BODY ELECTRICAL

MULTIPLEX COMMUNICATION SYSTEM

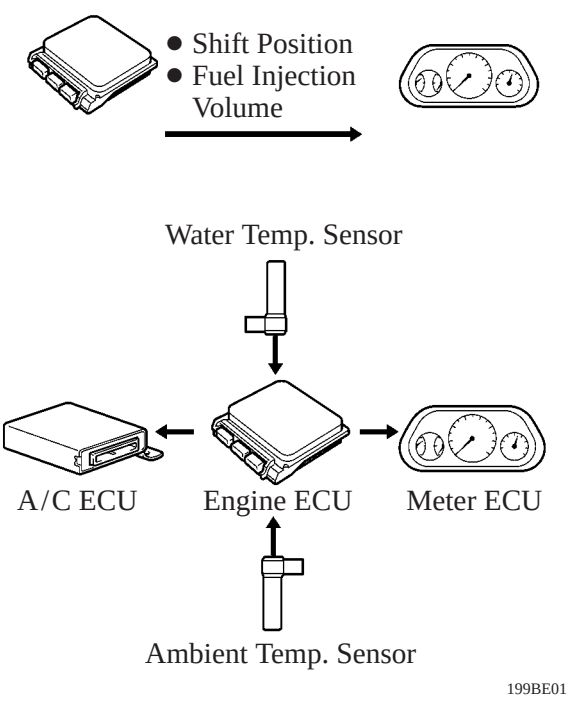
■DESCRIPTION

1. System Outline

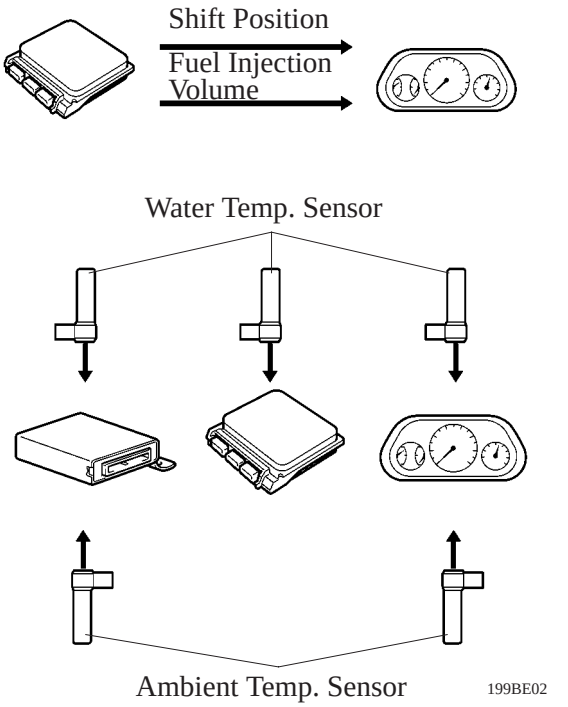
General

- A multiplex communication system establishes serial data communication by connecting the ECUs on a single communication line in order to exchange multiple pieces of information.
- The adoption of a multiplex communication system significantly reduces the number of wiring harnesses as well as the number of sensors.
- The types of multiplex communication systems are the BEAN (Body Electronics Area Network), which consists primarily of the ECUs that control the body systems, and the AVC-LAN (Audio Visual Communication - Local Area Network), which consists of the ECUs that control the audio and visual systems.

▶ Conceptual Drawing of Multiplex Communication System ◀



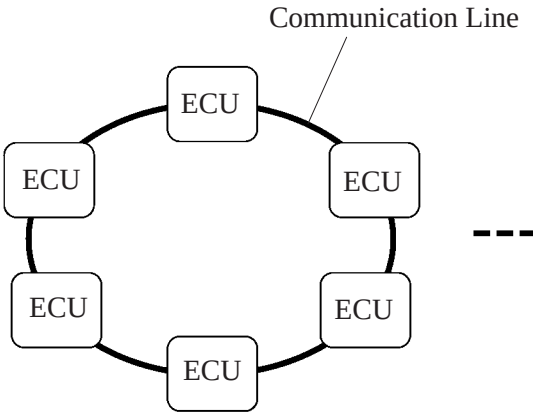
Multiplex Communication System



Conventional System

Daisy Chain

- The ECUs that comprise the BEAN are connected serially to form a ring. This type of connection method is called a daisy chain.
- The ECUs are connected by a communication line, and multiple pieces of information are transmitted and received by the ECUs by slightly staggering their times.



