

Navigation System

System Diagnosis Mode

Start-up procedure and Diagnosis Menu

There are two ways to enter the diagnostic mode:

1. Connect the SCS connector (see step 2 on page 23-52) to the navigation service connector located in the trunk. Turn the ignition switch to the ON (II) position. The display will go directly to the diagnostic menu screen shown below.

Note: when finished troubleshooting, make sure to remove the SCS connector!

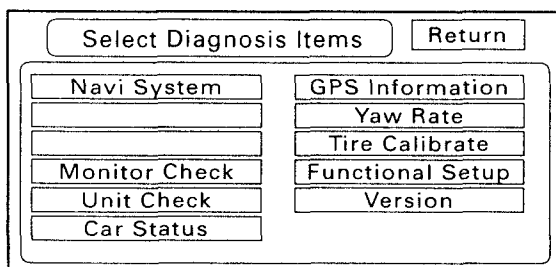
2. Turn the ignition switch to the ON (II) position. Use the navigation display hard buttons as described below:

A. If the battery has not been disconnected, then press and hold the 3 buttons (Menu, Map/Guide, and Cancel), and keep them pressed for approximately 5 seconds. The display screen will go directly to the "Select Diagnosis Items" menu shown below.

B. If the battery was disconnected and reconnected prior to this test, hold down the Menu and Zoom Out buttons at the "Code" or "GPS Acquire" screen. The display will go to the "Navi System Link" screen. Push the joystick to go to the "Functional Setup menu," then touch the Return icon to get to the "Select Diagnosis Items" menu.

Note: This only allows access to the diagnostic screens. All other navigation functions are disabled.

DIAGNOSIS MENU SCREEN

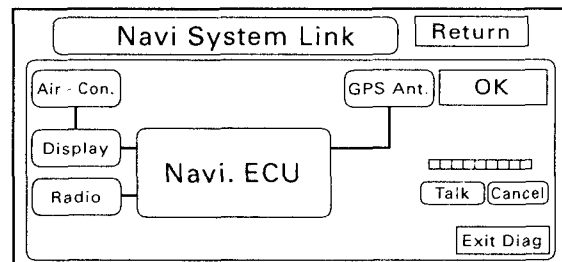


After the display changes to the Select Diagnosis Items menu, touch the item you want to check and the check will start. To return to the previous screen, touch "RETURN".

- Navi System (Link)
- Monitor Check
- Unit Check
- Car Status
- GPS Information
- Yaw Rate
- Tire Calibrate
- Functional Setup
- Version

Navi System Link

- This diagnostic tests the cables connecting the navigation components. Ensure that the ignition switch is in the ON (II) position. When the diagnostic begins, a "bong" sound is heard. The system is in a "Detecting" mode, and is waiting for all items in white to be tested. This includes the voice control switch, and microphone. Press the TALK button on the voice control switch, and in a normal voice, say "testing". The Talk indicator on the screen should become green, and the voice level indicator should move to the 6th bar to pass. Next, press the BACK button. This should cause the Cancel indicator to go green.
- If all of the communication lines connecting the system components, and the voice control switch/microphone check out OK (all block diagram items green), then the OK indicator will become green.
- If there is a problem with the system, the faulty system component item will change to red, and the screen will show "NG" in red. Use the troubleshooting index, and other diagnostic screens to help locate the problem.
- The indication on the screen will not change until the ignition switch is cycled. After repairing the affected cable or system, repeat this diagnostic. NOTE: Green boxes and green "OK" indicate that the communications lines (cables) are intact. This diagnostic does not necessarily imply that the individual components are functioning properly. For instance, the GPS antenna wire may be crushed, but still show as "green". A road test, or other diagnostic may be necessary to find the problem.
- Touch the Exit Diag icon to exit.

