■ NAVIGATION WITH AV SYSTEM

1. General

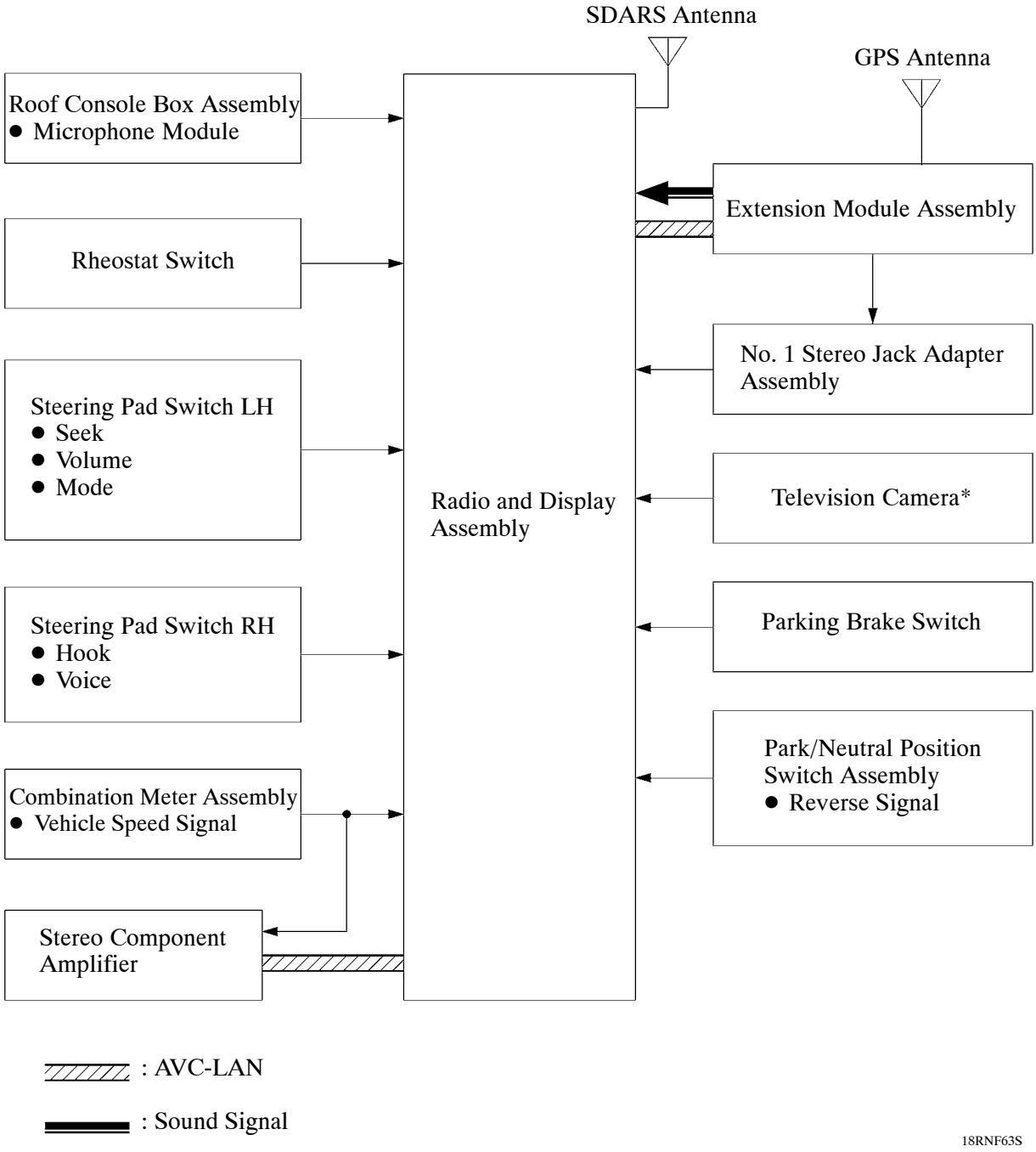
- For models equipped with the premium display audio with JBL system, a navigation system can be made available by mounting an optional extension module assembly.
- An extension module assembly, into which the navigation ECU is built, is used.
- Since an extension module assembly is mounted under the radio and display assembly, a navigation system that supports a Flash memory type map data media can be used.
- The navigation ECU handles information transmitted from various components such as a Global Positioning System (GPS) to display maps and provide a pressure sensitive touch panel on a 6.1-inch Liquid Crystal Display (LCD) of the radio and display assembly.
- Hawaii has been added to the map coverage area, ensuring marketability.
- The language of the screen buttons, pop-up messages and voice guidance can be selected from among English, French and Spanish.
- The navigation system supports the Entune Service. This service integrates the navigation system with the information service including an entertainment service on the internet by utilizing a Bluetooth phone function, internet connection and Toyota Entune Applications.
- The navigation system has a voice recognition system that uses natural speech technology to interpret a user's intent based on their natural speech pattern. The system recognizes natural speech patterns as voice recognition commands.

