

FURUNO

GPS Navigator **GP-33**

OPERATOR'S MANUAL



FURUNO ELECTRIC CO., LTD.

www.furuno.co.jp



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The paper used in this manual
is elemental chlorine free.

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* 0 0 0 1 7 3 1 7 7 1 2 *

IMPORTANT NOTICE

General

- The operator of this equipment must read and follow the descriptions in this manual. Wrong operation or maintenance can cancel the warranty or cause injury.
- Do not copy any part of this manual without written permission from FURUNO.
- If this manual is lost or worn, contact your dealer about replacement.
- The contents of this manual and equipment specifications can change without notice.
- The example screens (or illustrations) shown in this manual can be different from the screens you see on your display. The screens you see depend on your system configuration and equipment settings.
- Save this manual for future reference.
- Any modification of the equipment (including software) by persons not authorized by FURUNO will cancel the warranty.
- All brand and product names are trademarks, registered trademarks or service marks of their respective holders.

How to discard this product

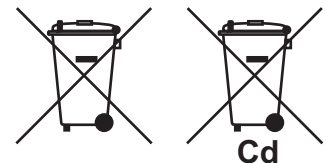
Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (<http://www.eiae.org/>) for the correct method of disposal.

How to discard a used battery

Some FURUNO products have a battery(ies). To see if your product has a battery(ies), see the chapter on Maintenance. Follow the instructions below if a battery(ies) is used. Tape the + and - terminals of battery before disposal to prevent fire, heat generation caused by short circuit.

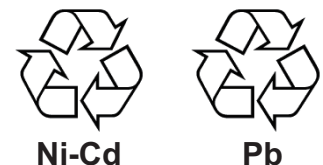
In the European Union

The crossed-out trash can symbol indicates that all types of batteries must not be discarded in standard trash, or at a trash site. Take the used batteries to a battery collection site according to your national legislation and the Batteries Directive 2006/66/EU.



In the USA

The Mobius loop symbol (three chasing arrows) indicates that Ni-Cd and lead-acid rechargeable batteries must be recycled. Take the used batteries to a battery collection site according to local laws.



In the other countries

There are no international standards for the battery recycle symbol. The number of symbols can increase when the other countries make their own recycle symbols in the future.



SAFETY INSTRUCTIONS



WARNING

Indicates a condition that can cause death or serious injury if not avoided.



CAUTION

Indicates a condition that can cause minor or moderate injury if not avoided.

Safety Instructions for the Operator



WARNING



Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can occur.



Turn off the power immediately if water leaks into the equipment or smoke or fire is coming from the equipment.

Failure to turn off the equipment can cause fire or electrical shock.
Contact a FURUNO agent for service.



CAUTION



The glass of an LCD panel breaks easily. Handle the LCD carefully.

Injury can result if the glass breaks.



No single navigation aid (including this unit) should ever be relied upon as the exclusive means for navigating your vessel.



The navigator is responsible for checking all aids available to confirm his position. Electronic aids are intended to assist, not replace, the navigator.

Safety Instructions for the Installer



WARNING



Turn off the power at the switchboard before you install the equipment.

Fire or electrical shock can occur if the power is left on.



Be sure that the power supply is compatible with the voltage rating of the equipment.

Connection of an incorrect power supply can cause fire or equipment damage. The voltage rating of the equipment appears on the label above the power connector.



CAUTION



Ground the equipment to prevent mutual interference.

Observe the following compass safe distances to prevent interference to a magnetic compass:

Model	Standard compass	Steering compass
GP-33	0.65 m	0.45 m

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FOREWORD

A Word to the Owner of the GP-33

Congratulations on your choice of the GP-33 GPS Navigator.

For over 60 years FURUNO Electric Company has enjoyed an enviable reputation for innovative and dependable marine electronics is furthered by our extensive global network of agents and dealers.

Your navigator is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless installed, operated and maintained properly. Please carefully read and follow the recommended procedures for installation, operation and maintenance.

We would appreciate feedback from you, the end-user, about where we are achieving our purposes.

Thank you for considering and purchasing FURUNO equipment.

Features

The main features of the GP-33 are as shown below.

- High-resolution color LCD
- WAAS capability
- Storage for 10,000 waypoints, 100 routes and 3,000 track points
- Alarms: Arrival/Anchor, XTE (Cross-track Error), Trip, Odometer, Time, WAAS and Speed
- Man overboard feature records position at time of man overboard and provides continuous updates of range and bearing when navigating to the MOB position.
- Unique Highway display provides a graphic presentation of boat's progress toward a waypoint.
- User-programmable nav data displays provide analog and digital navigation data.
- Navigation data output to the autopilot when connecting.
- Waypoint and route data can be uploaded from a PC and downloaded to a PC.

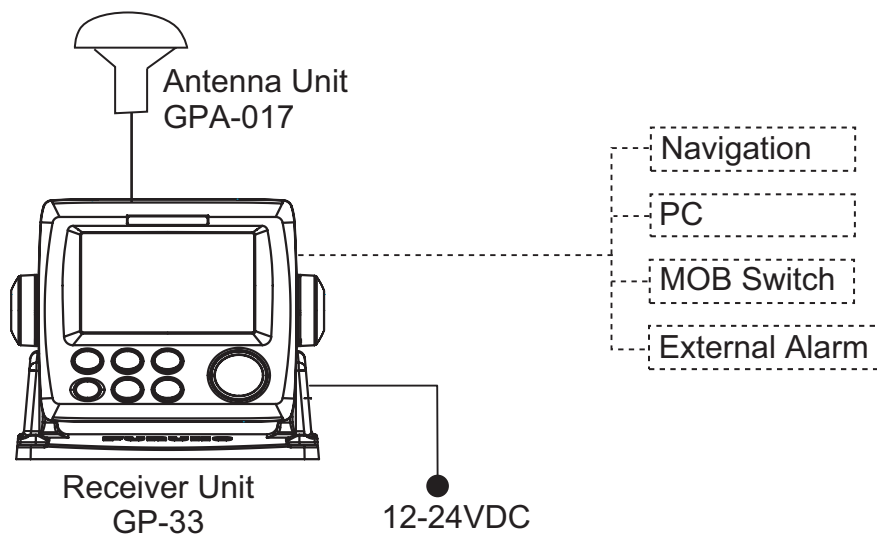
Program No.

Name	No.	Ver.
CPU MAIN	2051530-01.**	January, 2010
CPU Boot	2051531-01.**	January, 2010
CPU CAN LD	2051532-01.**	January, 2010
GPS	48502640-.**	January, 2010

**: Minor change

SYSTEM CONFIGURATION

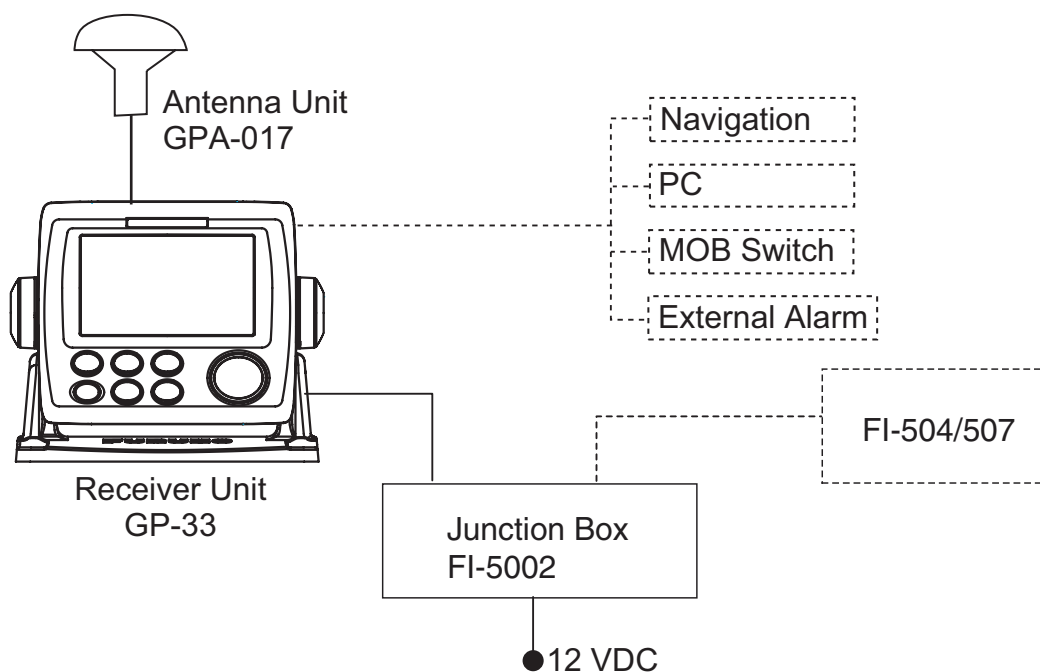
Standalone system



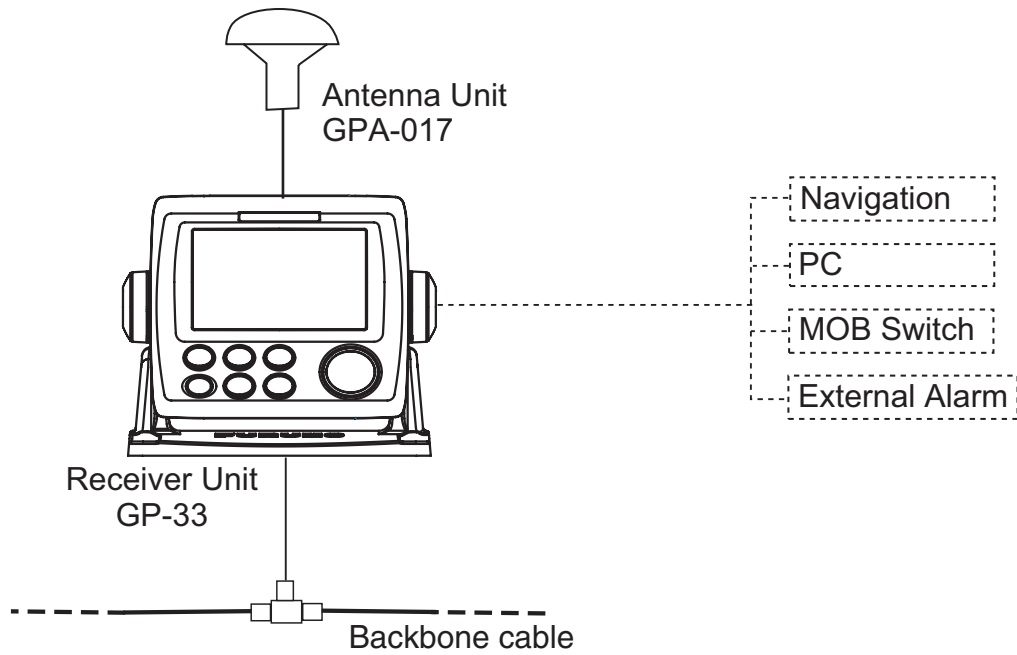
Standard configuration is shown with solid line.

CAN bus network

When optional junction box FI-5002 is connected



When no FI-5002 is connected



Category of Units








Units	Category
Antenna Unit GPA-017	Exposed to weather
Receiver Unit GP-33	Protected from weather
Junction Box FI-5002 (Option)	

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1. OPERATIONAL OVERVIEW

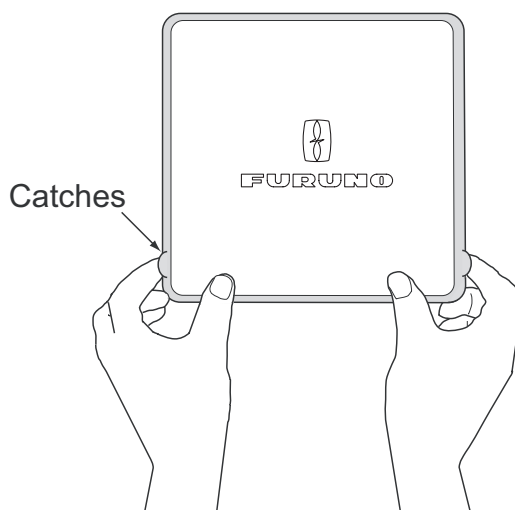
1.1 Controls




Key	Description
	Selects display mode.
	Sets destination.
	-Opens the Menu. (plotter and highway displays: twice, others: once) -Shows the zoom window (plotter and highway displays only).
 (Cursorpad)	-Shifts the cursor. -Selects item on menus.
	-Long press: Turns power off. -Momentary press: Turns power on./Shows Brill window.
	-Long press: Inscribes MOB mark. -Momentary press: Registers own boat position as MOB position.
	-Long press: Returns own boat position to center (plotter display only). -Momentary press: Confirms selection on menus.

How to detach the hard cover from the unit

Put your thumbs on the front and forefingers on the catches at the sides of the cover, and pull it toward you.




1.2 How to Turn Power On/Off

1. Press the  /**BRILL** key to turn on the power. The unit beeps and then starts up with the last-used display mode. Your equipment takes about 90 seconds to find its position. The equipment shows receiver status indication at the top left-hand corner in most display modes. The table below shows these indications and their meanings.


Status indications

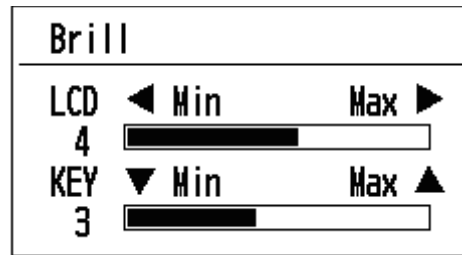
Indication	Meaning
2D	2D GPS position fixed
3D	3D GPS position fixed
W2D	2D WAAS position fixed
W3D	3D WAAS position fixed
DOP*	2D: HDOP larger than 4 3D: PDOP larger than 6
SIM	Simulation mode
- - -	Not fixed


*: DOP (Dilution of Precision) is the index of position accuracy, and it is the distribution pattern of satellites used in position fixing. Generally, the smaller the figure the better the position accuracy. (HDOP: Horizontal DOP, PDOP: Position DOP)

2. To turn off the power, press and hold down the  /**BRILL** key for three seconds. The time remaining until the power is turned off is counted down on the display.