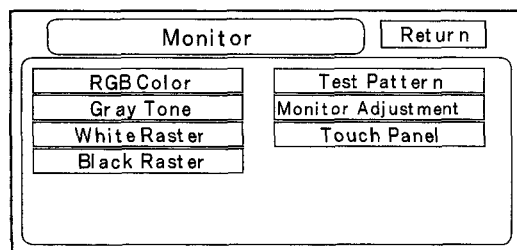


Monitor Check

Overview of display unit

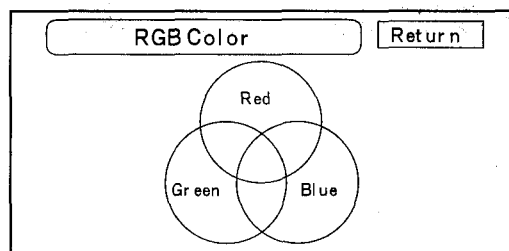
- The display unit communicates with the navigation unit over its own GA-Net bus. Information is sent to the navigation unit whenever the user activates the touch screen, or hard buttons. Information sent by the navigation unit to the display unit includes commands to control the LCD back light.
- The navigation unit also sends navigation information to the screen using the Red, Green, Blue, and Composite Video signals.
- The display unit is protected by the security system by daisy-chaining the security signal through it, and then passing the signal to the audio unit.
- The illumination input from the gauge brightness control provides back lighting for the hard buttons surrounding the screen.
- The display unit also communicates with the climate control module to set the A/C mode, and fan speed.

These screens allow troubleshooting of the display unit. Touch the menu item you want to troubleshoot, and follow the diagnostic instructions.



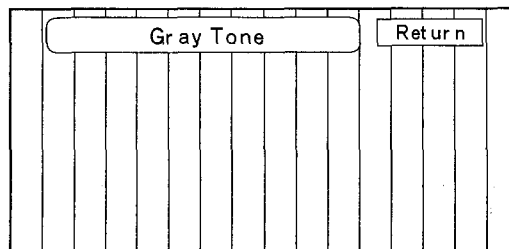
RGB Color

This screen verifies that the display unit is receiving the video (R, G, B and Composite sync) signals properly. The three primary colors should all be shown without distortion. The combination of all three should produce a central white section. If any of the colors are missing, troubleshoot for the color signal (see page 23-28). If the picture has lines in it or scrolls horizontally, or vertically, troubleshoot for a Composite sync problem (see page 23-29).



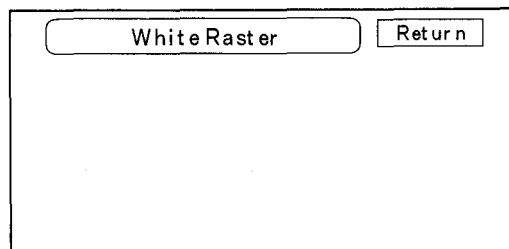
Gray Tone

This screen diagnoses problems with contrast. You should be able to see the changes from bar to bar across the scale. It is normal for the 2 bars on either side to appear the same.



White Raster

The entire display must be shown in white.



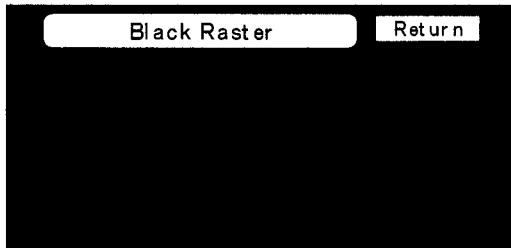
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Navigation System

System Diagnosis Mode (cont'd)

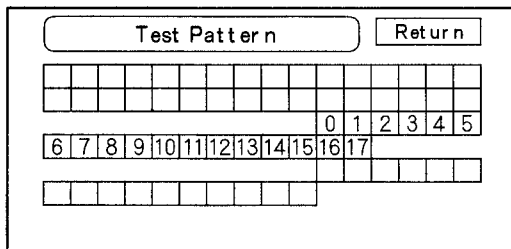
Black Raster

The entire display must be shown in black.



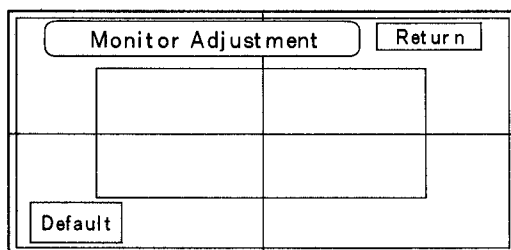
Test Pattern

The chart below; shows the colors being used for the map and menu screens. This is for factory use only. To check the color signal use the "RGB Color" diagnostic found under the Monitor Check menu item.



