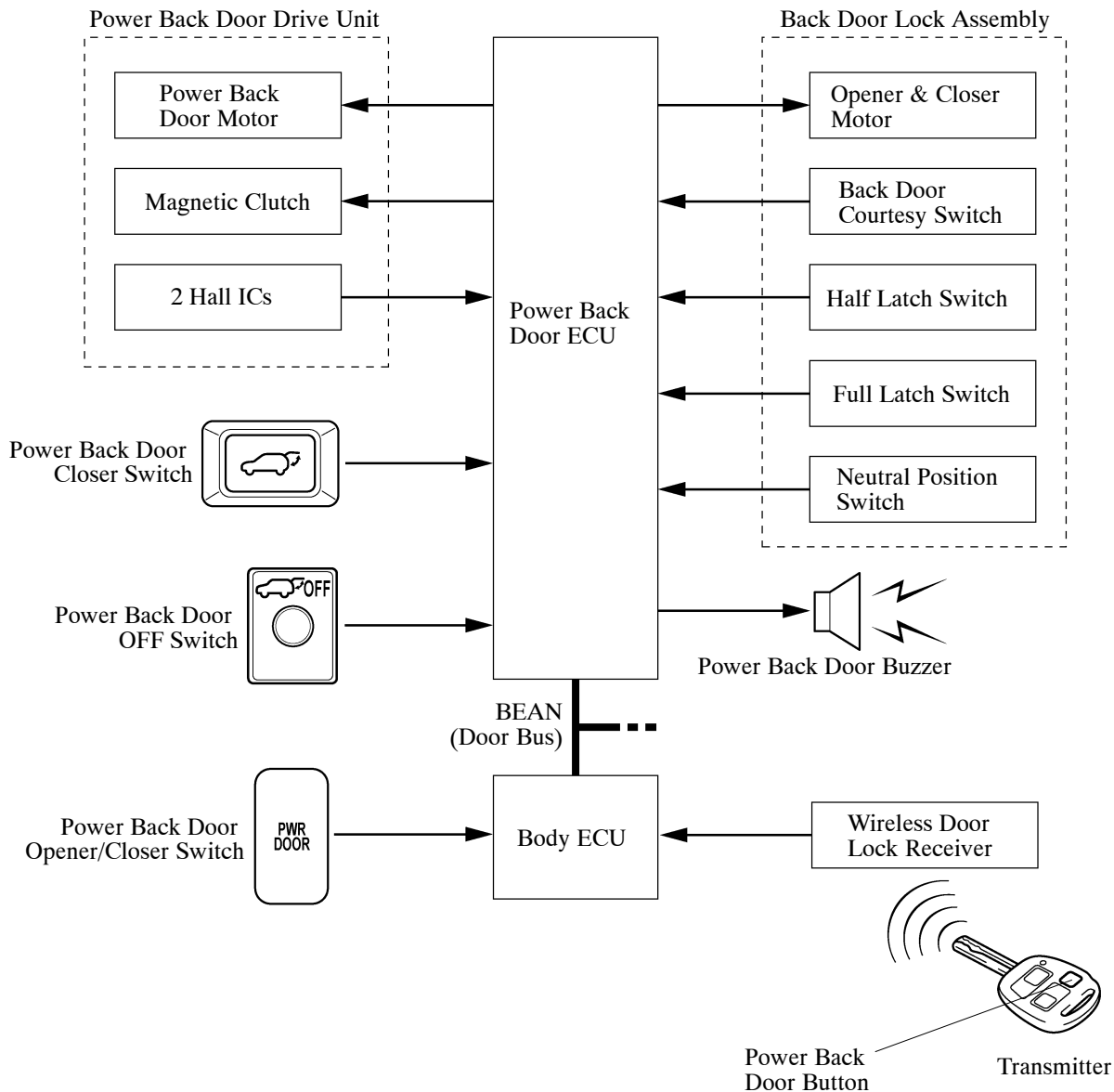


BE

### 3. Closer Function

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

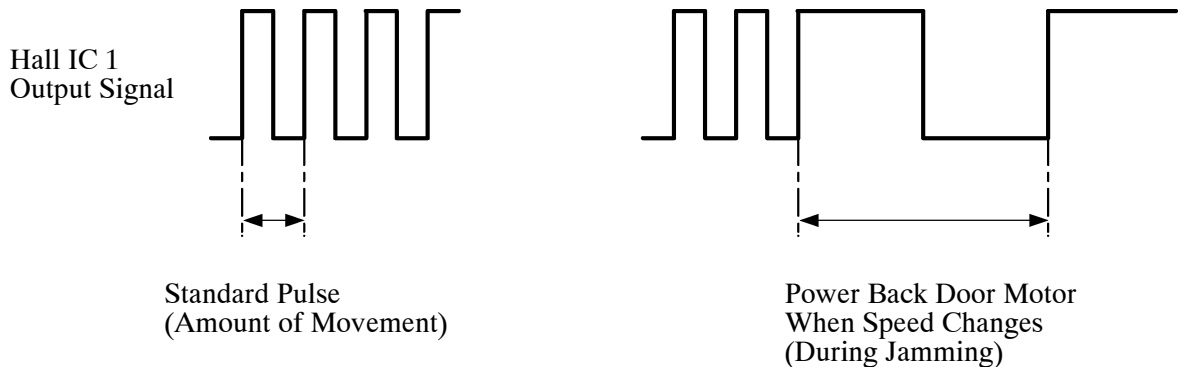
1. The power back door opener/closer switch or the power back door button on the transmitter is turned ON for a minimum of 1 second. Or, the power back door closer switch is turned ON.
2. The power back door buzzer sounds.
3. The power back door ECU actuates the power back door motor to start closing 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 full latch switch, the power back door ECU reverses the opener & closer motor to its initial position.
7. Upon detecting that the motor has reverted to its initial position from the state of the neutral position switch, the power back door ECU stops the opener & closer motor.



#### 4. Jam Protection Function

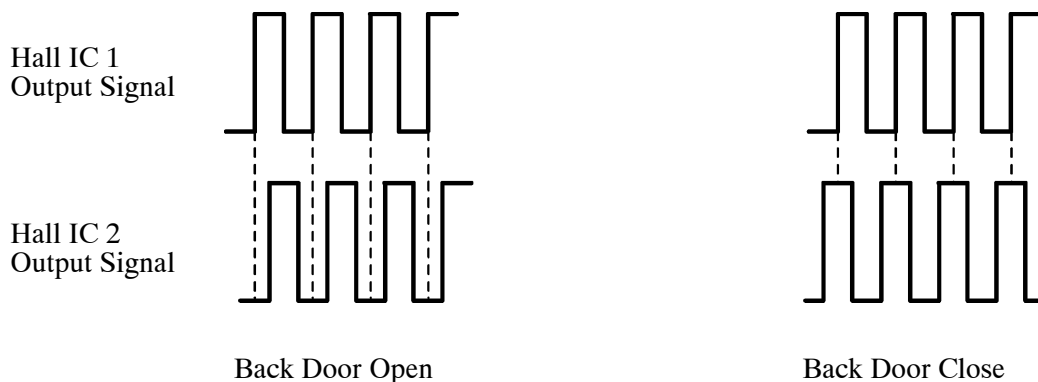
- The power back door ECU determines the jamming of the back door upon receiving the signals from a touch sensor and the Hall ICs of the power back door motor.
- The power back door ECU determines the back door movement distance and the back door opening/closing speed (back door foreign object jamming) 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 gets jammed during opening or closing of the power back door, the pulse width of the output signal from Hall IC of the power 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 again detected 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 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 power back door is closing, the resistor value of the sensor changes. The power back door ECU judges this resistor value change as jamming, and reverses the power back door motor.

##### ► Judgment of Amount of Movement and Opening/Closing Speed ◀



232BE34

##### ► Judgment of Back Door Moving Direction ◀



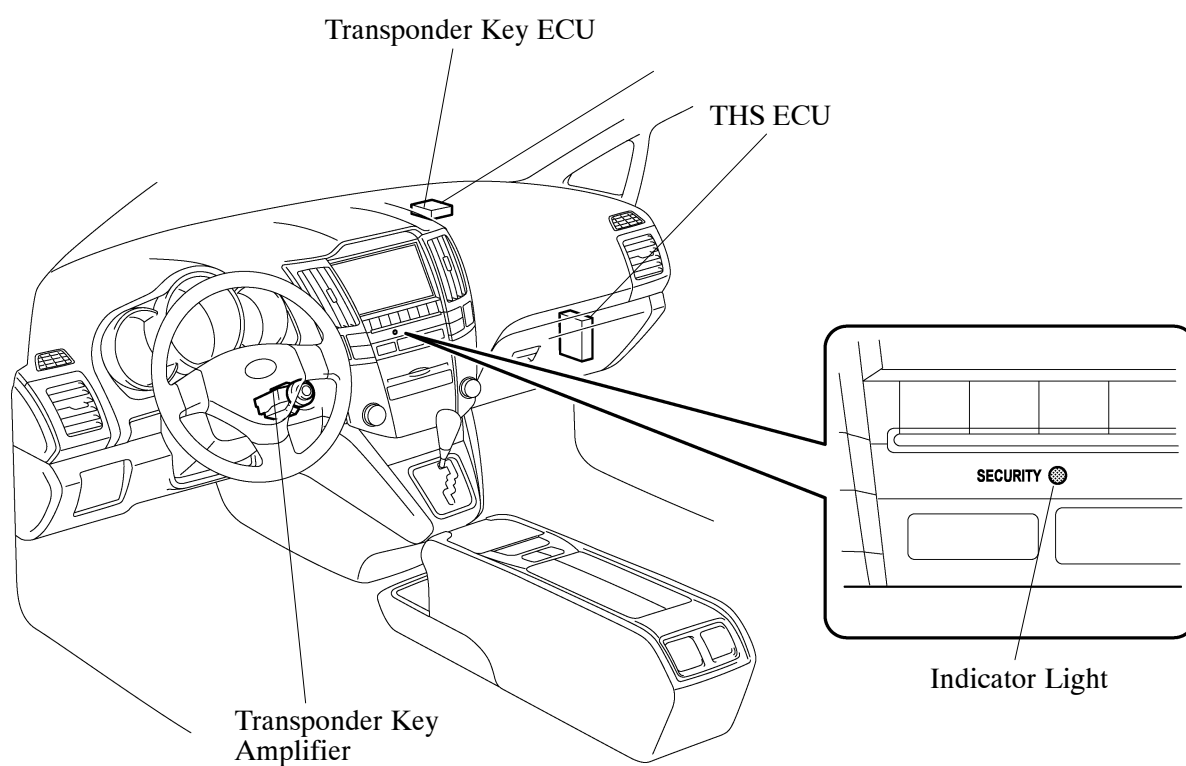
232BE35

## HV IMMOBILIZER SYSTEM

### DESCRIPTION

- This system has been provided as standard equipment on all models.
- The HV immobilizer system is a theft deterrent system that disables the engine from starting using the ignition key with an ID code that matched is the pre-registered code in the vehicle.
- The HV immobilizer system compares the ID code that is registered in the transponder key ECU with the ID code of the transponder chip that is embedded in the ignition key. The HV immobilizer system unsets if these ID codes match. Thus, the transponder key ECU and the THS ECU communicate with each other to authorize the starting of the hybrid system (READY) through the operation of the ignition switch.

### ► Layout of Main Components ◀



**LHD Model**

## THEFT DETERRENT SYSTEM

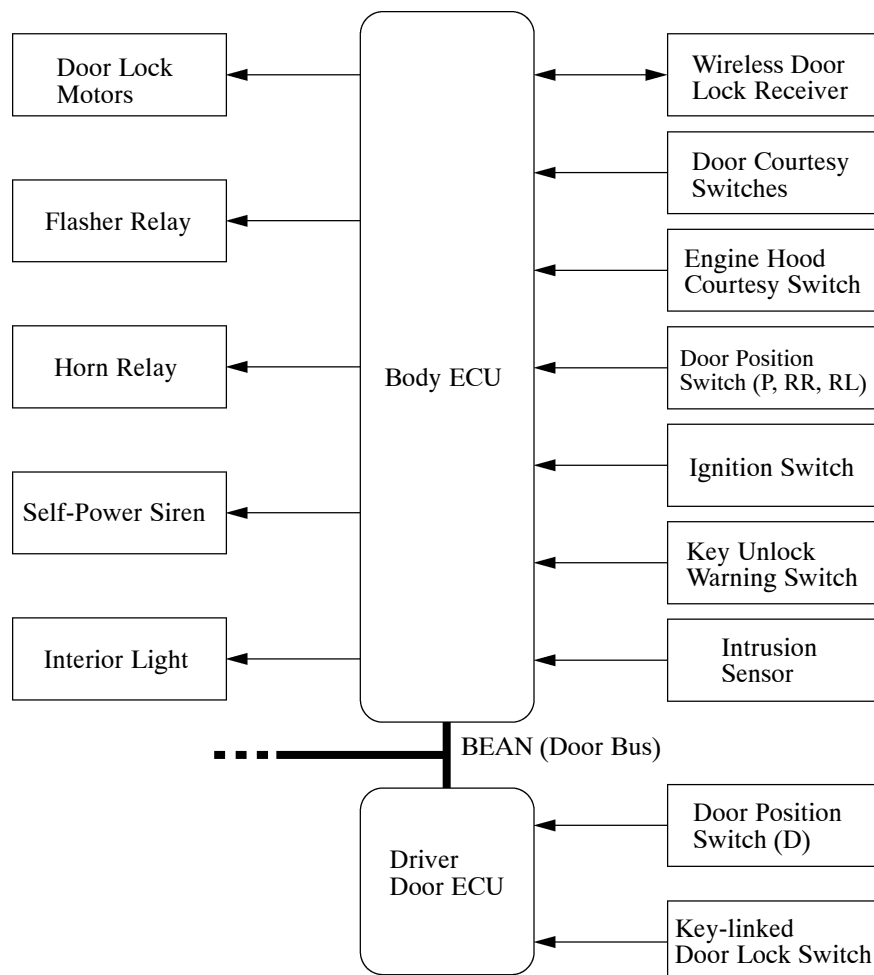
### DESCRIPTION

- This system has been provided as standard equipment on all models.
- The theft deterrent system uses the door lock control system and wireless door lock remote control system parts. The theft deterrent system will operate when somebody attempts to forcibly enter the vehicle, open the engine hood, or when the battery terminals are removed and reconnected.
- The control of this system is effected by the Body ECU.

### Warning Specifications ◀

|                |                  |                                                               |
|----------------|------------------|---------------------------------------------------------------|
| Warning Method | Interior Light   | Illuminates                                                   |
|                | Hazard Light     | Flashing                                                      |
|                | Vehicle Horn     | Sounds a warning at approx. 0.4 second cycles                 |
|                | Self-Power Siren | Sounds a warning at the cycle of the self-power siren it self |
|                | Door Lock Motor  | Locking                                                       |
| Warning Time   |                  | 57 sec.                                                       |