1.3 How to Adjust LCD and Key Panel Brilliance

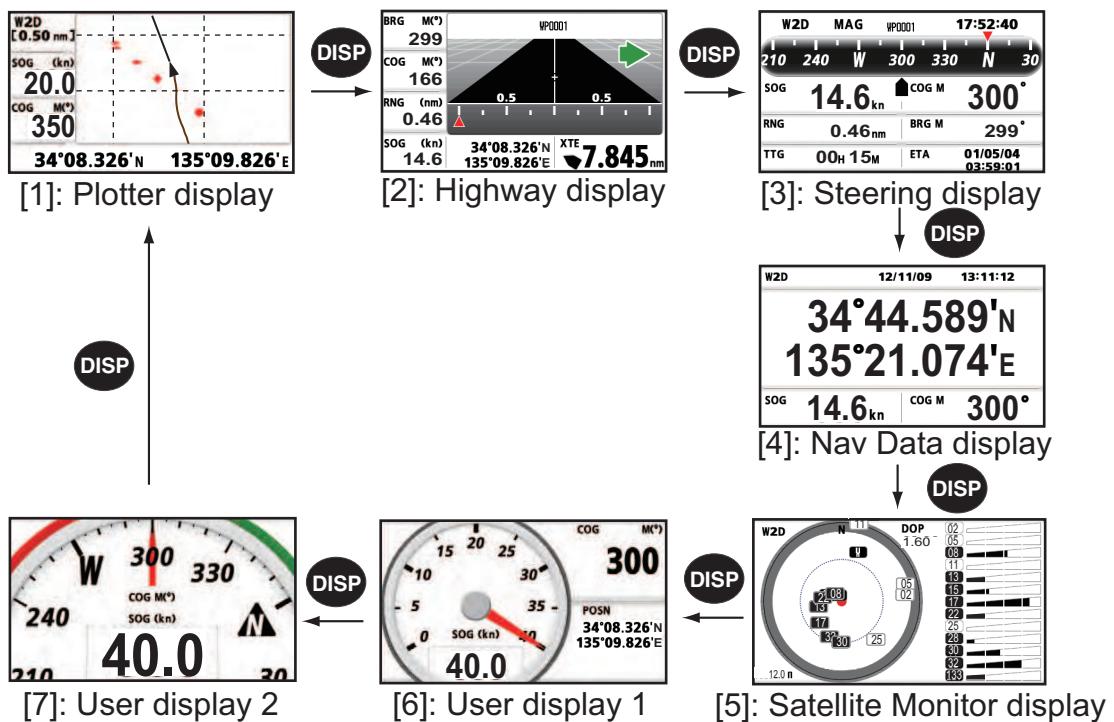
1. Press the  /**BRILL** key to show the following window.



2. To adjust the LCD brilliance, press  /**BRILL** key.
The setting changes “0→1→...→7→6...0→1...” continuously. Maximum setting is 7. You can use also the cursorpad (◀, ▶) to adjust the brilliance.
3. To adjust the panel brilliance, press the cursorpad (▲, ▼, max: 7).
4. Press **ENT** or **MENU/ZOOM** key.

1.4 Display Modes

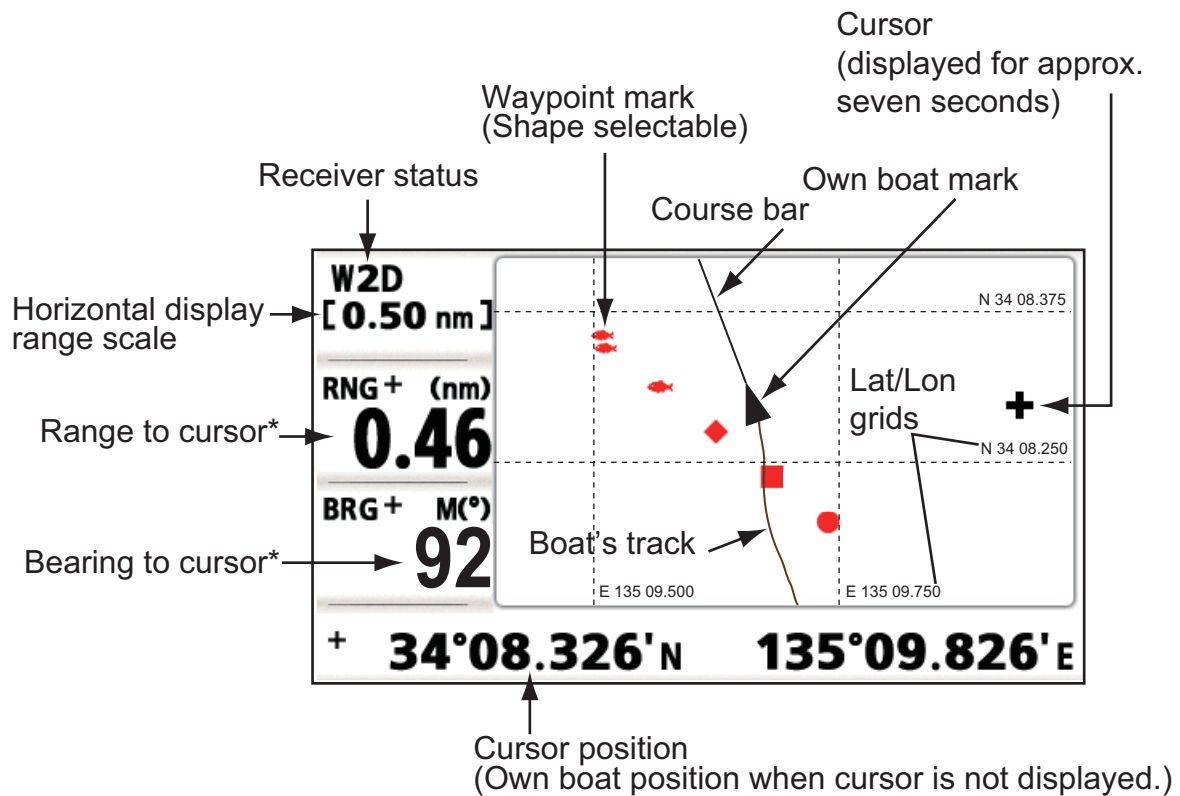
Your unit has seven display modes: Plotter Display, Highway Display, Steering Display, Nav Data Display, Satellite Monitor Display and User Display 1/2. Press the **DISP** key to select a display mode. Each time the key is pressed, the display mode changes in the sequence shown below. To step through the displays in reverse order, press the **DISP** key more than three seconds.



1. OPERATIONAL OVERVIEW

Plotter Display

The plotter display traces own boat's track.



*:COG and SOG replace bearing to cursor and range to cursor when the cursor is not displayed.

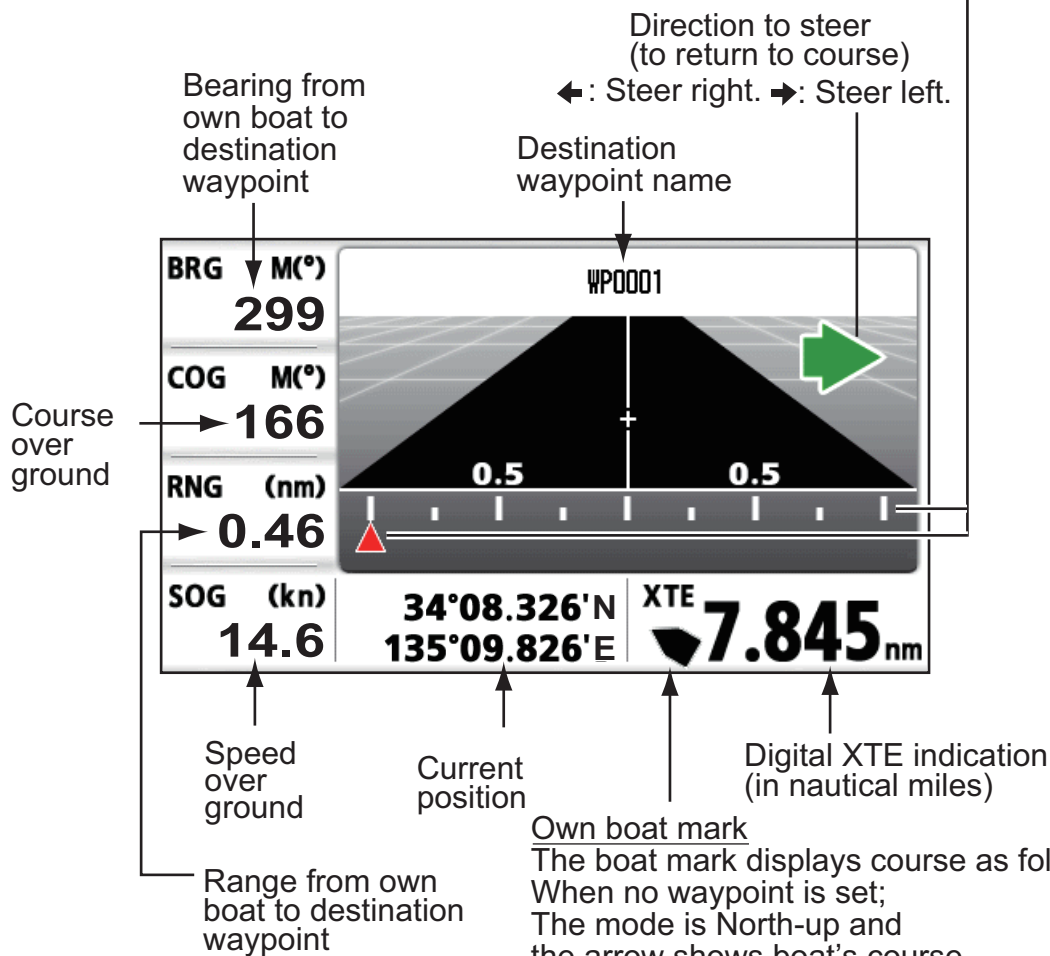
Highway Display

The highway display provides a 3-D view of own boat's progress toward destination.

XTE (Cross-track error) scale and arrow mark

Arrow shifts with boat's XTE. When the arrow is aligned with the center line the boat is on course. The arrow blinks if boat's XTE is greater than XTE scale range.

"N (North)" is displayed, instead of the arrow, at the center of the scale when no destination is set.



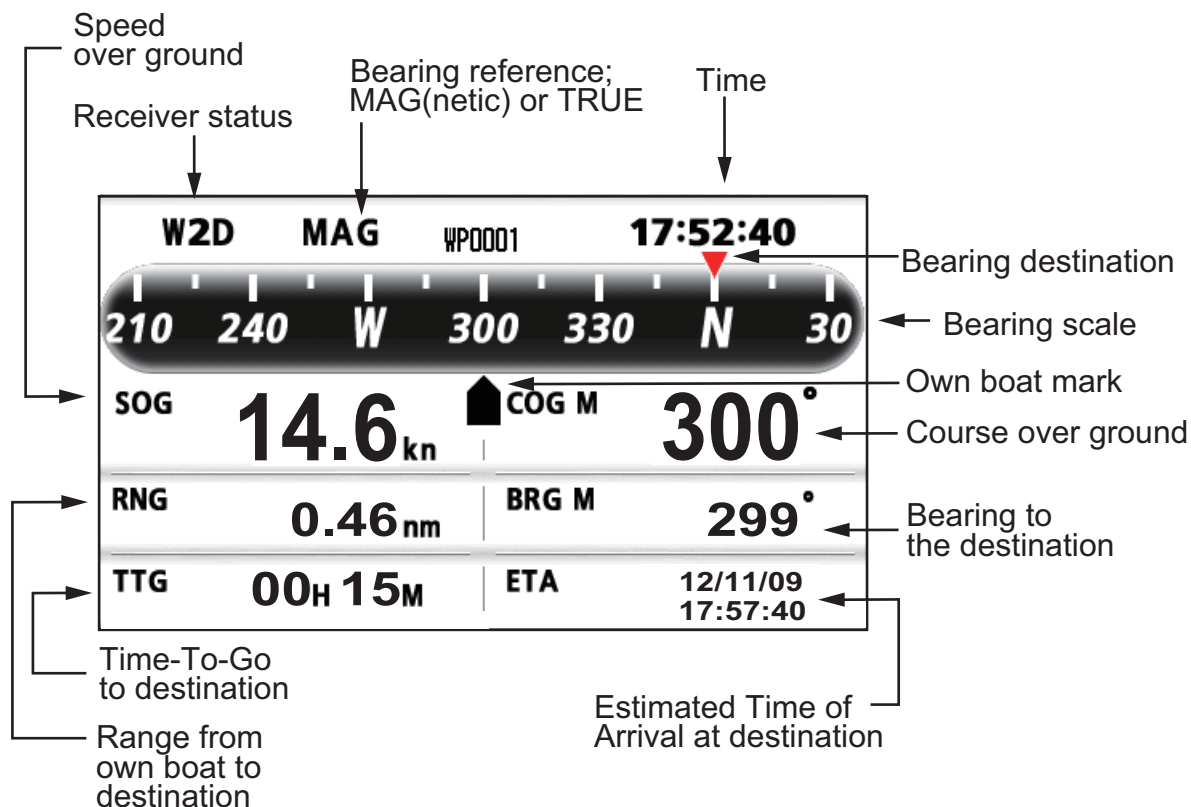
Own boat mark

The boat mark displays course as follows:
 When no waypoint is set;
 The mode is North-up and the arrow shows boat's course.
 When a waypoint is set;
 The arrow shows boat's course towards destination.

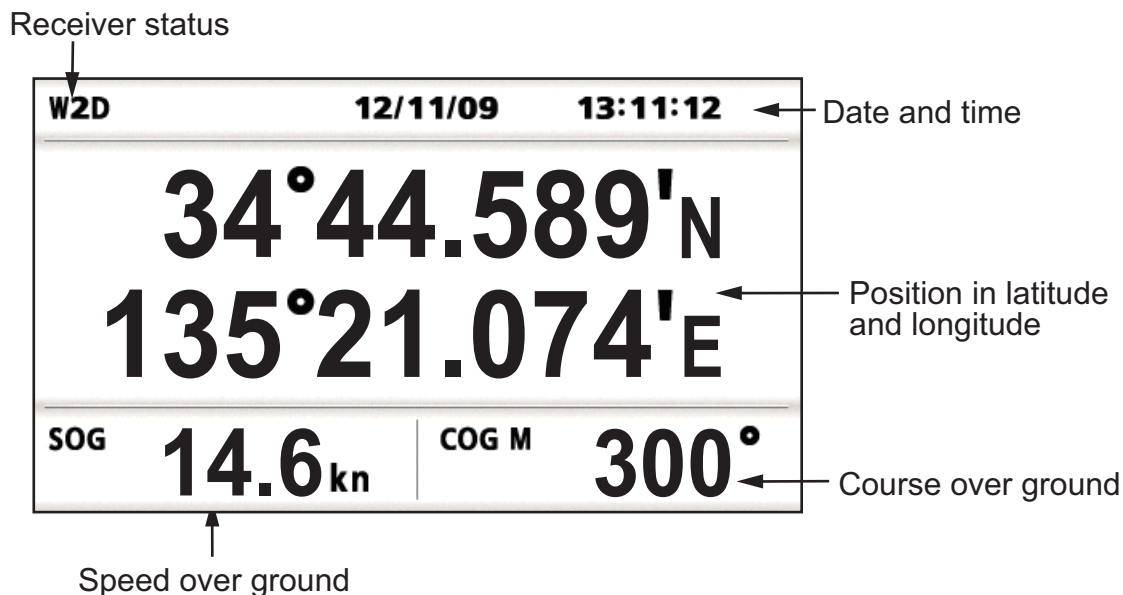
1. OPERATIONAL OVERVIEW

Steering Display

The steering display provides steering information.

