ACCESSORIES

■NAVIGATION SYSTEM

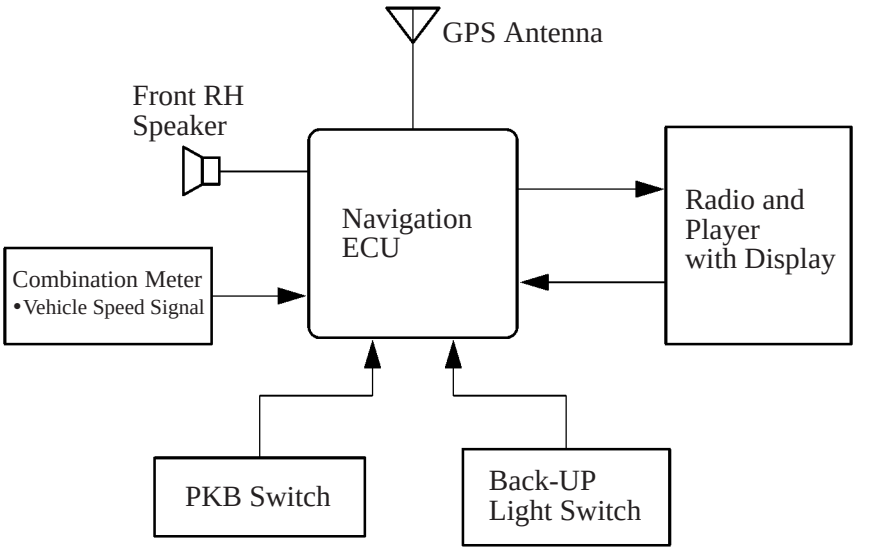
1. General

- The navigation system with AV(Audio Visual) system has been adopted on XLE grade model as optional equipment.
- 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 provided voice instructions to guide the driver through the route to reach the destination that has been selected.