### System Diagram ◀



BE

## ■ LAYOUT OF MAIN COMPONENTS

- Door Lock Assembly
- Door Lock Motor
  - Door Position switch

Wireless Door  
Lock Receiver

- Door Lock Assembly
- Door Lock Motor
  - Door Position Switch

Self-Power Siren

- Back Door Lock Assembly
- Door Courtesy Switch
  - Door Position Switch

Courtesy Switches

Engine Hood  
Courtesy Switch

Interior Light

Intrusion Sensor

Flasher Relay

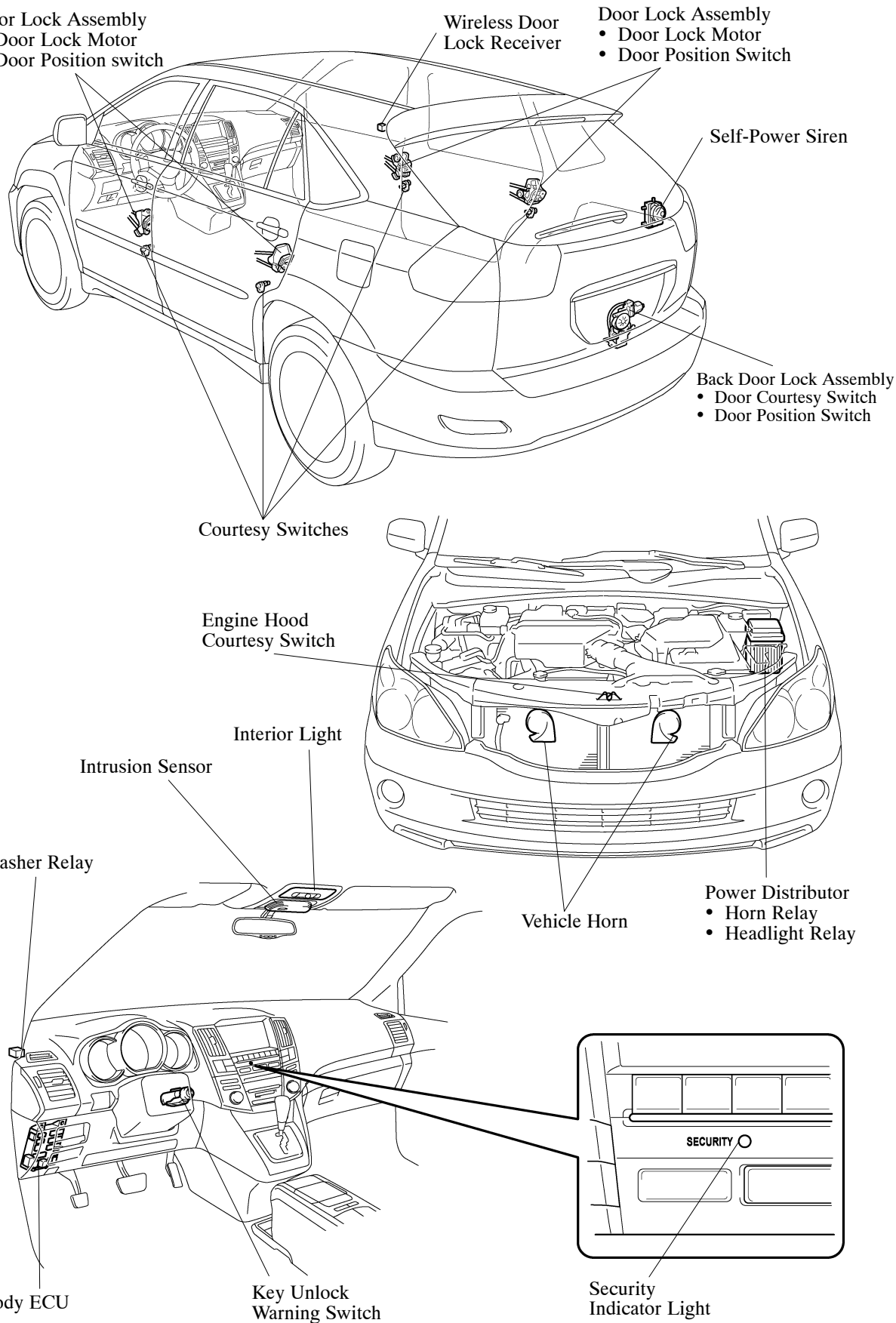
Vehicle Horn

- Power Distributor
- Horn Relay
  - Headlight Relay

Body ECU

Key Unlock  
Warning Switch

Security  
Indicator Light



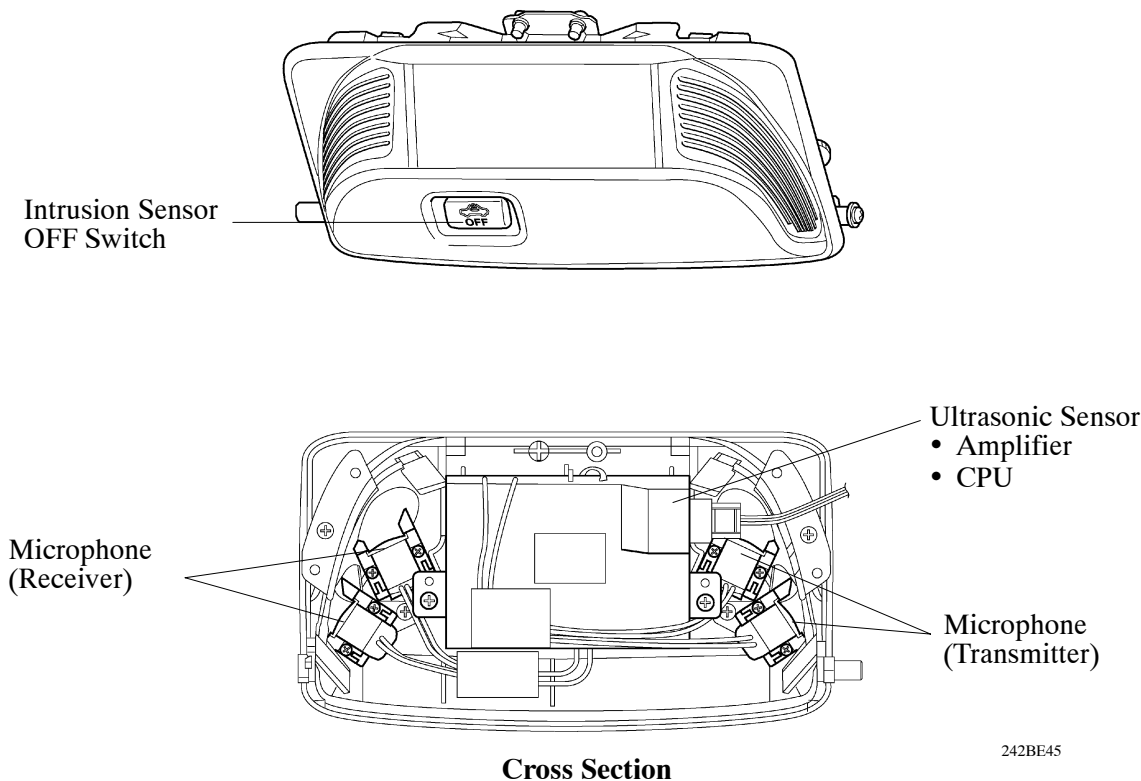
LHD Models

## ■ CONSTRUCTION AND OPERATION

### 1. Intrusion Sensor

#### General

- An intrusion sensor is provided in the front interior light located in the front of the vehicle interior.
- Intrusion sensor consists of intrusion sensor OFF switch, 4 microphone (transmitter and receiver) and ultrasonic sensor (amplifier and CPU). In this sensor, the ultrasonic waves are output by the transmitter microphone and input by the receiver microphone. The CPU determines that an intrusion has taken place by detecting the changes in the ultrasonic waves that have been amplified by the amplifier.



#### Operation

- The theft deterrent ECU activates the intrusion sensor when the system changes from the disarmed state to the armed preparation state. If an intrusion detection signal is input from the intrusion sensor during the armed state, the ECU changes to the alarm state in order to output an alarm.
- When the system is in the disarmed state, the function of the intrusion sensor can be disabled by pressing the intrusion sensor OFF switch. If the system changes from this state to the armed preparation state, the intrusion sensor will not activate. This function is canceled each time all doors are unlocked with a transmitter, and is reinstated when the intrusion sensor is ON.

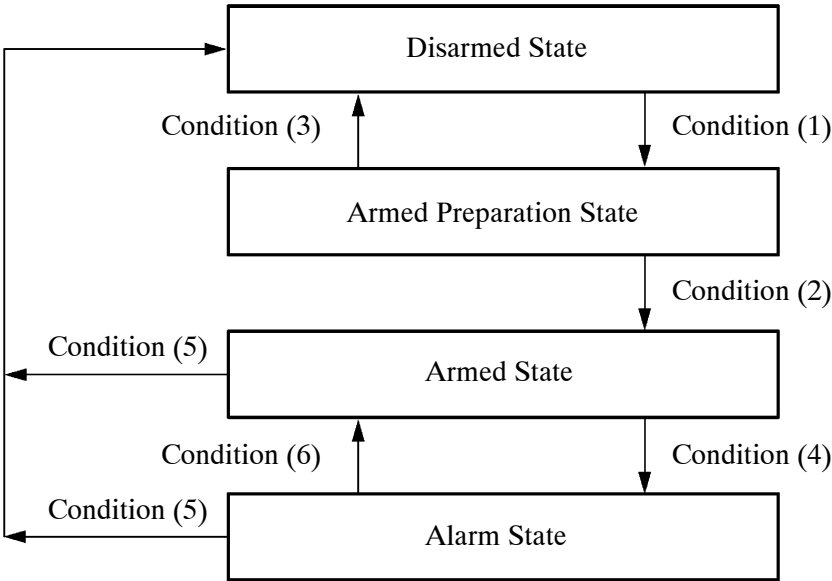
### 2. Self-Power Siren

During a normal operation, this siren sounds an alarm in accordance with the operation signal from the body 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.

■ SYSTEM OPERATION

1. Basic Operation

This system activates as described in the diagram below when one of items place in the respective state.



187BE40

| Condition     | Item                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Condition (1) | <ul style="list-style-type: none"><li>• There is no ignition key in the ignition key cylinder.</li><li>• When the doors, engine hood, and back door are all closed, the transmitter is used to lock all doors.</li></ul>                                                                                                                                                                      |
| Condition (2) | When the doors, engine hood, and back door are all closed and locked, and 30 seconds have elapsed.                                                                                                                                                                                                                                                                                            |
| Condition (3) | <ul style="list-style-type: none"><li>• When one of the doors, engine hood, or back door is changed from “close” to “open”.</li><li>• When one of the doors, engine hood, or back door is changed from “lock” to “unlock”.</li><li>• When the ignition key is inserted in the ignition key cylinder.</li><li>• When a terminal is disconnected from the battery and reconnected.</li></ul>    |
| Condition (4) | <ul style="list-style-type: none"><li>• Any door, engine hood, or back door is opened.</li><li>• Any door is unlocked with something other than the transmitter.</li><li>• The engine hood is opened.</li><li>• A terminal is disconnected from the battery and reconnected.</li><li>• If the ignition switch is bypassed.</li><li>• The intrusion sensor has detected an intruder.</li></ul> |
| Condition (5) | <ul style="list-style-type: none"><li>• The transmitter is used to unlock the doors.</li></ul>                                                                                                                                                                                                                                                                                                |
| Condition (6) | After approximately 30 seconds of the alarm time have elapsed.                                                                                                                                                                                                                                                                                                                                |

## 2. Forced Door Lock Operation

When the system starts the alarm state, and one of the doors is subsequently unlocked, the forced door lock operation forcefully outputs a door lock signal to prevent intrusion into the vehicle. This operation becomes activated when all the starting conditions listed below have been met, and stops when one of the stopping conditions occurs.

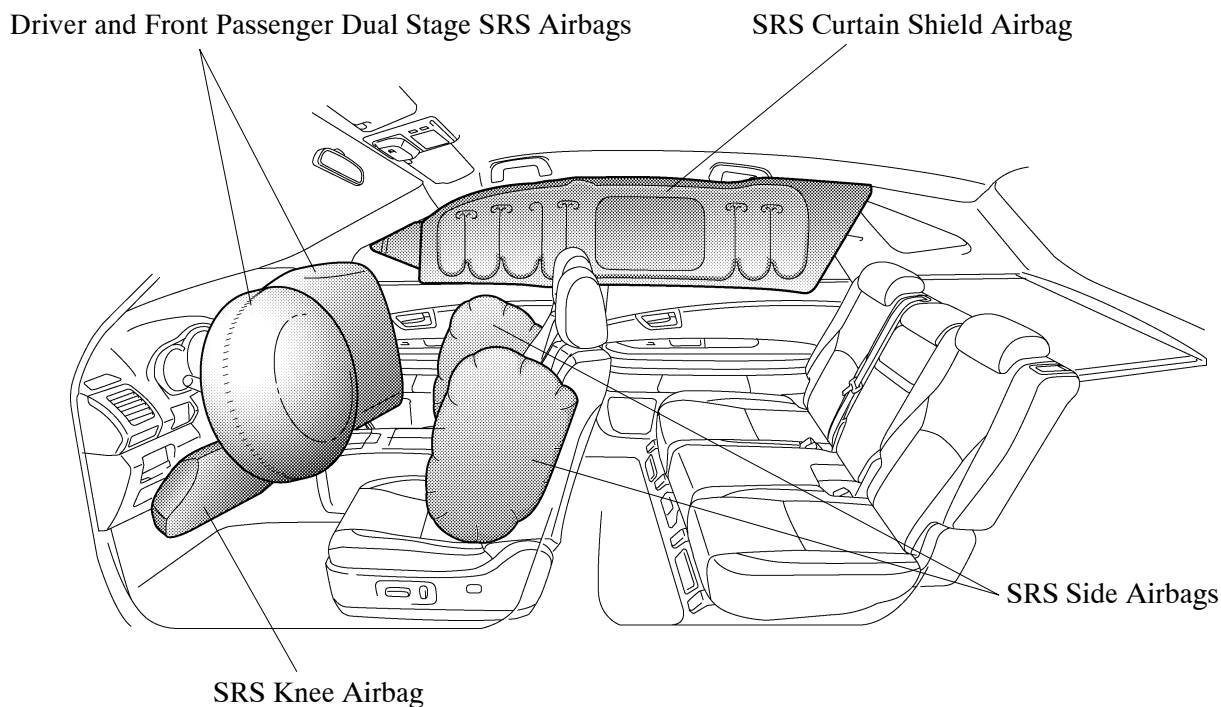
| Condition          | Item                                                                                                                                                                                                                  |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Starting Condition | <ul style="list-style-type: none"><li>• The theft deterrent system is in the alarm state.</li><li>• There is no key inserted in the ignition key cylinder.</li><li>• If one of the front doors is unlocked.</li></ul> |
| Stopping Condition | <ul style="list-style-type: none"><li>• All doors are locked.</li><li>• The warning ends after approximately 60 seconds.</li><li>• The ignition key is inserted in the ignition key cylinder.</li></ul>               |

## SRS AIRBAG SYSTEM

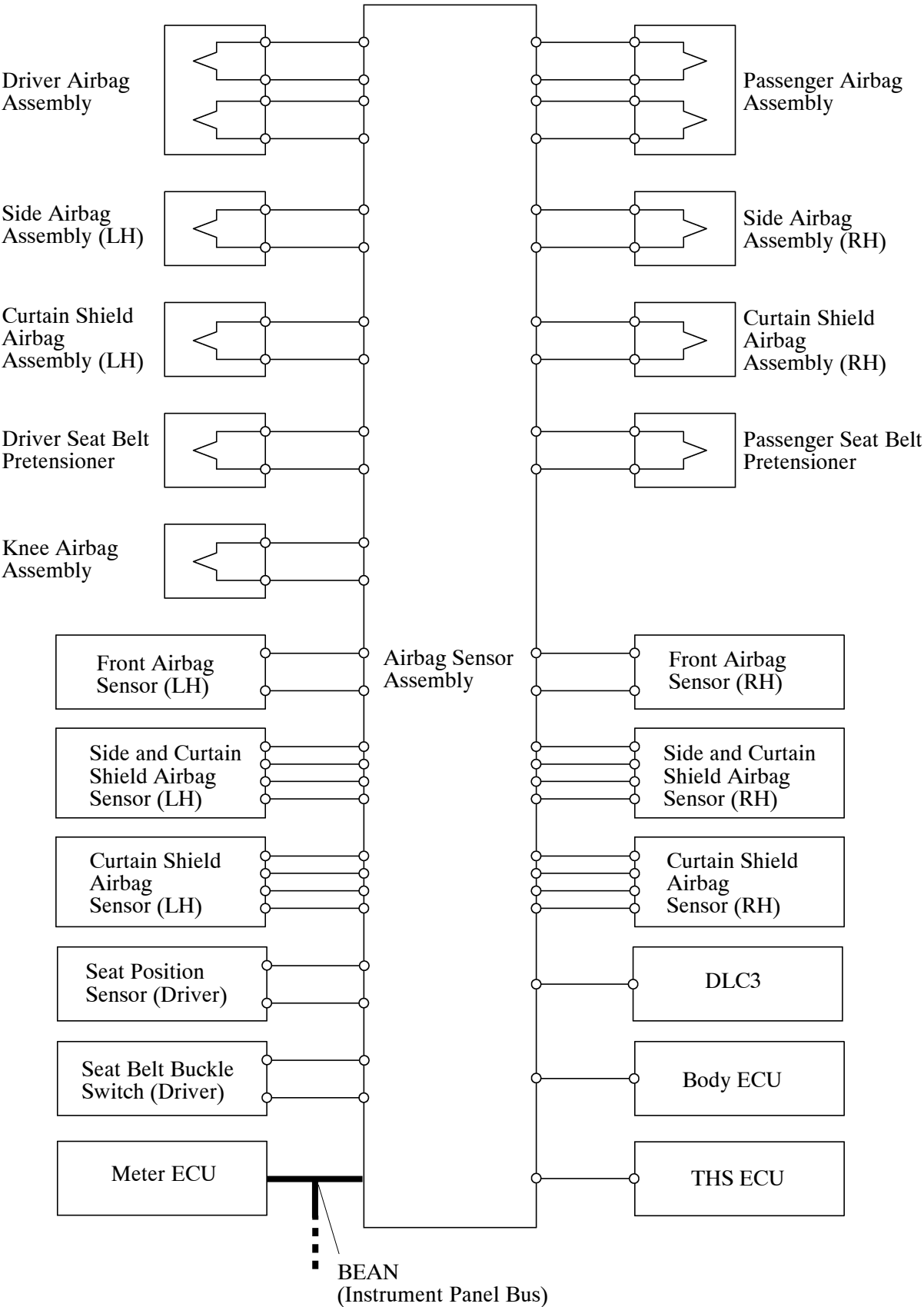
### DESCRIPTION

#### 1. General

- The driver and front passenger dual stage SRS (Supplemental Restraint System) airbags help to reduce the shocks to the head and chest of the driver and front passenger in the event of a frontal collision to supplement the seat belts.
- The SRS side and curtain shield airbags help to reduce the shocks to the head and chest of the driver, the front passenger, and rear outer passenger in the event of a side impact collision. Also, SRS curtain shield airbag is designed to help reduce the shocks to the head of the driver, the front passenger, and rear outer passenger in the event of a side collision.
- A knee airbag is provided for the lower part of the driver seat instrument panel.
- As on the current RX300, the new RX400h uses an electrical (deceleration sensor) type front airbag sensor.
- A no-contact type seat belt buckle switch that uses a Hall IC is used in the driver's seat belt buckle.
- An electrical connection check mechanism is used to detect the connection condition of the connector in the airbag sensor assembly.
- The front passenger airbag door is made invisible. This means that without the airbag door, the airbag will be inflated by splitting the instrument panel along the cleavage line.
- If any of the airbags have been deployed, the airbag sensor assembly transmits an airbag deployment signal to the THS ECU. For details, see page TH-61.