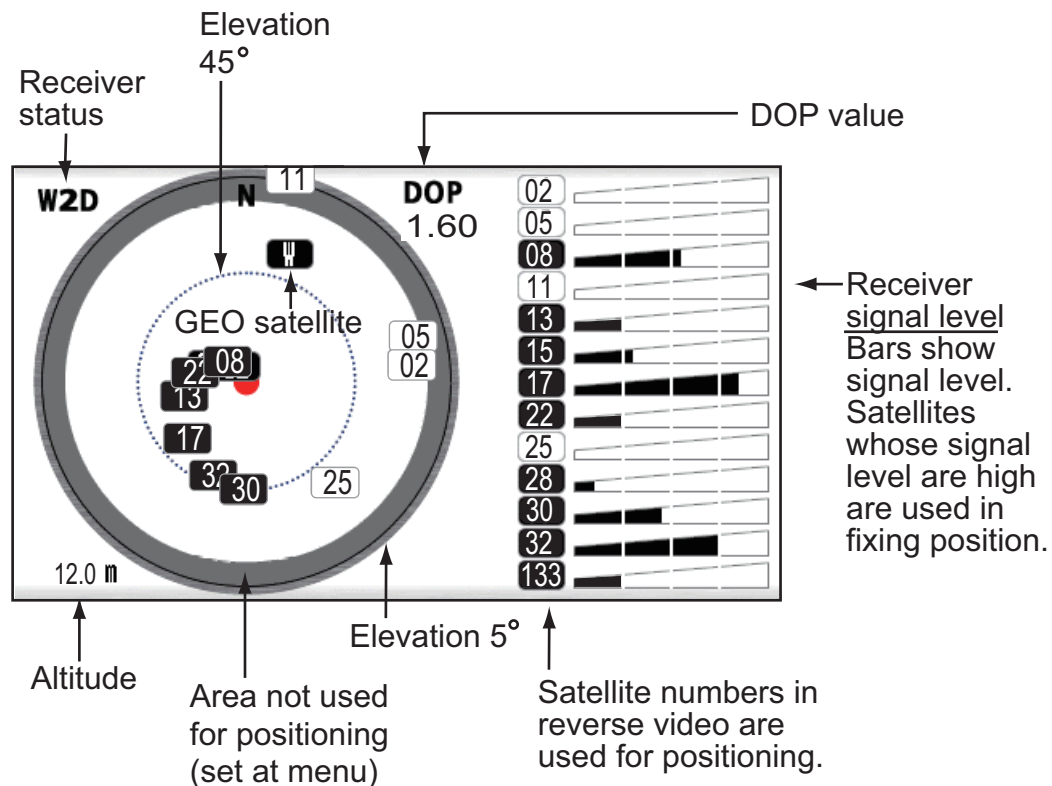


Nav Data Display



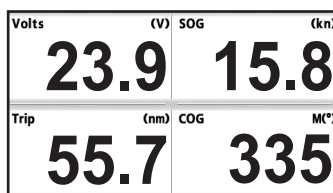
Satellite Monitor Display

The satellite monitor display shows the condition of GPS and GEO (WAAS) satellites. Number, bearing and elevation angle of all GPS and GEO satellites (if applicable) in view of your receiver appear.

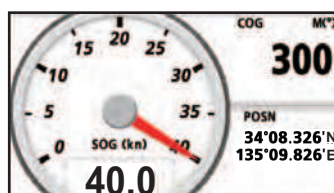


User Display 1, User Display 2

- Digital display
The digital display shows digital navigation data. You can select what data to display in one to four cells. The choices of data are time, date, speed over ground, cross-track-error, odometer distance, position, course over ground, time-to-go to destination, trip distance, power source voltage, range and bearing to waypoint and estimated time of arrival at destination.
- Speedometer display
The speedometer display provides both digital and analog displays of speed over ground.
- COG display
The COG display shows both analog course over ground, and digital speed over ground.



Digital display (four cells)



Speedometer display
(default: User display 1)



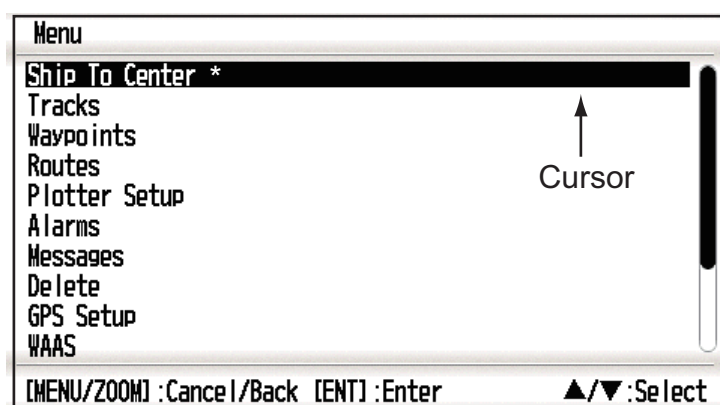
COG display
(default: User display 2)

1.5 Menu Overview

Most operations of your unit are done through the menu. Below is a quick introduction to how to select a menu and change menu settings. If you get lost in operation, press the **MENU/ZOOM** key to return to the main menu.

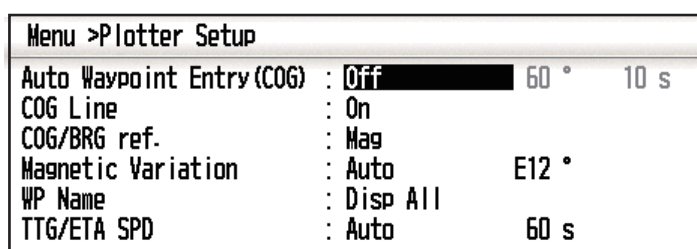
1. Press the **MENU/ZOOM** key once or twice to display the main menu.
Press once: Steering display, nav data display, satellite monitor display, user display 1/2.
Press twice: Plotter display, highway display

Note: Following explanation takes the menus for the plotter display as an example.



*: Shown only when the MENU/ZOOM key is pressed at the plotter display.

2. Press **▲** or **▼** to select an item, and press the **ENT** key.
3. Press **ENT** (or **►**) key.
For example, select [Plotter Setup] and press the **ENT** key.



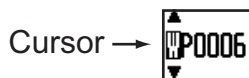
4. Press **▲** or **▼** to select option desired.
For example, select [COG/BRG ref.]
5. Press the **ENT** key (or **►**).
A window shows the options for the item selected.



6. Press **▲** or **▼** to select option desired.
7. Press the **ENT** key (or **►**).
8. Press the **MENU/ZOOM** key (or **◀**) twice to close the menu.

How to enter alphanumeric data

Some menu operations require you to enter alphanumeric data (A to Z, 0 to 9) and symbols (&, _, #, ' , - , > and space). The procedure which follows shows how to enter alphanumeric data. For example, to change the waypoint name "WP0006" to "KOBE", do the follows:

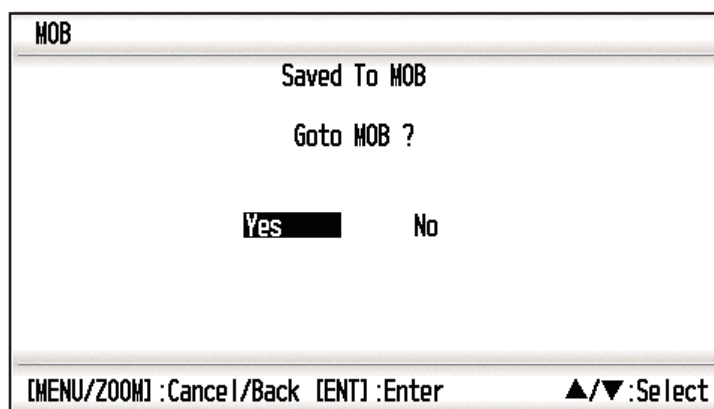


- 1) Press ▲ or ▼ to select "K".
- 2) Press ►, and press ▲ or ▼ to select "O".
- 3) Press ►, and press ▲ or ▼ to select "B".
- 4) Press ►, and press ▲ or ▼ to select "E".
- 5) Press ►, and press ▲ or ▼ to select " "(space).
- 6) Press ►, and press ▲ or ▼ to select " " (space).
- 7) Press the **ENT** key.

1.6 How to Enter the MOB Mark

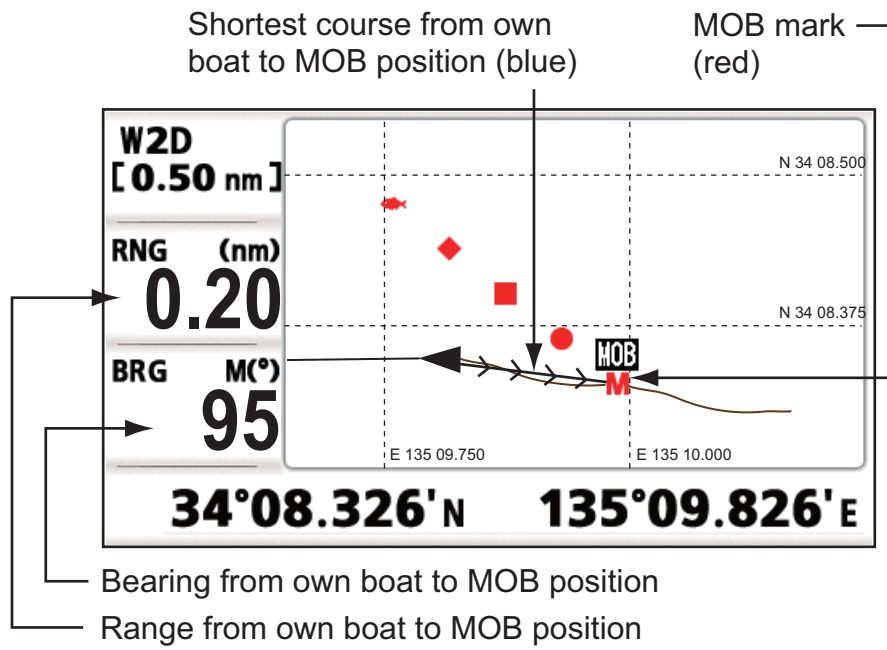
The MOB mark denotes man overboard position. Only one MOB mark is displayed. Each time the MOB mark is entered the previous MOB mark and its position data are overwritten.

1. Press and hold the **WPT/MOB** key down to show the following message.



2. To set MOB position as destination, confirm that [Yes] is chosen and press the **ENT** key. MOB mark ("M") appears and a blue line is drawn between own boat mark and the MOB mark. This line shows the shortest course to go to the MOB position, and arrows on the line show the direction to the MOB position.

1. OPERATIONAL OVERVIEW

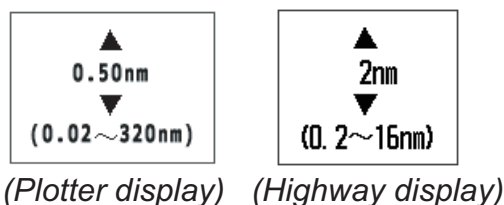


2. PLOTTER DISPLAY OVERVIEW

2.1 How to Select the Display Range

You can change the display range on the plotter and highway displays. The horizontal range in the plotter display is available among 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 40, 80, 160 and 320 nautical miles. The horizontal range in the highway display is available among 0.2, 0.4, 0.8, 1, 2, 4, 8 and 16 nautical miles.

1. Press the **MENU/ZOOM** key on the plotter or highway display.
The following window appears.



2. Press **▲** or **▼** to select range you want.
3. Press the **ENT** key.

2.2 How to Shift the Cursor

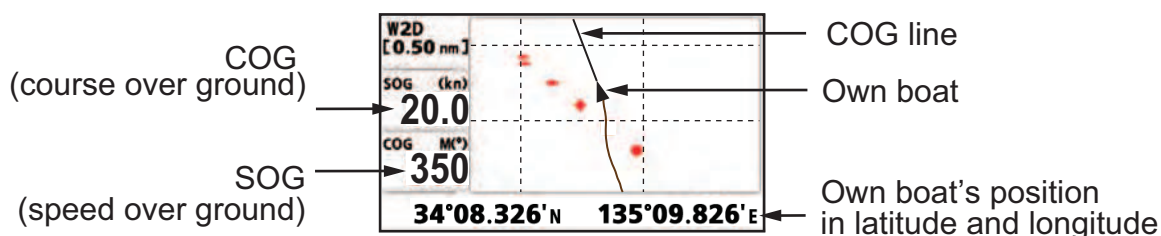
Use the cursorpad to shift the cursor. The cursor moves in the direction of the arrow or diagonal.

Cursor state and position indication

The position indication, shown at bottom of the plotter display, changes according to cursor state.

Cursor at rest

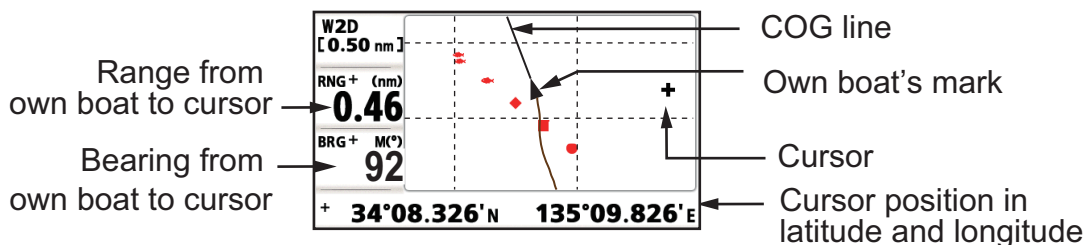
When the cursor is not shown, boat's position in longitude and latitude or TDs (depending on the menu setting) appears at the bottom of the display.



Cursor state and position indication

Cursor position is displayed in latitude and longitude or TDs at the bottom of the plotter display when the cursor is shown.

If there is no operation for about seven seconds, the cursor disappears.



2.3 How to Shift the Display

The display can be shifted on the plotter display.

1. Press the cursorpad to show the cursor.
2. Press and hold down an arrow on the cursorpad.
When the cursor is placed at an edge of the screen, the display shifts in the direction opposite to cursorpad operation.

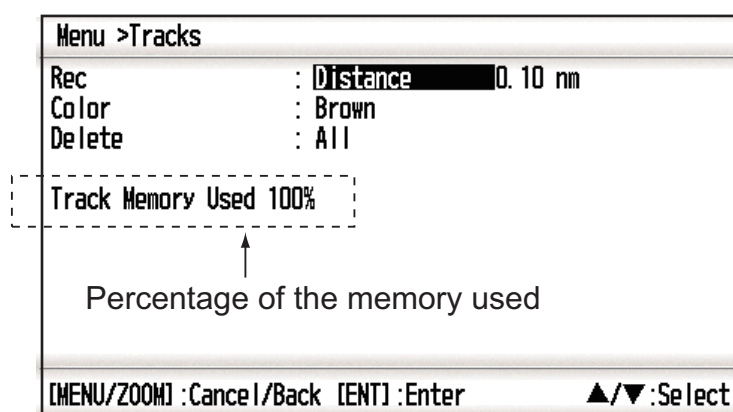
Centering own boat's position

When own boat tracks off the plotter display, the own boat mark is automatically returned to the screen center. You can also return it manually by pressing and holding the **ENT** key for more than three seconds.

2.4 How to Change Track Plotting Interval, Stop Recording

To trace the boat's track, the boat's position is stored into the memory at an interval of distance or according to display range. For distance, a shorter interval provides better reconstruction of the track, but the storage time of the track is shorten. When the track memory becomes full, the oldest track is erased to make room for the latest. The current percentage of the memory used can be confirmed by choosing [Tracks] on the menu.

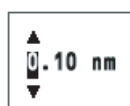
1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Tracks], and press the **ENT** key.



3. Confirm that the [Rec] is selected, and press the **ENT** key.



4. Select [Off], [Distance] or [Auto], and press the **ENT** key.
Off: Track is not recorded. This setting is useful when you do not need to record track.
Distance: Track is recorded and plotted at the distance interval set.
Auto: Plotting and recording interval changes with display range selected.
5. For [Off] or [Auto], go to step 6. For [Distance], enter the recording interval as follows:
 - 1) Press ►.
 - 2) Press **ENT** key.



- 3) Use the cursorpad to enter the interval, and press the **ENT** key.
For entering the numeric data, see page 1-9.
6. Press the **MENU/ZOOM** key twice to close the menu.