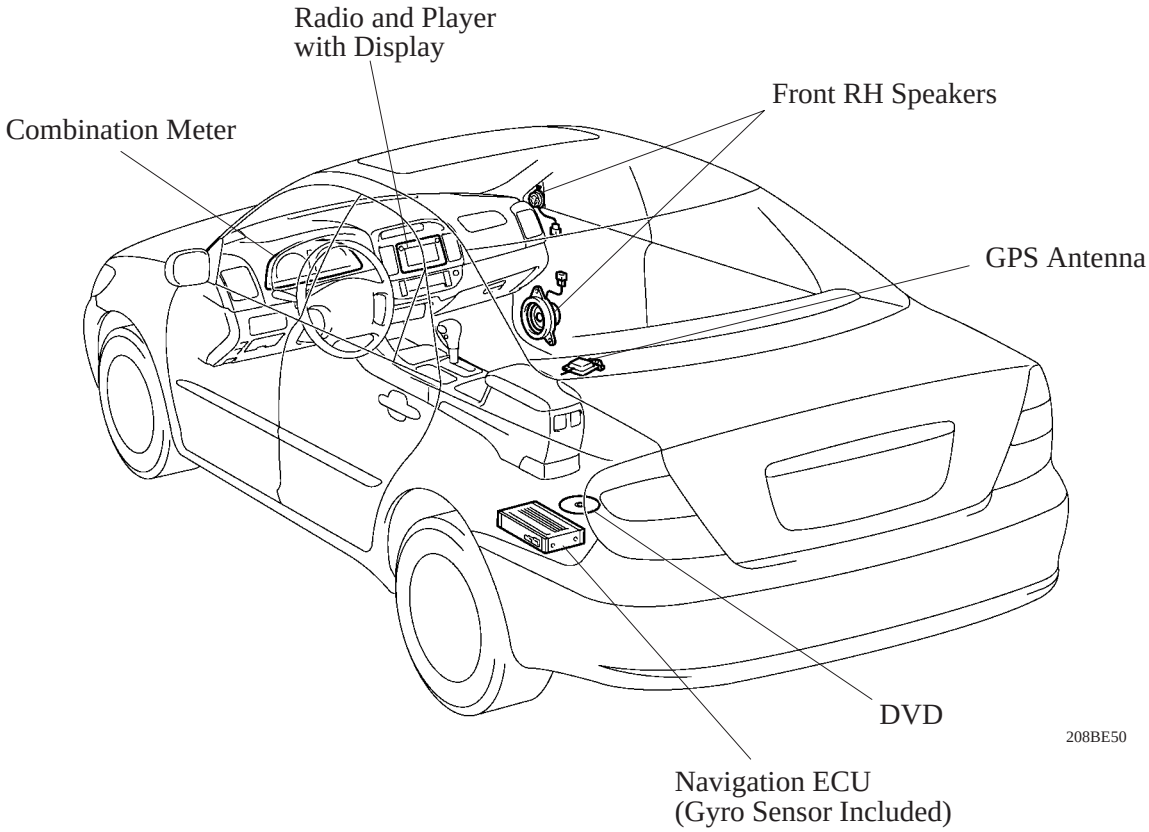
▶ Specifications ◀

Display	● 6.5-Inch Wide LCD (Liquid Crystal Display) ● Pressure Sensitive Touch Panel ● Dual Screen Display
Map Data Media	DVD (Digital Versatile Disc)
Navigation System	GPS (Global Positioning System)

2. System Diagram



3. Layout of Main Component



LHD Model

4. Construction and Operation

General

Listed below are the main functions of navigation display.

Function	Outline
Adjustment Screen Display	Image quality adjustment screen indication.
Navigation Screen 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.

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.
- The Camry has the GPS voice navigation system 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.
Destination Search	Last Destination Memory	Stores 20 locations of coordinates, names and times that have been set as destinations in the past.
	Hybrid Points-of-interest Search	Narrows the search by names of the points-of-interest, category, and areas.
	Points-of-interest Pinpoint Display	Pinpoints and displays the position of the point-of-interest.
	House Number Search	Searches for a house number.
	Special Memory Point	Sets a pre-registered point as a destination point while driving.
	Nearest Point-of-interest Search List Display	Searches nearest points-of-interest and displays a list.

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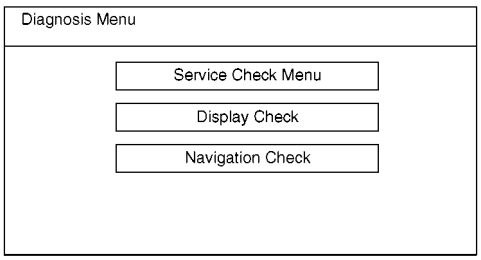
Item		Function
Destination Search	Intersection Search	By specifying two streets, the point at which they intersection is set as the destination point.
	Freeway Entrance / Exit Search	Searches for the destination bay the name of the street that connects to a freeway entrance / exit.
Route Search	Multiple 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.
Guidance	Destination Direction Arrow Display	Uses arrows along the road to display the direction of the destination during route guidance.
	Off-Route Arrow Display	Uses arrows along the road to display the direction of the destination during off-route.
	Rotary Guidance	Guidance that renders the entry and exit into a rotary as a single branching point.
	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.

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 three items

a) Service Check Menu
b) Display Check
c) Navigation Check

For details, refer to the Camry Repair Manual (Pub. No. RM915E).

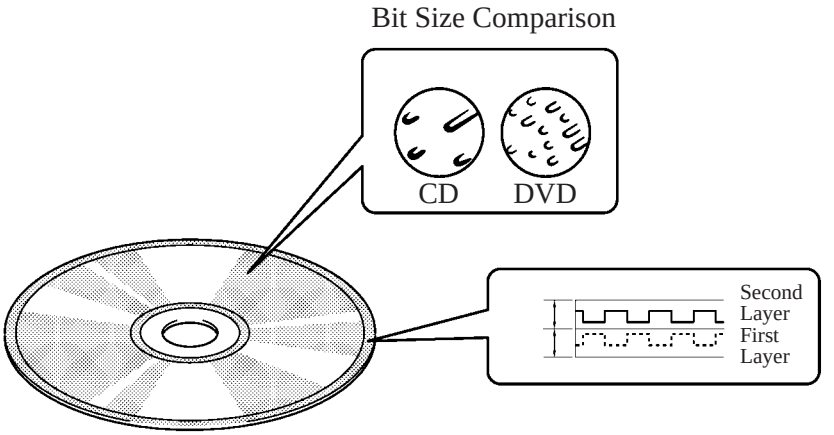


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DVD (Digital Versatile Disc)