Monitor Adjustment

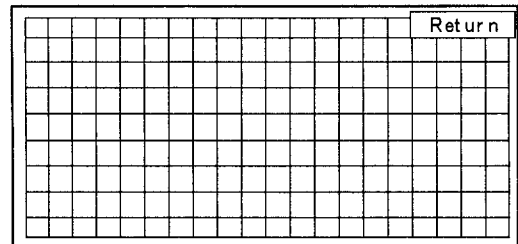
This allows the navigation display to be centered. Use the joystick to move the picture up/down or left/right. It is unlikely that you will ever need to adjust the monitor position. The "Default" button will reset the display position to factory specifications.



Touch Panel

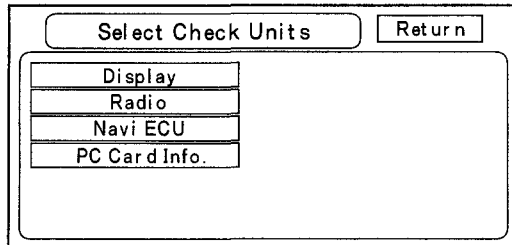
The panel touch sensing system consists of 9 horizontal and 20 vertical infrared beams. Touching the screen blocks both a horizontal and a vertical beam. Every possible touch position is shown on this diagnostic screen. Touching one of these areas should cause its color to reverse, and sound a "beep". If any areas of the screen either don't respond, or respond at some other location when touched, then replace the display unit. The "Display" diagnostic listed in Unit Check provides an additional method to determine if one of the infrared sources or detectors is bad.

NOTE: Direct sunlight can affect this test by falsely triggering the infrared detectors, so perform this diagnostic inside or in a shaded area.



Unit Check

Touch the item you want to check and the check starts.



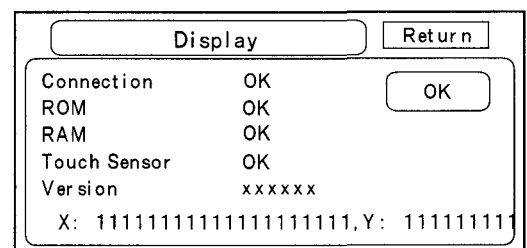
A rectangular screen with a title bar containing 'Select Check Units' and a 'Return' button. Below the title bar is a list of four items: 'Display', 'Radio', 'Navi ECU', and 'PC Card Info.', each in its own rectangular box.

Display

This diagnostic performs additional checks on the communication bus between the control unit and the display. In addition, the internal electronics and touch screen functionality are confirmed.

- When the connection is NG, first check for loose terminals at the navigation unit and the display unit connections. Next check for an open or short in the communication line between the navigation unit and the display unit. If the line is found to have an open or short, replace the affected shielded harness.
- If the ROM or RAM is NG, replace the display unit.
- If the touch sensor is NG, then check for zeros in the "X", or "Y" values below.
- The version represents the software version in the display.
- The "1" following the X, indicate the 20 working vertical infrared beams/receptors (from left to right). The "1s" following the Y, indicate the 9 working horizontal beams (from top to bottom). If any one of the "1s" is a zero, this indicates that there is a problem with one of the beams or receptors. Check all around the inside rim of the navigation screen for dirt or anything that may be blocking a beam. If nothing is found, replace the display unit. See the display unit diagram in the "System Description" showing the infrared beam layout. Individual touch positions can be verified by running the "Touch Panel" diagnostic under the Monitor Check menu choice.

NOTE: When selecting this diagnostic from "Unit Check," quickly remove your fingers from the touch-screen to avoid a false detection of the infrared sensors.



A rectangular screen with a title bar containing 'Display' and a 'Return' button. Below the title bar is a table of diagnostic results:

Connection	OK
ROM	OK
RAM	OK
Touch Sensor	OK
Version	xxxxxx
X: 11111111111111111111, Y: 11111111	

There is an 'OK' button to the right of the 'Connection' row.

(cont'd)

Navigation System

System Diagnosis Mode (cont'd)

Navi ECU

This screen diagnoses the navigation unit. When this diagnostic is initiated, there is a delay of up to a minute while it runs.

NOTE: Do not try to end this diagnostic by pressing "OK" or "Mem Clr" before it finishes, otherwise the system will reboot.