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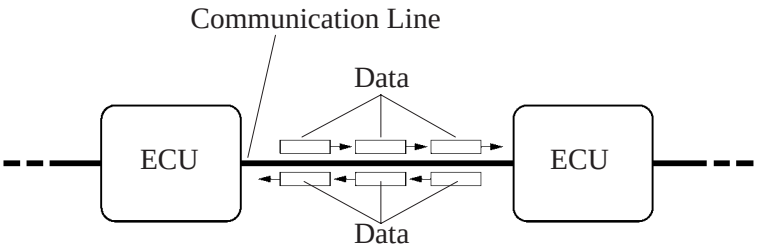

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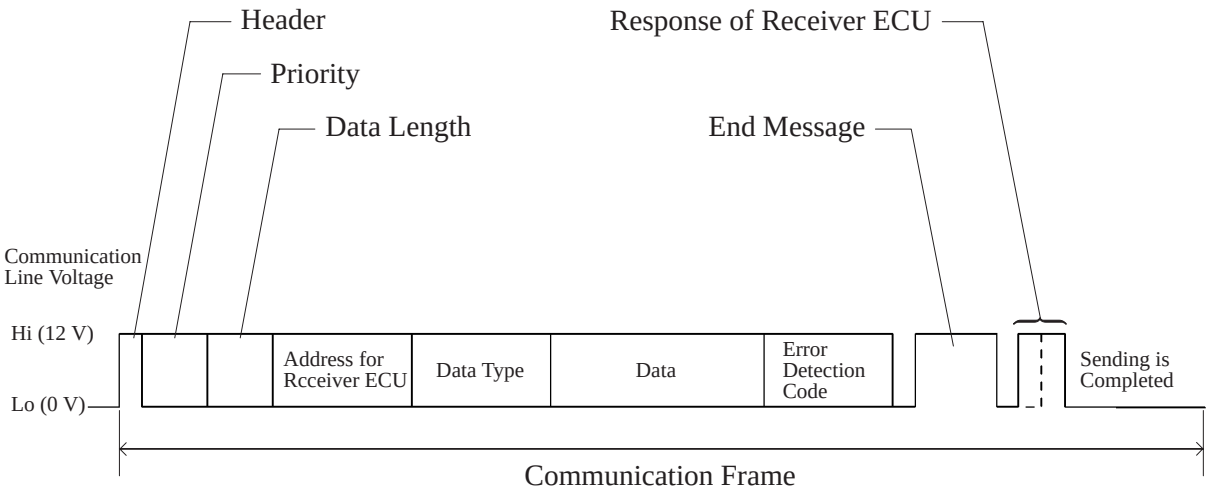
Communication Frame

The ECUs in the BEAN exchange data in the form of individual clusters called communication frames, which are configured as described in the diagram below.



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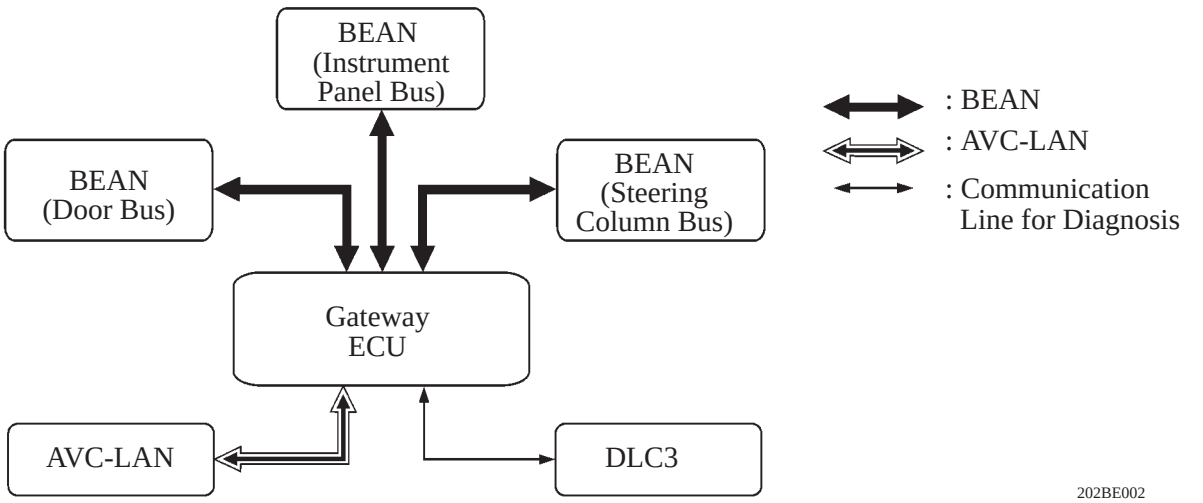
2. General

- The basic construction and function of the multiplex communication system on the SC430 are the same as on the LS430.
- The BEAN consists of three buses (bus : A single cluster of daisy chain):
  a) Door bus
  b) Instrument panel bus
  c) Steering column bus
- The gateway ECU connects the buses, the AVC-LAN, and the DLC3 (Data Link Connector 3), and manages the communication among them.
- The communication between the control signals related to the audio and visual systems and the Gateway ECU is established via the AVC-LAN.
- A customized body electronics system has been adopted.
- To protect the lighting operations and wiper operations in case the communication is disrupted due to a malfunction, a backup bus and fail-safe line is provided.