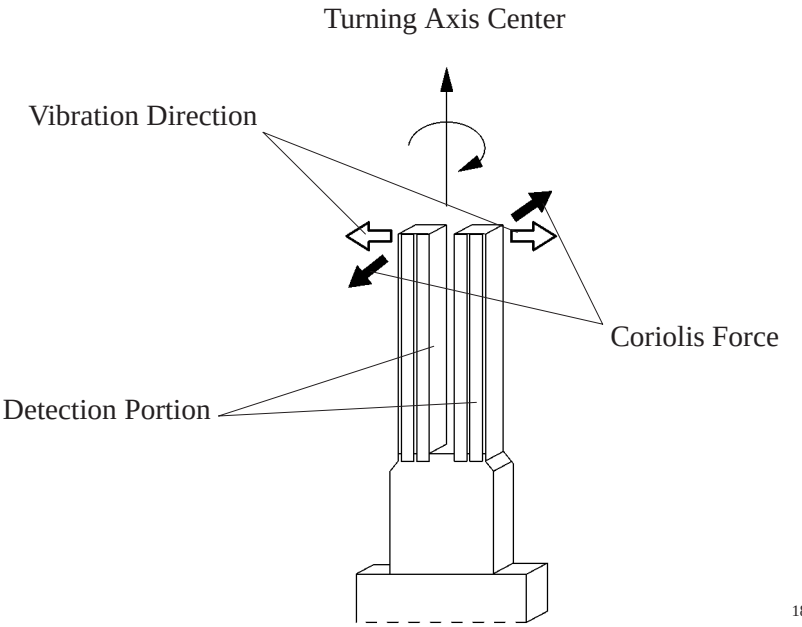
The DVD, which uses a smaller laser beam diameter than the CD (Compact Disc), is able to record and play back a greater amount of data because it can handle pits, or signal grooves, at a higher density. The volume of data that a 12 cm (0.47 in.) diameter DVD can store is equivalent to approximately 7.5 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.



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Gyro sensor

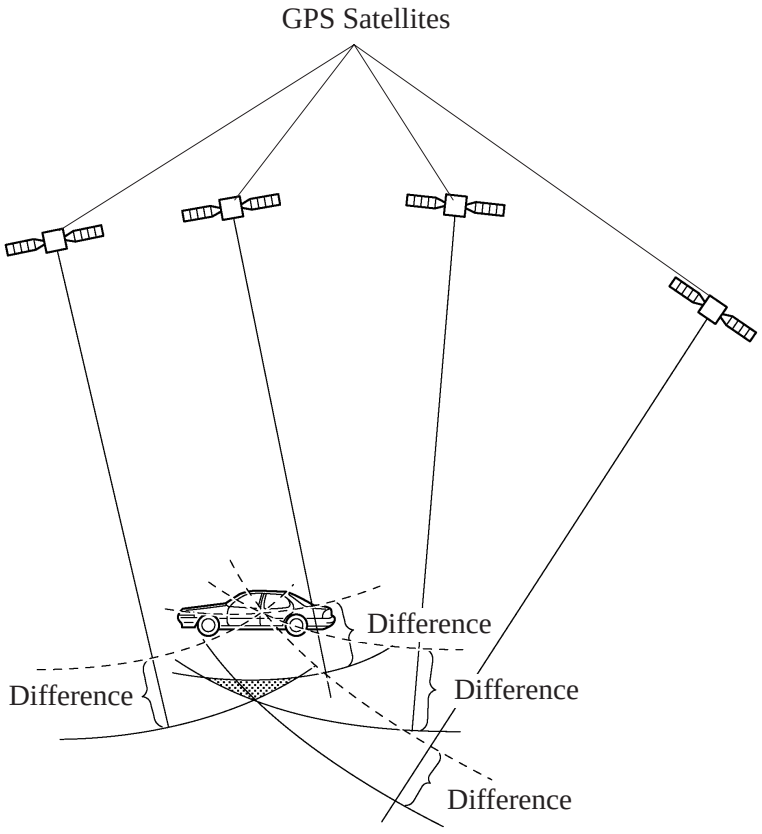
The gyro sensor is designed to detect the yaw rate of vertical axis turn of the vehicle and installed in the Navigation ECU.
The gyro sensor has a piezoelectric ceramic piece inside. This piezoelectric ceramic piece deforms by charging voltage and generates voltage by deforming with force.
The piezoelectric 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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Detection 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 radio wave transmission time signals.
The navigation ECU also contains a clock, which can understand the radio wave time signals that are received from the satellites.
As a result, the length of time that is taken by the radio waves to arrive from the satellites to the antenna can be determined. Thus, the lengths of time that elapse for the radio waves 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 / 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 signal 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.



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