▶ Specifications ◀

Item		Specification
Display		6.1-inch Wide LCD
Navigation ECU		Harman Becker
Gyro Sensor		Piezoelectric Ceramic Element
Map Data Media		Flash Memory (Capacity 8GB)
Language Supported	Voice Guidance	English and Spanish*1, English and French*2
	Voice Recognition	

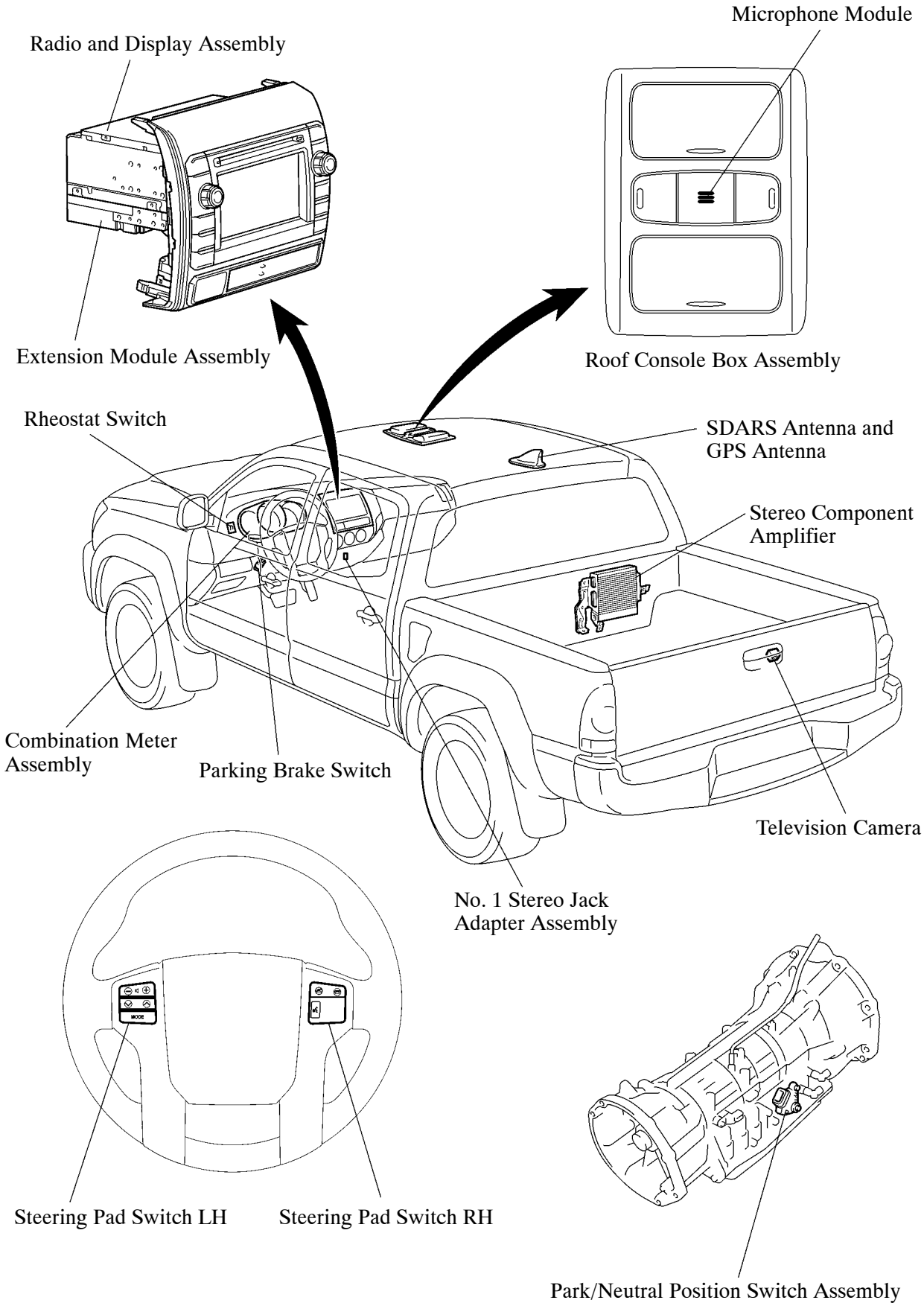
*1: Models for U.S.A.
*2: Models for Canada