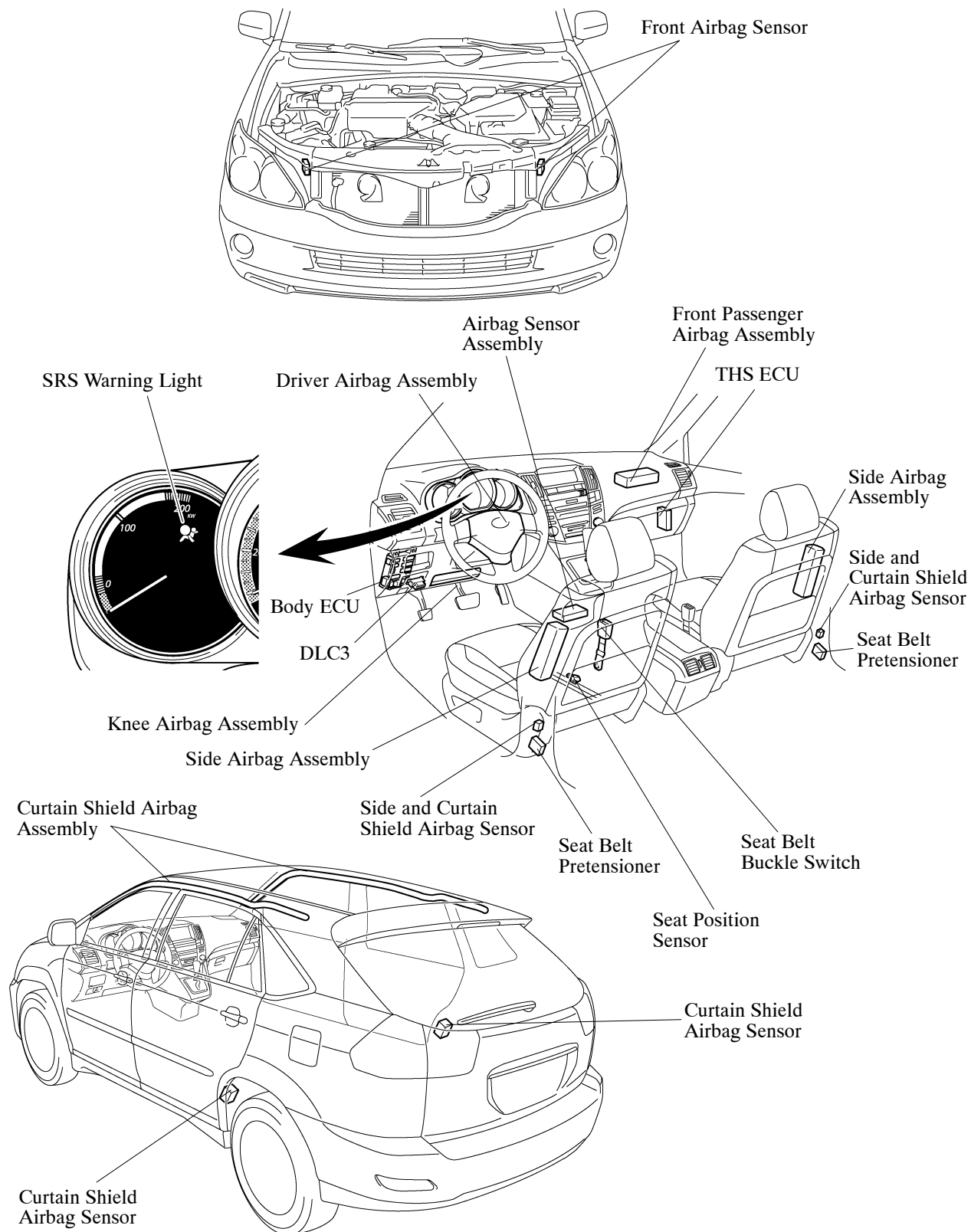


2. Wiring Diagram



BE

### 3. Layout of Main Components



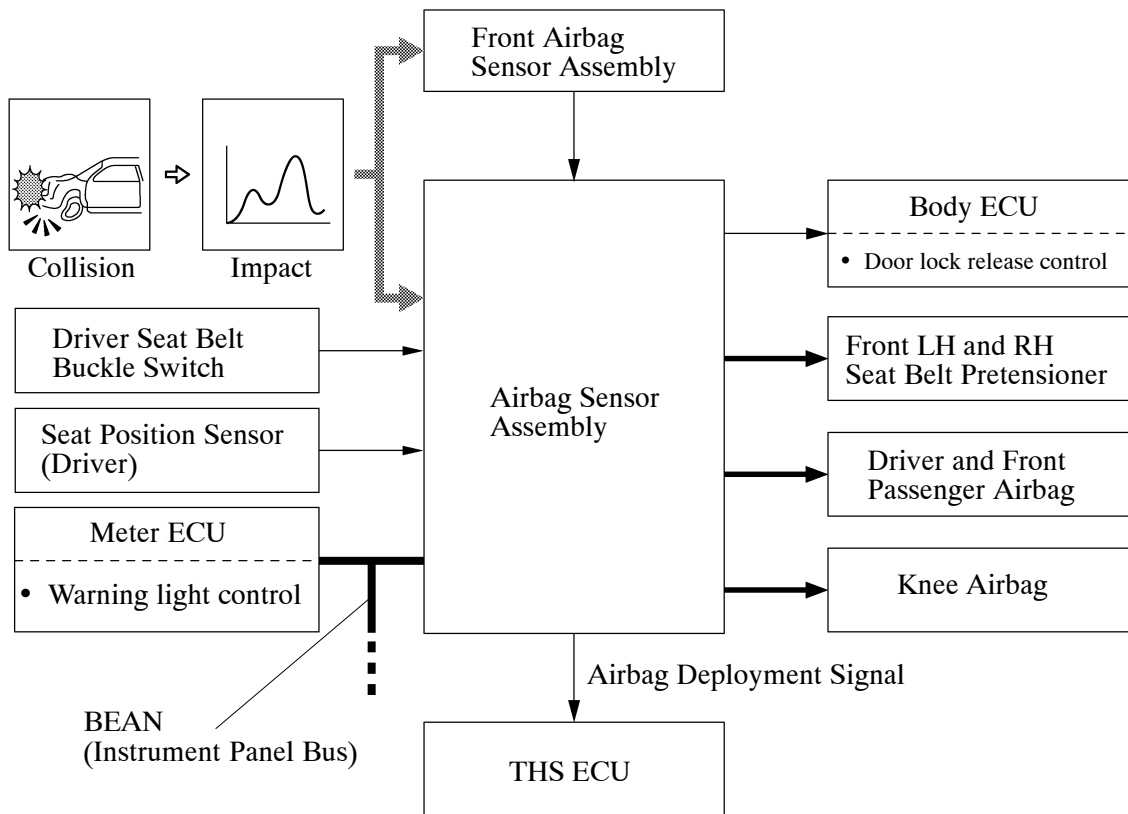
**LHD Model**

## ■ AIRBAGS FOR FRONT COLLISION

### 1. General

- In conjunction with impact absorbing structure for front collision, the driver and front passenger dual-stage SRS airbags and the driver knee airbag have been designed to help reduce injury to the head, chest and leg in the event of a front collision. These airbags all deploy with the same timing, and are supplements to the seat belts.
- The deceleration sensor is enclosed in the front airbag sensor. Based on the deceleration of the vehicle during a front collision, a distortion is created in the sensor and converted into an electrical signal. Accordingly, the extent of the initial collision can be detected in detail.

#### ► Front Airbag Operation ◀



## 2. Dual-stage SRS Airbags System

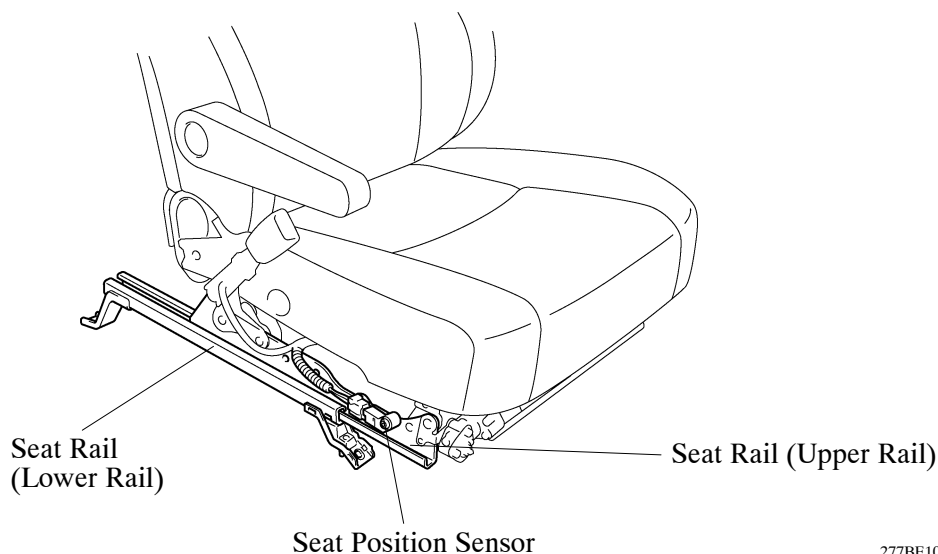
### General

In this system, when the front airbag sensors and airbag sensor assembly detect the front collision, the airbag sensor assembly judges the extent of impact, seat position and whether or not the seat belt is fasten, thus making the airbag inflating output optimum by delaying the inflating timing of the 2nd initiator and the 1st initiator.

### Seat Position Sensor

#### 1) General

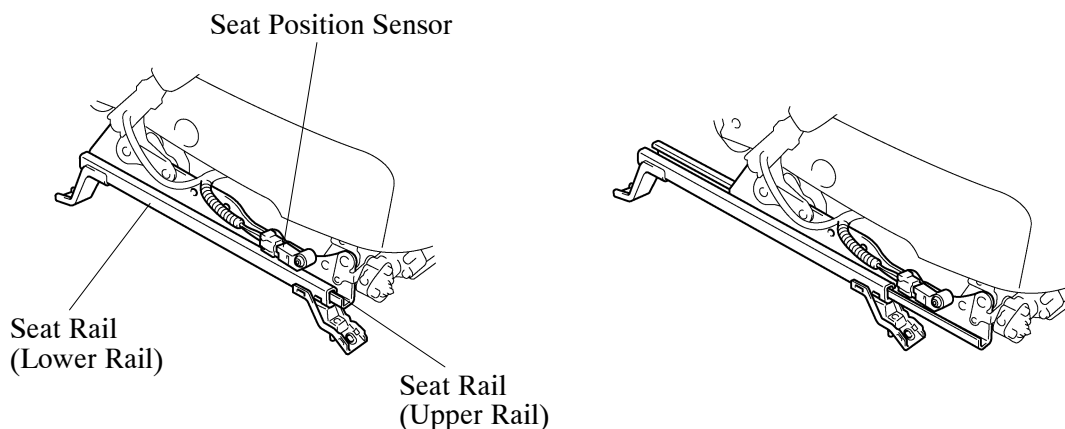
The seat position sensor is mounted on the upper rail portion of the driver seat rail, and includes a Hall IC and a magnet. This sensor is used to detect a sliding position of the driver seat.



277BE106

#### 2) Operation

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



277BE107

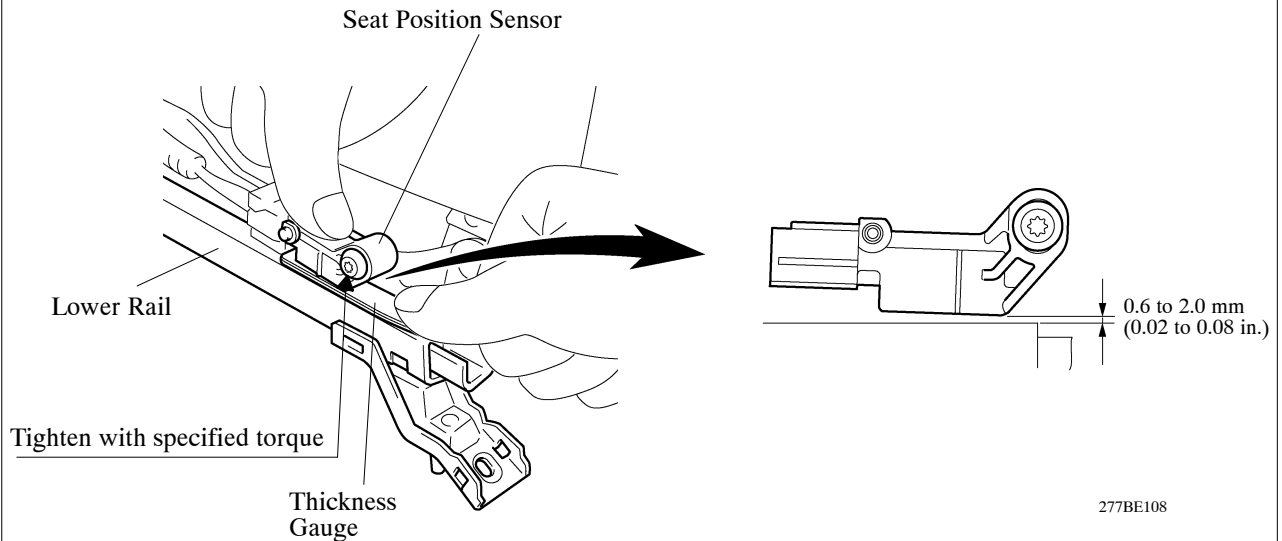
**Seat position is rearward**

**Seat position is forward**

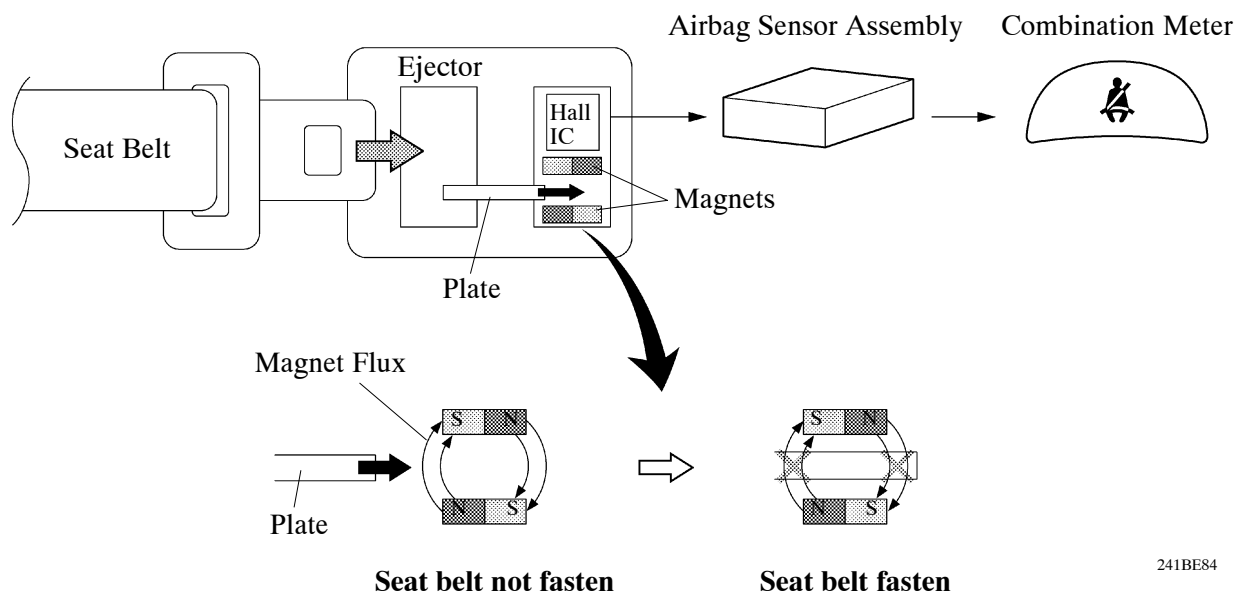
**Service Tip**

When installing the seat position sensor, first insert a 1 mm (0.04 in.) thickness gauge between the seat position sensor and the lower rail portion. And then, tighten the mounting bolt to the specified torque with the seat position sensor pushed down as shown.

For details, see the LEXUS RX400h Repair Manual (Pub. No. RM1139E).

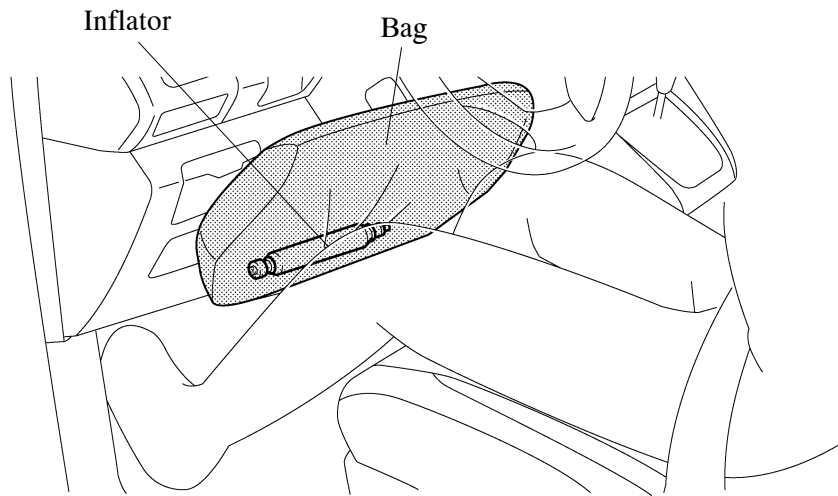
**Seat Belt Buckle Switch**

- On the new RX400h, the no-contact contact type seat belt buckle switch is used.
- The seat belt buckle switch comprises a Hall IC and 2 magnets, 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 applied. The movement of the plate cuts off the magnetic flux density of the seat belt buckle switch magnet. The Hall IC detects the changes in the magnetic flux density as seat belt removal or application, and outputs the signal to the airbag sensor assembly.



### 3. Knee Airbag

- The knee airbag deploys simultaneously with the front airbag in a front collision. With the deployment of the knee airbag, the driver's lower part of the body is restricted, thus providing the excellent efficiency of the passenger protection by the seat belt and front airbag.
- The knee airbag is installed below the driver seat instrument panel, and comprises the airbag door, inflator and bag.



241BE85

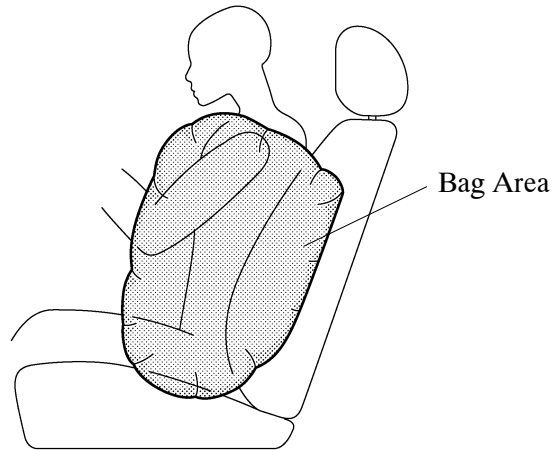
## ■ AIRBAGS FOR SIDE/REAR OF SIDE COLLISION

### 1. General

In conjunction with impact absorbing structure for side/rear side collision, the SRS side and curtain shield airbags have been designed to help reduce the impact energy that is transmitted to the driver, front passenger and rear outer passenger in the event of a side/rear side collision.

### 2. Side Collision

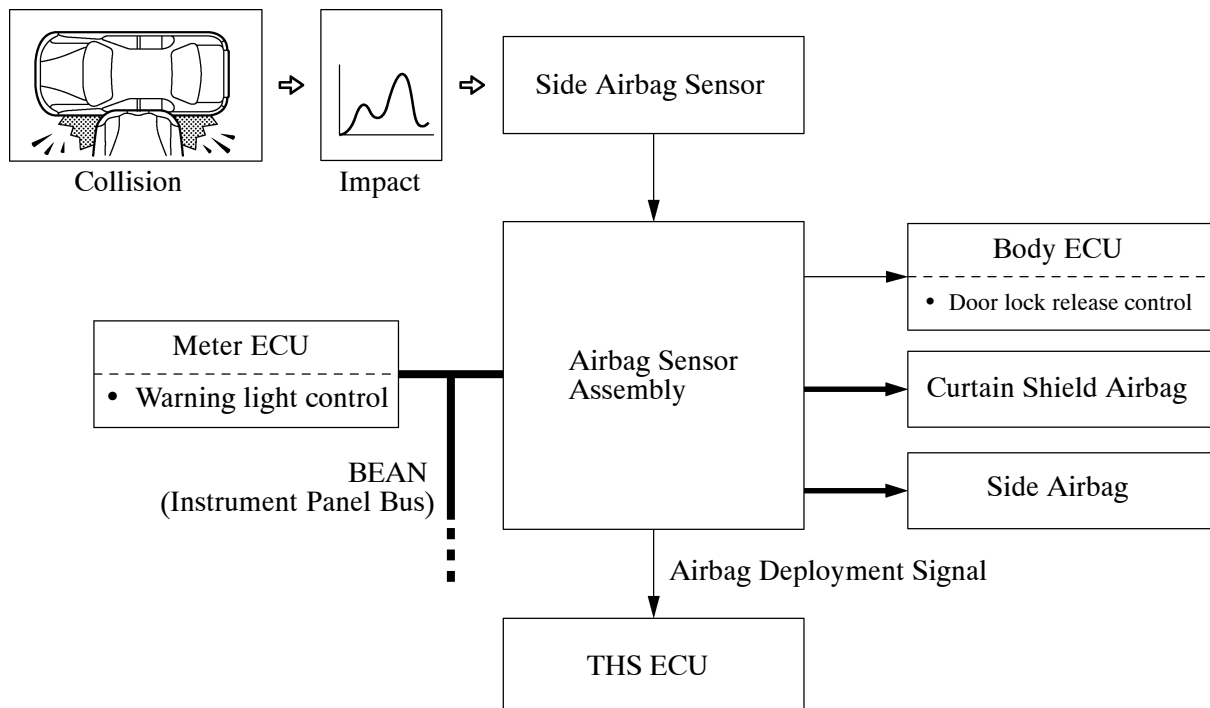
When a side collision is detected by the side airbag sensor, the side and curtain shield airbags will be deployed simultaneously.