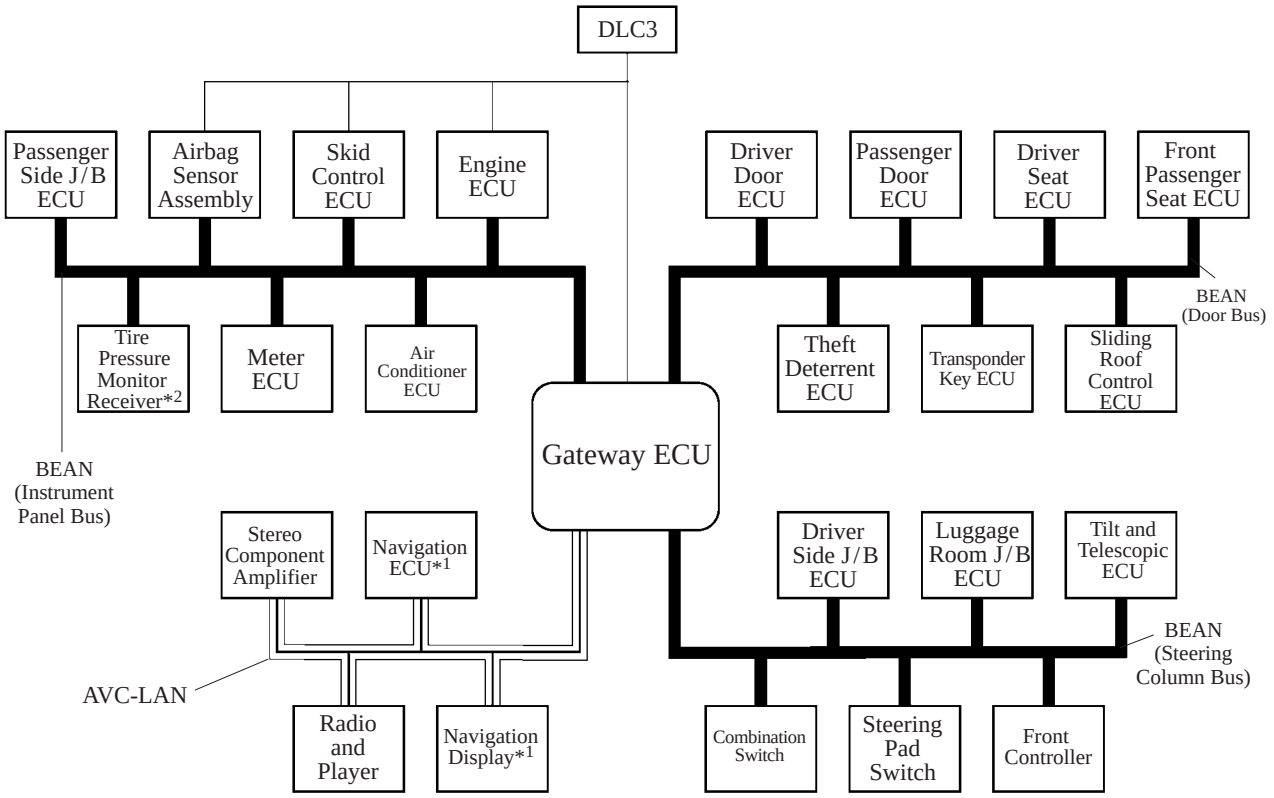
▶ Specifications ◀

Item		SC430	LS430
Connected ECUs *1		21	28
Communication Frame *2		100	140
Gateway Function	BEAN x Diagnosis	Gateway ECU	←
	BEAN x AVC-LAN	Gateway ECU	←
ECU in charge of vehicle information of the customized body electronics system		Gateway ECU	←
Troubleshooting the multiplex communication system		The DTCs (Diagnostic Trouble Codes) of the Gateway ECU are checked on the LEXUS hand-held tester	←
Communication Speed		10 kbps *3	←

*1: Optional ECUs are also included.
*2: A group of data that is required for a single instance of communication.
*3: A unit of data transmission per second (bit per second).