2. System Diagram



*: Models for Rear View Monitor System

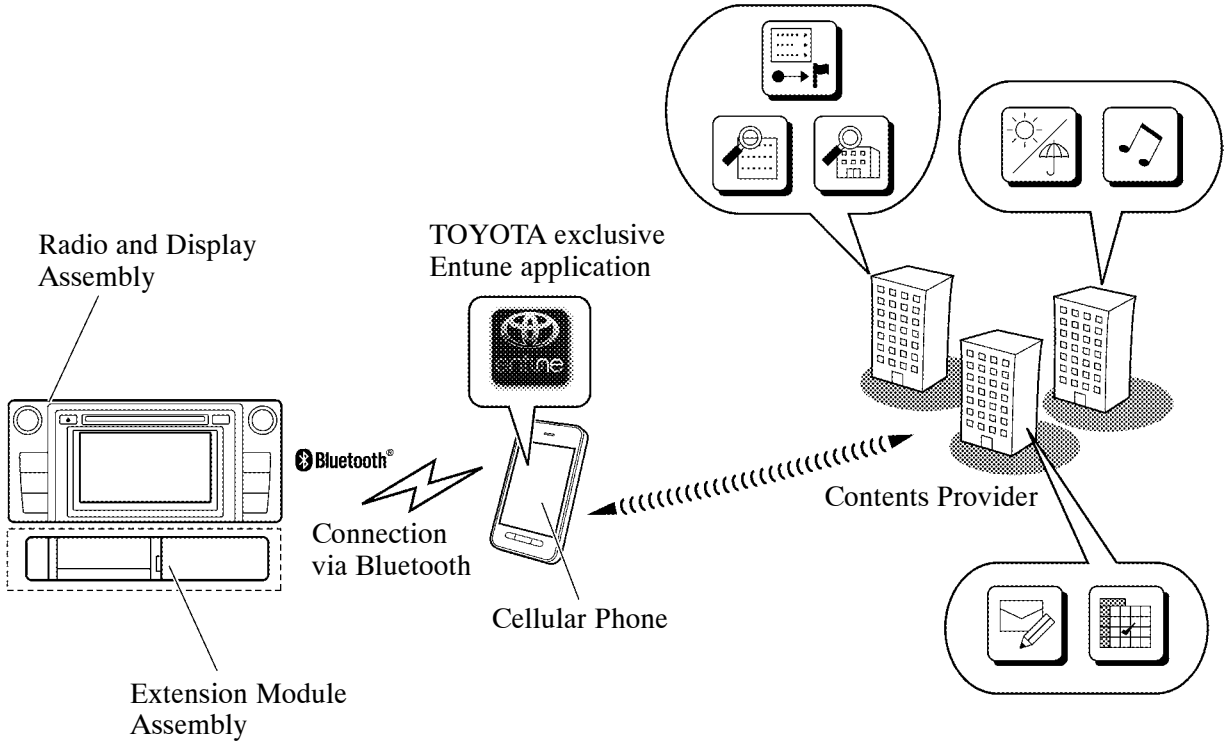
3. Layout of Main Components



4. Main Features

Entune

- The Entune service makes it possible to operate specified applications on the multi-display by using Bluetooth to connect the navigation system to a cellular phone with the Toyota Entune application installed. These applications are displayed on and operated from the multi-display.
- The Entune service enables communication between the navigation system, application server and content provider utilizing the Toyota exclusive Entune application installed on a cellular phone.
- The following applications ("Apps") are available for the Entune service: Local business search, internet radio, Restaurant reservation service, Movie ticket purchase, Fuel Price information, Sports information, Stock information, Local traffic information, weather information, etc. However, since this supported application lineup is subject to change, visit http://www.toyota.com/Entune/ for details on the Entune service.