- "ROM (Application)", and "ROM (Loader)" are for factory use.
- If "V-RAM" or "D-RAM" is NG, then replace the navigation unit.
- If "GPS" indicates "NG (ANT)", then check the entire GPS Antenna wire from the navigation unit to the antenna. If the wire is crushed or damaged, try a known good antenna. If this diagnostic reads OK, then order a new GPS antenna. If the diagnostic still reads NG (ANT), then replace the navigation unit.
- "DVD ROM" represents the database version on the DVD. This information can also be found in Setup Screen 4 by touching "information".
- "Serial No." should be the same as the serial number found on the underside of the navigation unit. This number is needed to obtain the security code from the Interactive Network (IN) system.
- The "Mem Clr" button is for factory use and should not be used unless instructed by the factory. Touching this button will erase the customer's settings, personal information, GPS orbital data, and anything else stored in memory.

Navi.ECU		Return
ROM(Application)	[xxxxxxx]	OK
ROM(Loader)	[xxxxxxx]	
V-RAM	OK	Mem Clr
D-RAM	OK	
GPS	OK	
DVD-ROM	xxxxxxx	
Serial No.	xxxxxxx	

PC Card info.

Normally there is no PC Card in the PC slot, and the screen should say, "PC Card is not inserted" as below:

PC Card Info.	Return
PC Card is not inserted.	

If the factory instructs you to insert a card, then this screen displays the Manufacturer, and Product Name as shown in the following screen.

PC Card Info.	Return
Manufacturer xxxxxx Product Name xxxxxx	

Car Status

This screen is used to confirm that navigation unit is properly receiving input signals. Signals equal to (0) are OFF, and signals equal to (1) are ON. If the value on the display does not match the actual vehicle status, then check the wire carrying the signal.

- CHG and CHG(CAN) are not used for this model.

- VSP-Vehicle Speed Pulse from PCM
(Pin 6 of C-connector)
 - a) OFF (0) when vehicle is not moving
 - b) ON (1) when vehicle is moving

The VSP comes from the PCM as a dedicated signal. Internally, the navigation unit compares the actual VP on the map against street data to adjust the pulse to speed scaling factor. As this scaling factor becomes more accurate, the "Level" gradually increases from 0 to 10 (see the Tire Calibrate diagnostic screen).

- BACK-Reverse indication from reverse relay
(Pin 5 of C-connector)
 - a) OFF (0) when shift lever is in any position other than reverse
 - b) ON (1) when shift lever is in reverse

The Back signal is used by the navigation unit to allow the map screen to show the VP moving backwards when in reverse. This signal is needed because the Speed Pulse has no direction indication.

- ILL-Illumination Indication
(Pin 5 of navigation unit A-connector)
 - a) OFF (0) when parking lights, or headlights are off
 - b) ON (1) when parking lights, or headlights are on

This signal is used by the navigation unit to determine whether to put the navigation screen into the Day or Night brightness mode. (Setup screen 1)

- DVD Lid-senses if DVD door is open
 - a) (Close) when door is closed
 - b) (Open) when door is open

The navigation unit has a micro switch to detect this. If open is indicated when the door is closed, replace the navigation unit.

- PC Card Lid-Senses if PC Card door is open
 - a) (Close) when door is closed
 - b) (Open) when door is open

The navigation unit has a micro switch to detect this. If open is indicated when the door is slid shut, then replace the navigation unit. This slot is for insertion of PC Flash memory cards for gathering diagnostic information. This is for factory use only.

Car Status				Return
CHG	[*]	ILL	[*]	
VSP(NAVI)	[1]	BACK	[*]	
CHG(CAN) [*]				
DVD Lid	[Close]	PC Card Lid	[Close]	

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Navigation System

System Diagnosis Mode (cont'd)

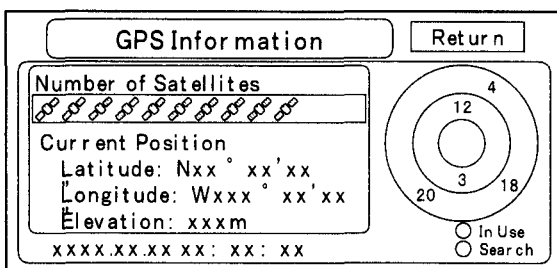
GPS Information

This screen shows the current status of GPS reception. The circular diagram shows the current location of the GPS satellites (yellow numbers) as they would appear in the sky. The outer circle represents the horizon (0 degrees elevation). The middle and inner circles represents 30 and 60 degrees respectively. The very center of the diagram (90 degrees elevation) is directly overhead. Naturally, nearby obstructions, like tall buildings will block satellites in that direction. That is why it is necessary to be in an open area to effectively troubleshoot GPS reception issues.