2.5 How to Change Track Color

You can select the color for the tracks among red, yellow, green, blue, purple, black and brown. It is useful to change the color to distinguish tracks at different times of a day, for example.

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Tracks], and press the **ENT** key.
3. Select [Color], and press the **ENT** key.



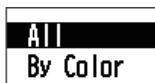
4. Select the color to use for the track, and press the **ENT** key.
5. Press the **MENU/ZOOM** key twice to close the menu.

2.6 How to Erase Track

The tracks can be erased collectively or by color. The tracks cannot be restored once erased, therefore be absolutely sure you want to erase the tracks.

2.6.1 How to erase track by color

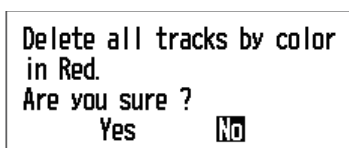
1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Tracks], and press the **ENT** key.
3. Select [Delete], and press the **ENT** key.



4. Select [By Color], and press the **ENT** key.



5. Select the track color to erase, and press the **ENT** key.
The window shown below appears.



6. Press **◀** to select [Yes], and press the **ENT** key.
The tracks with the color chosen at step 5 are erased.

Note: To cancel, select [No] at this step.

7. Press the **MENU/ZOOM** key twice to close the menu.

2.6.2 How to erase all tracks

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Tracks], and press the **ENT** key.
3. Select [Delete], and press the **ENT** key.
4. Select [All], and press the **ENT** key.

Delete all tracks.
Are you sure ?
Yes **No**

5. Press ◀ to select [Yes], and press the **ENT** key to erase all tracks.
[Track Memory Used] on the Tracks menu shows “0%”.
6. Press the **MENU/ZOOM** key twice to close the menu.

2. PLOTTER DISPLAY OVERVIEW

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3. WAYPOINTS

3.1 How to Enter Waypoints

In navigation terminology a waypoint is a particular location on a voyage, whether it be a starting, intermediate or destination waypoint. Your unit can store 10,000 waypoints. Waypoints can be entered on the plotter display: at cursor position, at own boat's position, through the waypoints list and at the MOB position. Also, waypoints can be entered automatically when your boat changes course prominently.

3.1.1 How to enter a waypoint with the cursor

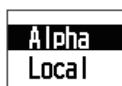
1. Use the cursorpad to place the cursor on the location desired for a waypoint.
2. Press the **ENT** key to enter the waypoint mark (default shape: green solid circle). This waypoint is named with the youngest unused waypoint number, and saved to the waypoint list.

3.1.2 How to enter a waypoint at own boat position

Press the **WPT/MOB** key to enter the waypoint mark (default shape: green solid circle). This waypoint is named with the youngest unused waypoint number, and saved to the waypoint list.

3.1.3 How to enter a waypoint through the list

1. Press the **MENU/ZOOM** key to show the main menu.
2. Select [Waypoints], and press the **ENT** key.



3. Press the **ENT** key to show the waypoint list.

Menu >Waypoints >Waypoint List					
Name	Symbol	Color	RNG (nm)	BRG (°)	
[New]					
G WP0001	●	Red	115	115	
WP0002	■	Red	116	116	
WP0003	◆	Red	117	117	
WP0004	⦿	Red	118	118	
WP0005	⦿	Red	119	119	
[MENU/ZOOM] :Cancel/Back [ENT] :Enter ▲/▼ :Select					

3. WAYPOINTS

- Confirm that [New] is chosen, and press the **ENT** key.

Waypoints >Waypoint List >Waypoint Info.	
Name	: WP0005
Symbol	: ●
Color	: Green
Lat	: 63°56.708'N
Lon	: 138°39.266'E
Comment	: 15:50 17NOV09
RNG (nm)	: 196
BRG (°)	: 197

[MENU/ZOOM] :Cancel/Back [ENT] :Enter ▲/▼:Select

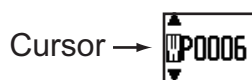
The default name, Lat/Lon and Comment are as follows:

Name: The youngest unused waypoint number.

Lat, Lon: Current own boat position

Comment: Current date/time

- To change the waypoint name, press the **ENT** key.



- Operate the cursorpad to change the waypoint name (max. 8 characters).
- To change the mark shape, select [Symbol] and press the **ENT** key.



- Select a mark desired, and press the **ENT** key.
- To change the mark color, select [Color], and press the **ENT** key.



- Select a color desired, and press the **ENT** key.
- To change the position, do as follows:
 - Select [Lat], and press the **ENT** key.
 - Enter latitude, and press the **ENT** key.
 - Press ▼ to select [Lon], and press the **ENT** key.
 - Enter longitude, and press the **ENT** key.

12. To change the comment, select [Comment] and press the **ENT** key.
13. Enter the comment, and press the **ENT** key.
14. Press the **MENU/ZOOM** key to register the new waypoint into the list.
15. To register other waypoints, repeat steps 4 through 14.
16. Press the **MENU/ZOOM** key several times to close the menu.

3.1.4 How to enter waypoints automatically

Waypoints can be entered automatically when your course changes by a specified degree. This function is useful for reversely following the waypoints recorded on an outward voyage when you return home. To set the criteria for automatic entering of waypoints, do the following:

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Plotter Setup], and press the **ENT** key.

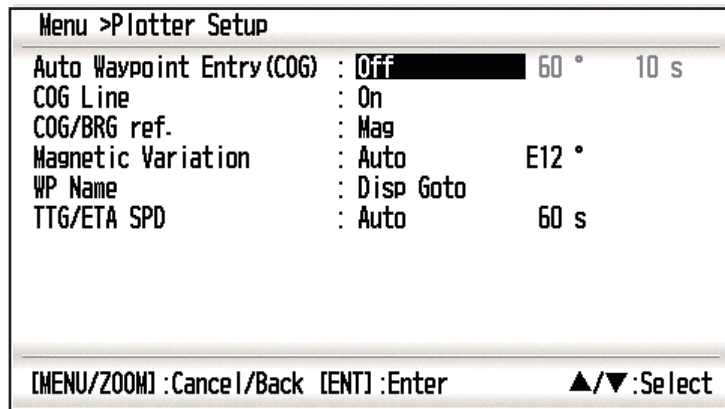
Menu >Plotter Setup			
Auto Waypoint Entry (COG)	: Off	60 °	10 s
COG Line	: On		
COG/BRG ref.	: Mag		
Magnetic Variation	: Auto	E12 °	
WP Name	: Disp All		
TTG/ETA SPD	: Auto	60 s	

3. Select [Auto Waypoint Entry (COG)], and press the **ENT** key.
4. Select [On], and press the **ENT** key.
5. Press ► to select the degree setting, and press the **ENT** key.
6. Enter the degree, and press the **ENT** key (setting range: 15 to 150°).
7. Press ► to select the seconds setting, and press the **ENT** key.
8. Enter the seconds, and press the **ENT** key (setting range: 1 to 60 seconds).
9. Press the **MENU/ZOOM** key twice to close the menu.

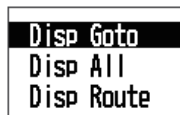
3.2 How to Display Waypoint Name

You can display waypoint names as follows:

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Plotter Setup], and press the **ENT** key.



3. Select [WP Name], and press the **ENT** key.



4. Select [Disp Goto], [Disp All] or [Disp Route], and press the **ENT** key.
 Disp Goto: Displays only the destination waypoint name.
 Disp All: Displays all waypoint names.
 Disp Route: Displays all waypoint names in the route when it is set as destination.
5. Press the **MENU/ZOOM** key twice to close the menu.

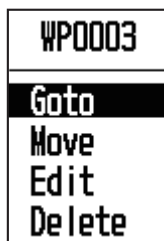
3.3 How to Edit Waypoints

Waypoint position, name, mark shape and comment can be edited on the plotter display or through the waypoint list.

Note: When the waypoint chosen is set as the destination, the message "Change The Waypoint. Are you sure?" appears.

3.3.1 How to edit waypoints on the plotter display

1. Operate the cursorpad to place the cursor on the waypoint to edit.
2. Press the **ENT** key to show the pop-up window.



3. Select [Edit], and press the **ENT** key to show the waypoint information.
4. Edit the waypoint (see the paragraph 3.1.3).
5. Press the **MENU/ZOOM** key to return to the plotter display.

3.3.2 How to edit waypoints through the list

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Waypoints], and press the **ENT** key.
3. Select [Alpha] or [Local], and press the **ENT** key.
Alpha: The list shows waypoints in alphabetical order.
Local: The list shows waypoints from the nearest to the furthest.
4. Select the waypoint to edit, and press the **ENT** key to show the pop-up window.

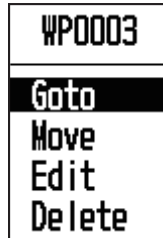


5. Select [Edit], and press the **ENT** key to show the waypoint information.
6. Edit the waypoint data (see the paragraph 3.1.3).
7. Press the **MENU/ZOOM** key several times to close the menu.

3.4 How to Move Waypoints

You can move waypoints to any position on the plotter display.

1. Operate the cursorpad to place the cursor on the waypoint to move.
2. Press the **ENT** key to show the pop-up window.



3. Select [Move], and press the **ENT** key to show the waypoint information.
4. Operate the cursorpad to move the cursor to the new position.
5. Press the **ENT** key.

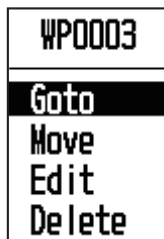
3.5 How to Erase Waypoints

You can erase each or all waypoint(s).

Note: You cannot erase the waypoint used as the current destination. (See paragraphs paragraph 3.5.1, paragraph 3.5.2.)

3.5.1 How to erase a waypoint on the plotter display

1. Operate the cursorpad to place the cursor on the waypoint to erase.
2. Press the **ENT** key to show the pop-up window.



3. Select [Delete], and press the **ENT** key.

3.5.2 How to erase a waypoint through the waypoint list

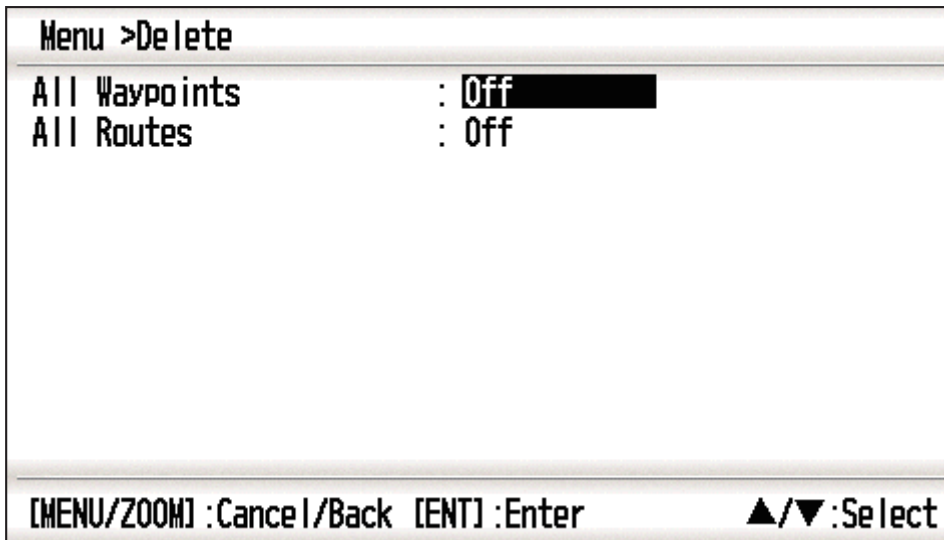
1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Waypoints], and press the **ENT** key.
3. Select [Alpha] or [Local], and press the **ENT** key.
4. Select the waypoint to erase, and press the **ENT** key.



5. Select [Delete], and press the **ENT** key.
6. Press the **MENU/ZOOM** key several times to close the menu.

3.5.3 How to erase all waypoints

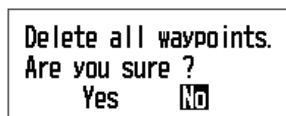
1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Delete], and press the **ENT** key.



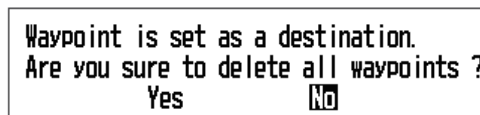
3. Confirm that [All Waypoints] is chosen, and press the **ENT** key.



4. Select [Delete], and press the **ENT** key.



When no waypoint is set as destination



When a waypoint is set as destination

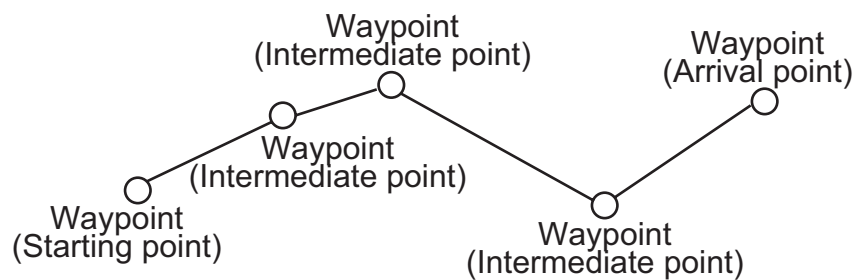
5. Select [Yes], and press the **ENT** key to erase all waypoints.
Note: To cancel, select [No].
6. Press the **MENU/ZOOM** key twice to close the menu.

4. ROUTES

In many cases a trip from one place to another involves several course changes, requiring a series of waypoints which you navigate to, one after another. The sequence of waypoints leading to the ultimate destination is called a route. Your unit can automatically advance to the next waypoint on a route, so you do not have to change the destination waypoint repeatedly.

4.1 How to Create Routes

You can store up to 100 routes, and a route can have 30 waypoints. A route is constructed with the waypoints you have entered.



Sample route

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Routes], and press the **ENT** key.
3. Press the **ENT** key to show the route list.

Menu >Routes >Route List		
Name	TLEG (nm)	Number
[New]		

[MENU/ZOOM] :Cancel/Back [ENT] :Enter ▲/▼:Select

4. ROUTES

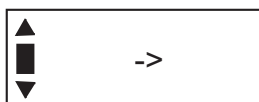
- Confirm that [New] is chosen, and press the **ENT** key to show the route information.

Routes >Route List >Route Info.				
Name	:	RT0001	Total	LEG 0.00nm 0 Points
Cmnt	:	->	LEG	BRG
1	:			
2	:		nm	
3	:		nm	
4	:		nm	
5	:		nm	
6	:		nm	
7	:		nm	
8	:		nm	
[MENU/ZOOM] :Cancel/Back [ENT] :Enter ▲/▼:Select				

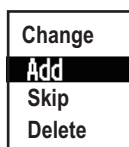
- Press the **ENT** key to change the route name.



- Operate the cursorpad to enter the route name, and press the **ENT** key (maximum: six characters).
- Press ▼ then **ENT** key.



- Operate the cursorpad to enter the comment (maximum: 18 characters).
- Press ▼ to move the cursor to [1], and press the **ENT** key.



- Confirm that [Add] is chosen, and press the **ENT** key.
- Select [Alpha] or [Local], and press the **ENT** key to show the waypoint list.
- Select the waypoint to add to the route, and press the **ENT** key.
The chosen waypoint (as the starting point) is registered to [1].
- Press ▼ to select [2], and press the **ENT** key.
- Repeat steps 10 through 13 to complete the route.
- Press the **MENU/ZOOM** key several times to close the menu.