3. System Diagram

Entire System



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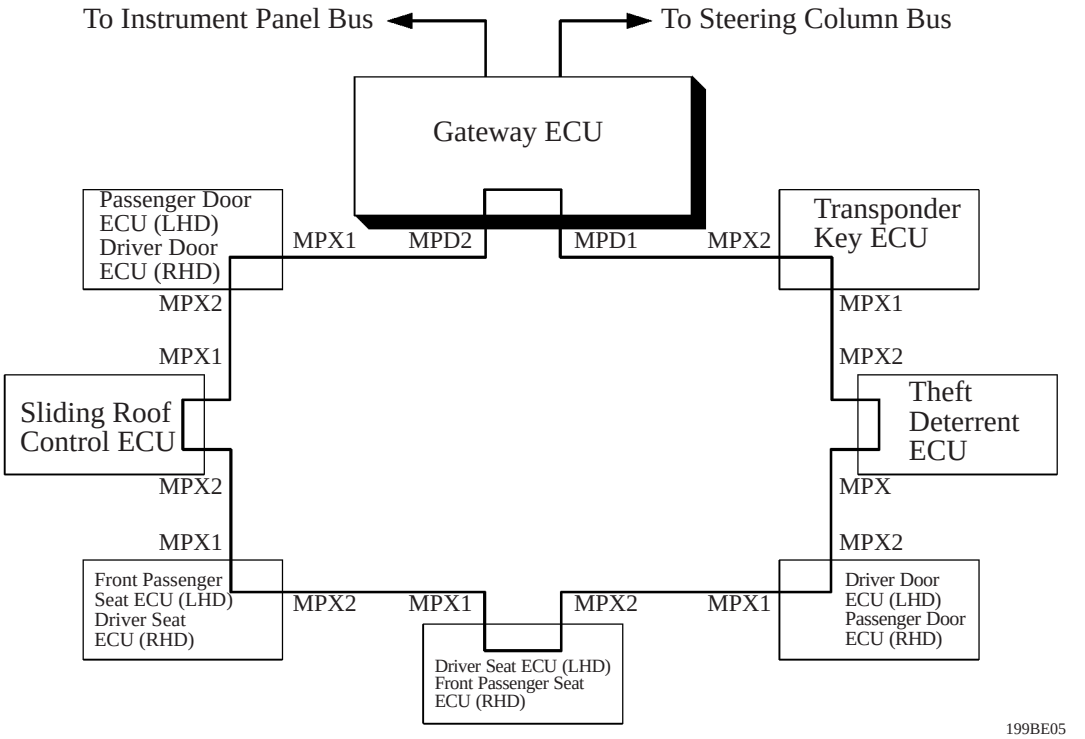
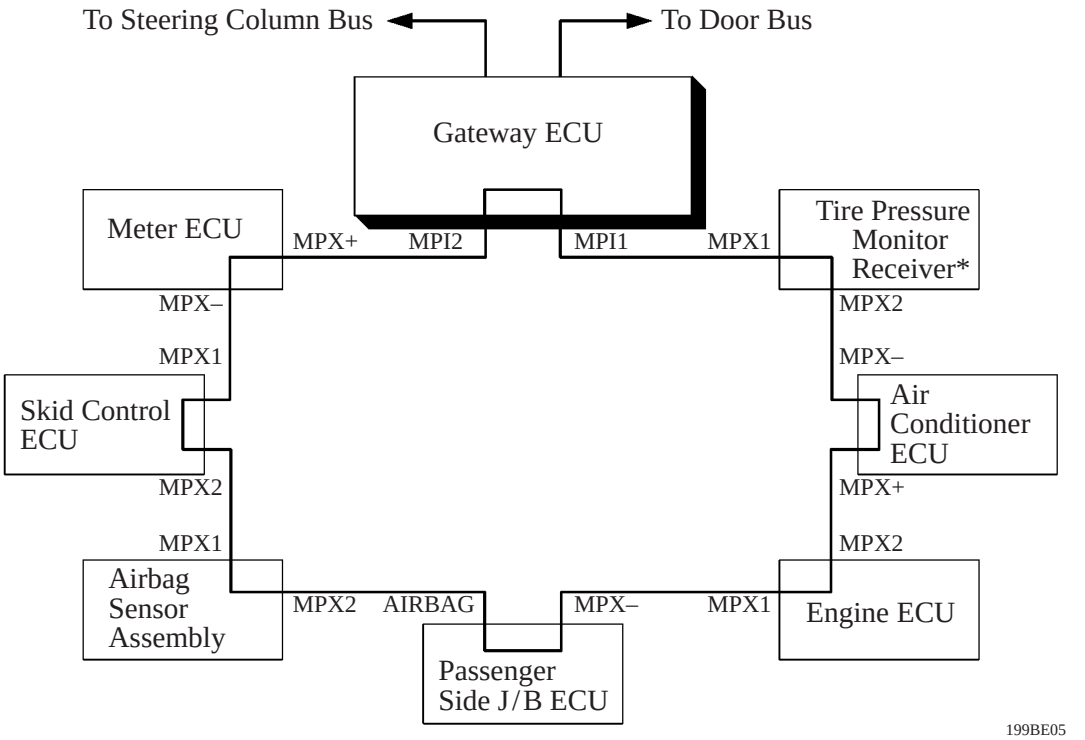
*1: with LEXUS Navigation System
*2: Only for European Model