Side Airbag Deployment Area

241BE86

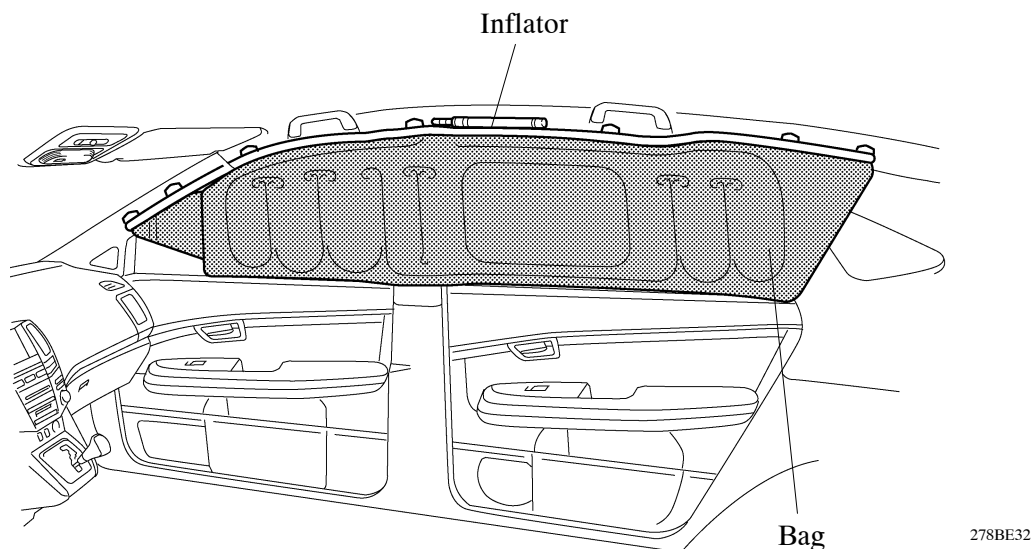
### ► Side and Curtain Shield Airbag Operation ◀



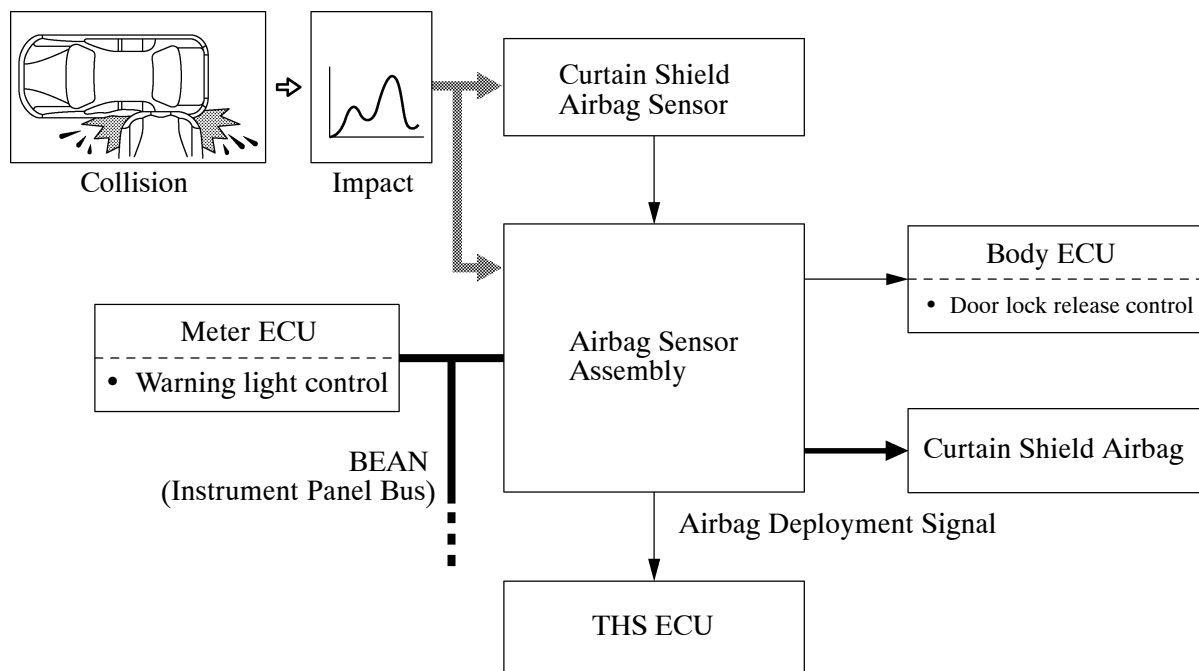
BE

### 3. Rear of Side Collision

- When a collision on the rear of the side is detected by the curtain shield airbag sensor, only the curtain shield airbag will be deployed.
- Due to the wide size of the airbag, inflator for the curtain shield airbag is installed near the center of the curtain shield airbag in order to help ensure an efficient deployment.



### ► Curtain Shield Airbag Operation ◀



## ■ DIAGNOSIS FUNCTION

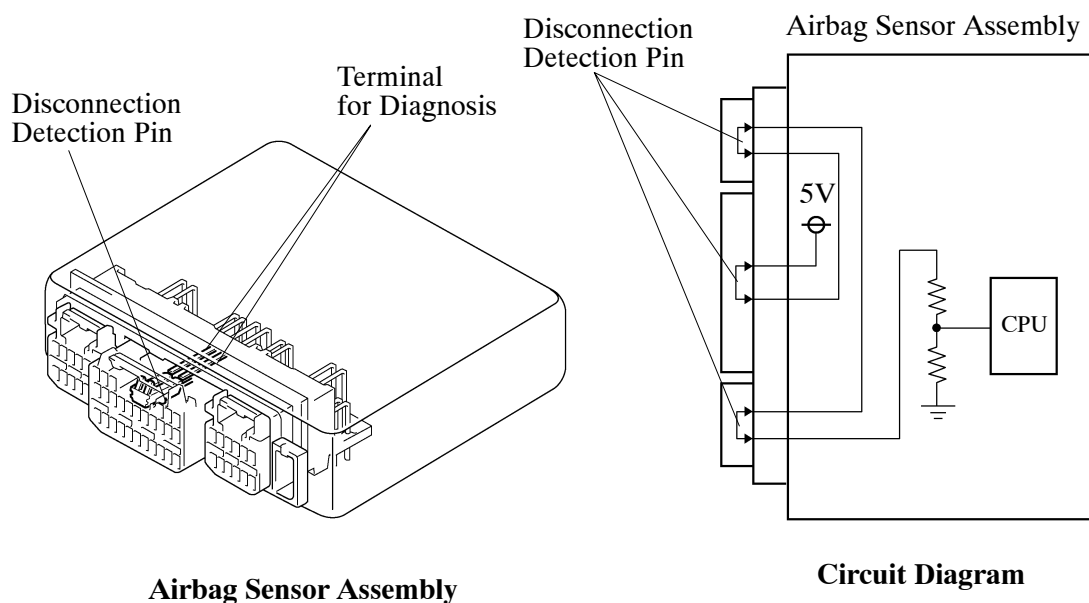
### 1. General

- If the airbag sensor assembly detects a malfunction in the SRS airbag system, the airbag sensor assembly stores the malfunction data in memory, in addition to illuminating the SRS warning light. Then, the DTCs (Diagnostic Trouble Codes) can be accessed by connecting an intelligent tester II to the DLC3 terminal or the SST (09843-18040) to the Tc and CG terminals of the DLC3 and reading the blinking of the SRS warning light. For details, see the LEXUS RX400h Repair Manual (Pub. No. RM1139E).
- Electrical connection check mechanism to detect the connection condition of the connector in the airbag sensor assembly is used.
- If the SRS Airbag deploys, the airbag sensor assembly will turn on the SRS airbag warning light. However, different from the ordinary diagnosis function, a DTC will not be memorized. The airbag warning light can be turned off only by changing the airbag sensor assembly to a new one.

### 2. Electrical Connection Check Mechanism

- This mechanism is composed from the terminals for diagnosis arranged for each of 3 connectors of the airbag sensor assembly side and the disconnection detection pin arranged for each of 3 connectors of wiring harness side.
- The disconnection detection pin connects with the diagnosis terminals when the connector housing lock is completely locked.
- When these connectors are connected (the connector housing lock is completely locked), the terminals for diagnosis and the disconnection detection pin will be similarly connected. As a result, a series circuit is created. Upon detecting this condition, the airbag sensor assembly will determine that these connectors are completely locked.

When these connectors are partially connected (the connector housing lock is not completely locked), the terminals for diagnosis and the disconnection detection pin will not be connected. As a result, the series circuit is not created, and the electrical connection check circuit voltage changes to 0 V. Upon detecting this condition, the airbag sensor assembly will determine that these connectors are partially connected, and will cause the SRS warning light to illuminate. At this time, output the DTC (B1135/24).

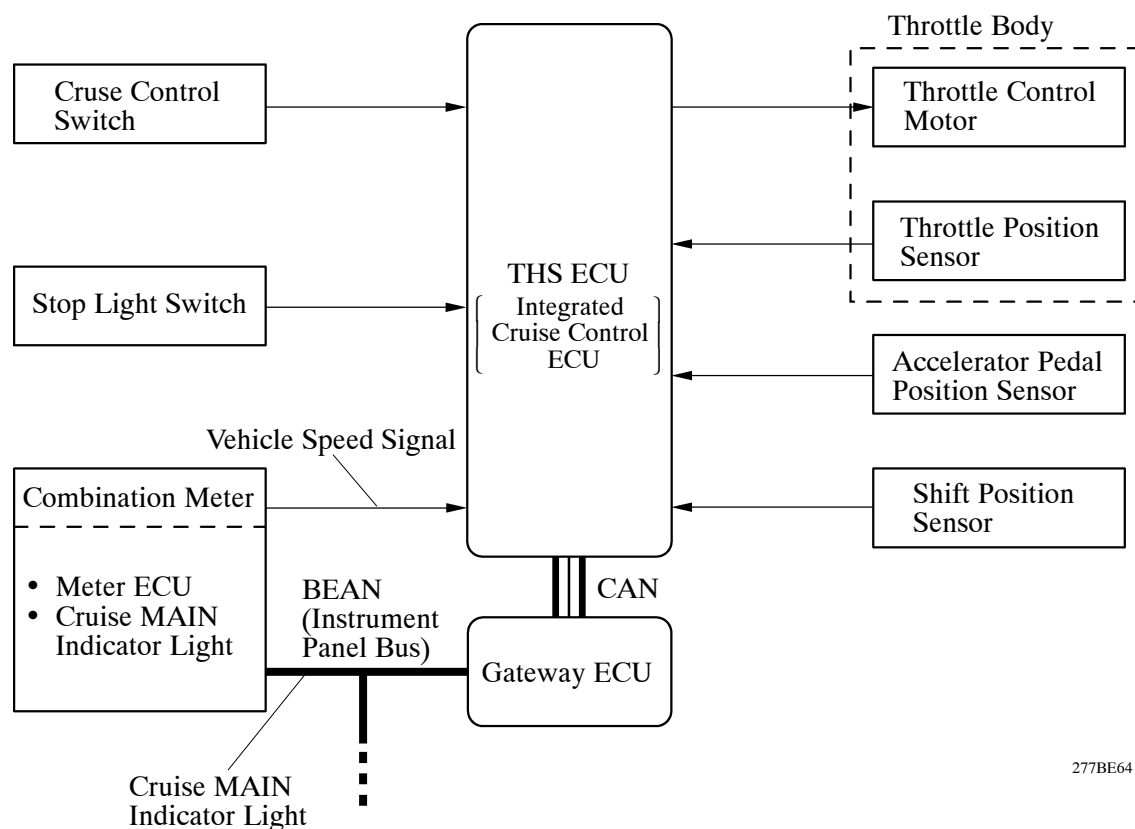


## CRUISE CONTROL SYSTEM

### DESCRIPTION

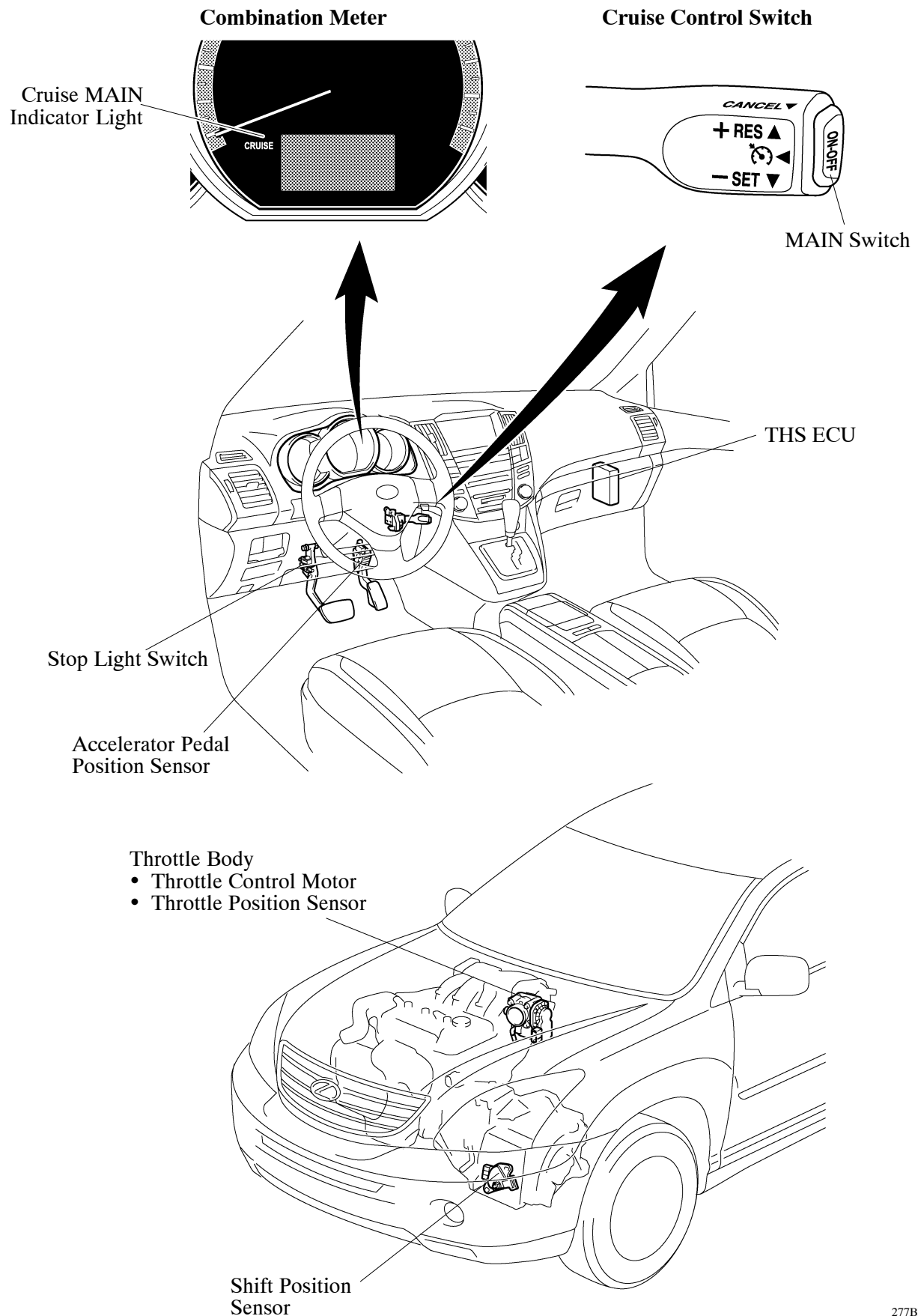
- Cruise control system has been provided as optional equipment.
- The basic function of this system is the same as the current RX300.
- Once the system is set to a desired vehicle speed, the throttle valve position is adjusted automatically to maintain the vehicle speed at that speed without depressed the accelerator pedal.
- As with the current RX300, the ETCS-i (Electronic Throttle Control System-intelligent) performs throttle valve angle control on the RX400h.
- This system is controlled by the cruise control ECU built into the THS ECU.