4.2 How to Edit Routes

You can edit the route created.

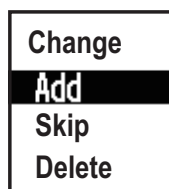
Note: When the route chosen is set as route navigation, the message "Route is set as a destination. Are you sure?" appears.

4.2.1 How to replace a waypoint in a route

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Routes], and press the **ENT** key.
3. Select [Alpha] or [Local], and press the **ENT** key to show the route list.
4. Select the route to edit, and press the **ENT** key.



5. Select [Edit], and press the **ENT** key to show the route list.
6. Select the waypoint to replace, and press the **ENT** key.



7. Select [Change], and press the **ENT** key.
8. Select [Alpha] or [Local], and press the **ENT** key to show the waypoint list.
9. Select the new waypoint, and press the **ENT** key.
10. Press the **MENU/ZOOM** key several times to close the menu.

4.2.2 How to delete a waypoint from a route

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Routes], and press the **ENT** key.
3. Select [Alpha] or [Local], and press the **ENT** key to show the route list.
4. Select the route to edit, and press the **ENT** key.
5. Select [Edit], and press the **ENT** key to show the route information.
6. Select the waypoint to delete from the route, and press the **ENT** key.
7. Select [Delete], and press the **ENT** key.
8. Press the **MENU/ZOOM** key several times to close the menu.

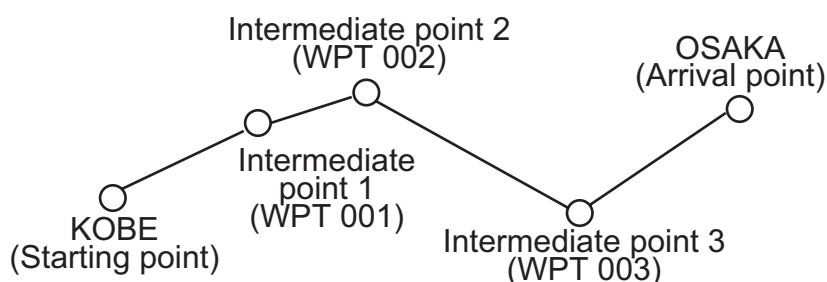
4.2.3 How to insert a waypoint in a route

To insert a waypoint in a route, do the following:

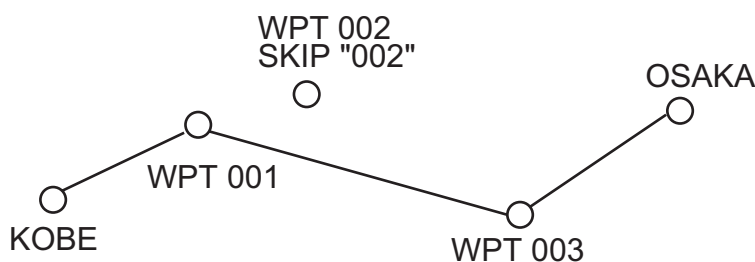
1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Routes], and press the **ENT** key.
3. Select [Alpha] or [Local], and press the **ENT** key to show the route list.
4. Select the route to edit, and press the **ENT** key.
5. Select [Edit], and press the **ENT** key to show the route list.
6. Select the waypoint which will come after the waypoint to be inserted, and press the **ENT** key.
7. Select [Add], and press the **ENT** key.
8. Select [Alpha] or [Local], and press the **ENT** key to show the waypoint list.
9. Select the waypoint, and press the **ENT** key.
10. Press the **MENU/ZOOM** key several times to close the menu.

4.2.4 How to temporarily deselect a waypoint in a route

You can temporarily deselect an unnecessary waypoint from a route. Using the route created in the illustration shown below as an example, deselect the second intermediate waypoint.



If you reconstruct the route without the second intermediate point it would look like the illustration below.



1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Routes], and press the **ENT** key.
3. Select [Alpha] or [Local], and press the **ENT** key to select the route list.
4. Select the route to edit, and press the **ENT** key.
5. Select [Edit], and press the **ENT** key to show the route information.
6. Select the waypoint to skip, and press the **ENT** key.
7. Select [Skip], and press the **ENT** key to show "X" next to the waypoint chosen at step 6.

- Press the **MENU/ZOOM** key several times to close the menu.

Note: To restore waypoint to a route, select [Skip Off] at step 7, and press the **ENT** key.

4.3 How to Erase a Route

You can erase routes individually or collectively.

4.3.1 How to erase a route through the route list

Note: The route used as route navigation can not be erased.

- Press the **MENU/ZOOM** key twice to show the main menu.
- Select [Routes], and press the **ENT** key.
- Select [Alpha] or [Local], and press the **ENT** key to show the route list.
- Select the route to erase, and press the **ENT** key.
- Select [Delete], and press the **ENT** key to erase the route chosen at step 4.
- Press the **MENU/ZOOM** key several times to close the menu.

4.3.2 How to erase all routes

- Press the **MENU/ZOOM** key twice to show the main menu.
- Select [Delete], and press the **ENT** key.
- Select [All Routes], and press the **ENT** key.
- Select [Delete], and press the **ENT** key to show the following message.

Delete all routes.
Are you sure?
Yes **No**

When no route is set as destination

Route is set as destination.
Are you sure to delete all routes?
Yes **No**

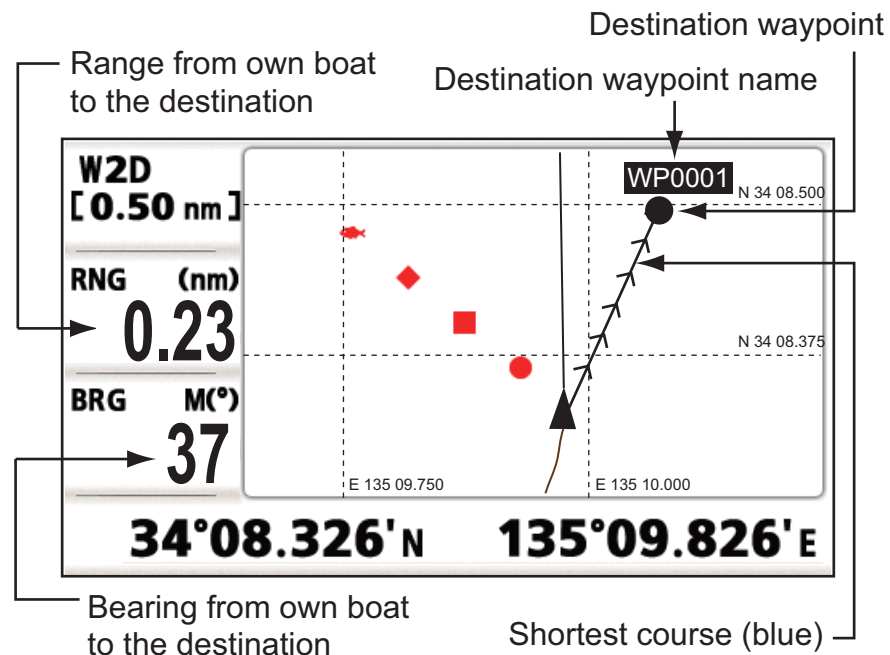
When a route is set as destination

- Select [Yes], and press the **ENT** key to erase all routes.
Note: To cancel, select [No].
- Press the **MENU/ZOOM** key twice to close the menu.

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5. DESTINATION

Destination can be set four ways: by cursor, by waypoint, by route and by MOB position. Previous destination is cancelled whenever a new destination is set. The setting by MOB position is described in chapter 1. When setting a destination, a blue line is shown between own boat and the destination selected. Also, the range and bearing from own boat to the destination are shown at the left-hand side of the screen.



5.1 How to Set Destination by Cursor Position

You can set a destination at the position with no waypoint. This destination is called "Quick Point".

1. On the plotter display, operate the cursorpad to place the cursor on the location desired for destination.
2. Press the **GO TO** key to enter the waypoint as the quick point. The quick waypoint is shown with a green solid circle, and named as "QP". This point is saved in the waypoint list automatically.
3. Cancel the destination, referring to section 5.4, when arriving at the waypoint.

Note: The quick point set is erased when a new one is entered.

5.2 How to Set Destination by Waypoint

You can set a waypoint as destination by using the cursor or the waypoints list.

5.2.1 How to set a destination waypoint with the cursor

1. On the plotter display, operate the cursorpad to place the cursor on the waypoint which you want to set as the destination.
2. Press the **ENT** key.

WP0000
Goto
Move
Edit
Delete

3. Select [Goto], and press the **ENT** key.
4. Cancel the destination referring to section 5.4 when arriving at the waypoint.

5.2.2 How to set a destination waypoint through the list

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Waypoints], and press the **ENT** key.
3. Select [Alpha] or [Local], and press the **ENT** key to show the waypoint list.

Menu >Waypoints >Waypoint List					
Name	Symbol	Color	RNG (nm)	BRG (°)	
[New]					
G WP0001	●	Red	115	115	
WP0002	■	Red	116	116	
WP0003	◆	Red	117	117	
WP0004	⦿	Red	118	118	
WP0005	⦿	Red	119	119	
[MENU/ZOOM] :Cancel/Back [ENT] :Enter ▲/▼ :Select					

4. Select the waypoint to set as a destination, and press the **ENT** key.

Goto
Edit
Delete

5. Select [Goto], and press the **ENT** key to show the plotter display.
6. Cancel the destination referring to section 5.4 when arriving at the waypoint.

5.3 How to Set Route as Destination

You can set a route as destination through the list.

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Route], and press the **ENT** key.

3. Select [Alpha] or [Local], and press the **ENT** key.

Menu >Routes >Route List				
Name		TLEG (nm)	Number	
[New]				
RT000	: WP000 ->WP0001	0.85	2	
RT001	: WP003 ->WP0001	0.06	2	
RT002	: WP001 ->WP0005	1.83	3	
RT003	: WP001 ->WP0004	3.54	4	
[MENU/ZOOM] :Cancel/Back [ENT] :Enter ▲/▼ :Select				

4. Select the route to set as a destination, and press the **ENT** key.

Goto
Edit
Delete

5. Select [Goto], and press the **ENT** key.
6. Select [Forward] or [Reverse].
Forward: Follows waypoints in order registered (1→2→3...)
Reverse: Follows waypoints in reverse order registered (30 (when maximum entered) →29→28...→1)
7. Press the **ENT** key to show the plotter display. The destination route is shown with waypoints connected with legs.
8. Cancel the destination referring to section 5.4 when arriving at the waypoint.

How to change the following direction after you set a route as destination

After you start doing the route destination, you can change the following direction, [Forward]→[Reverse] or vice versa. Place the cursor on a leg of the route, and press the **ENT** key to show the following pop-up window. Select [Reverse] (or [Forward]). Then, select [Yes] and press the **ENT** key.

RT0000
Cancel Route
Reverse
Route Info.

Note: If your boat has not yet arrived at the first waypoint in the route, the current route destination is cancelled if you select [Reverse] (or [Forward]). Set the route destination again.

5.4 How to Cancel Destination

You can cancel destination by using the cursor, or through the list.

5.4.1 How to cancel destination with the cursor

1. On the plotter display, operate the cursorpad to place the cursor on the waypoint (route) set as the current destination.

5. DESTINATION

- Press the **ENT** key.

WP0001
Move
Cancel Goto
Edit
Delete

QP0001
Move
Cancel Goto
Edit
Delete

WP0001
Move
Skip
Cancel Route
Edit

RT0000
Cancel Route
Reverse
Route Info.

(for waypoint destination) (for QP destination) (for route navigation)

(for route leg)

- Select [Cancel Goto (Route)], and press the **ENT** key.

Cancel Goto. Are you sure?
Yes No

Cancel Route Navigation. Are you sure?
Yes No

(for waypoint destination)

(for route navigation)

- Chose [Yes], and press the **ENT** key.

To cancel, select [No].

5.4.2 How to cancel destination through the list

- Press the **MENU/ZOOM** key twice to show the main menu.
- Select [Waypoints] (or [Routes]), and press the **ENT** key twice.
- Select the waypoint (route) set as the current destination.

Menu >Waypoints >Waypoint List					
Name	Symbol	Color	RNG (nm)	BRG (°)	
[New]					
G WP0001	●	Red	115	115	Destination mark →
WP0002	■	Red	116	116	
WP0003	◆	Red	117	117	
R WP0004	⚓	Red	118	118	Waypoint used for destination route →
WP0005	⚓	Red	119	119	
[MENU/ZOOM] :Cancel/Back [ENT] :Enter					▲/▼:Select

- Press the **ENT** key.

Cancel Goto
Edit
Delete

Cancel Route
Edit
Delete

(for waypoint destination) (for route navigation)

- Select [Cancel Goto (Route)], and press the **ENT** key.

Cancel Goto. Are you sure?
Yes No

Cancel Route Navigation. Are you sure?
Yes No

(for waypoint destination)

(for route navigation)

- Select [Yes], and press the **ENT** key.

To cancel, select [No].

- Press the **MENU/ZOOM** key several times to close the menu.

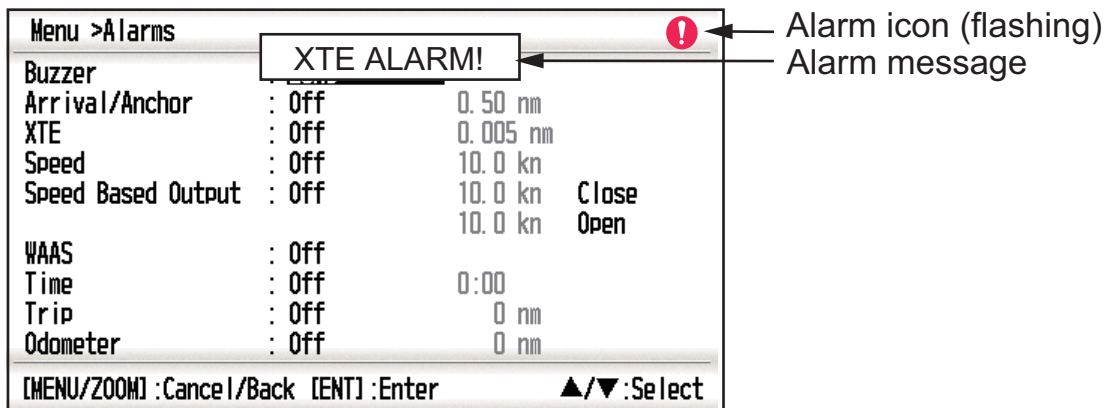
6. ALARMS

6.1 Overview

There are nine alarm conditions which generate both audio and visual alarms: Arrival alarm, Anchor watch alarm, XTE (Cross-Track Error) alarm, Speed alarm, Speed Based Output alarm, WAAS alarm, Time alarm, Trip alarm and Odometer alarm.

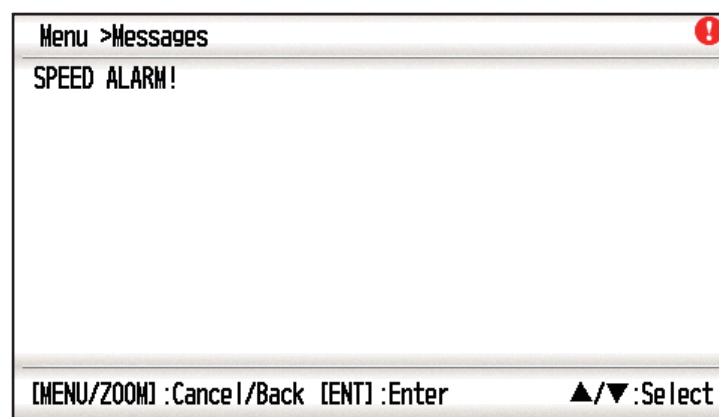
When an alarm setting is violated, the buzzer sounds and the name of the offending alarm and the alarm icon appear on the display (alarms other than Speed Based Output).