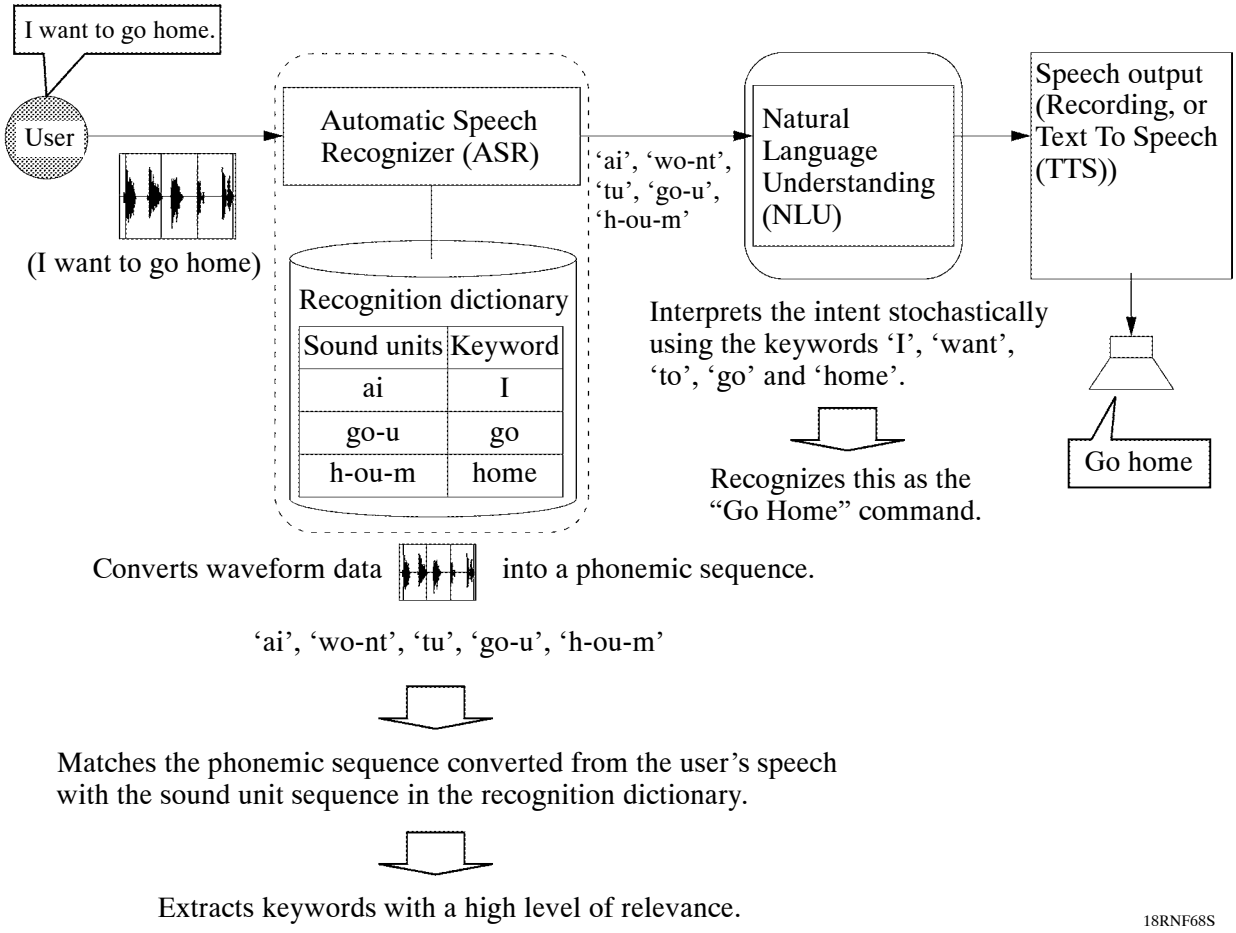


Voice Recognition System

- When the voice recognition system starts operating, the commands that the system is able to recognize are displayed on the multi-display.
- A shortcut menu is provided on the voice recognition command screen, enabling the user to operate the system with fewer voice commands.
- The natural speech technology* adopted for this voice recognition system can recognize a user's natural speech as voice recognition commands ("natural speech" refers to naturally spoken utterances that include several keywords).
- Natural speech technology* enhances the voice recognition task achievement rate because the user does not have to memorize voice recognition commands exactly. This technology also shortens the time taken to accomplish speech recognition (task) because it does not require a step-by-step input of speech recognition commands (interaction).
- Natural speech technology* uses the system's Automatic Speech Recognizer (ASR) and Natural Language Understanding (NLU) to recognize voice recognition commands.
  - The ASR extracts keywords from a user's natural speech using a phonemic sequence (the units of sound that make up a phrase or sentence).
  - The NLU analyzes these extracted keywords based on their probable meaning, interpreting the intent of the user's utterances.

*: Natural speech technology does not apply to French or Spanish.

▶ Example of 'I want to go home' ◀



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- In order to interpret the intent of a user's speech, the NLU unit records key words in a data table.
- The data table is organized by task, and the data is used to interpret the probable meaning of the user.
  - The data table for the Go Home task is shown below.
  - The key words [Destination: Home] are shown in the key word column. If both the word 'Destination' and the word 'Home' are included in the user's speech related to the Go Home task, the system is able to recognize the intention ('Home' can be recognized from either 'Home', 'House', or 'Home base').

Task	Keyword
Go home	destination (home)
	directions (home)
	take me (home)
	go (home)
	route (home)
	(home)

