

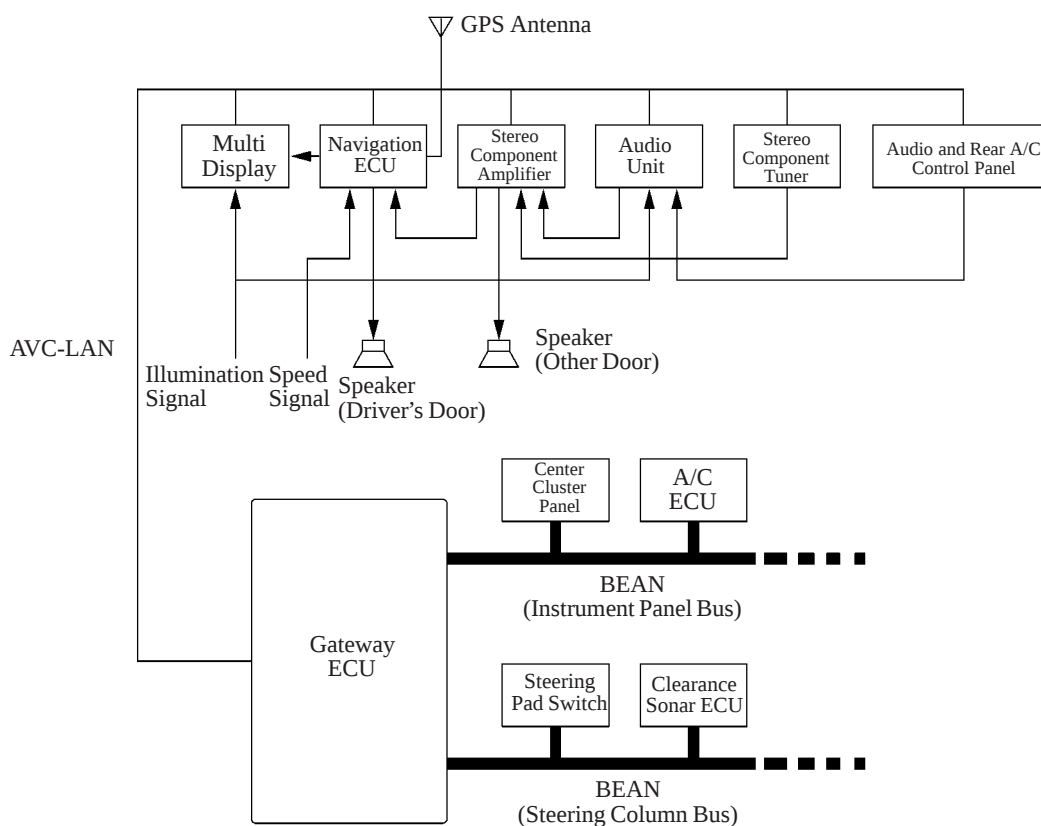
ACCESSORIES

■ MULTI DISPLAY

1. General

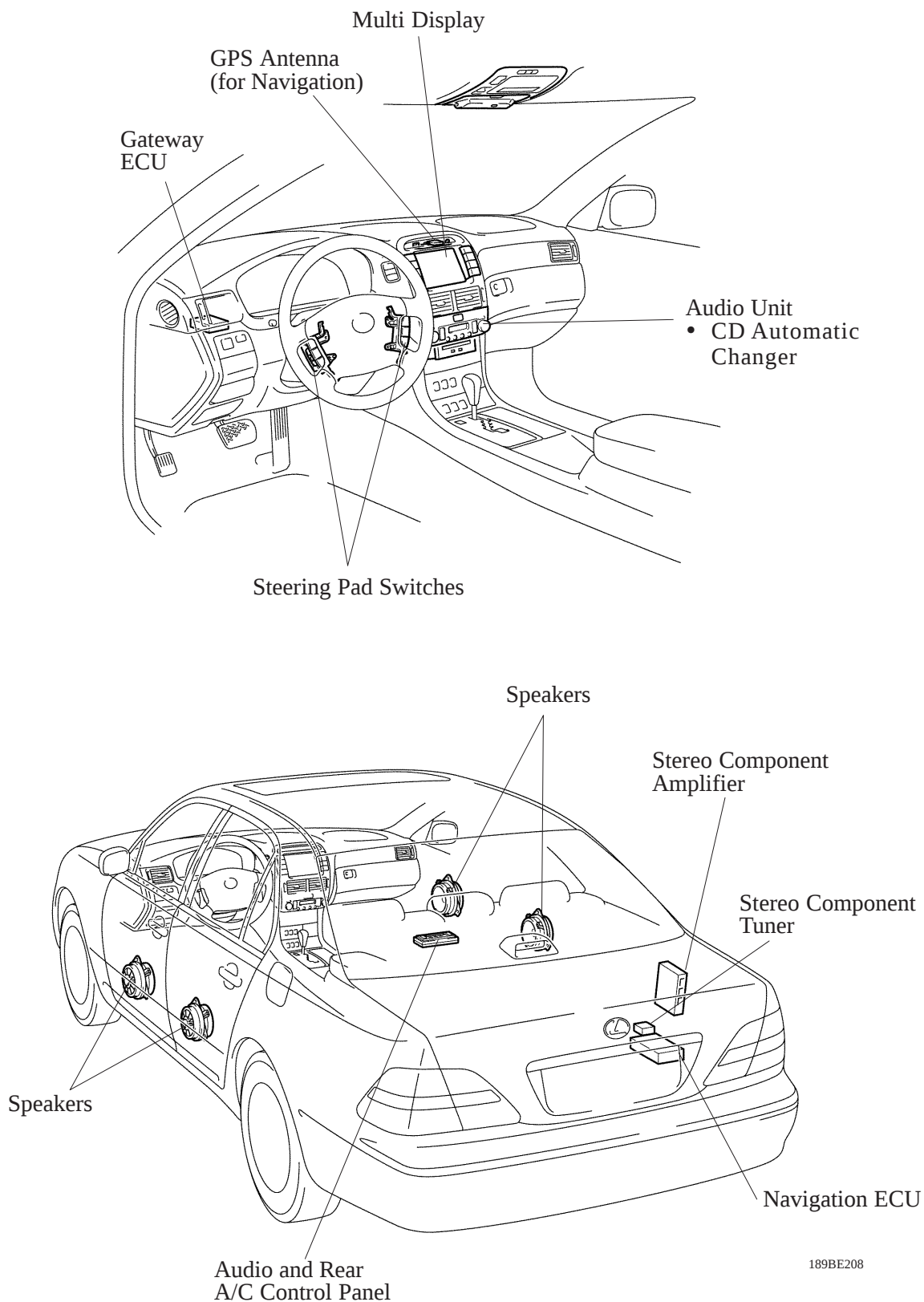
- A Multi display has been provided on the center cluster panel as an option only for Europe model. The display, which consists of a 7.0-inch wide LCD (Liquid Crystal Display) screen with a IR (Infrared)-sensitive touch panel, offers improved ease of use.
- Through the use of the GPS (Global Positioning System) and map data in a DVD (Digital Versatile Disc), this navigation system analyzes the position of the vehicle and indicates that position on the map that is displayed on the screen.
Additionally, it provides voice instructions to guide the driver through the route to reach the destination that has been selected.

2. System Diagram



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3. Layout of Component



4. Construction and Operation

Multi Display

1) General

Upon receiving the vehicle information that is transmitted by the Gateway ECU, the navigation information that is transmitted by the Navigation ECU, and the operation information from audio unit and LEXUS park assist system, Multi display displays these data on the display.

Listed below are the main function of the Multi display.

Function	Outline
Audio Screen Display	• Status of audio equipment and audio operation screen indication. • Sound quality adjustment screen indication.
On-screen Display	• Display the operating condition of the air conditioner. • Display the outside temperature.
Adjustment Screen Display	• Image quality adjustment screen indication. • Clock adjustment screen indication.
Trip Information Display	• Cruising Range • Distance After Refueling. • Average Speed. • Fuel Consumption (Current, After Refueling, Average).
LEXUS Park Assist Display*	Display the operation LEXUS park assist system.
Navigation Screen Display	• Language selector display. • Enlargement/reduction, rotation and movement of map. • Indication of current position and direction of travel. • Correction of current position. • Setting change and indication of route. • Voice guidance. There are many additional functions.
Diagnosis Screen Display	• Service Check Menu. • Display Check. • Navigation Check.

*: with LEXUS Park Assist System

2) Navigation Screen

The navigation screen is a function that is provided in the GPS voice navigation system. Based on the map data on the DVD, signals 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 this screen. This screen has the display functions listed below.