You can silence the buzzer and remove the alarm name indication by pressing any key. The alarm icon remains on the screen until the reason for the alarm is cleared.



To know which alarm has been violated, do the following procedure.

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Messages], and press the **ENT** key.



Example alarm message

The display shows the names of offending alarms. When there are no alarms, the message "No Message! " appears.

Message and meanings

Message	Meaning
XTE ALARM!	The boat is off its intended course by the range set.
TIME ALARM!	The time set has come.
SPEED ALARM!	The boat's speed is higher than the range set.
ARRIVAL ALARM!	The boat is approaching the arrival area.
TRIP ALARM!	The boat has traveled further than the preset trip distance.
ODOMETER ALARM!	The boat has traveled the total distance set.
ANCHOR WATCH!	The boat has moved a certain distance (when it should be at rest).
NO WAAS SIGNAL!	WAAS signal cannot be found.

Note: The message screen also shows equipment trouble. See section 8.3.

6.2 Buzzer Type Selection

The buzzer sounds whenever an alarm setting is violated. You can select the type of buzzer as follows:

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Alarms], and press the **ENT** key.
3. Select [Buzzer], and press the **ENT** key.



4. Select buzzer type, and press the **ENT** key.
 Short: A short beep sounds.
 Long: Three long beeps sound.
 Continuous: Continuous long beeps sound until a key is pressed.
5. Press the **MENU/ZOOM** key twice to close the menu.

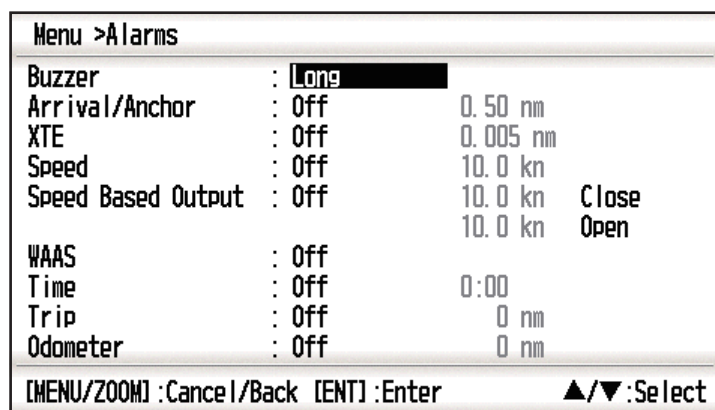
6.3 How to Set an Alarm

Set alarms as below:

Note: For the Anchor alarm, press the **WPT/MOB** key to enter the waypoint at own boat's position, and set it as destination referring to paragraph 5.2.1.

1. Press the **MENU/ZOOM** key twice to show the main menu.

2. Select [Alarms], and press the **ENT** key.



3. Select an alarm item, and press the **ENT** key.
4. Do one of the following:
 - (Arrival/Anchor)
 - 1) Select [Arrival] or [Anchor], and press the **ENT** key.
 - 2) Press ► and **ENT** key.
 - 3) Enter the alarm area, and press the **ENT** key.
 - (XTE, Speed, Trip and Odometer)
 - 1) Select [On], and press the **ENT** key.
 - 2) Press ► and **ENT** key.
 - 3) Enter the value, and press the **ENT** key.
 - (WAAS)
 - Select [On], and press the **ENT** key.
 - (Time)
 - 1) Select [On], and press the **ENT** key.
 - 2) Press ► and **ENT** key in order.
 - 3) Enter the time, and press the **ENT** key.
 - 4) For 12-hour clock, press ► and **ENT** key.
 - 5) Select [AM] or [PM], and press the **ENT** key.
 - (Speed Based Output)
 - 1) Select [On], and press the **ENT** key.
 - 2) Press ► and **ENT** key.
 - 3) Enter the speed at which to close the contact signal, and press the **ENT** key.
 - 4) Press ▼ and **ENT** key.
 - 5) Enter the speed to open the contact signal, and press the **ENT** key.
5. Press the **MENU/ZOOM** key twice to close the menu.

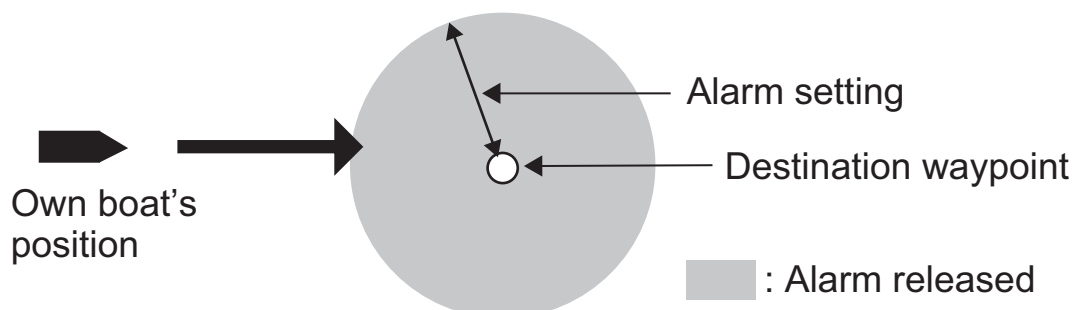
Note 1: To cancel an alarm, select [Off] at 1) on step 4.

Note 2: You can activate the arrival alarm or the anchor watch alarm; they cannot be activated together.

6.4 Alarm Descriptions

Arrival alarm

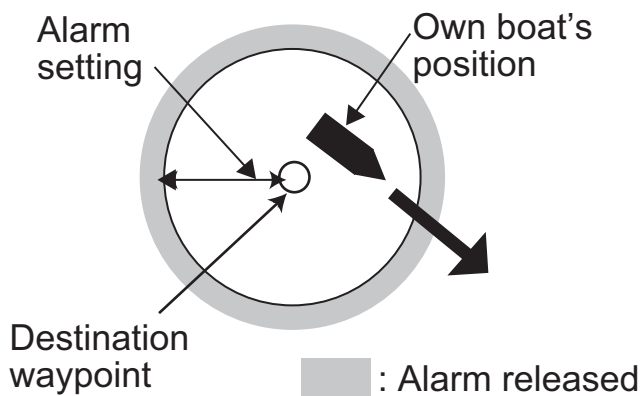
The arrival alarm informs you that own boat is approaching a destination waypoint. The area that defines an arrival zone is that of a circle which you approach from the outside of the circle. The alarm will activate if your boat enters the circle.



How the arrival alarm works

Anchor watch alarm

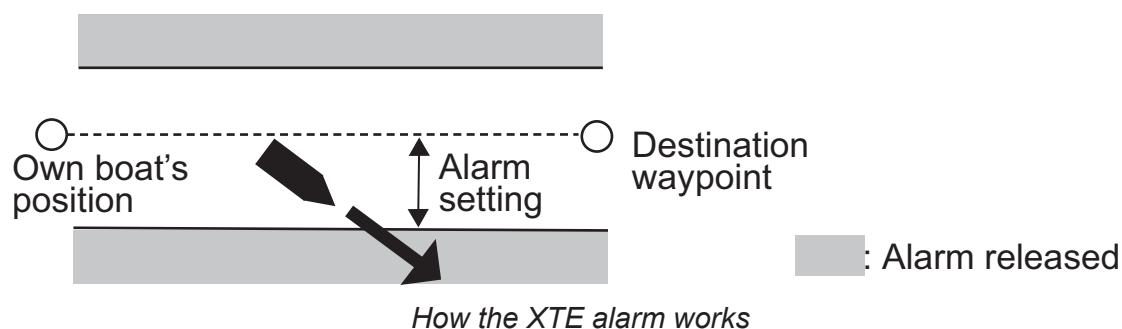
The anchor watch alarm sounds to warn you that your boat is moving when it should be at rest. Before setting the anchor watch alarm, set current position as destination waypoint.



How the anchor watch alarm works

XTE (Cross-Track Error) alarm

The XTE alarm warns you when own boat is off its intended course.

**Speed alarm**

The speed alarm alerts you when the boat's speed is higher than the alarm range set.

WAAS alarm

This alarm alerts you when the WAAS signal is lost. Note that On cannot be chosen if [Mode] in Menu>WAAS is set to GPS.

Time alarm

The time alarm works like an alarm clock, releasing audio and visual alarms when the time entered has come.

Trip alarm

The trip alarm tells you when your boat has traveled further than the preset trip distance.

Odometer alarm

This alarm alerts you when your boat has traveled the total distance you set.

Speed Based Output

This alarm is for a boat that has a control system that applies the boat's speed. The contact signal is normal open. When your boat's speed is faster than the [Close] setting, the contact signal is closed. When your boat's speed is less than the [Open] setting, the contact signal is opened.

6. ALARMS

This page is intentionally left blank.

7. OTHER FUNCTIONS

This chapter describes menu items not carried in other chapters.

7.1 Plotter Setup Menu

Menu >Plotter Setup			
Auto Waypoint Entry(COG)	: Off	60 °	10 s
COG Line	: On		
COG/BRG ref.	: Mag		
Magnetic Variation	: Auto	E12 °	
WP Name	: Disp Goto		
TTG/ETA SPD	: Auto	60 s	

[MENU/ZOOM] :Cancel/Back [ENT] :Enter ▲/▼ :Select

COG Line

You can show or hide the COG line on the plotter display.

COG/BRG ref.

Boat's course and bearing to a waypoint are displayed in true or magnetic bearing. Magnetic bearing is true bearing plus (or minus) earth's magnetic variation. Select the bearing reference in according to the compass installed: magnetic for magnetic compass, true for gyrocompass or satellite compass using true bearing.

Magnetic Variation

The location of the magnetic north pole is different from the geographical north pole. This causes a difference between the true and magnetic north direction. The difference is called magnetic variation, and varies with respect to the observation point on earth. Your unit is pre-programmed with all the earth's magnetic variation. However, you may wish to enter variation manually to refine accuracy using the latest chart. Set [COG/BRG ref.] on the Plotter Setup menu to [Mag] to use magnetic variation.

To enter magnetic variation manually, do the following:

- 1) If necessary, change coordinate from east to west or vice versa.
- 2) Enter the value referring to a recent nautical chart.
- 3) Press the **ENT** key.

TTG/ETA SPD

To calculate time to go and estimated time of arrival, enter your speed as below.

-Auto (GPS calculated speed)

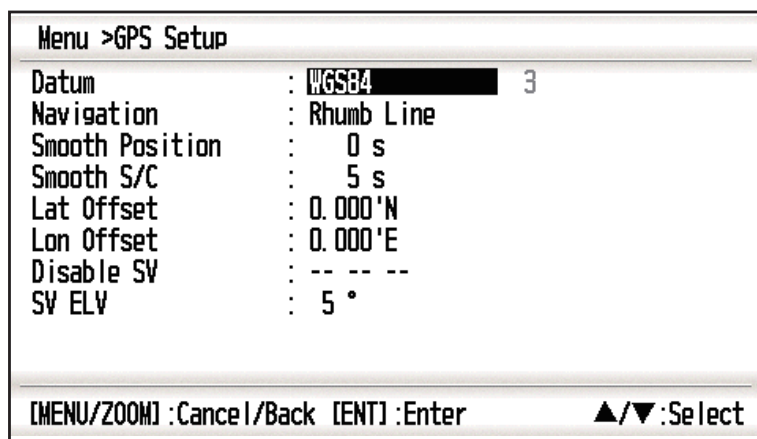
1. Press ► and **ENT** in order.
2. Enter the speed average (1 to 999 sec.) to use, and press the **ENT** key.

-Manual (Speed calculated manually)

1. Press ► and **ENT** in order.
2. Enter speed (1 to 999 knot), and press the **ENT** key.

7.2 GPS Setup Menu

The GPS Setup menu smooths position and course, averages speed, applies position offset, and deactivates unhealthy satellites.

**Datum**

Your unit is programmed to recognize most of the major chart systems of the world. Although the WGS-84 system, the GPS standard, is now widely used other categories of charts still exist. Select the same datum which is used in your nautical charts. Select WGS84 (default setting), WGS72 or Other (required the datum number entering).

Navigation

When you set a destination, the equipment displays the range, bearing and course to that destination. Range and bearing are calculated by the Great Circle or Rhumb Line method. Route total distance is also calculated. Cross-track error is only calculated in the Rhumb Line method.

Rhumb line: This method calculates the range and bearing between two points drawn on a nautical chart. Since the bearing is kept constant it is ideal for short-range navigation.

Great circle: This course line is the shortest course between two points on the surface of the earth, like stretching a piece of string between two points on earth. Frequent bearing changes are required to navigate by this method. For long-range navigation, divide the Great Circle route into several routes, and navigate each route by Rhumb Line.

Smooth Position

When the receiving condition is unfavorable, the GPS fix may change randomly, even if the boat is dead in water. This change can be reduced by smoothing the raw GPS fixes. The setting range is from 0 (no smoothing) to 999 seconds. The higher the setting the more smoothed the raw data, however too high a setting slows response time to change in latitude and longitude. This is especially noticeable at high boat speeds. "0" is the normal setting; increase the setting if the GPS fix changes randomly.

Smooth S/C (speed/course)

During position fixing, your boat's velocity (speed and course) is directly measured by receiving GPS satellite signals. The raw velocity data may change randomly depending on receiving conditions and other factors. You can reduce this random variation by increasing the smoothing. Like with latitude and longitude smoothing, the higher the speed and course smoothing the more smoothed the raw data. If the setting is too high, however, the response to speed and course change slows. The setting range is from 0 (no smoothing) to 9999 seconds.

Lat Offset. Lon Offset

If there is the error between the positions shown on your equipment and chart when docking at a pier, you may apply an offset to latitude and longitude position. Mark own boat's position on the chart to calculate the error with latitude and longitude, and enter the values.

Disable SV (satellite)

Every GPS satellite is broadcasting abnormal satellite number(s) in its Almanac, which contains general orbital data about all GPS satellites. Using this information, the GPS receiver automatically eliminates any malfunctioning satellite from the GPS satellite schedule. However, the Almanac sometimes may not contain this information. You can disable an inoperative satellite manually. Enter satellite numbers (max. three satellites) in two digits.

SV ELV (satellite elevation)

Set the minimum elevation of satellites to use to fix position.

7.3 WAAS Menu

Menu >WAAS		
Mode	:	WAAS
WAAS Search	:	Auto 134
Corrections Data Set	:	0*
[MENU/ZOOM] :Cancel/Back [ENT] :Enter ▲/▼:Select		

*Use "0" (as default setting).

Mode

You can select GPS or WAAS for the position fixing mode.

WAAS Search

For WAAS setting, the GEO satellite is searched automatically or manually. For GEO satellite number, see page AP-3.

Auto: The system automatically searches for the optimum GEO satellite from your current position. (All satellites are searched.)

Manual: Enter a GEO satellite number manually.

Correction Data Set

Use [0] as default setting.

7.4 Position Display Format

Position can be shown in latitude and longitude or TDs (Loran C). Loran C chain data is programmed into the equipment.