### ► System Diagram ◀



277BE64

## ■ LAYOUT OF MAIN COMPONENTS



BE

## ■ FUNCTION

The cruise control has the following functions.

| Function                | Outline                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Constant Speed Control  | The THS ECU compares the actual vehicle speed and the set speed and if the vehicle speed is higher than the set speed, it activates the throttle control motor in the throttle closing direction. If the vehicle speed is lower than the set speed, it activates the throttle motor in the throttle opening direction.                                                                                                                                                      |
| Set Control             | When this system fulfils the following conditions, and the cruise control switch is pressed to the SET/- side and released with the MAIN switch turned on, the THS ECU stores the vehicle speed and controls it constantly at that speed. <ul style="list-style-type: none"> <li>• The vehicle is running within a cruising speed control range [approx. 25 mph (40 km/h) or more].</li> <li>• While the shift lever is in position D.</li> </ul>                           |
| Low Speed Limit Control | The low speed limit is the lowest speed that cruise control can be set and is designed at approx. 25 mph (40 km/h). The cruise control cannot be set below that speed. If the vehicle speed drops below that speed while running in the cruise control mode, the cruise control is cancelled automatically and the set speed in the memory is cleared.                                                                                                                      |
| Accelerator Control     | When the cruise control switch is kept pushed to the RES/+ side while the vehicle operates in the cruise control mode, the THS ECU regulates the drive force of the electric motor and the engine in the direction that increases the vehicle speed. As the vehicle keeps accelerating, the THS ECU stores the vehicle speed at the time the driver's hand is released from the cruise control switch. From then on, the THS ECU keeps the vehicle operating at that speed. |
| Tap-Up Control          | When the difference between the actual vehicle speed and the set speed is less than 3 mph (5 km/h), the set speed can be increased approx. 1 mph (1.6 km/h) each time by operating the RES/+ switch quickly within approx. 0.5 seconds.                                                                                                                                                                                                                                     |
| Coast Control           | When the cruise control switch is kept pushed to the SET/- side while running in the cruise control mode, the THS ECU regulates the driver force of the electric motor and the engine in the direction that decreases the vehicle speed. As the vehicle keeps decelerating, the THS ECU stores the vehicle speed at the time the driver's hand is released from the cruise control switch. From then on, the THS ECU keeps the vehicle operating at that speed.             |
| Tap-Down                | When the difference between the actual vehicle speed and the set speed is less than 3 mph (5 km/h), the set speed can be lowered approx. 1 mph (1.6 km/h) each time by operating the SET/- switch quickly within approx. 0.5 seconds.                                                                                                                                                                                                                                       |
| Resume Control          | After the cruise control mode is cancelled by any of the cancel switches, the mode can be resumed and controlled at the set speed by operating the cruise control switch in the RES/+ direction providing that the vehicle speed has not dropped below the low speed limit [approx. 25 mph (40 km/h)].<br>The mode cannot be resumed if the vehicle speed once drops below the low speed limit, because the speed in the memory is cleared.                                 |
| Manual Cancel Control   | If any of the following signals is sent to the THS ECU while the vehicle is running in the cruise control, the cruise control is cancelled accordingly. <ul style="list-style-type: none"> <li>• Stop light switch ON signal (Depress the brake pedal)</li> <li>• D position circuit (in shift position sensor) OFF signal (Shift the transmission shift lever from D to N)</li> <li>• CANCEL switch ON signal</li> <li>• MAIN switch OFF signal</li> </ul>                 |

(Continued)

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Automatic<br>Cancel<br>Control | When any of the following conditions occur during 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 MAIN switch is turned ON again. <ul style="list-style-type: none"> <li>• Stop light switch open or short circuit</li> <li>• The vehicle speed signal is not set for a predetermined period of time (approx. 140 msec)</li> <li>• ETCS-i malfunction</li> </ul> |
|                                | When any of the following conditions occur 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 ignition switch is turned OFF again. <ul style="list-style-type: none"> <li>• Stop light switch input signal abnormal</li> <li>• THS ECU malfunction</li> </ul>                                                                                            |
|                                | When any of the following conditions occurs during the cruise control driving, the set speed in the memory is cleared to cancel the cruise control mode. Cruise control can be resumed at the set speed by operating the SET or RESUME switch providing that the vehicle speed is above the lower speed limit [approx. 25 mph (40 km/h)]. <ul style="list-style-type: none"> <li>• The vehicle speed falls below the low speed limit [approx. 25 mph (40 km/h)]</li> <li>• The vehicle speed drops more than 10 mph (16 km/h) below the set speed as in uphill driving</li> </ul> |
| Diagnosis                      | If a malfunction occurs in the cruise control system, during cruise control driving, the THS ECU actuates Auto Cancel of the cruise control and turns on and off the cruise main indicator light to inform the driver of a malfunction. At the same time, the malfunction is stored in memory as a DTC (Diagnostic Trouble Code).                                                                                                                                                                                                                                                 |

## ■ DIAGNOSIS

- If a malfunction occurs in the cruise control system, during cruise control driving, the THS ECU actuates Auto Cancel of the cruise control and turns on and off the cruise main indicator light to inform the driver of a malfunction. At the same time, the malfunction is stored in memory as a DTC (Diagnostic Trouble Code).
- The DTC (Diagnostic Trouble Code) can be accessed by connecting an intelligent tester II to DLC3 terminal. An intelligent tester II can be used to read 5-digit codes.  
For details, see the RX400h Repair Manual (Pub. No. RM1139E).
- The DTC listed below is used.

| DTC No. | Circuit Inspection                        |
|---------|-------------------------------------------|
| 5-digit |                                           |
| P0500   | Vehicle speed sensor circuit open         |
| P0571   | Stop light switch circuit (open or short) |
| P0607   | Input signal abnormal                     |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Automatic<br>Cancel<br>Control | <p>When any of the following conditions occur during 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 MAIN switch is turned ON again.</p> <ul style="list-style-type: none"> <li>• Stop light switch open or short circuit</li> <li>• The vehicle speed signal is not set for a predetermined period of time (approx. 140 msec)</li> <li>• ETCS-i malfunction</li> </ul> |
|                                | <p>When any of the following conditions occur 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 ignition switch is turned OFF again.</p> <ul style="list-style-type: none"> <li>• Stop light switch input signal abnormal</li> <li>• THS ECU malfunction</li> </ul>                                                                                            |
|                                | <p>When any of the following conditions occurs during the cruise control driving, the set speed in the memory is cleared to cancel the cruise control mode. Cruise control can be resumed at the set speed by operating the SET or RESUME switch providing that the vehicle speed is above the lower speed limit [approx. 25 mph (40 km/h)].</p> <ul style="list-style-type: none"> <li>• The vehicle speed falls below the low speed limit [approx. 25 mph (40 km/h)]</li> <li>• The vehicle speed drops more than 10 mph (16 km/h) below the set speed as in uphill driving</li> </ul> |
| Diagnosis                      | <p>If a malfunction occurs in the cruise control system, during cruise control driving, the THS ECU actuates Auto Cancel of the cruise control and turns on and off the cruise main indicator light to inform the driver of a malfunction. At the same time, the malfunction is stored in memory as a DTC (Diagnostic Trouble Code).</p>                                                                                                                                                                                                                                                 |

## ■ DIAGNOSIS

- If a malfunction occurs in the cruise control system, during cruise control driving, the THS ECU actuates Auto Cancel of the cruise control and turns on and off the cruise main indicator light to inform the driver of a malfunction. At the same time, the malfunction is stored in memory as a DTC (Diagnostic Trouble Code).
- The DTC (Diagnostic Trouble Code) can be accessed by connecting an intelligent tester II to DLC3 terminal. An intelligent tester II can be used to read 5-digit codes.  
For details, see the RX400h Repair Manual (Pub. No. RM1139E).
- The DTC listed below is used.

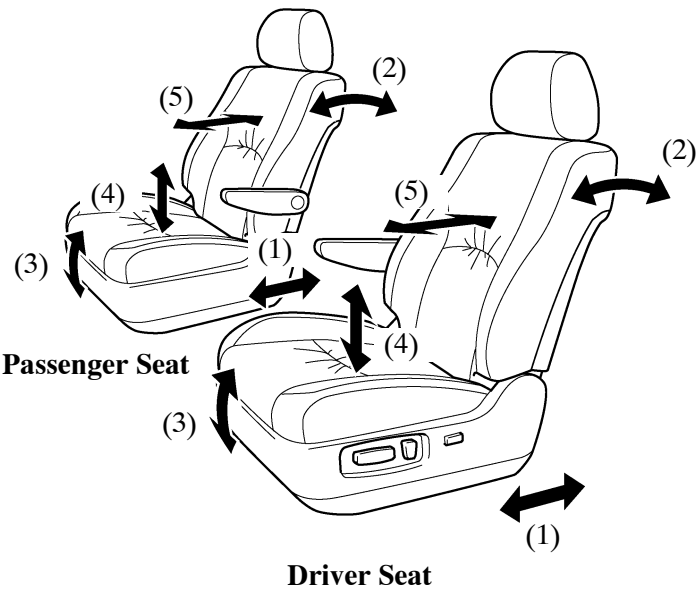
| DTC No. | Circuit Inspection                        |
|---------|-------------------------------------------|
| 5-digit |                                           |
| P0500   | Vehicle speed sensor circuit open         |
| P0571   | Stop light switch circuit (open or short) |
| P0607   | Input signal abnormal                     |

POWER SEAT

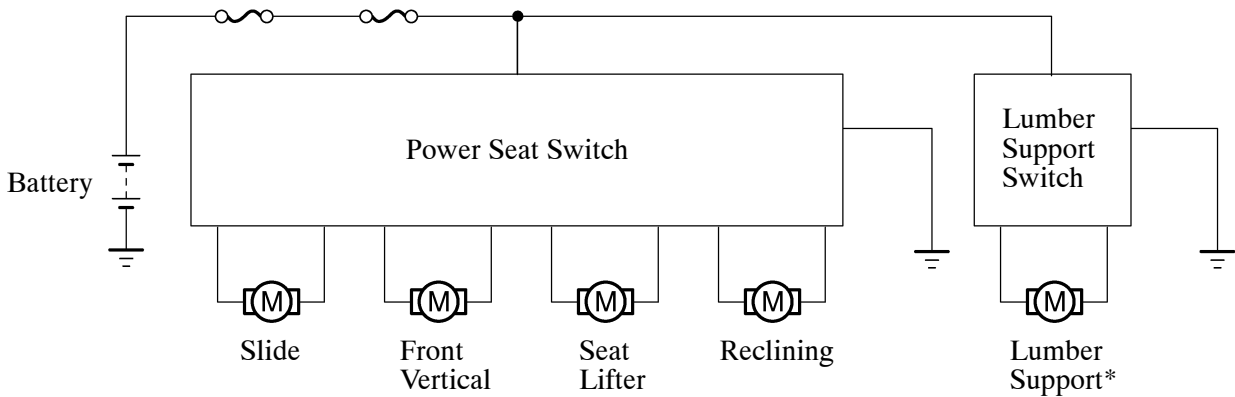
DESCRIPTION

- Power seats for driver and front passenger side is standard equipment on all models.
- On the models with the memory system, the control of the front power seat (fore-and-after slide, reclining, front vertical, and seat lifter) is effected by the driver seat ECU, which is integrated with the power seat switch. Similar to the models without the memory system, the control of the lumbar support and the front passenger seat is effected directly by the switch.
- The following features are all for power functions.

| Power Adjustment Function |                    |          | Stroke    |                           |                            |
|---------------------------|--------------------|----------|-----------|---------------------------|----------------------------|
|                           |                    |          | Driver    | Passenger                 |                            |
|                           |                    |          |           | Option<br>(Leather Cover) | Standard<br>(Fabric Cover) |
| (1)                       | Fore-and-Aft Slide | mm (in.) | 240 (9.4) | ←                         | ←                          |
| (2)                       | Reclining          | degrees  | 78°       | ←                         | ←                          |
| (3)                       | Front Vertical     | degrees  | 10°       | ←                         | —                          |
| (4)                       | Seat Lifter        | mm (in.) | 47 (1.9)  | ←                         | —                          |
| (5)                       | Lumbar Support     | mm (in.) | 21 (0.8)  | ←                         | —                          |



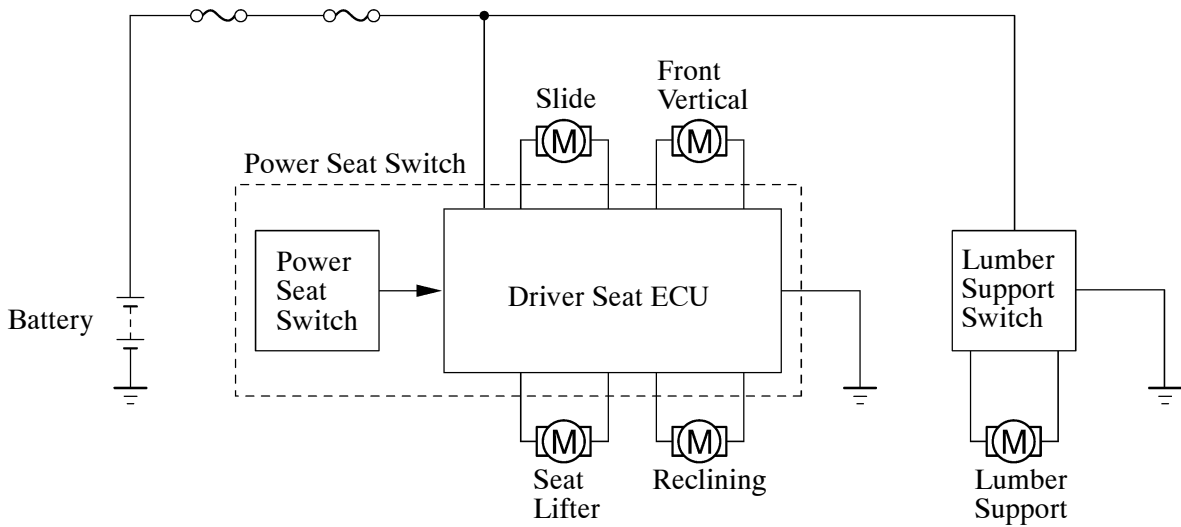
► System Diagram ◀



\*: Only for Driver's Seat

211BE41

Power Seat for Models without Memory System



BE

241BE150

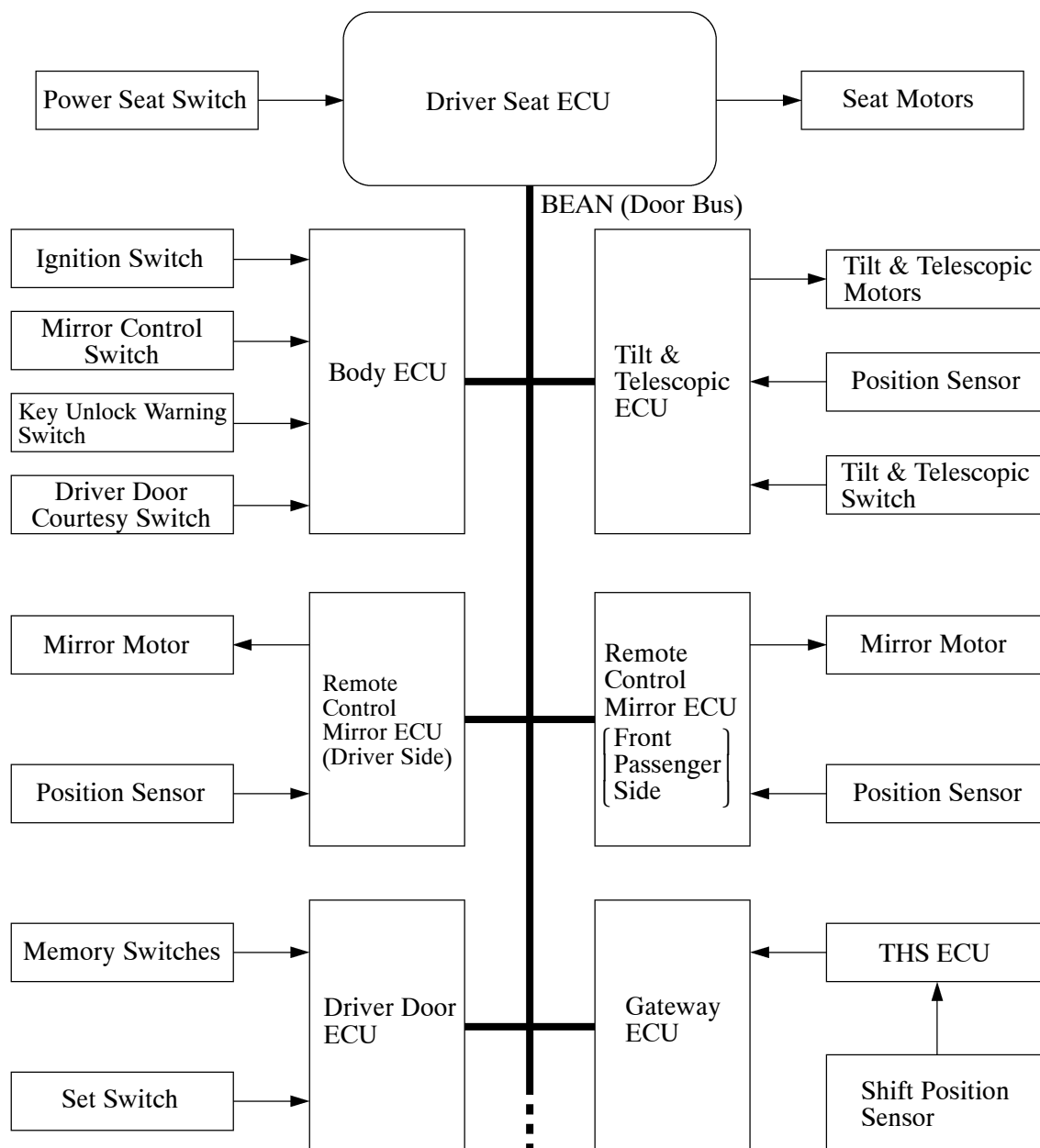
Driver's Seat for Models with Memory System

## MEMORY SYSTEM

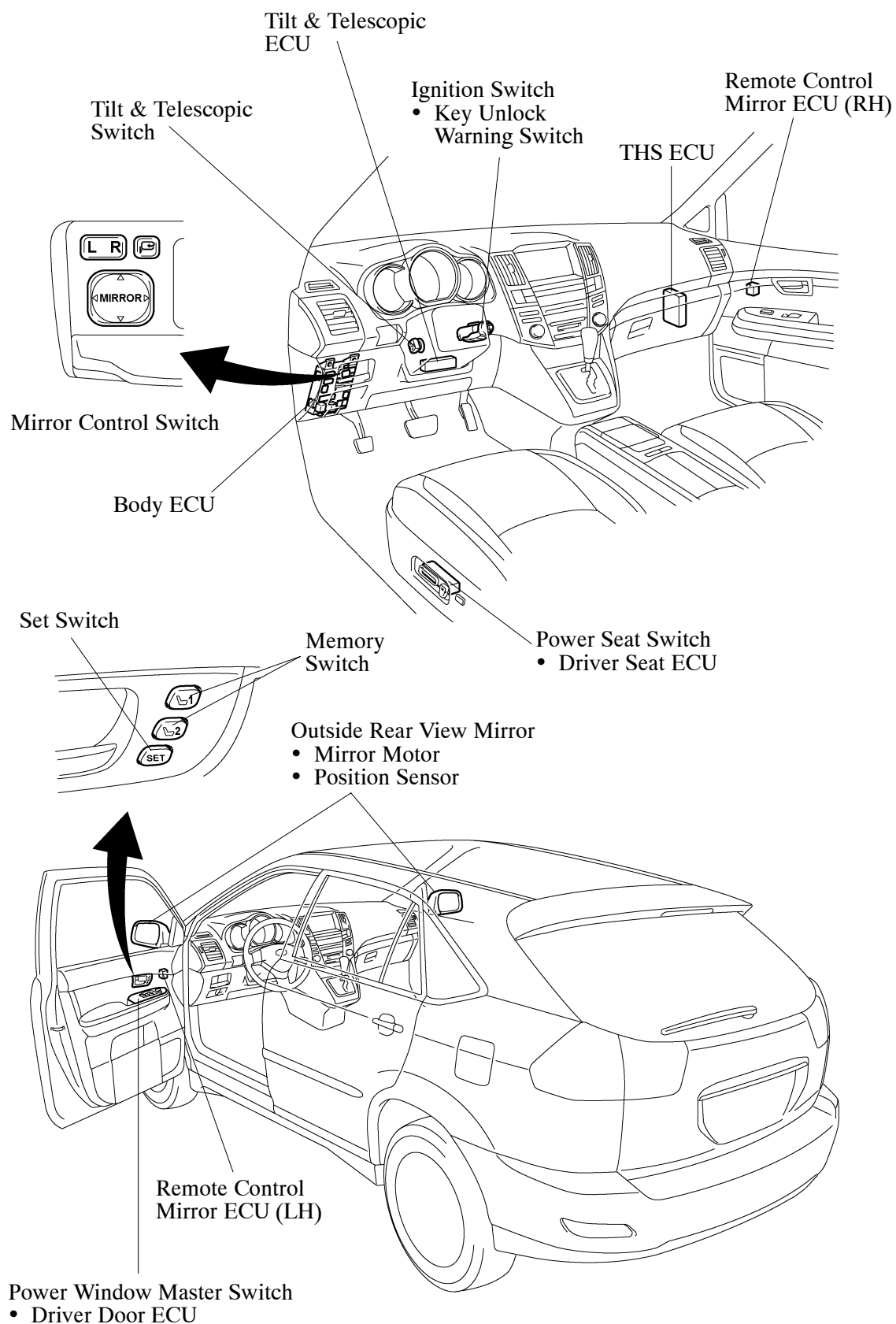
### DESCRIPTION

- On the new RX400h, a memory system for the driver seat is provided as an optional equipment on all models.
- The driver seat ECU effects control by memorizing two seat positions, outside rear view mirror position and tilt & telescopic position.
- On the conventional memory system, the seat position is detected by the Hall IC that is installed on the power seat motor. However, the new RX400h uses a new mechanism to detect the seat position, in which the driver seat ECU converts the driving current pulsations generated by the rotation of the motor into pulse signals.