The satellite numbers shown on the diagram correspond to the "PRN" number in the "GPS Details" screen. There are always 24 "active" GPS satellites in orbit. Because satellites fail, and have to be removed from service, spares are always parked in orbit, ready to be activated. This is why the PRN (satellite ID number) can be greater than 24.

NOTE: To use this screen for troubleshooting, the vehicle should be out side away from buildings, tall trees, and high-tension wires for at least 10 minutes with the engine running. Also, make sure the rear shelf is free of loose items that can block reception and that the trunk lid is closed.

- The "Number of Satellites" box shows the number of acquired satellites (maximum of 12). It should contain 3 or more icons. If not troubleshoot for "GPS icon is white" (see page 23-32).
- The "Current Position" shows latitude, longitude, and elevation (in meters). If there are less than 3 satellites, the elevation can be grossly inaccurate.
- The Date/Time field shows the current date, and also a time that includes daylight savings and other offsets entered by the customer in Setup screen 2 "Adjust Time Zone/Clock".



GPS Detail

By pressing and holding the MENU button for 10 seconds, a GPS Detail screen is displayed. This screen displays real time incoming satellite positional data. Most of the information shown on this screen is for factory use, however some of the data can indicate partial GPS signal interference.

GPS Detail						Return
TS: xx	HDop: xx.x	Speed: xxKm/h	Date: xxxx.xx.xx			
AS: xx	VDop: xx.x	Direction: x°	Time: xx:xx:xx			
	PRN	ST	AZI	EL	C/N	ACC
○	xx	xx	xxx	xx	xxx	xx
○	xx	xx	xxx	xx	xxx	xx
○	xx	xx	xxx	xx	xxx	xx
○	xx	xx	xxx	xx	xxx	xx
○	xx	xx	xxx	xx	xxx	xx
○	xx	xx	xxx	xx	xxx	xx
○	xx	xx	xxx	xx	xxx	xx
○	xx	xx	xxx	xx	xxx	xx

- The box TS/AS and HDop/VDop is for factory use.
- The Speed and Direction information is updated in real time when driving, and can be used to detect intermittent speed sensor problems.
- The Date/Time Information is the same as in Setup screen 2 "Adjust Time Zone/Clock".
- If the "3D" icon is shown above the yellow dots, this implies that at least 4 satellites are available for map positioning, and the "GPS" indicator on the map screen will be green. See the "Global Positioning System" detailed explanation in the "System Description".
- If the row of data in the table below begins with a "yellow dot", the AZI and EL fields can be used to locate each satellite on the circular GPS diagram (see prior screen).

NOTE: The data below is an example only.

The table of values shown on the screen below has the following columns:

Column	Description	Problem indication
Active	Active satellites (Yellow Dot)	If "3D" is missing, follow troubleshooting (see page 23-32).
PRN	The satellite ID number	
ST	The status: 0 = cannot view or searching, 2 = acquiring	If all 0, then, follow troubleshooting (see page 23-32).
AZI	Azimuth, the angle (0-360) clockwise from north	
EL	Elevation from the horizon (90 deg is overhead)	
C/N	N/A	Healthy signal is 49-52, no signal: 27-33
ACC	N/A	

Yaw Rate

This diagnostic checks the yaw rate sensor in the control unit. This device detects when the vehicle turns, and repositions the vehicle position icon on the map screen. For more detailed information, see the yaw rate sensor theory of operation under "System Description"

- "Sensor" indicates the voltage output from the yaw rate sensor. It should indicate about 2.500 volts when stopped.
- "Offset" is the reference voltage or standard within the yaw rate sensor. It also should indicate about 2.500 volts when stopped.
- A "sensor" output voltage HIGHER than the "Offset" voltage indicates that the vehicle is turning to the right.
A "sensor" output voltage LOWER than the "Offset" voltage indicates that the vehicle is turning to the left.
- The yaw rate offset, and sensor should both indicate about 2.500 volts when stopped. If either reads zero, or 5.000 volts, replace the navigation unit.