	Item	Outline
Map Display	Heading Up/North Up	Changes the orientation of the map.
	Front Wide	Displays a map in the direction of travel of the vehicle in an enlarged form. (Heading up only)
	Stepless Scale Display	Changes the scale of the map from the basic 13 steps to an even finer display.
	Direct Scale Change	Directly select and display the map scale.
	Multi-step Scale Display	Change and display the map scale in 13 stages.
	Scroll Display	Scrolls the screen to display the desired point on the map.
	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 numbers on the map.
Destination Search	Hybrid Points-of-interest Search	Narrows the search by names of the points-of-interest, category, and areas.
	Hybrid Street Search	Narrows the search by street name and area.
	Points-of-interest Pinpoint Display	Pinpoints and displays the position of the point-of-interest.
	Telephone Number Search	Performs search by telephone number.
	Address Search	Searches for a house number.
	Special Memory Point	Sets a pre-registered point as a destination point while driving.
	Nearest Points-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 intersect is set as the destination point.
Search	Search Condition Designation	Searches for the quick and shortest routes.
	Regulated Road Consideration	Performs search while considering regulated roads.
Language Selector		The language of the text displayed on the navigation screen and of the voice guidance can be selected from five languages (English, French, German, Italian, and Dutch).

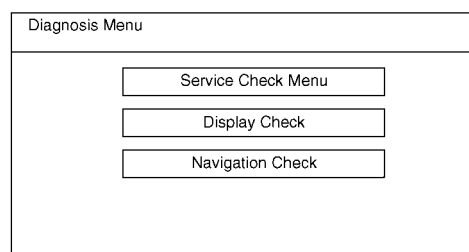
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	Item	Outline
Guidance	Right or Left Turn Guidance	Voice guidance to instruct the direction of travel to be taken.
	Motorway Direction of Travel Guidance	Voice guidance to instruct the direction of travel to take on the motorway.
	Distance Display to Destination	Displays the distance from the present location to the destination.
	Motorway Branching Lane Guidance	Guides the lane in which to drive when the motorway branches (only on the model for Germany).
	Intersection Zoom-in Display	Zoom-in display when approaching an intersection.
	Motor SA/PA Information	Displays information on the SA (service area) and PA (parking area) of the motorway.

3) Diagnosis Screen

This system's diagnosis screen can be displayed and operated on the multi-information display. The diagnosis menu contains the following three items: Service Check Menu, Display Check, and Navigation Check.

For details, refer to the LEXUS LS430 Repair Manual (Pub. No. RM792E).



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GPS (Global Positioning System) Voice Navigation

1) General

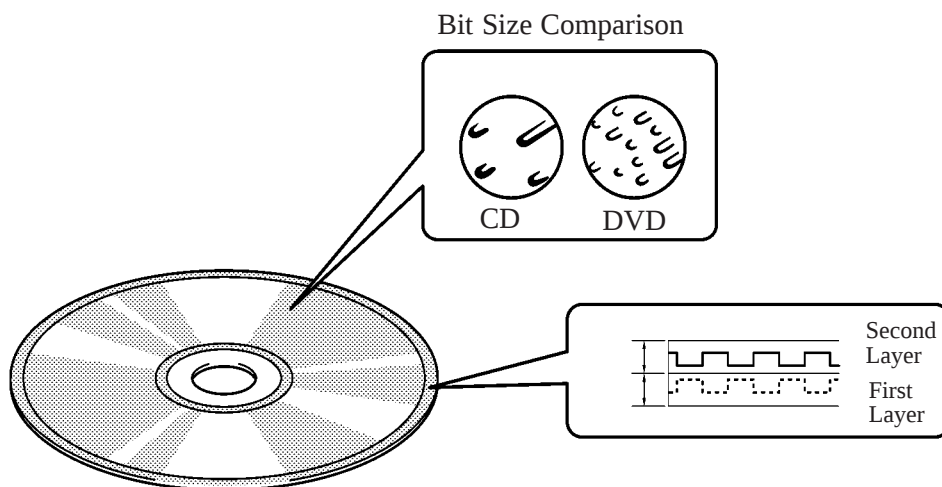
On the new LS430 the reading of the gyro sensor and map data that are enclosed in the Navigation ECU has been changed from CD (Compact Disc) to DVD (Digital Versatile Disc).