### System Diagram



## ■ LAYOUT OF MAIN COMPONENTS



BE

## ■ DRIVER SEAT ECU

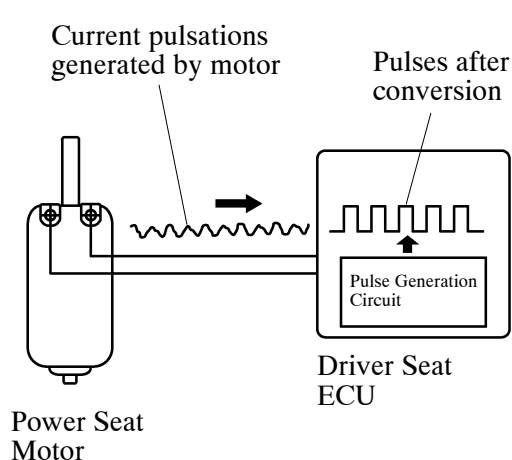
### 1. General

- The driver seat ECU effects the main control of the memory system in order to memorize and execute the driver seat position. In addition, the driver seat ECU instructs the tilt & telescopic ECU, driver mirror ECU and the passenger mirror ECU to start memorizing or executing their respective positions.
- The driver seat position, tilt & telescopic steering, and the outside rear view mirror position, are memorized by the respective ECUs.
- The ECUs exchange the information that is necessary for memory control via the BEAN (Body Electronics Area Network).

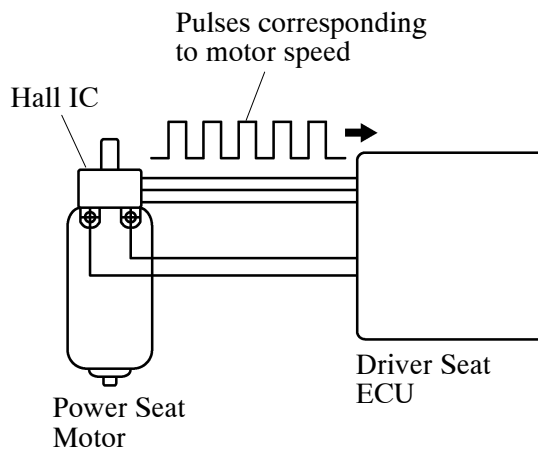
### 2. Seat Position Detection

On the conventional memory system, the Hall IC installed on the power seat motor generated the number of pulses that corresponded to the speed of the motor. These pulses were then picked up by the driver seat ECU in order to detect the seat position.

On the new RX400h, however, a pulse generation circuit in the driver seat ECU converts the driving current pulsations that are generated by the rotation of the motor into pulse signals. These signals are then picked up in order to detect the seat position. As a result, the construction of the system has been simplified.



**RX400h**



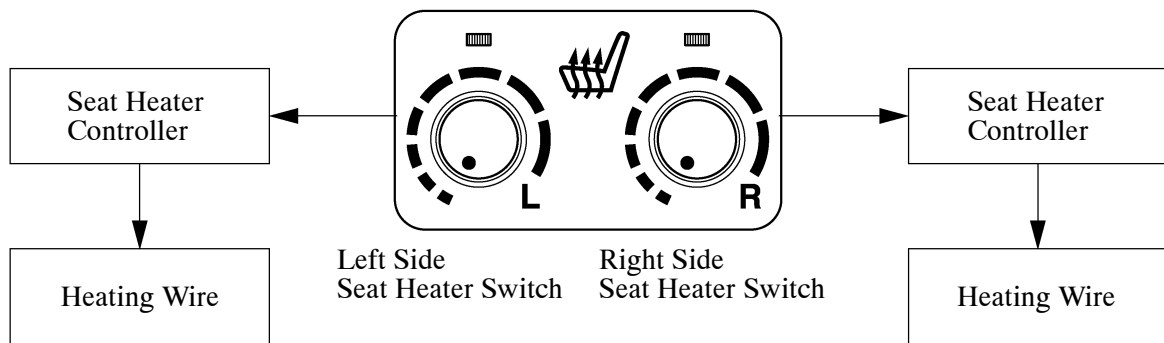
**Conventional Memory System**

## SEAT HEATER

### ■ DESCRIPTION

- The seat heater for the driver and front passenger seats are provided as optional equipment.
- By operating the dial-type seat heater control switch, which is located in the instrument panel lower part, the temperature can be controlled steplessly within the range of 30°C to 42°C (86°F to 108°F).
- Whether the seat heater is ON or OFF can be determined by illuminating condition of the indicator light of the seat heater control switch.

### ► System Diagram ◄



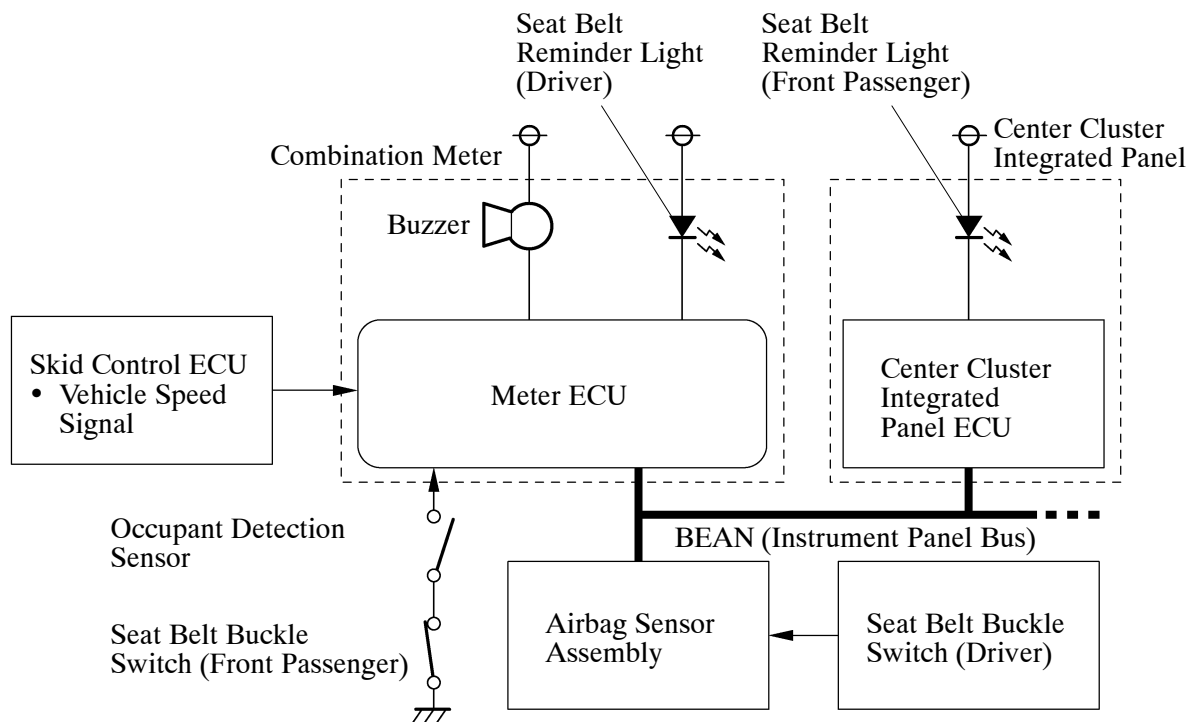
241BE153

## SEAT BELT REMINDER SYSTEM

### DESCRIPTION

- A seat belt reminder system is used. If the seat belt is not buckled, the reminder light flashes and the buzzer sounds.
- When the ignition switch is turned ON, this system determines whether or not the seat belt is buckled depending on whether the signal from the switch in the seat belt buckle is ON or OFF.
- The occupant detection sensor provided in the seat cushion of the front passenger seat determines whether or not an occupant is seated in the front passenger seat.
- On the new RX400h, the ON/OFF setting of the buzzer can be changed by operating the multi-information display in the combination meter.

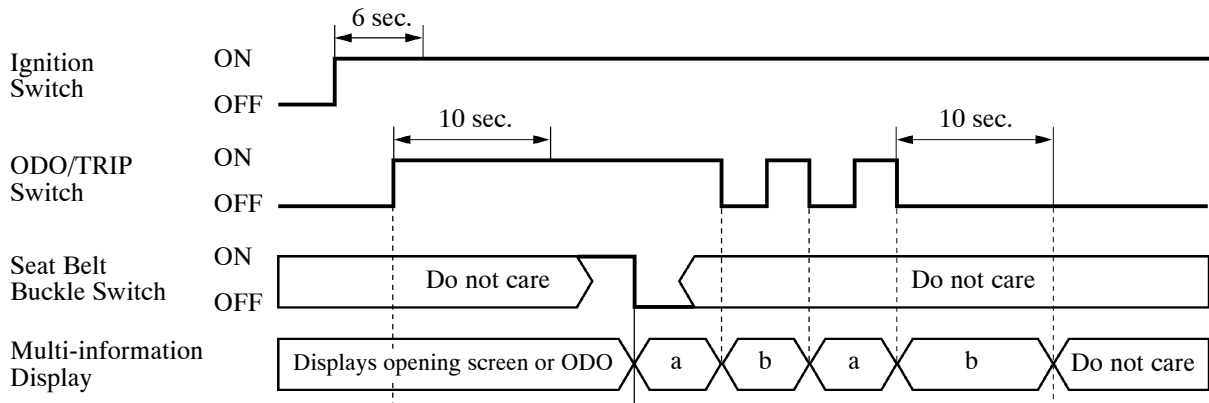
### System Diagram



**Service Tip**

On the new RX400h, the ON/OFF setting of the buzzer of the seat belt reminder system can be changed by operating the multi-information display in the combination meter, as indicated below.

- 1) Within 6 seconds after turning the ignition switch ON, press and hold the ODO/TRIP switch for a minimum of 10 seconds.
- 2) The buzzer proceeds to the cancel mode when the driver seat belt or the passenger seat belt is buckled (seat belt buckle switch OFF) within 10 seconds while performing the above step. The setting of the buzzer differs depending on whether the driver seat belt or the passenger seat belt is operated this time.
  - Operating the driver seat belt:  
Enables the buzzer sound to be set for both the driver and passenger.
  - Operating the passenger seat belt:  
Enables the buzzer sound to be set only for the passenger. The seat belt must be operated while an occupant is seated in the passenger seat.
- 3) “SEAT BELT BUZZER ON” appears on the multi-information display.
- 4) Release the ODO/TRIP switch to turn it OFF, and “SEAT BELT BUZZER OFF” appears on the multi-information display.
- 5) The indication on the multi-information display changes when the ODO/TRIP switch is turned ON or OFF. When approximately 10 seconds elapse after the buzzer is set ON or OFF and the ignition switch is turned OFF, the buzzer cancel mode ends. This completes the setting of the buzzer in the seat belt reminder system.



278BE37

**a****b**

278BE38

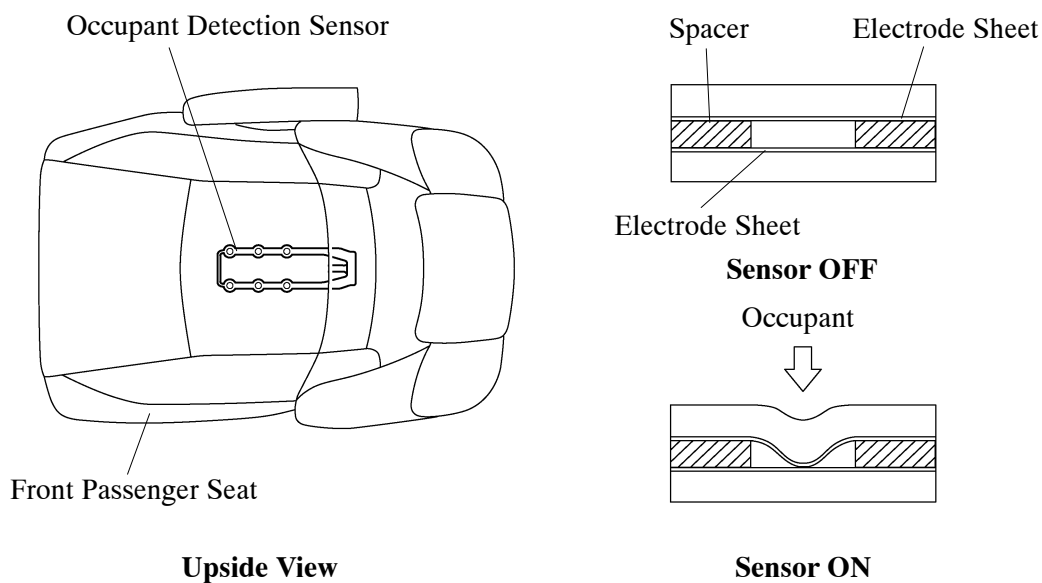
**Multi-information Display**

## ■ 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 two 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.

Thus, the sensor detects whether or not an occupant is seated in the front passenger seat.



242BE54

## REAR VIEW MIRROR

### ■ DESCRIPTION

The new RX400h has a rear view mirror with following equipment:

| Function                 |                                                                   | Equipment |
|--------------------------|-------------------------------------------------------------------|-----------|
| Inside Rear View Mirror  | Automatic Glare-resistant EC Mirror                               | Standard  |
|                          | Electrical Remote Control                                         | Standard  |
| Outside Rear View Mirror | Rear Window Defogger-Linked Mirror Heater and Front Wiper Deicer* | Standard  |
|                          | Automatic Glare-resistant EC Mirror                               | Standard  |
|                          | Reverse Shift-Linked Mirror                                       | Option    |
|                          | Memory Function                                                   | Option    |

\*: Optional Equipment

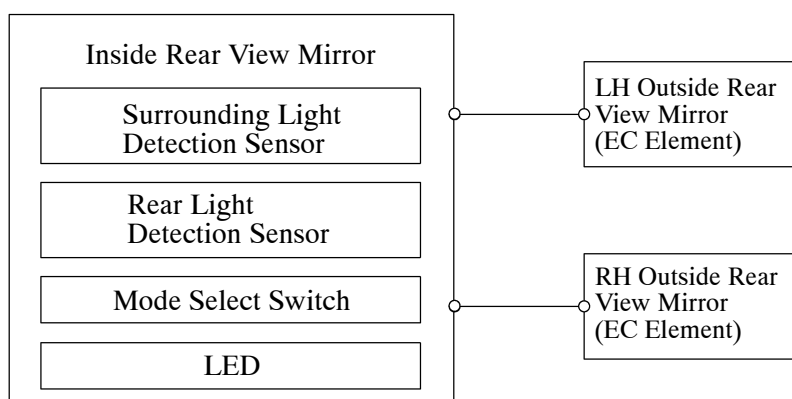
## ■ AUTOMATIC GLARE-RESISTANT EC MIRROR

### 1. General

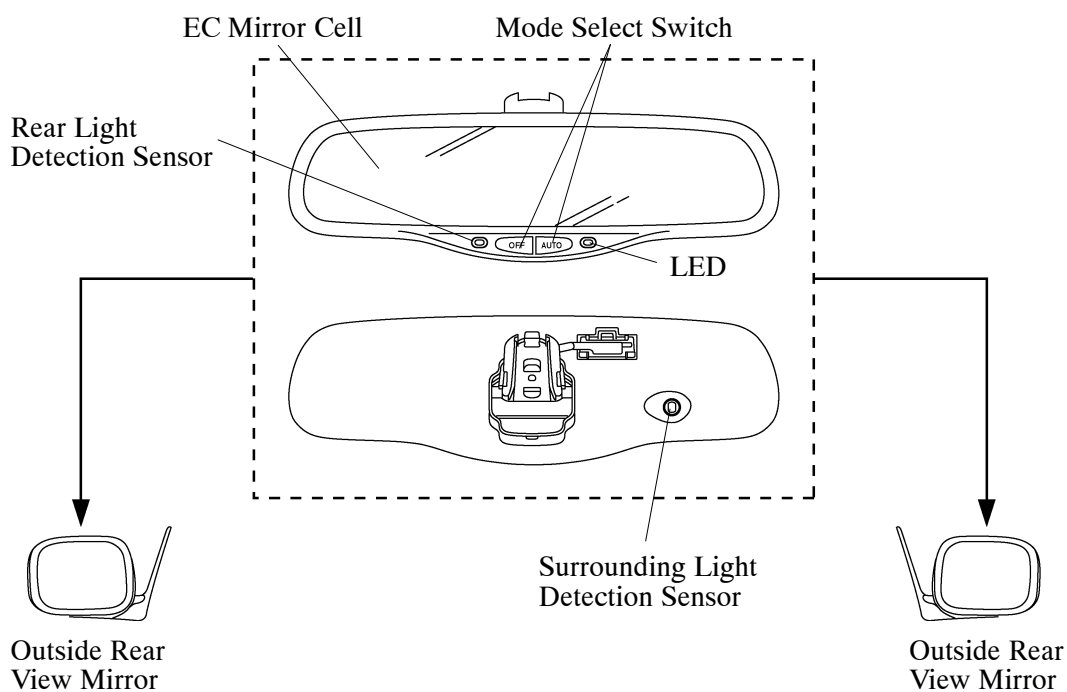
During nighttime driving, if a large difference in intensity exists between the surrounding light and the light entering the inside rear view mirror from the headlights behind, automatic glare-resistant EC (Electrochromic) mirror automatically reduce the reflection rate of the inside rear view mirror and thus dampens the glare on the mirror. The reflection rate of the outside rear view mirrors varies in accordance with the change in the reflection rate of the inside rear view mirror.

- This system uses 2 sensors that are attached the inside rear view mirror to detect the difference between the intensity of light entering the inside rear view mirror from the rear of the vehicle.
- When the ignition switch is turned from OFF to ON, this system always turns on in the AUTO mode.