- The yaw rate offset and sensor should be within +/- 0.01 V of each other when stopped. The sensor value should change relative to the offset as the car is turned while driving. If not, replace the navigation unit.

Example: Car stopped

Normal		Abnormal	
Offset	2.526 V	Offset	2.526 V
Sensor	2.516–2.536 V	Sensor	2.623 V

Example: Car turning

Normal		Abnormal	
Offset	2.526 V	Offset	2.526 V
Sensor	2.678 V (right turn) 2.478 V (left turn)	Sensor	2.623 V (no change on turns)

- Auto tuning should always be on. If it is off, turn it on.
- "Sensitivity study" represents the status of the internal tuning function. At initialization, this status of the internal tuning function. At initialization, this value starts at 6 and increases to # 10 as the internal correction values become more accurate.
- The settings "CCW Cal Factor", "CW Cal Factor", and "Set" are for factory use only. THIS SHOULD NEVER BE USED.

Yaw Rate		Return	
Sensor	x.xxxV		
Offset	x.xxxV		
Auto Tuning	ON	ON	OFF
Sensitivity study	Level 5		
CCW Cal Factor	+0.0	-	+
CW Cal Factor	+0.0	-	+
			Set

(cont'd)

Navigation System

System Diagnosis Mode (cont'd)

Tire Calibrate

As the vehicle moves, the navigation system receives speed pulses from the PCM. These pulses are converted using a conversion factor to a mph speed that moves the vehicle position (VP) on the map. The navigation system has an internal tuning function that generates and refines this factor based on actual driving. The "Level" indicates the status of the tuning. At initialization, it begins at 0, and increases to 10 as the navigation system is used.

- The "Auto Tuning" is factory set to "ON", and should remain on.
- The "LEVEL" indicates the tuning status. If it is less than 10, the unit is still calibrating.
- The "Tire-Cal. Tuning" and the "Set" button should not be used. It is for factory use only.

Tire-Calibrate		Return
Auto Tuning	ON	ON OFF
LEVEL	Level 2	
Tire-Cal. Tuning	-1.0%	- + Set

Functional Setup

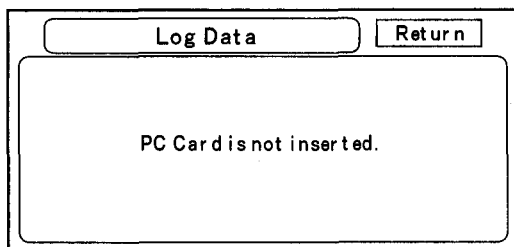
Touch the item you want to check.

Functional Setup		Return
Log Data	Demonstration	
GPS Offset Time		
Mic Level		
VSP Count		

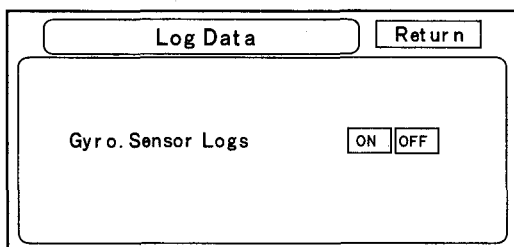
Log Data

This screen allows factory to collect log data to troubleshoot navigation system issues.

- Normally there is no card in the "PC Card slot", and the PC slot door should always be closed. The screen should look like below.



- However, if the factory instructs you to insert a PC Card, insert it into the card slot (label side up), and then slide the PC Card door shut. If instructed by the factory, touch the "Gyro. Sensor Logs ON" button on the screen. Follow the factory procedure for gathering test data, and properly ending the test.



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Navigation System

System Diagnosis Mode (cont'd)

GPS Offset Time

This screen is for factory use only. It allows adjustment of the GPS time. This display updates in real time.

- "GPS Time" is the time as received from the GPS satellites. It is in Greenwich Mean Time (GMT).
- "System Time" is the internal time used by the navigation unit to calculate your position on the map. It is also in Greenwich Mean Time (GMT).
- "Display Time" is the time shown on Setup screen 2 "Adjust Time Zone/Clock", and reflects any changes due to daylight savings time or time adjustments entered by the customer.
- Date, Hour, Minute, and "Set" buttons should not be used.