Menu >Pos/TD Setup		
Display	:	xx.xxx'
Loran C	:	7980:Southeast USA 23-43
△TD1	:	+ 0.0
△TD2	:	+ 0.0
[MENU/ZOOM] :Cancel/Back [ENT] :Enter ▲/▼:Select		

Display

Select the position format.

- xx.xxx': Shows L/L position with no seconds.
- xx'xx.x": Displays L/L position with seconds.
- LC TD: Loran C TDs

Loran C

When choosing LC TD at Display, do the following:

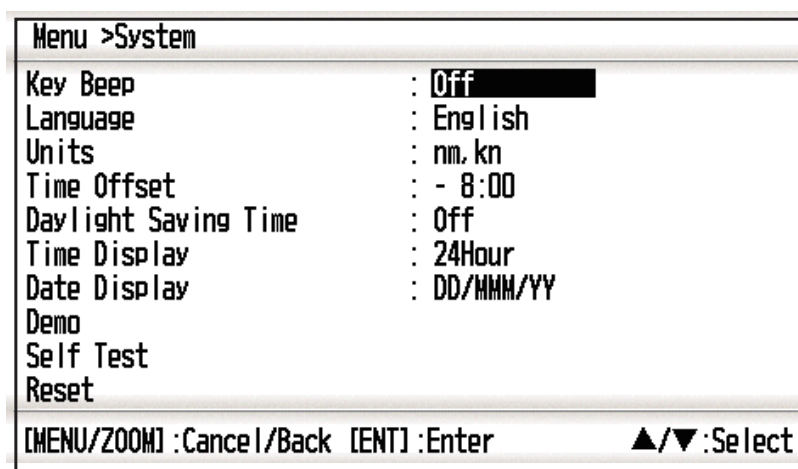
- 1) Press the **ENT** key.
- 2) select the GRI code, and press the **ENT** key.
- 3) Press **►** and **ENT** key.
- 4) Select the pair of slave station, and press the **ENT** key.

△TD1, △TD2

Enter TD offsets to refine Loran C position accuracy.

7.5 System Menu

In the System menu, you can customize various display settings, for example, time and date formats, etc.

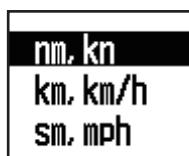


Key Beep

This item turns the key beep on or off.

Units

The Units item lets you select the unit of measurement for range, speed and distance, from the units shown below.



Time Offset

GPS uses UTC time. If you would rather use local time, enter the time difference (range: -14:00 to +14:00, 15 minutes step) between it and UTC time.

Daylight Saving Time

For countries that use daylight savings time, select On to enable daylight savings time.

Time Display

You can display the time in 12 or 24 hour format.

Date Display

Select the date display, DD/MMM/YY or MM/DD/YY.

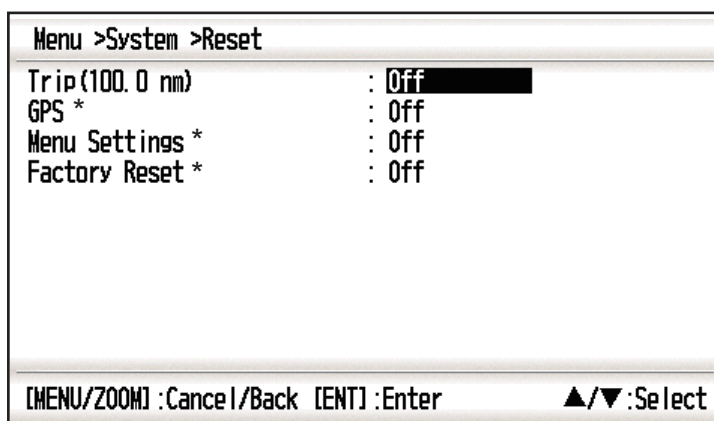
Demo

The demonstration display provides simulated operation of this unit. You may set the speed manually and course manually or automatically. All controls are operative - you may enter marks, set destination, etc.

- **Mode:** select [On]. The indication SIM appears at the top left-hand side to inform you that the simulation mode is in use. To cancel, select [Off].
- **Speed:** Enter the speed (two digits) to use for the demonstration mode.
- **Course:** Select Auto or Manual. For manual entry of course, enter course in three digits. The Auto course tracks a circular course.
- **Lat, Lon:** Enter latitude and longitude of the position to start the demonstration.

Reset (Trip)

You can reset the trip meter to zero. Select [On] at [Trip] on System>Reset menu.

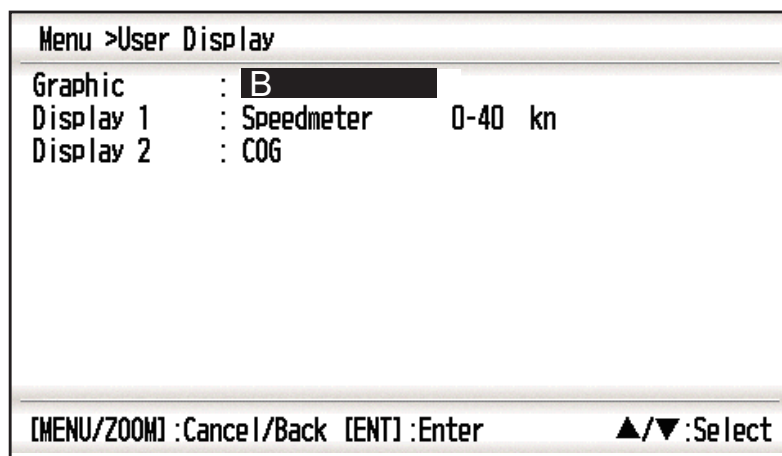


*: Items to be cleared (See section 8.5.)

7.6 User Display Menu

To customize user displays, which are [6] and [7] appeared when the **DISP** key is pressed (see section 1.4), use the User Display menu.

	DISP key is pressed	Item name on User Display menu
User display 1	Display [6]	Display 1
User display 2	Display [7]	Display 2



Note: You can show the User Display menu by pressing the **ENT** key more than three seconds at the User display 1 (display [6]) and 2 ([7]).

Graphic

You can select the graphic type for the analog COG and speedometer displays from two patterns (A and B) which have different character font and scale steps. Note that the graphic selected here can affect minor changes to other displays.

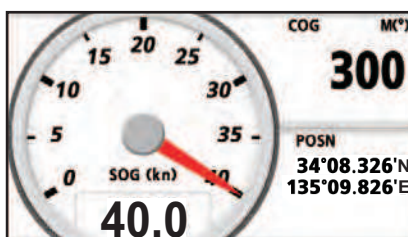
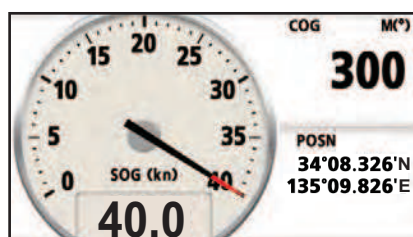
Graphic: A



Graphic: B



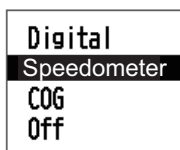
COG display



Speedometer display

Display 1, Display 2

You can select items to show on the User display 1 (display [6]) and 2 ([7]), from among digital data, speedometer and COG (see page 1-7). When choosing [Off] for Display 2, for example, the display [7] is not shown.



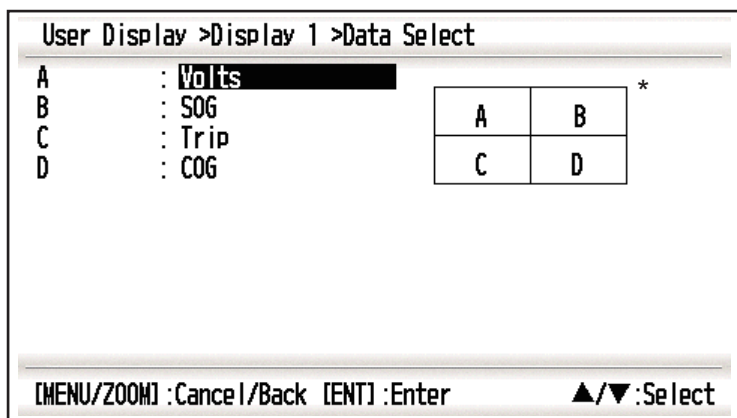
For [Digital], you can display one to four items of digital navigation data on the user display.

1. Press **►** and **ENT** key in order to show the following window.

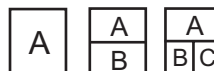


2. Select the screen division, which is the number of data to display, and press the **ENT** key.

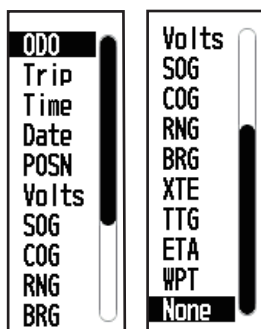
The display now looks something like the one shown below, showing data choices and screen division selected.



* : Depending on the selection at step 2.



3. Select [A], [B], [C] or [D], and press the **ENT** key.



Page 1

Page 2

ODO: Odometer distance

Trip: Trip distance

Time: Time

Date: Date

POSN: Position

Volts: Power voltage

SOG: Speed over ground

COG: Course over ground

RNG: Range

BRG: Bearing

XTE: Cross-track error

TTG: Time to go
(to destination)

ETA: Estimated time to
arrival (to destination)

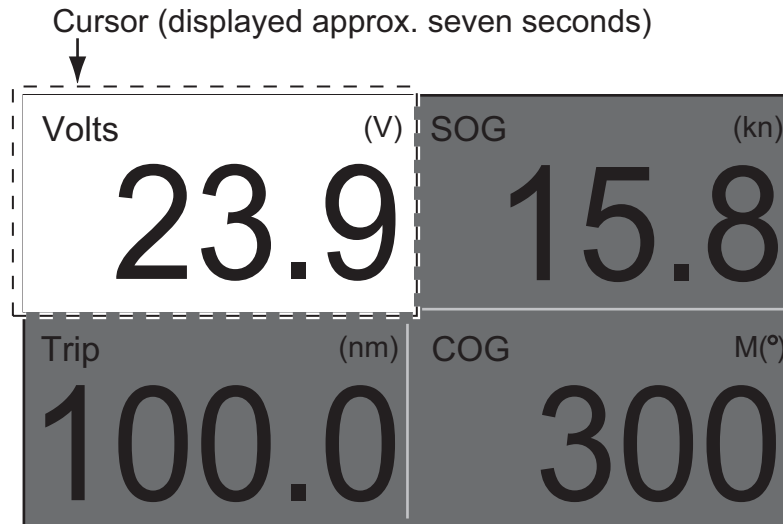
WPT: Range and bearing
to waypoint

None: No display

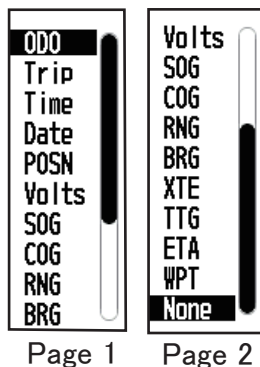
4. Select data desired, and press the **ENT** key.
5. Repeat steps 3 and 4 to set other data.

You can select digital data also from the User display 1 (display [6]) and 2 ([7]) directly.

1. Press the **DISP** key several times to show User display 1 or 2 desired, and press the **ENT** key to show the cursor.



2. Operate the cursormap to select the column to select data, and press the **ENT** key.



Page 1

Page 2

ODO: Odometer distance	XTE: Cross-track error
Trip: Trip distance	TTG: Time to go
Time: Time	(to destination)
Date: Date	ETA: Estimated time to
POSN: Position	arrival (to destination)
Volts: Power voltage	WPT: Range and bearing
SOG: Speed over ground	to waypoint
COG: Course over ground	None: No display
RNG: Range	
BRG: Bearing	

3. Select the item to show, and press the **ENT** key.
4. Repeat steps 2 and 3 for other displays if necessary.

Speedometer

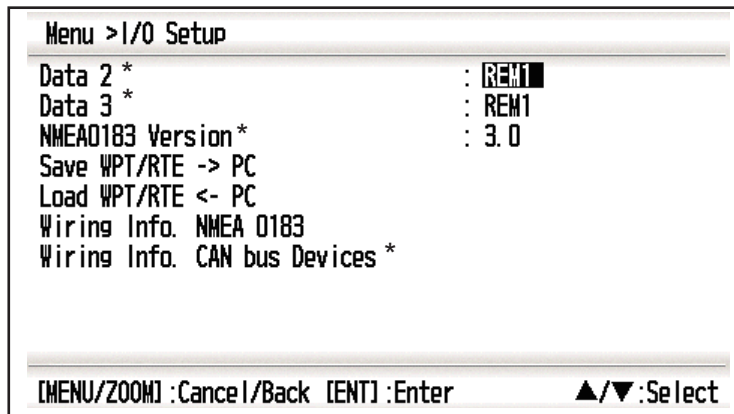
When choosing [speedometer], you can select the range for the speedometer to show on the User display 1 or 2.

0-20	0-40
0-40	0-80
0-80	0-160
(kn, mph)	(km/h)

7.7 I/O Setup Menu

Waypoint and route data can be uploaded from your unit to a PC, or downloaded from a PC to your unit.

There are two kinds of data for route data: route data and route comment data.



*: See chapter 9.

Note: No position fix is available during uploading or downloading.

Setting for communication software on PC

Baud Rate	38400 bps
Character Length	8 bit
Parity	None
Stop Bit	1 bit
Flow Control	XON/OFF

Waypoint data format

\$PFEC,	GPwpl,	<u>lll.ll</u> ,	<u>a</u> ,	<u>yyyyy.yy</u> ,	<u>a</u> ,	<u>c—c</u> ,	<u>c</u> ,	<u>c—c</u> ,	<u>a</u> ,	<u>hhmmss</u> ,	<u>xx</u> ,	<u>xx</u> ,	<u>xxxx</u>	<CR><LF>
		1	2	3	4	5	6	7	8	9	10	11	12	

1: Waypoint latitude

2: N/S

3: Waypoint longitude

4: E/W

5: Waypoint name (1 to 8 characters)

6: Waypoint color

(NULL/0: black, 1: red, 2: yellow, 3: green, 4: brown, 5: purple, 6: blue)

7: Waypoint comment ("@_" (see below.)" + 0 to 13 characters)

-Internal mark code is 0x10 through 0x19. 0x71 through 0x7A are always place at 2nd byte of mark code.

-Following characters can be used for comments:

_ _ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789&()+/=?> (space)

0x10: ● @q, 0x11: ■ @r, 0x12: ◆ @s, 0x13: 🐟 @t, 0x14: ☹ @u,

0x15: 🤖 @v, 0x16: 🏔 @w, 0x17: ⚓ @x, 0x18: ☠ @y, 0x19: 🏴 @z

8: Flag marking waypoint (A: displayed, V: Not displayed)

9: UTC (Always NULL)

10: Day (Always NULL)

11: Month (Always NULL)

12: Year (Always NULL)

7. OTHER FUNCTIONS

Route data format

\$GPRTE, $\frac{x.x}{1}$, $\frac{x.x}{2}$, $\frac{a}{3}$, $\frac{c--c}{4}$, $\frac{c--c}{5}$, ... , $\frac{c--c}{12}$ <CR><LF>

- 1: Number of sentences required for one complete route data (1 to 6) See note.
- 2: Number of sentences currently used (1 to 6)
- 3: Message mode (Always set to "C".)
- 4: Route No. (1 to 100)
- 5 to 12: Waypoint name (1 to 8 characters, length of each waypoint name is fixed to 7 byte)
1st byte: "-" (hyphen)= skip ON,
" " (space)= skip OFF
After 2nd byte: Waypoint name
(1 to 8 characters)

Note: A route can contain max.30 waypoints and GPRTE sentence for one route data may exceed 80 byte limitation. In this case, route data is divided into several GPRTE sentences (max. 4 sentences). This value shows the number of sentences route data has been divided.