### ► System Diagram ◀



211BE45



278BE23

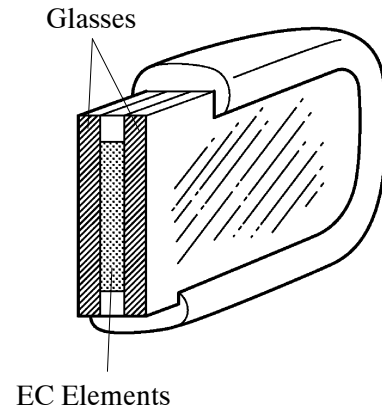
## 2. Function of Components

### General

| Component                          | Function                                                                                              |
|------------------------------------|-------------------------------------------------------------------------------------------------------|
| Surrounding Light Detection Sensor | Detect the intensity of the light surrounding the vehicle.                                            |
| Rear Light Detection Sensor        | Detects the intensity of the light entering the inside rear view mirror from the rear of the vehicle. |
| LED                                | Turns on to inform the driver the AUTO mode is operating.                                             |
| Mode Select Switch (AUTO, OFF)     | Selects the inside and outside rear view mirror control to AUTO mode or AUTO OFF mode.                |
| EC Mirror Cell                     | Varies the reflection rate of the mirror through the function of EC element.                          |
| CPU                                | Controls the reflection rate in accordance with the signals from the 2 sensors.                       |

### EC Mirror Cell

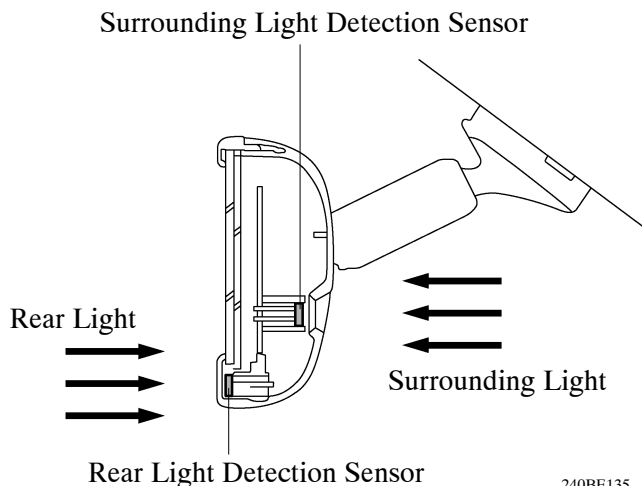
An EC mirror cell consists of 2 layers of glass, which sandwich the EC (Electrchromic) elements in the middle. The EC elements control coloring and discoloring characteristics through their electro-chemical oxidation reduce reaction. These characteristics are utilized to electronically vary the mirror's reflection rate.



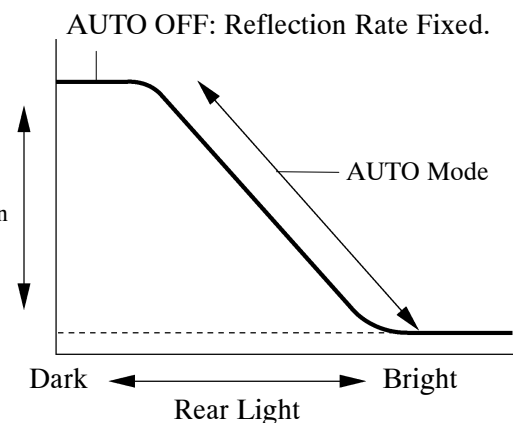
189BE55

## 3. Reflection Rate Control

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



240BE135



240BE136

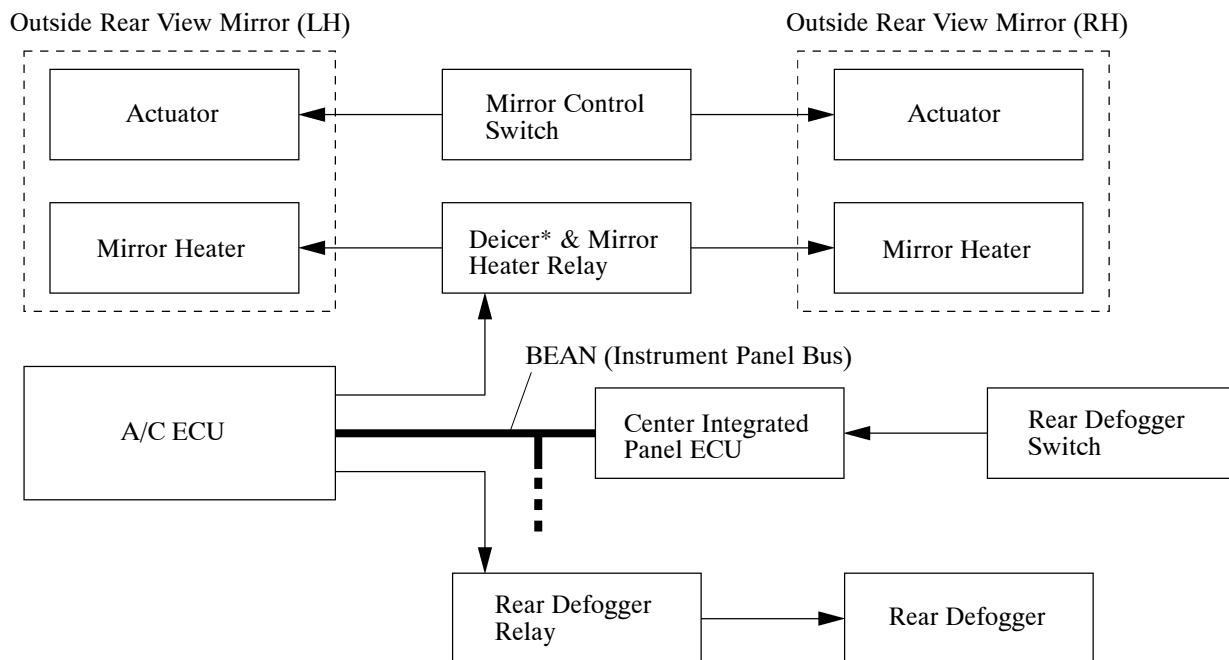
## ■ OUTSIDE REAR VIEW MIRROR

### 1. General

- Electrical remote control mirrors with internal heater, which operate in conjunction with the rear window defogger and wiper deicer, have been adopted. Similar to the inside rear view mirror, automatic glare-resistant EC (Electrochromic) mirrors are standard equipment on the outside rear view mirrors.
- On the models with the memory system, the outside rear view mirrors are controlled by the remote control mirror ECU.
- On the models without the memory system, the positions of the outside rear view mirrors are controlled by the mirror control switch.
- The mirror heaters are controlled by the air conditioner ECU.

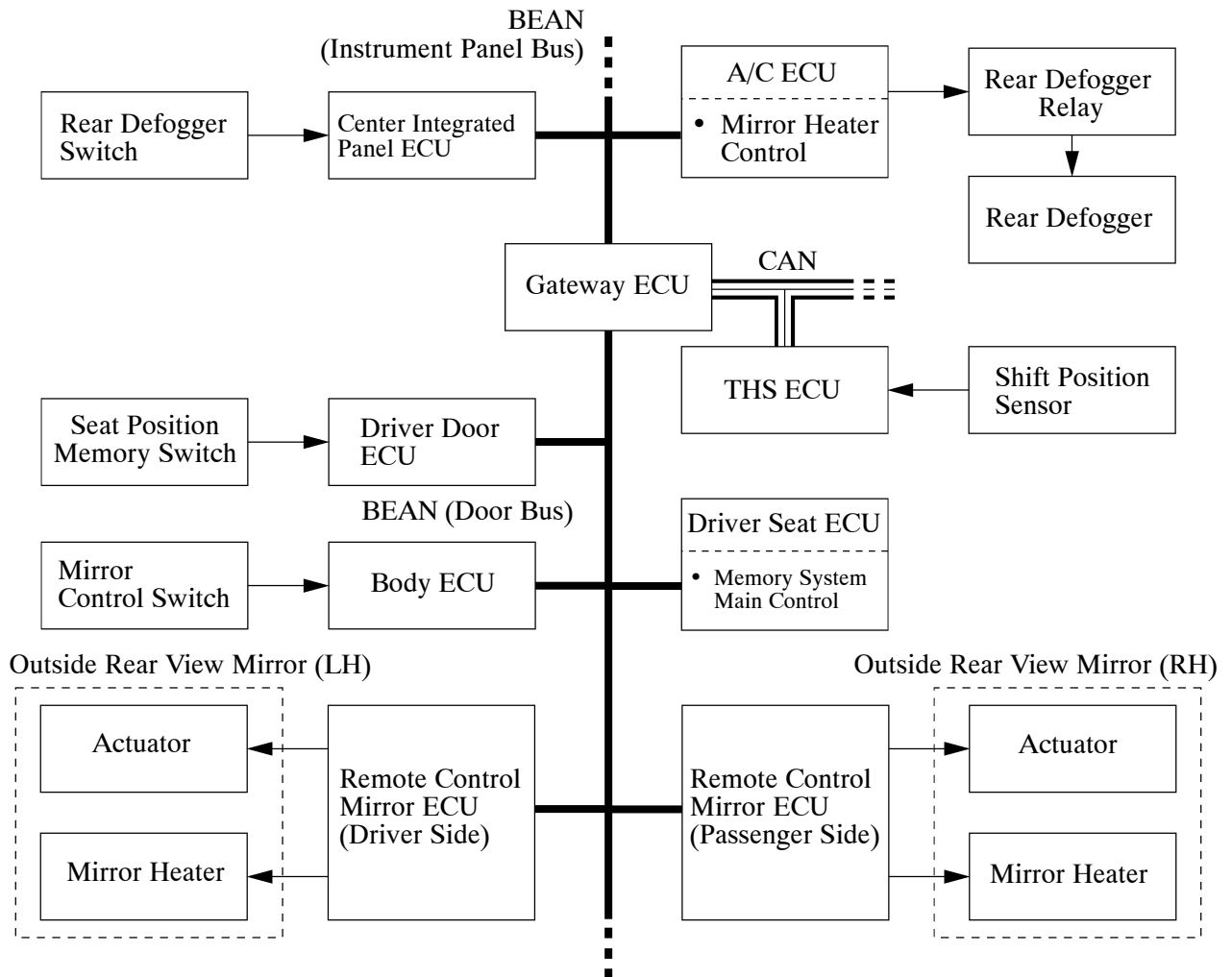
### 2. System Diagram

#### ► Models without Memory System ◀



\*: Optional Equipment

► Models with Memory System ◀



277BE78

### 3. Function

The outside rear view mirror has following functions:

| Function                                                           | Outline                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Electrical Remote Control type Mirror                              | 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.<br>Setting the mirror master switch to the “R” position operates the right mirror, and to the “L” position operates the left mirror.                                                                       |
| Rear Window Defogger-linked Mirror Heater and Front Wiper Deicer*1 | This function also automatically turns ON the mirror heater (and front wiper deicer*1) when the rear window defogger switch is turned ON.<br>After 15 minutes have elapsed from the time this function has been activated, the rear window defogger turns OFF automatically, and the mirror heater (and front wiper deicer*1) also turns OFF.                                 |
| Automatic Glare-resistant EC Mirror                                | This function prevents the glare of the headlights of the vehicle being driven behind that are reflected on the mirror from blinding the driver during nighttime driving. It works in unison with the inner mirror to reduce the amount of reflection.<br>For details, see page BE-166.                                                                                       |
| Reverse Shift-linked Mirror*2                                      | This function directs the mirror surface downward to improve the visibility when driving in reverse, provided that all the conditions given below have been met. <ul style="list-style-type: none"> <li>• Ignition switch is ON.</li> <li>• Shift lever is moved from a position other than “R” to “R”.</li> <li>• Mirror master switch is in “R” or “L” position.</li> </ul> |
| Memory Function*2                                                  | This function stores 2 mirror adjustment positions in the remote control mirror ECU. Thus, the mirrors can be adjusted to the positions that are stored in the remote control mirror ECU by pressing the memory switch.<br>This function operates by linking with the driver seat position memorized in the driver seat ECU.<br>For details, see page BE-158.                 |

\*1: Optional Equipment

\*2: Models with Memory System

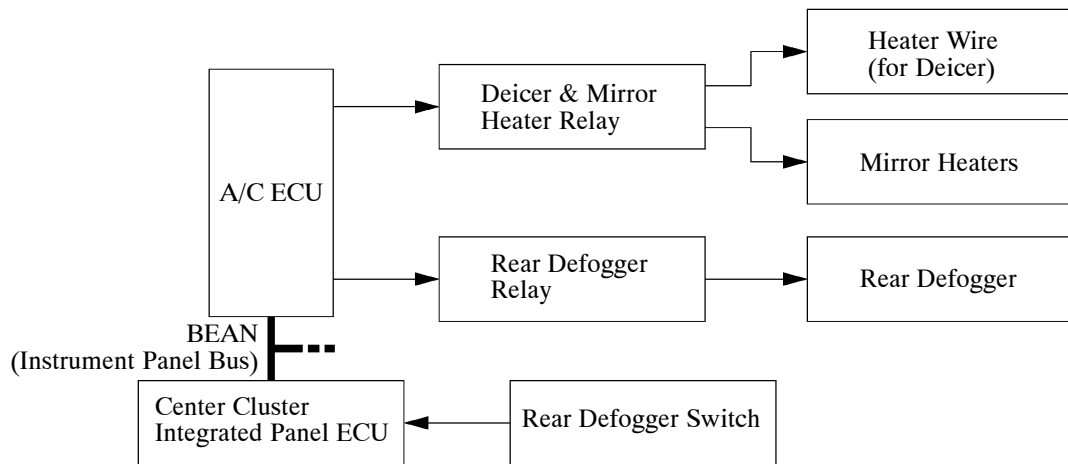
## FRONT WIPER DEICER SYSTEM

### DESCRIPTION

The front wiper deicer system uses the heater wire in the front windshield glass to deice frozen front wipers.

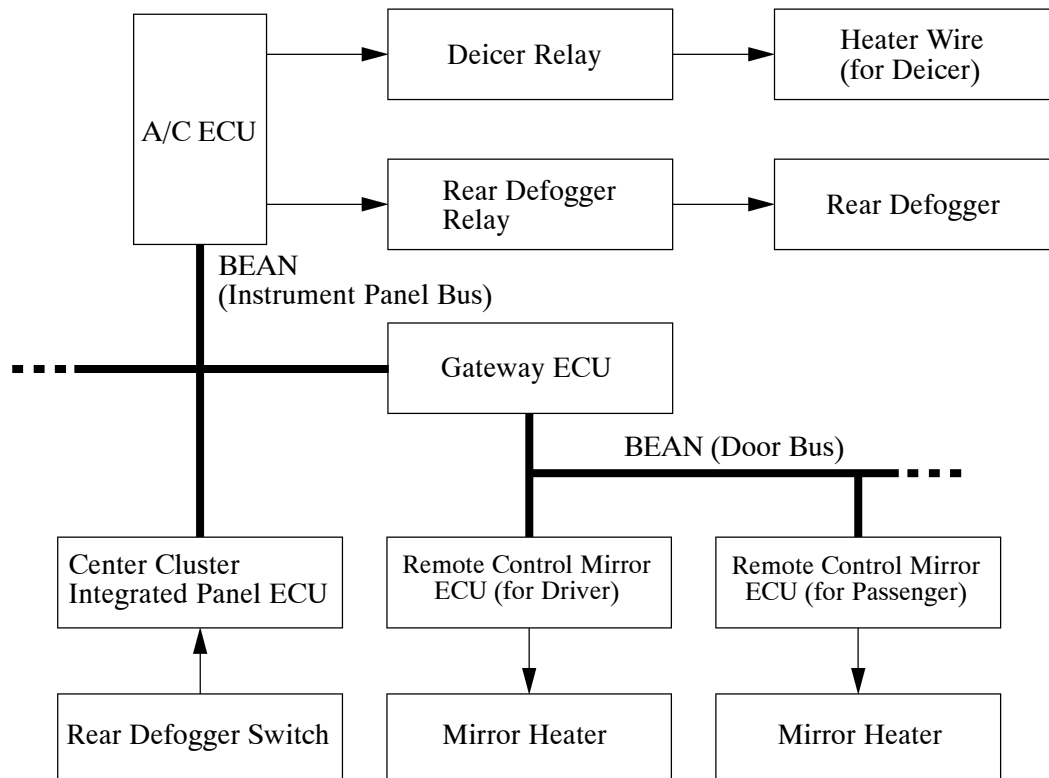
- This system is optional equipment.
- This system is activated when the ignition switch is turned ON, and rear defogger switch is pushed. This switch is provided with a timer function to keep the deicer, mirror heater and rear defogger ON for approx. 15 minutes.
- The circuit of this system varies depending on whether the vehicle is equipped with a memory system; however, its operation remains the same.

### System Diagram



241BE157

Models without Memory System



277BE100

Models with Memory System

HEADLIGHT CLEANER SYSTEM

DESCRIPTION

- The headlight cleaner system is standard equipment on the all models.
- When the headlight cleaner switch turned on while the headlights are on, this system sprays washer fluid on the headlight lenses to wash the dirt off them.
- This system is controlled by the headlight cleaner control relay.