Door Bus

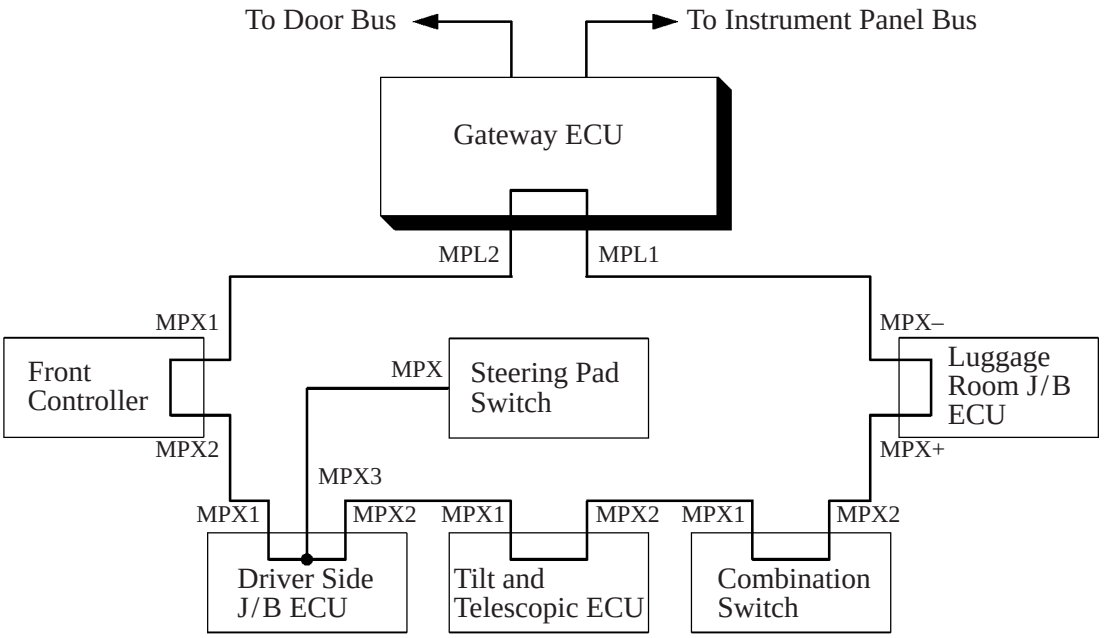


Instrument Panel Bus



*: Only for European Model

Steering Column Bus



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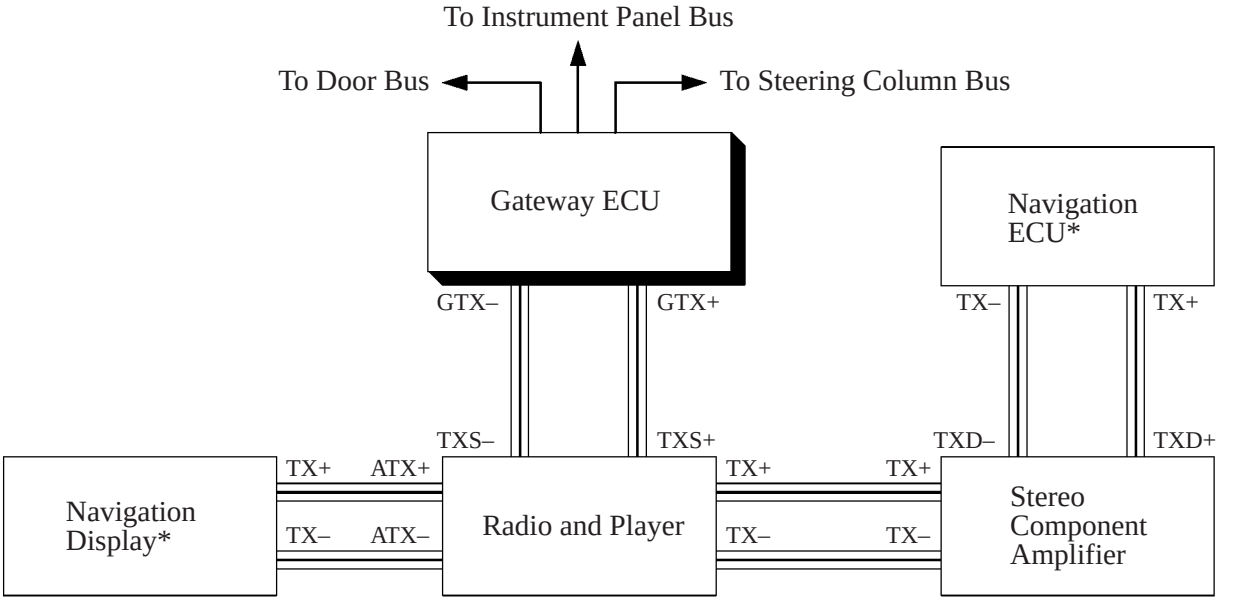
AVC-LAN