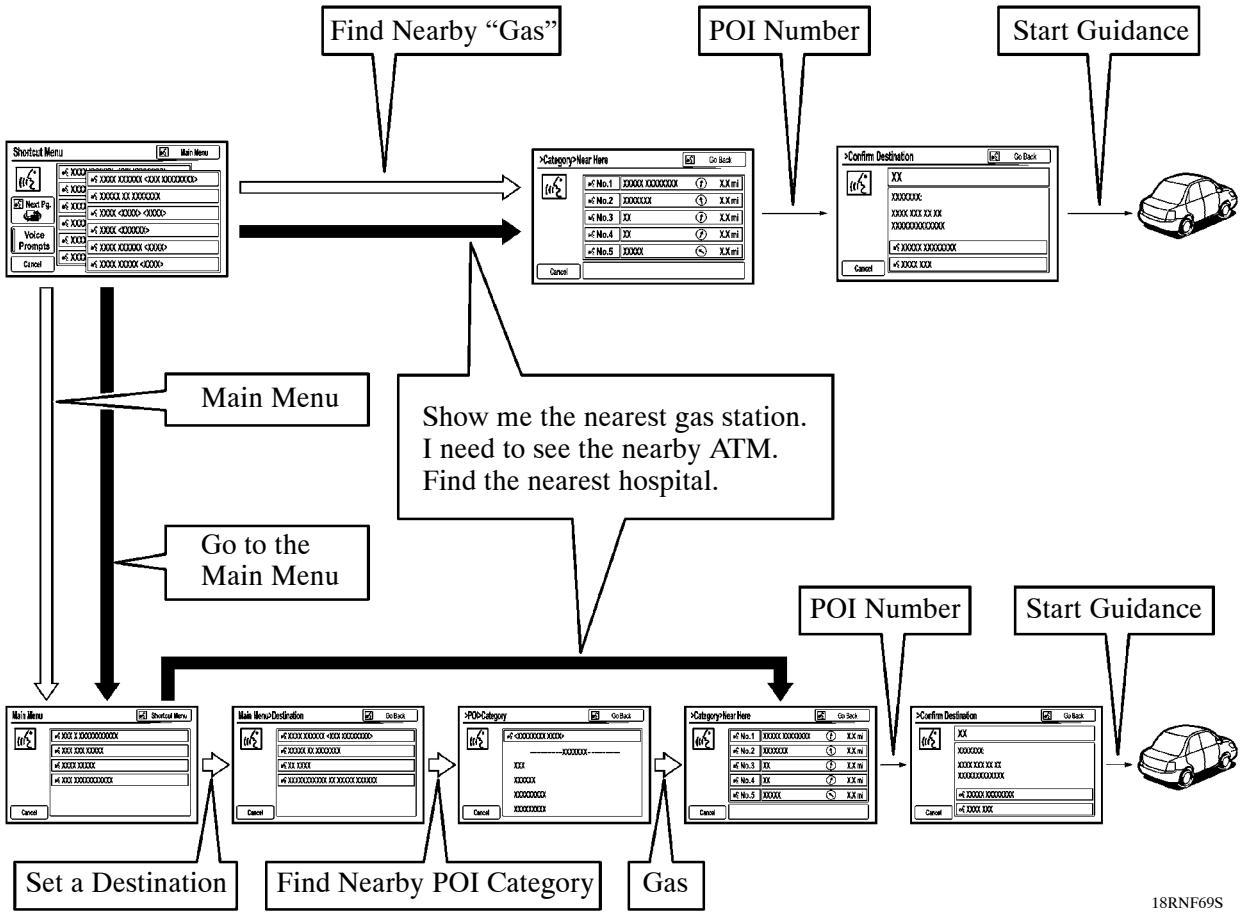
- The Go Home command can be recognized even if the user doesn't actually say 'Destination: Home', or 'Go Home', and instead uses phrases like 'My destination is home.' or 'I want to go home.', which contain extra words such as 'I' and 'to'.

— REFERENCE —

The natural speech technology used by the voice recognition system does not function in the following cases.

- *When the key words used are not in the data table.*
- *When inputting address elements such as the city name in the address input screen.*
- *When a phrase includes several intentions (Ex. "Go home... actually, no... I want to call Bob.").*
- *When spoken instructions are for a level that can not be recognized by the system (Ex. When the user attempts to carry out a task from a different level while another task is still in progress, such as trying to make a phone call while the Destination screen is being displayed after giving the 'Destination' command).*