GPS Offset Time		Return
Global Time	xxxx.xx.xx:xx	
Local Time	xxxx.xx.xx:xx	
Disp.Time	xxxx.xx.xx:xx	
Date	0 - +	
Hour	0 - +	
Minute	0 - +	Set

Mic Level

This diagnostic allows you to independently test the microphone and the TALK and BACK buttons on the steering wheel (voice control switch). The microphone and voice control switch are used to activate the voice control system. The microphone is located near the map light in the ceiling. It is directional, and works best if the voice is coming from the drivers seat.

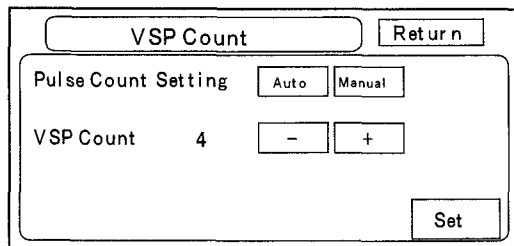
- Press the TALK button on the steering wheel, and in a normal voice say "testing". The TALK indicator on the screen should momentarily become green, and the text "Now Recording..." should appear in yellow. In addition, the Mic Level indicator should move at least to the 6th bar. If the Talk indicator on the screen does not briefly become green, then check the wiring from the steering wheel talk button to the navigation unit. If there is no "Mic Level" movement when you speak, then you should check the wire running from the microphone to the control unit.
- Press the BACK button on the steering wheel. This should cause the Cancel indicator on the screen to momentarily become green. If it does not briefly change to green, then check the wiring from the steering wheel BACK button to the navigation unit.

Mic Level		Return
Mic Level		
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
Steering SW		
Talk		Cancel

VSP Count

This screen displays the number of pulses per revolution of the tire. This is for factory use only, and should not be changed.

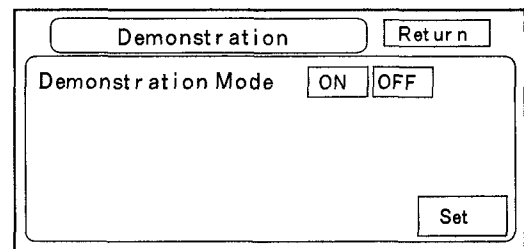
- "Pulse Count Setting" should always be set to "Auto"
- "VSP Count" should always be "4", and should never be adjusted or set to any other value.



The VSP Count screen has a title bar with "VSP Count" and a "Return" button. Below the title bar, there is a "Pulse Count Setting" section with "Auto" and "Manual" buttons. Underneath, the "VSP Count" is displayed as "4", with "-" and "+" buttons for adjustment. At the bottom right is a "Set" button.

Demonstration

This screen is for factory use only, and should always be set to "OFF". Occasionally this setting is turned "ON" when vehicles are being used at Auto Shows or similar events. Turning this feature on, allows the navigation system to automatically follow a route to a destination when the vehicle is stationary.



The Demonstration screen has a title bar with "Demonstration" and a "Return" button. Below the title bar, there is a "Demonstration Mode" section with "ON" and "OFF" buttons. At the bottom right is a "Set" button.

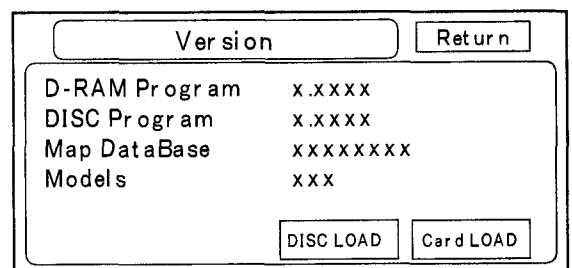
Version

This screen displays the current version of the program, and allows the loading of a new version of the program either from a CD/DVD or from a PC card.

The D-Ram Program version should always be greater than or equal to the Disc Program version. The mapped database version is the date of the database on the DVD.

The Model code is 23H, and is for factory use only.

Do not use either of the load buttons, unless instructed to do so by the factory.



The Version screen has a title bar with "Version" and a "Return" button. Below the title bar, there is a table showing version information:

D-RAM Program	x.xxxx
DISC Program	x.xxxx
Map DataBase	xxxxxxxxx
Models	xxx

At the bottom right are two buttons: "DISC LOAD" and "Card LOAD".