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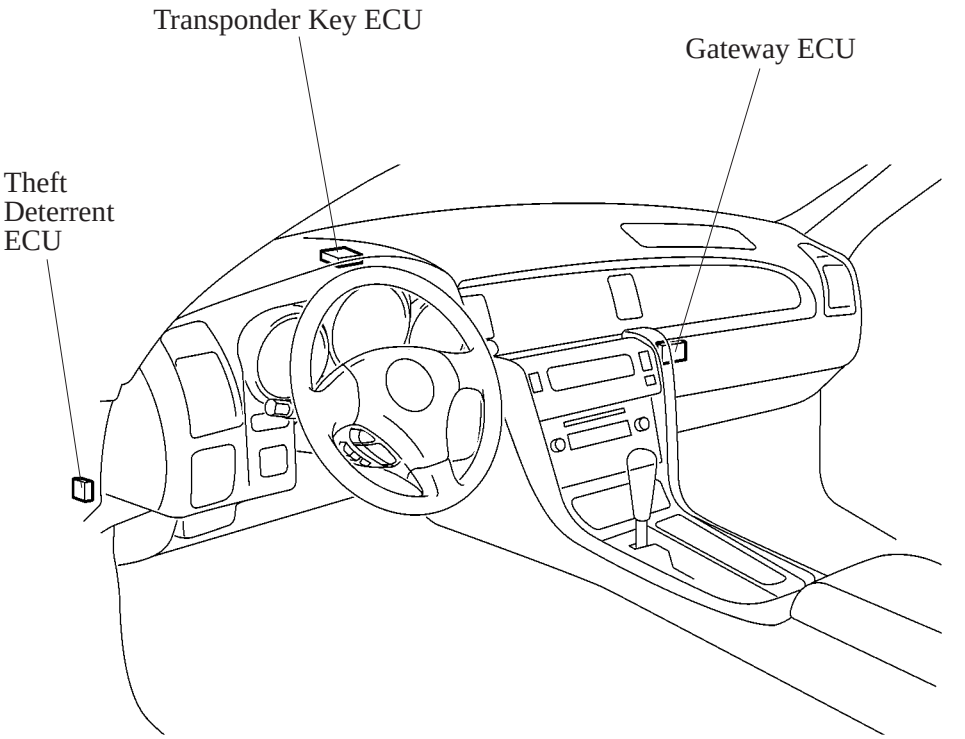
*: with LEXUS Navigation System

4. Layout of Component

Door Bus



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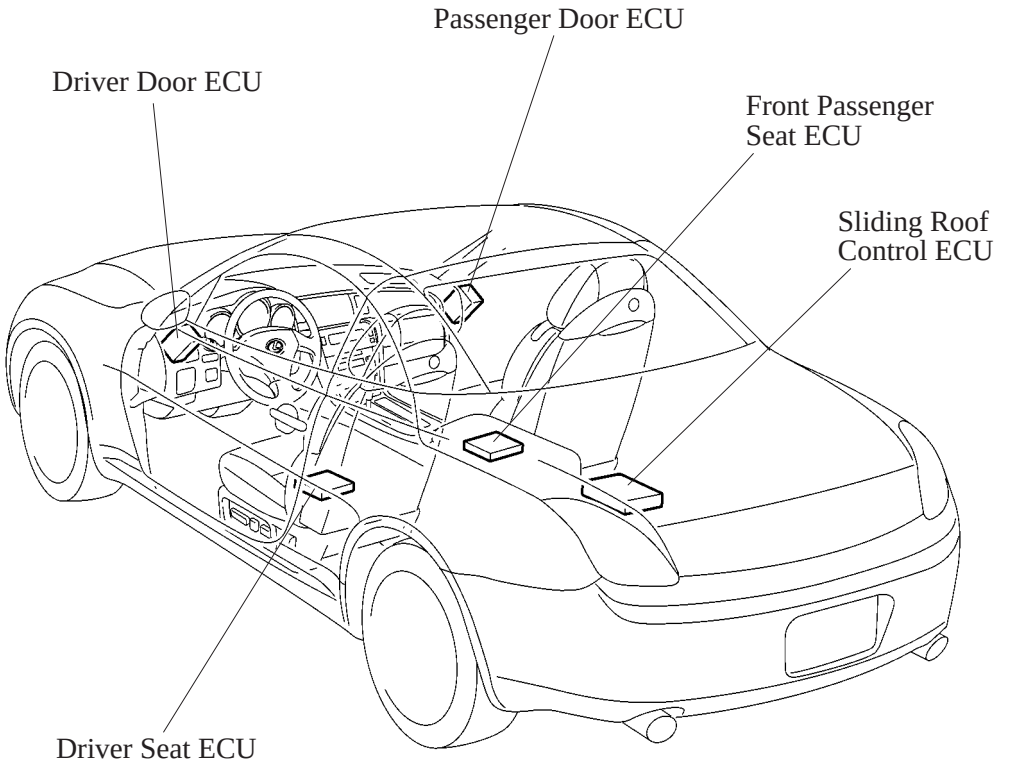