▶ Examples of Spoken Phrases for the Destination Screen ◀

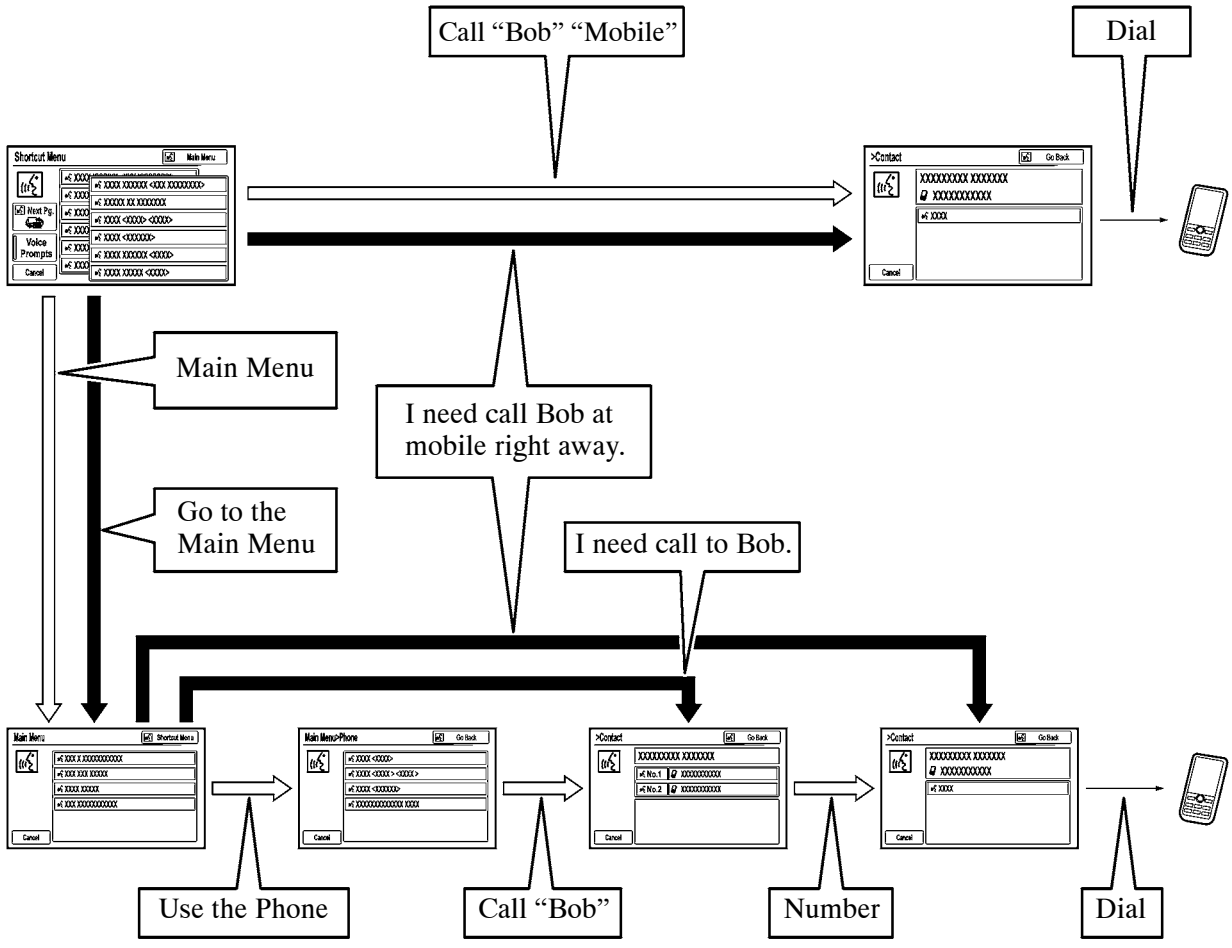


⇨ : Transition when saying speech using the voice commands

➡ : Transition when the natural speech recognition is used

*: If the system cannot recognize all the utterances, it changes the screen to the voice recognition command screen that suits the recognized task.