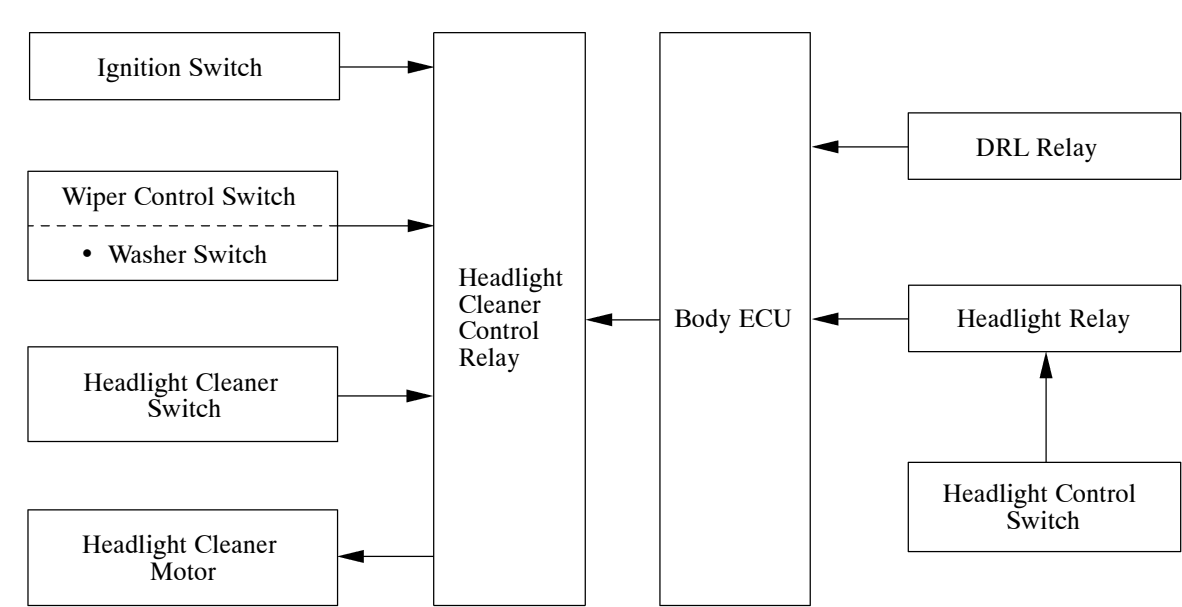
Operation

○: Activate    —: not Activated

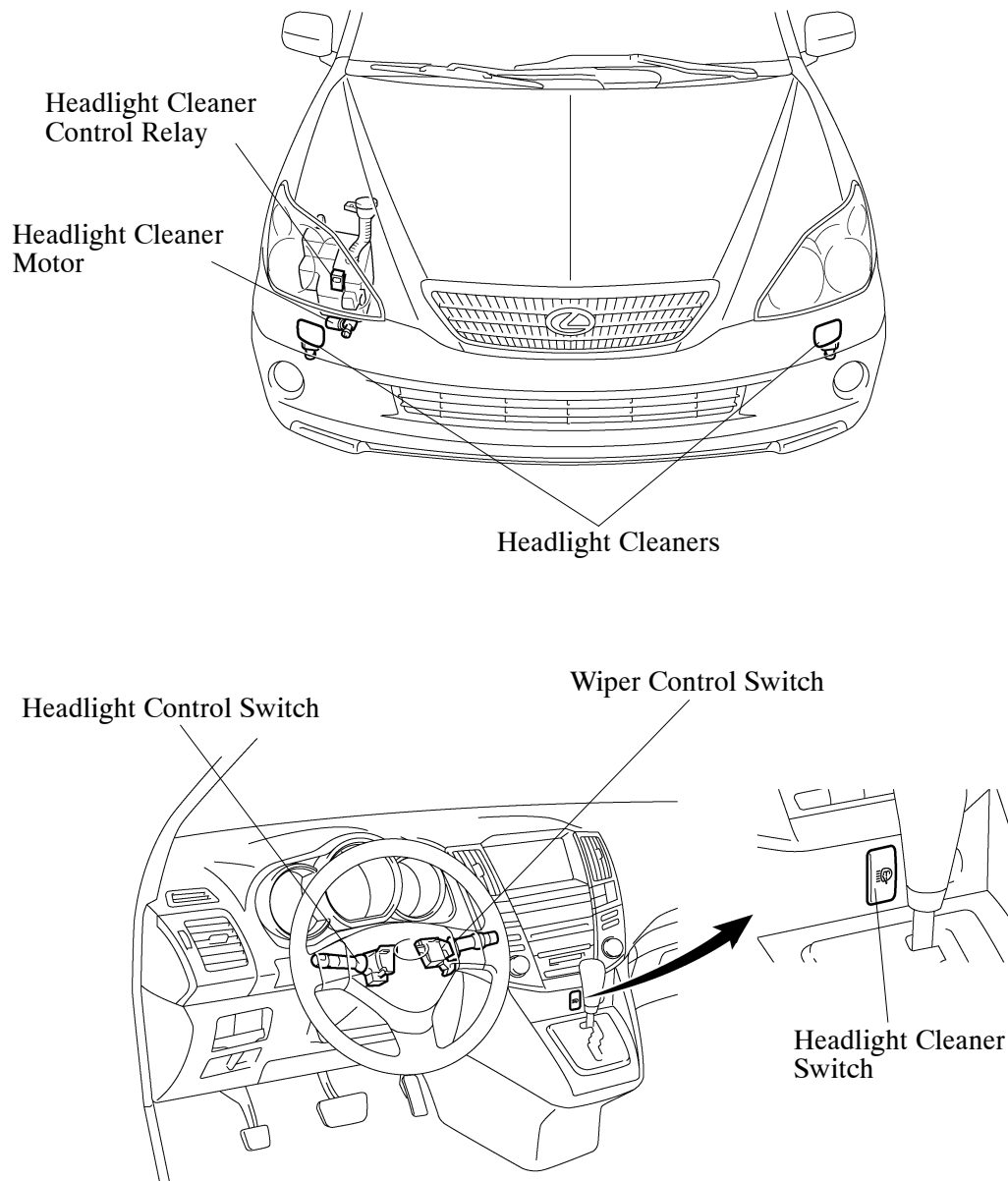
| Item          | Headlight Cleaner Switch ON | Washer Switch ON (first time) | Washer Switch ON (second time and ON) |
|---------------|-----------------------------|-------------------------------|---------------------------------------|
| Headlight ON  | ○                           | ○                             | —                                     |
| Headlight OFF | —                           | —                             | —                                     |
| DRL* ON       | ○                           | —                             | —                                     |

\*: Daytime Running Light

System Diagram



## ■ LAYOUT OF MAIN COMPONENTS

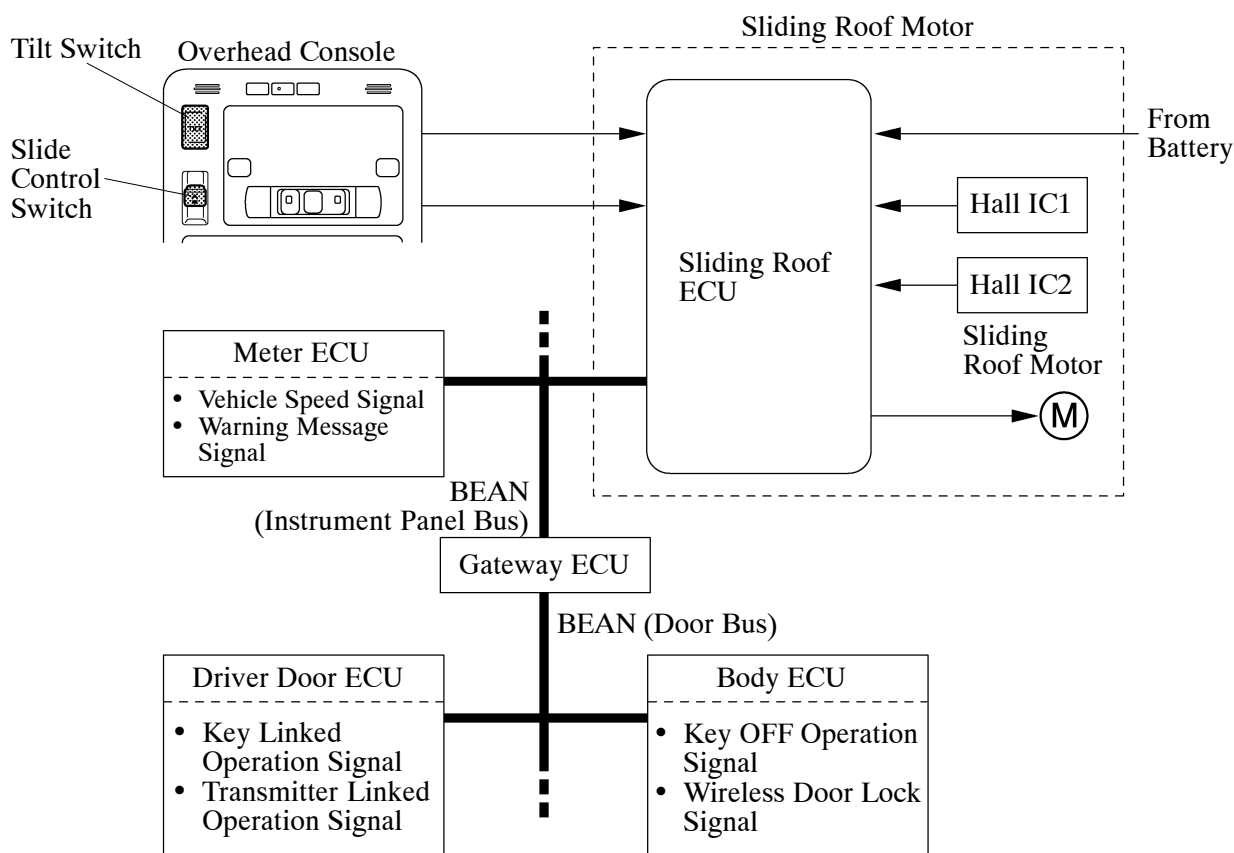


## SLIDING ROOF SYSTEM

### DESCRIPTION

- The sliding roof system is optional equipment on all models.
- A jam protection function has been provided.
- As on the current RX300, the new RX400h uses pulse sensors (Hall ICs) to detect the sliding roof position.
- The sliding roof ECU and the sliding motor have been integrated to reduce the number of components.

### System Diagram



277BE92

### Service Tip

The sliding roof ECU memorizes the initial position of the sliding roof. Therefore, the data will be lost if a battery terminal is disconnected or the sliding roof motor assembly is removed, thus enabling the sliding roof to be operated only manually. After reconnecting the battery terminal or reinstalling the sliding roof motor, initialize the system by performing the steps described below.

- With the ignition switch turned ON, keep the tilt-up or slide close switch pressed. 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.
- The initialization process ends when the close operation is completed.
- Keep the tilt-up or slide close switch pressed during initialization. If the tilt 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.

## FUNCTION

### 1. General

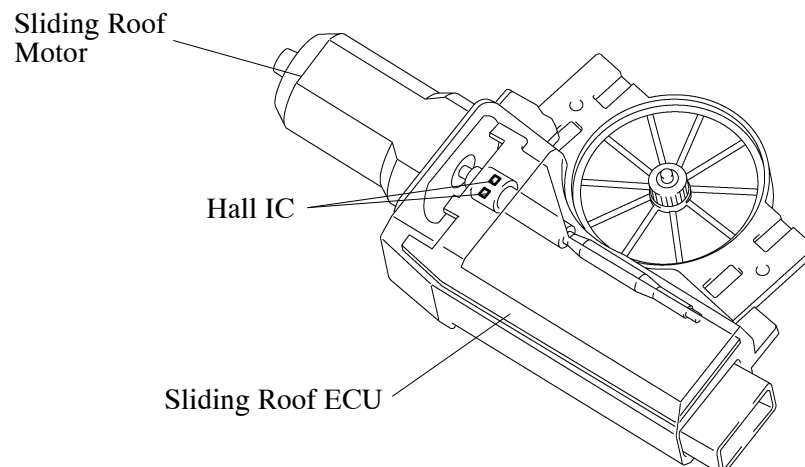
The sliding roof has following functions:

| Function                           | Outline                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manual open-and-close              | This function causes the sliding roof to open (or close) when the SLIDE OPEN switch (or SLIDE CLOSE switch) is pressed for a maximum of 0.3 seconds. The sliding roof stops as soon as the switch is released.                                                                                                                                                                                                                                                                          |
| One-touch auto open-and-close      | This function causes the sliding roof to be fully opened (or closed) when the SLIDE OPEN switch (or SLIDE CLOSE switch) is pressed for a minimum of 0.3 seconds.                                                                                                                                                                                                                                                                                                                        |
| Manual tilt up-and-down            | This function causes the sliding roof to tilt up (or tilt down) when the TILT UP switch (or TILT DOWN switch) is pressed for a maximum of 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 tilted up (or down) when the TILT UP switch (or TILT DOWN switch) is pressed for a minimum of 0.3 seconds.                                                                                                                                                                                                                                                                                                                           |
| Jam Protection                     | A "jam protection function" automatically stops the sliding roof and moves it open half way (or fully tilt up) if a foreign object gets jammed in the sliding roof during one-touch auto-close operation (or one-touch auto tilt down operation).                                                                                                                                                                                                                                       |
| Key-off operation                  | The "key-off operation function" makes it possible to operate the sliding roof for approx. 43 seconds after the ignition switch is turned to the ACC or LOCK position, if the front doors are not opened.                                                                                                                                                                                                                                                                               |
| Key-linked open-and-close*         | When the ignition key is not in the key cylinder, the driver's door is locked, and the key in the driver's door is turned and maintained in the lock direction for 0.5 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 0.5 seconds or more will cause the sliding roof to be opened. |
| Transmitter-linked open-and-close* | When the body ECU receives an unlock/lock signal from the transmitter continuously for longer than 2.5 seconds, the sliding roof ECU control the sliding roof motor in accordance with the signal to open/close the sliding roof.                                                                                                                                                                                                                                                       |

\*: The setting of function can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-20.

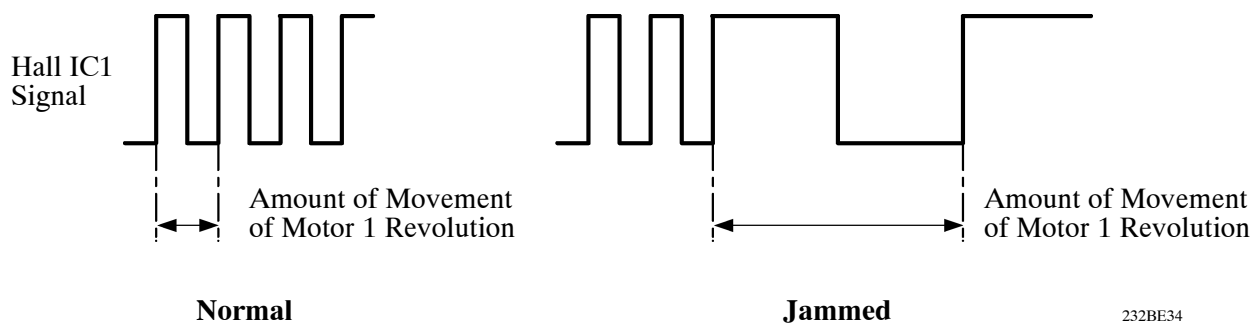
### 2. Jam Protection Function

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

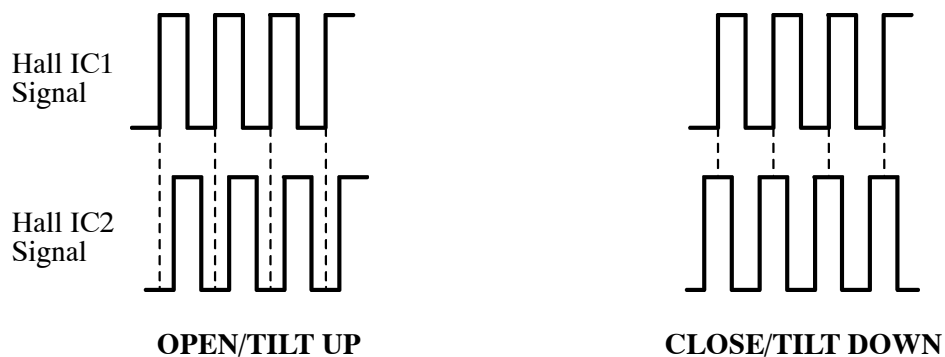


- To control the jam protection function, the ECU determines the amount of movement and the jamming of the sliding roof from the pulse signals from the Hall IC1, and the moving direction of the sliding roof from the phase difference between the pulses from the Hall IC1 and Hall IC2.

### ► Judgment of Amount of Movement and Jamming ◀



### ► Judgment of Moving Direction ◀

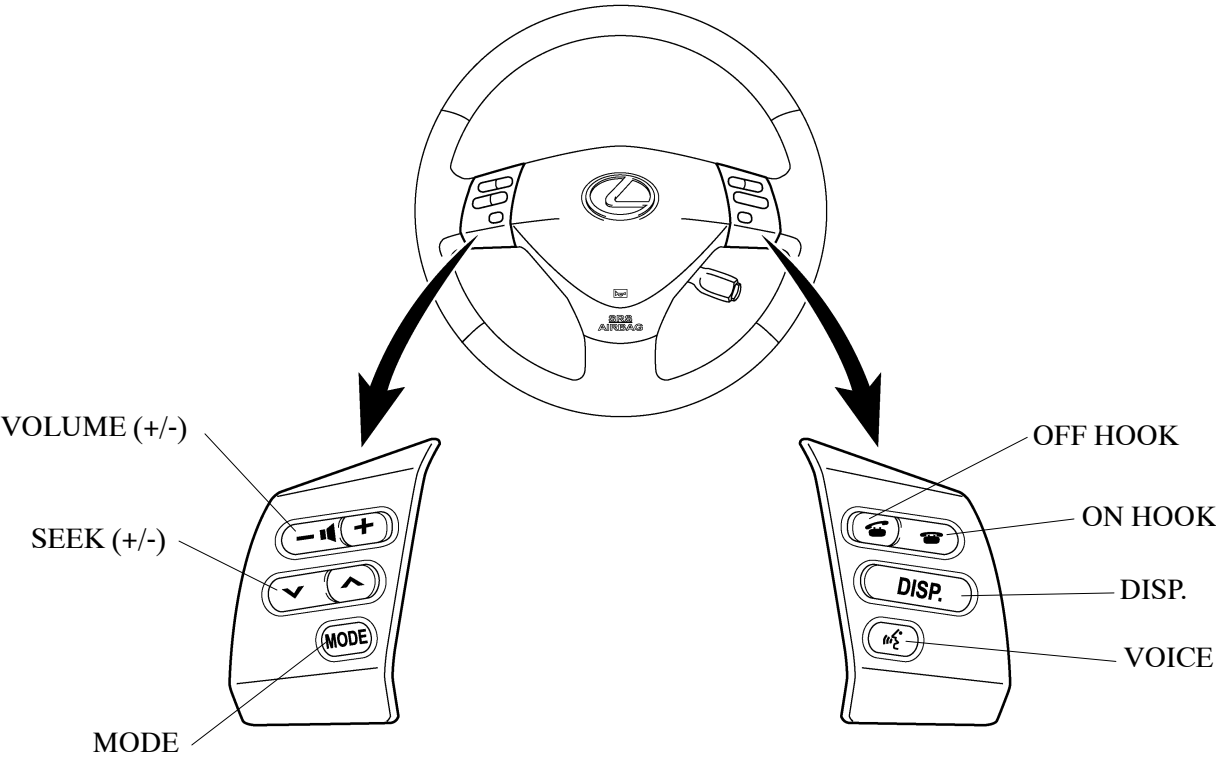


STEERING PAD SWITCH

DESCRIPTION

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

| System                                        | Switch                                                                                             | Standard | With Navigation |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------|----------|-----------------|
| Audio                                         | <ul style="list-style-type: none"><li>• VOLUME (+/-)</li><li>• MODE</li><li>• SEEK (+/-)</li></ul> | ○        | ○               |
| Multi-information Display (Combination Meter) | <ul style="list-style-type: none"><li>• DISP.</li></ul>                                            | ○        | ○               |
| Navigation                                    | <ul style="list-style-type: none"><li>• VOICE</li></ul>                                            | —        | ○               |
| Telephone                                     | <ul style="list-style-type: none"><li>• ON HOOK</li><li>• OFF HOOK</li></ul>                       | —        | ○               |



BE