for LHD Model

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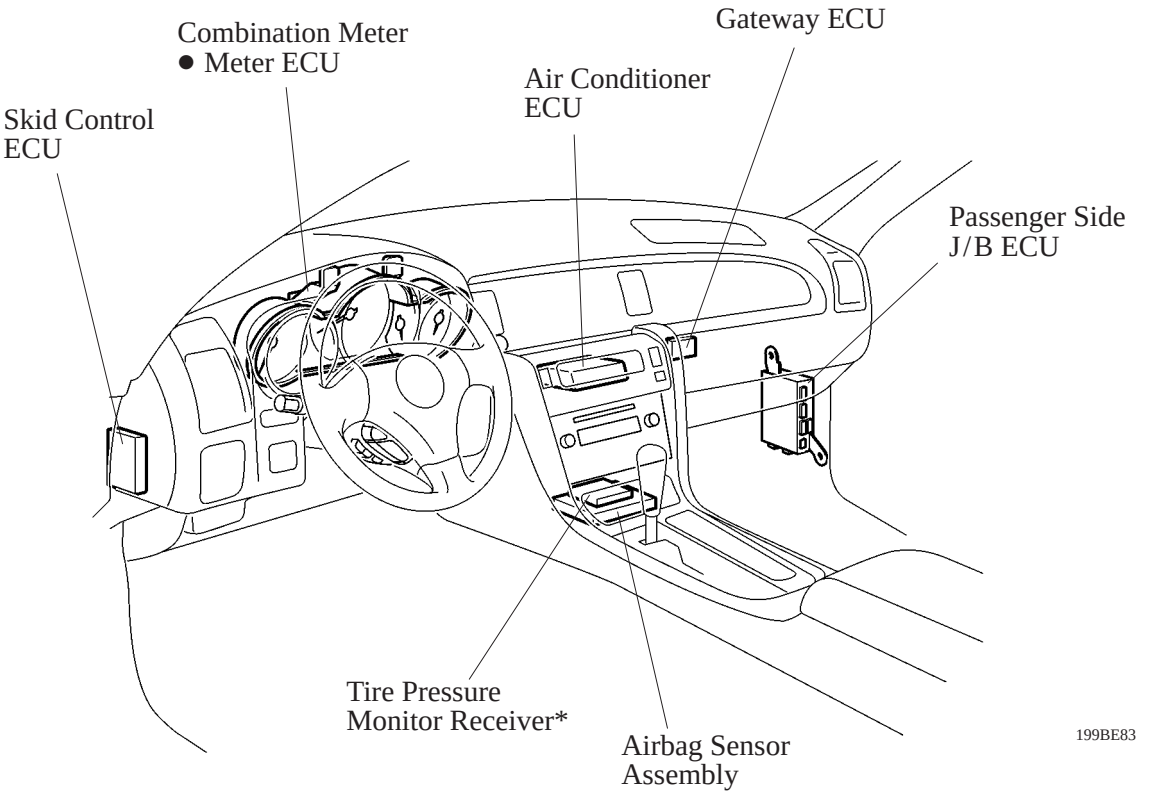
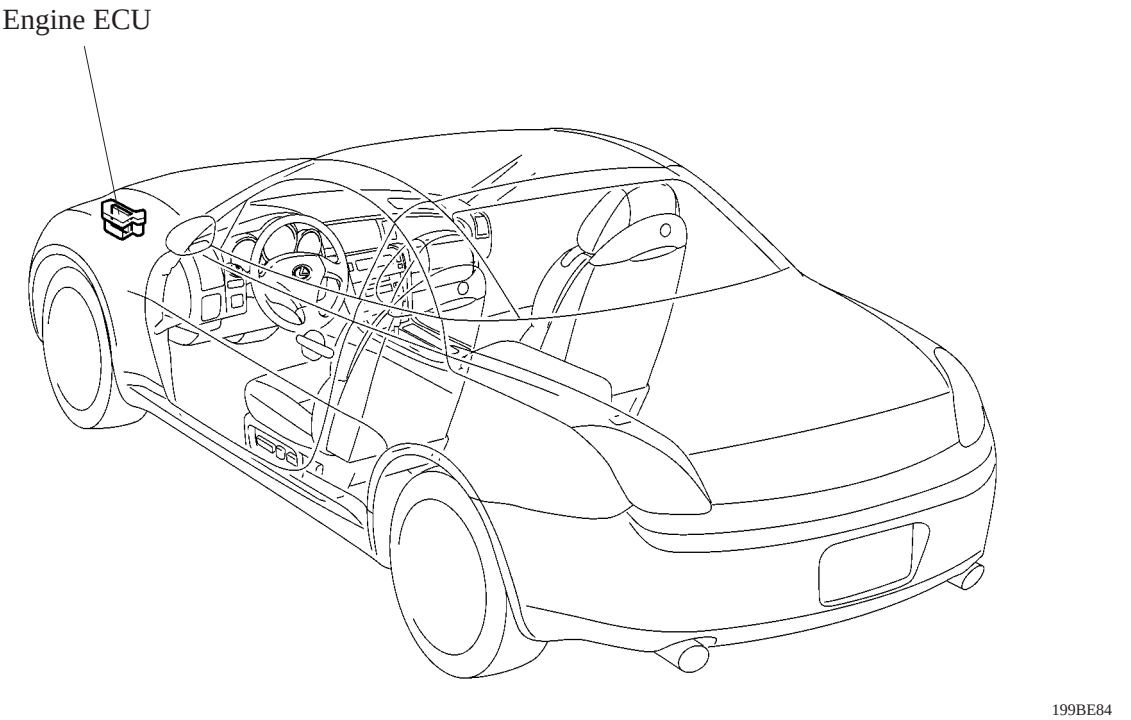
Instrument Panel Bus