The GPS voice navigation function consists of the following components:

- GPS Antenna
- Speed Sensor
- Speaker
- DVD-ROM
- Navigation ECU
- GPS Receiver (Contained in the Navigation ECU)
- Gyro Sensor (Contained in the Navigation ECU)

2) DVD (Digital Versatile Disc)

The DVD, which uses a smaller laser beam diameter than the CD (Compact Disc), is able to record and play back a greater amount of data because it can handle pits, or signal grooves, at a higher density. The volume of data that a 12 cm (0.47 in.) diameter DVD can store is equivalent to approximately 7.5 times that of a CD-ROM, totaling 4.7 gigabytes. The navigation system has adopted a dual-layer DVD, which has two layers per side to store a large capacity of signal data, totaling 8.5 gigabytes.



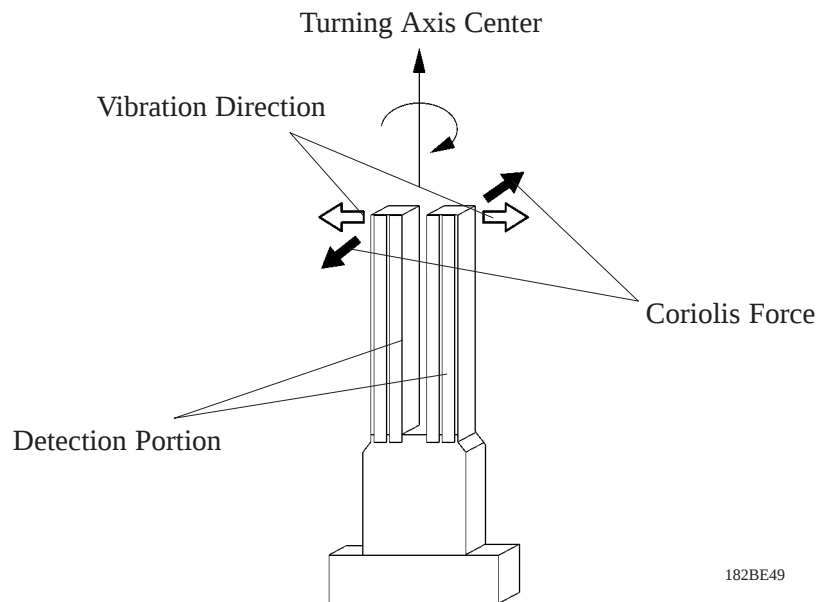
3) Gyro Sensor

The gyro sensor is designed to detect the yaw rate of vertical axis turn of the vehicle and installed in the Navigation ECU.

The gyro sensor has a turning-fork shape type piezoelectric ceramic piece inside. This piezoelectric ceramic piece deforms by charging voltage and generates voltage by deforming with force.

The piezoelectric ceramic piece inside the gyro sensor is vibrated by the driving circuit and when the vehicle turns (when the detection portion turns to the axis direction), coriolis force is added to the detection portion. With this force, the detection portion is twisted. The voltage generated by this twisting is signal-processed inside the gyro sensor and outputted.

Navigation ECU receives this signal and judges the yaw rate of the vehicle.



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4) Detecting the Vehicle Position

The navigation ECU calculates the position based on the principle of a 3-point measurement.

The GPS satellites are equipped with high-precision clocks. Thus, the satellites are able to transmit continuous orbit signals and radiowave transmission time signals.

The navigation ECU also contains a clock, which can understand the radiowave time signals that are received from the satellites.

As a result, the length of time that is taken by the radiowaves to arrive from the satellites to the antenna can be determined. Thus, the lengths of time that elapse for the radiowaves of the 4 satellites to reach the antenna are measured. Each of these lengths of time are multiplied by the luminous flux (the rate of transmission of luminous energy: approximately 300,000 km per second), the results of which are the distances from the satellites to the antenna. Because the positions of the GPS satellites are known by their signals, the receiving point (vehicle position) can be rendered as the point in which the 4 spheres (of which the centers are the respective satellites) converge.

However, due to the differences that exist between the clocks of the satellite and the ECU, the 4 spheres do not converge at a single point. Therefore, the ECU uses another satellite to calculate the point at which the 4 spheres converge at a single point and corrects its internal clock. As a result, the ECU determines the vehicle position and adjusts its internal clock to the clocks of the satellites.