▶ Examples of Spoken Phrases for the Phone Screen (1) ◀



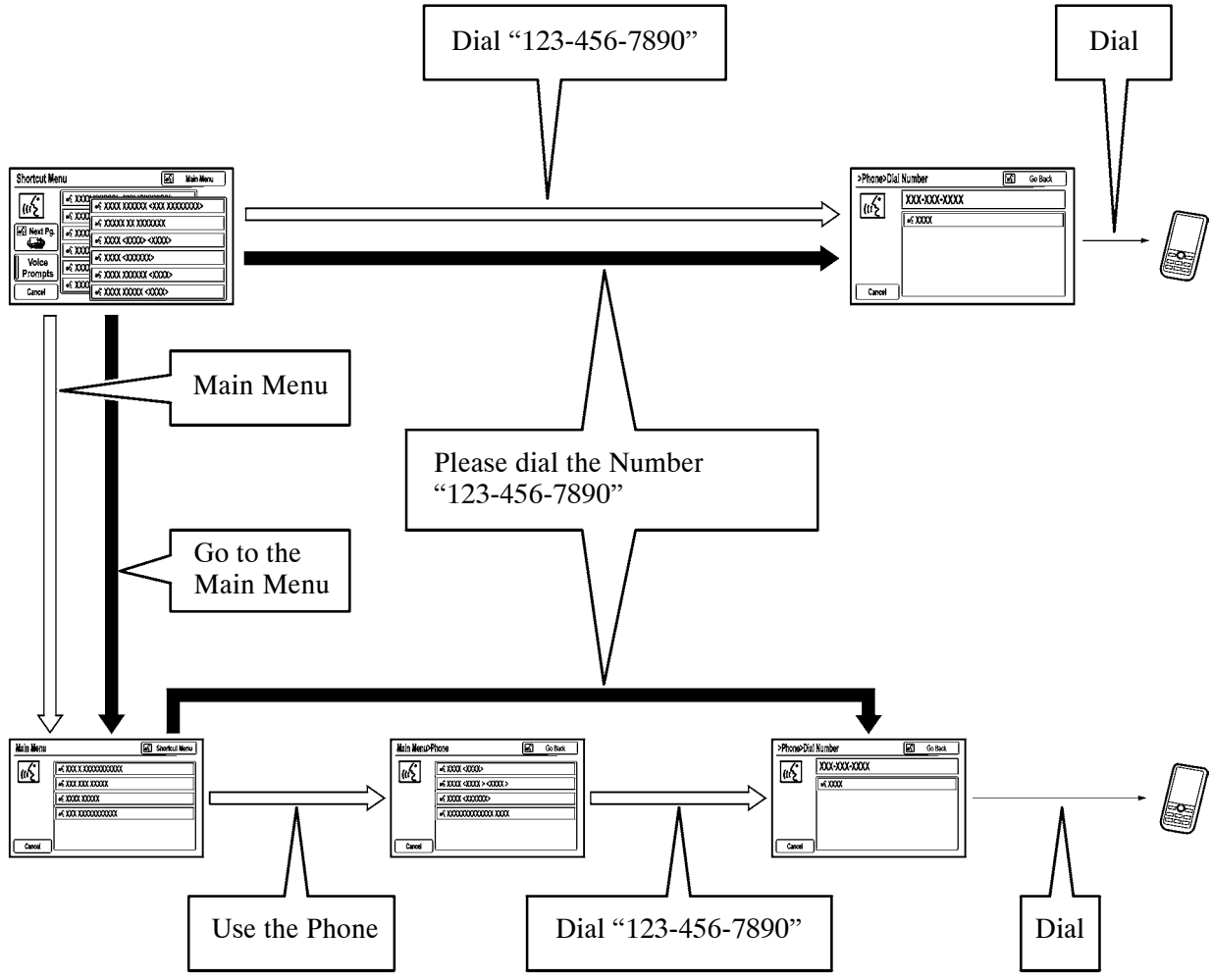
⇨ : Transition when saying speech using the voice commands

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➡ : Transition when the natural speech recognition is used

*: If the system cannot recognize all the utterances, it changes the screen to the voice recognition command screen that suits the recognized task.

▶ Examples of Spoken Phrases for the Phone Screen (2) ◀



⇨ : Transition when saying speech using the voice commands

➡ : Transition when the natural speech recognition is used

*: If the system cannot recognize all the utterances, it changes the screen to the voice recognition command screen that suits the recognized task.

5. Function

General

The main functions of navigation with AV system are listed below.

Function		Outline
Navigation System		Through the use of the Global Positioning System (GPS) and map data which is stored on a flash memory, the navigation system analyzes the position of the vehicle and indicates that position on the map that is displayed on this screen. In addition, it is possible to use the system to register memory points and navigate to a destination.
Audio/Video System		Serves as the display and controls for the following: ● Radio Operation ● CD player operation ● Bluetooth-compatible portable player operation ● USB memory operation (USB type) ● Media transfer protocol (MPT) device operation (USB type) ● iPod operation ● Portable audio player operation (AUX type)
Hands-free System		When a Bluetooth-compatible cellular telephone is registered to the multi display, the driver can make and receive calls or talk hands-free on the cellular telephone by operating the switches on the screen/steering pad.
Speech Command System		Operates the navigation, audio, and hands-free systems based on voice commands.
Monitor System		Displays a view of the area behind the vehicle that is captured by the television camera mounted on the tailgate when the shift lever is moved to the R.
Others	Calendar	The calendar screen is displayed using time information from the GPS.
	Language Select	The language of the on-screen buttons, pop-up messages and the voice guidance can be changed. ● English and Spanish are available (models for U.S.A.). ● English and French are available (models for Canada).
	Beep Setting	The beep sound can be turned off.
	Picture slide show	Performs a slide show of picture data stored in a USB memory device.
	Keyboard Layout	The keyboard layout can be changed.
	Delete Personal Data	The following personal data can be deleted or returned to their default settings: ● Address book ● Previous points ● Route guidance ● Phonebook data ● Call history data ● Speed dial data ● Bluetooth phone data ● Phone sound settings ● Message settings ● Audio setting ● Bluetooth audio setting
	Screen Adjustment	The brightness or contrast of the screen can be adjusted to suit the brightness of the surroundings.