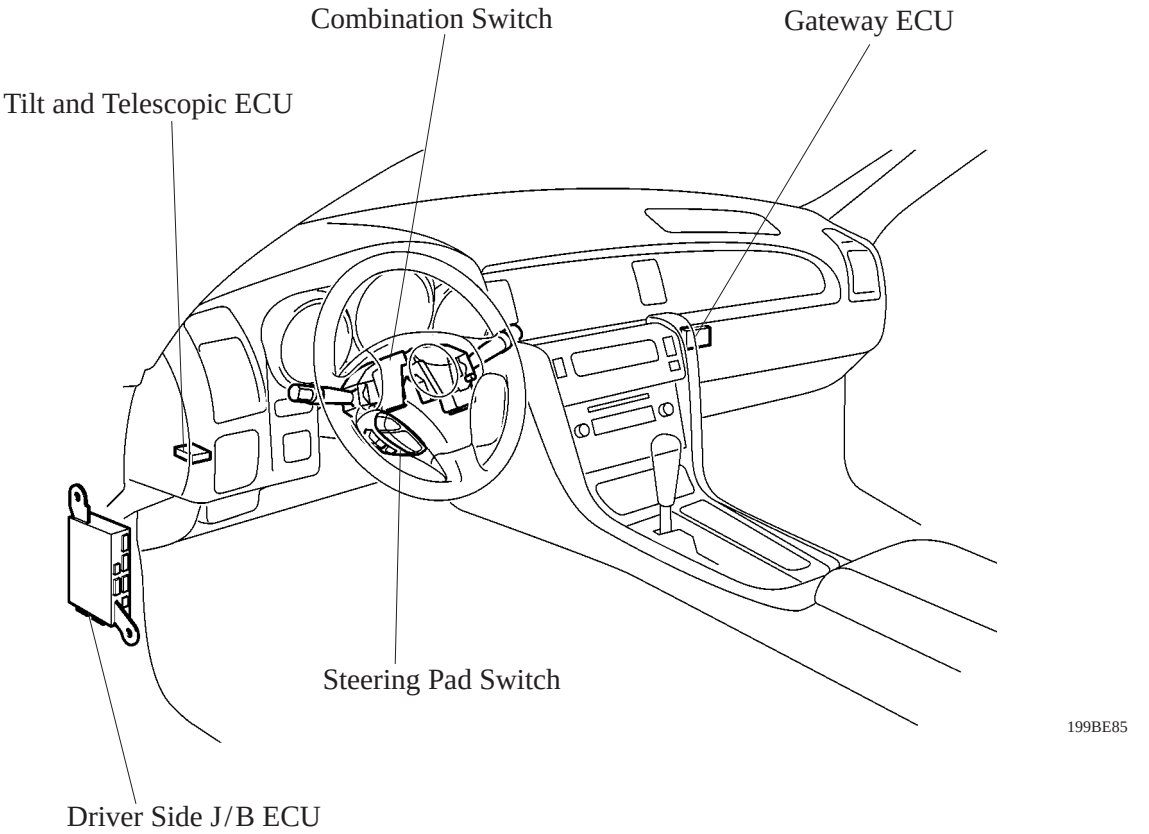




*: Only for European Model

for LHD Model

Steering Column Bus



for LHD Model