(Continued)

Function	Outline
Diagnosis	This menu contains the following items: ● Failure Diagnosis – System Check ● Function Check/Setting – Panel and Steering Switch – Touch Switch – Color Bar – Vehicle Signal – EXT BOX ● Service Information – Version Information

Navigation Screen

The navigation ECU calculates the present position and direction of travel, then determines a route and calculates the driving distance based on the following information sources:

- Map data in the extension module
- Global Positioning System (GPS) Satellites
- Built-in Gyro Sensor
- Vehicle Speed Signal
- Reverse signal

The functions of the navigation screen display are shown below:

Item		Function
Map Display	Map Color Change	Depending on the position of the light control switch, the screen changes to day mode or night mode.
	Taillight-interlocked Map Color Change	Changes the color of the map screen that is displayed when the taillights are turned on.
	North Up/Heading Up	● If North Up is selected, regardless of the direction of vehicle travel, north is always up. ● If Heading Up is selected, the direction of vehicle travel is always up.
	3D Display	Displays a 3-dimensional (3D) view of the map.
	Multi-step Scale Display	Changes the map scale in 14 steps.
	Street Name Indication on Scrolled Map	Displays the street name and city name even when the map screen is being scrolled.
	Road Number Sign Board Display (Models for U.S.A. and Canada)	Displays the road number on the map.
	Point of Interest Display	Displays selected types of points of interest as marks on the map.
	Route Guidance Demonstration	Demonstrates the route guidance to the destination.
	Vehicle Icon	Appears on the 3D display. The color can be changed among blue, red, yellow, green and purple.

(Continued)

Item		Function	
Destination Search	Address Search	A destination can be set by entering a city name, street name, intersection name, zip code and house number.	
	Point of Interest Search	The following 3 types of search pattern can be used after a search area is selected.	
		By category	Searches for POI by referring to POI categories.
		By name	Searches for POI with a POI name entered by the user.
		By map	Searches for POI with a POI icon selected on the map.
	Previous Destination Search	Stores the coordinates, names, and date of up to 100 locations that have been set as destinations in the past.	
	Address Book (Memory Point) Search	Sets a destination from the registered Address Book (Memory Point).	
	Map Search	A destination can be set by scrolling the cursor on the map.	
	Coordinate Search	A destination can be input by entering its coordinates.	
	Voice-recognition Search	A destination can be set up by voice command input.	
	Entune Search	A point searched for using Entune content can be set as a destination.	
Route Search	Multiple Destination Setting	Sets multiple destinations. It can also rearrange the sequence of the destinations.	
	Multiple Route Search	Searches for multiple routes.	
	Search Condition Designation	Searches for the fast, short, and ecological routes.	
	Detour Search	Changes the route to detour around a section of the route.	
	Avoid Traffic Search	Manually changes to another route to avoid heavy congestion.	
	National Border Conscious Search	Searches for routes that do not cross the border of the U.S.A., Canada or Mexico.	
Guidance	Voice Guidance	Provides voice guidance about the distance and the direction of travel to a destination point based on road conditions and vehicle speed.	
	Next Turn Guidance	Provides guidance about the distance to the next turn and indicates the direction of the turn using an arrow.	
	Distance-to-destination Display	Displays the distance from the present location to the destination.	
	Estimated Arrival Time Display	Displays estimated arrival time.	
Others	Voice Recognition	Recognizes pre-programmed system commands spoken to operate the navigation system.	

Setup Screen

The settings for functions of the multi-display are available from the setup screen.

Item		Function
Setup	Display Settings	● Map Menu and Camera screen adjustment. ● Depending on the position of the headlight switch, the screen changes to day or night mode.
	General Setting	● The language can be selected. ● The beep sound can be turned off. ● Registered information (personal data) can be cleared. ● Distance unit can be changed. ● Keyboard layout can be changed. ● The voice guidance volume can be adjusted or switched off. ● Phone voice volume can be adjusted. ● Ring volume can be adjusted. ● Voice Dialog volume can be adjusted. ● Data can be stored on a USB memory device. ● Data can be copied from a USB memory device. ● Time zones and the on/off settings of daylight saving time can be changed (models for U.S.A. and Canada).
	Bluetooth Settings	● The connection to a Bluetooth device can be turned on or off. ● Connectable Bluetooth devices can be searched for. ● The names of the Bluetooth devices that are currently connected or that are in the connection history can be displayed in a list. Additionally, availability information for each Bluetooth device is displayed. ● PIN codes used for Bluetooth connection certification can be set. ● A profile for connecting to the internet can be set.
	Phone Settings	● The ring tone can be changed or turned off. ● Message reception notification can be turned on or off. ● E-mail reception notification can be turned on or off. ● Phone book data stored on a cellular phone can be transferred manually.
	Audio Settings	HD radio system settings can be changed: – Receive both analog and digital broadcasts – Receive only digital broadcasts – Receive only analog broadcasts

Diagnosis

For details on the procedure required to enter the Service Menu screen, refer to the 2012 TOYOTA TACOMA Repair Manual (Pub. No. RM18R0U).