Route comment data format

\$PFEC, GPrtc, $\frac{x}{1}$, $\frac{c--c}{2}$, $\frac{c--c}{3}$ <CR><LF>

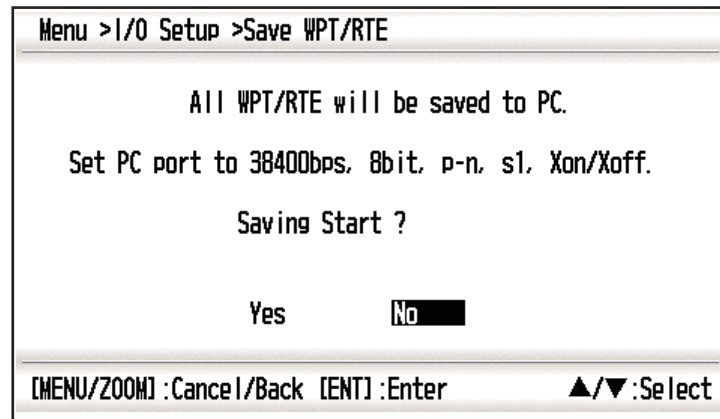
- 1: Route No. (1 to 100)
- 2: Route comment (Max. 18 characters, variable length)
- 3: Route name (Max. 6 characters, variable length)

End of sentence

\$PFEC, GPxfr, CTL, E <CR><LF>

7.7.1 Uploading data to a PC

1. Connect a PC to your GP-33, referring to the interconnection diagram at the back of this manual.
2. Press the **MENU/ZOOM** key twice to show the main menu.
3. Select [I/O Setup], and press the **ENT** key.
4. Select [Save WPT/RTE -> PC], and press the **ENT** key.

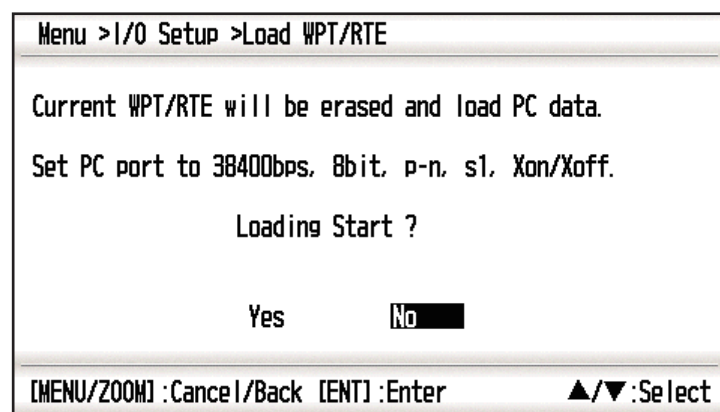


5. Press **◀** to select [Yes], and press the **ENT** key to start the uploading.
6. When the completion message appears, press any key to finish.

7.7.2 Downloading data from PC

Note that all waypoint and route data stored in the GP-33 will be deleted when data is downloaded from PC.

1. Connect a PC to your GP-33, referring to the interconnection diagram at the back of this manual.
2. Press the **MENU/ZOOM** key twice to show the main menu.
3. Select [I/O Setup], and press the **ENT** key.
4. Select [Load WPT/RTE <- PC], and press the **ENT** key.



5. Press **◀** to select [Yes], and press the **ENT** key to start the downloading.
6. After the completion message appears, press any key to finish.

7. OTHER FUNCTIONS

This page is intentionally left blank.

8. MAINTENANCE, TROUBLE-SHOOTING

NOTICE

Do not apply paint, anti-corrosive sealant or contact spray to plastic parts or equipment coating.

Those items contain products that can damage plastic parts and equipment coating.

8.1 Maintenance

Regular maintenance is important to maintain performance. Check the following points to help maintain performance.


- Check that connectors on the rear panel are firmly tightened and free of rust.
- Check that the ground system is free of rust and the ground wire is tightly fastened.
- Check that battery terminals are clean and free of rust.
- Dust or dirt may be removed from the cabinet with soft cloth. Water-diluted mild detergent may be used if desired. DO NOT use chemical cleaners to clean the display unit; they may remove paint and markings.
- Wipe the LCD carefully to prevent scratching, using tissue paper and an LCD cleaner. To remove dirt or salt deposits, use an LCD cleaner, wiping slowly with tissue paper so as to dissolve the dirt or salt. Change paper frequently so the salt or dirt will not scratch the LCD. Do not use solvents such as thinner, acetone or benzene for cleaning. Also, do not use degreaser or antifog solution, as they can strip the coating from the LCD.

Life of LCD

The life of the LCD is approximately 50,000 hours. The actual number of hours depends on ambient temperature and humidity. When the brilliance cannot be raised sufficiently, ask your dealer about replacement.

8.2 Troubleshooting

This section provides simple troubleshooting procedures which the user can follow to restore normal operation. If you cannot restore normal operation, do not attempt to check inside the unit. Any trouble should be referred to a qualified technician.

Symptom	Remedy
You cannot turn on the power.	Check that power cable is firmly fastened.
	Check for damaged power cable and connector.
	Check battery for proper voltage output.
No picture appears.	Press the  / BRILL key several times to adjust the brilliance.
There is no response when a key is pressed.	Turn off and on the power. If no change, ask your dealer.
Position is not fixed within 90 seconds.	Check that antenna connector is firmly fastened.
	Check the number of satellites on Satellite Monitor display. If there are two or less, check for obstructions between antenna unit and satellites.
Position is wrong.	Check that the correct geodetic chart system is selected on the GPS Setting screen.
	Enter position offset on the GPS Setting screen.
Loran C TDs do not appear.	Check Loran C chain data on the Pos/TD Setup screen.
Loran C TDs are wrong.	Enter TD offset on the Pos/TD Setup screen.
Bearing is wrong.	Check Magnetic Variation on the Plotter Setup screen.

8.3 Displaying the Message Board

When an error occurs, a message and an alarm icon appear on the screen. The message board displays the error messages (see page 6-2) shown in table below.

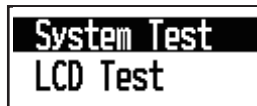
Messages and meanings

Message	Meaning, remedy
GPS ERROR!	Request service.
GPS NO FIX!	No GPS signal. Check antenna cable.
RAM ERROR!	Request service.
ROM ERROR!	Request service.
BACKUP ERROR!	RAM data corrupted. Try to clear backup data.

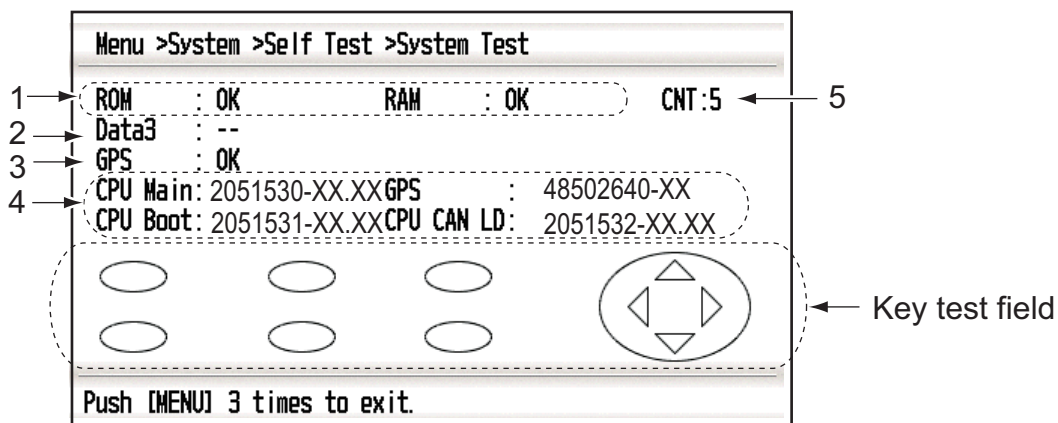
8.4 Diagnostics

The diagnostic test checks the ROM, RAM, input data, GPS core, keyboard and LCD performance. The user can do the tests to help the service technician in troubleshooting.

1. Press the **MENU/ZOOM** key twice to show the menu.
2. Select [System], and press the **ENT** key.
3. Select [Self Test], and press the **ENT** key.



4. Select [System Test], and press the **ENT** key to start the test.
The results are individually displayed as OK or NG (No Good). If NG appears, try the test again. If NG re-appears, contact your dealer for advice.



XX: Program version No.

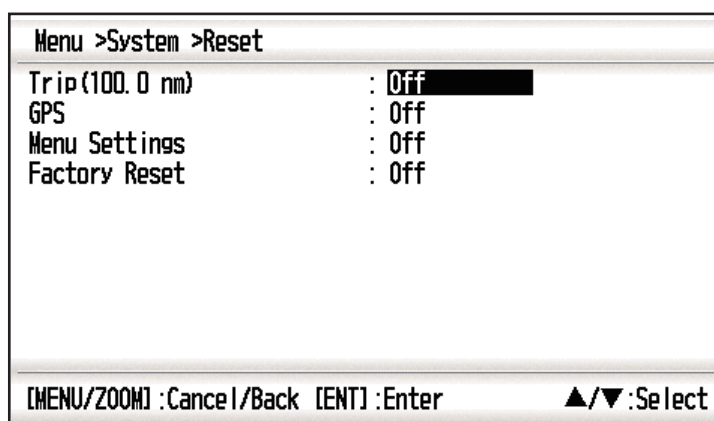
No.	Test Items	Description
1	ROM, RAM test	Correct: "OK", Wrong: "NG"
2	Data3 test	"-" (This test is used at factory only.)
3	GPS test	Correct: "OK", Wrong: "NG"
4	Program version No.	The program version No. which is currently used appears.
5	CNT	Number of test repetition.

- Press each key one by one.
The corresponded mark on the display turns red if the key is functioning properly.
- Press the **MENU/ZOOM** key three times to close the test screen.
- Select [LCD Test], and press the **ENT** key.
Each press of this key changes the LCD pattern in the sequence shown below.
Red→Green→Blue→Red (gradation)→Green (gradation)→Blue (gradation)→White→Black→White/Black (gradation)→return to System screen.
Note: To cancel the test, press the **MENU/ZOOM** key.
- Press the **MENU/ZOOM** key twice to close the menu.

8.5 Clearing Data

You can clear GPS data, menu settings* and all backup data* to start afresh (*other than Language, Units and TD).

- Press the **MENU/ZOOM** key twice to show the menu.
- Select [System], and press the **ENT** key.
- Select [Reset], and press the **ENT** key.



- Select [GPS], [Menu Settings] or [Factory Reset], and press the **ENT** key.
- Select [On], and press the **ENT** key.
- Press ◀ to select [Yes], and press the **ENT** key.
[Menu Settings], [Factory Reset]: Go to Initial Setting screen. Select the language, then press **ENT** and **MENU/ZOOM** key in order.

9. INSTALLATION

9.1 Equipment Lists

Standard Supply

Name	Type	Code No.	Qty	Remarks
Receiver unit	GP-33	-	1	
Antenna Unit	GPA-017	-	1	w/10 m cable
Installation Materials	CP20-03300	-	1 set	-M12-05BM+05BF-060 -CP20-03310
Accessories	FP20-01200	-	1 set	See the packing list at the back of this manual.

Optional Supply

Name	Type	Qty	Remarks
Junction Box	FI-5002	000-010-765	
Cable Assy.	FRU-10BFFM-02M	001-112-970-10	
Right Angle Antenna Base	NO.13-QA330	001-111-910-10	For mounting the antenna unit, select one.(See the installation procedure at the back of this manual.)
L-type Antenna Base	NO.13-QA310	001-111-900-10	
Handrail Antenna Base	NO.13-RC5160	001-111-920-10	
Mast Mounting Kit	CP20-01111	004-365-780	
NMEA Connector	SS-050505-FMF-TS001	000-168-603-10	CAN bus distributor, micro style
	NC-050505FMF-TS001	000-160-507-10	CAN bus distributor, mini style

9.2 Installation of Receiver Unit

9.2.1 Installation consideration

The receiver unit can be installed on a desktop, underside of table or in a panel. Refer to the outline drawings at the end of this manual for installation instructions. When selecting a mounting location, keep in mind the following points:

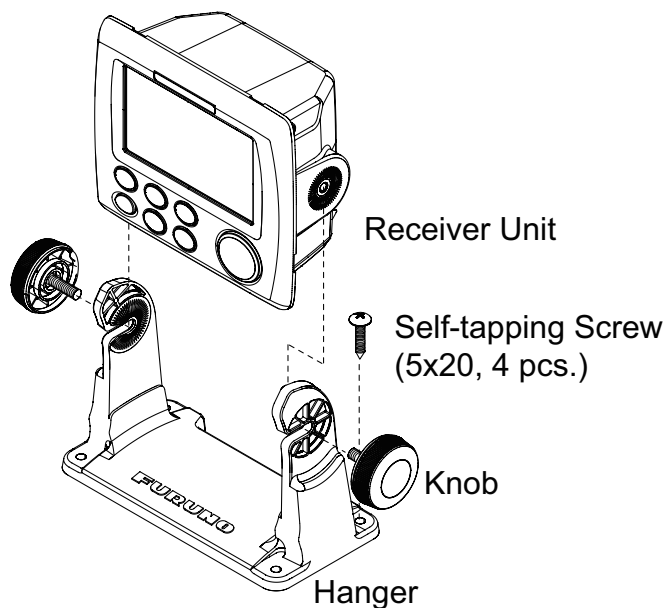
- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal.

9. INSTALLATION

- Locate the unit away from equipment which generates electromagnetic fields such as a motor or generator.
- Allow sufficient maintenance space at the sides and rear of the unit and leave sufficient slack in cables, to facilitate maintenance and servicing.
- Observe compass safe distances noted on page ii to prevent interference to a magnetic compass.
- Locate the unit away from direct sunlight. An LCD may black out if it is exposed to direct sunlight for a long time.
- The optimal viewing distance is 0.6 m. Select a suitable mounting location considering the distance.

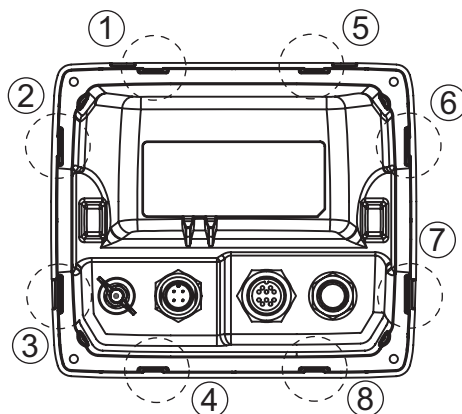
9.2.2 Desktop and underside of table mount

1. Unscrew knobs to dismount the receiver unit from the hanger.
2. Prepare four pilot holes (for 5x20 self-tapping screws) at the mounting location.
3. Fix the hanger to the mounting location with four self-tapping screws (5x20, supplied).
4. Attach cables to the back of the receiver unit (see section 9.4).
5. Set the receiver unit to the hanger, and fasten knobs to fix it.

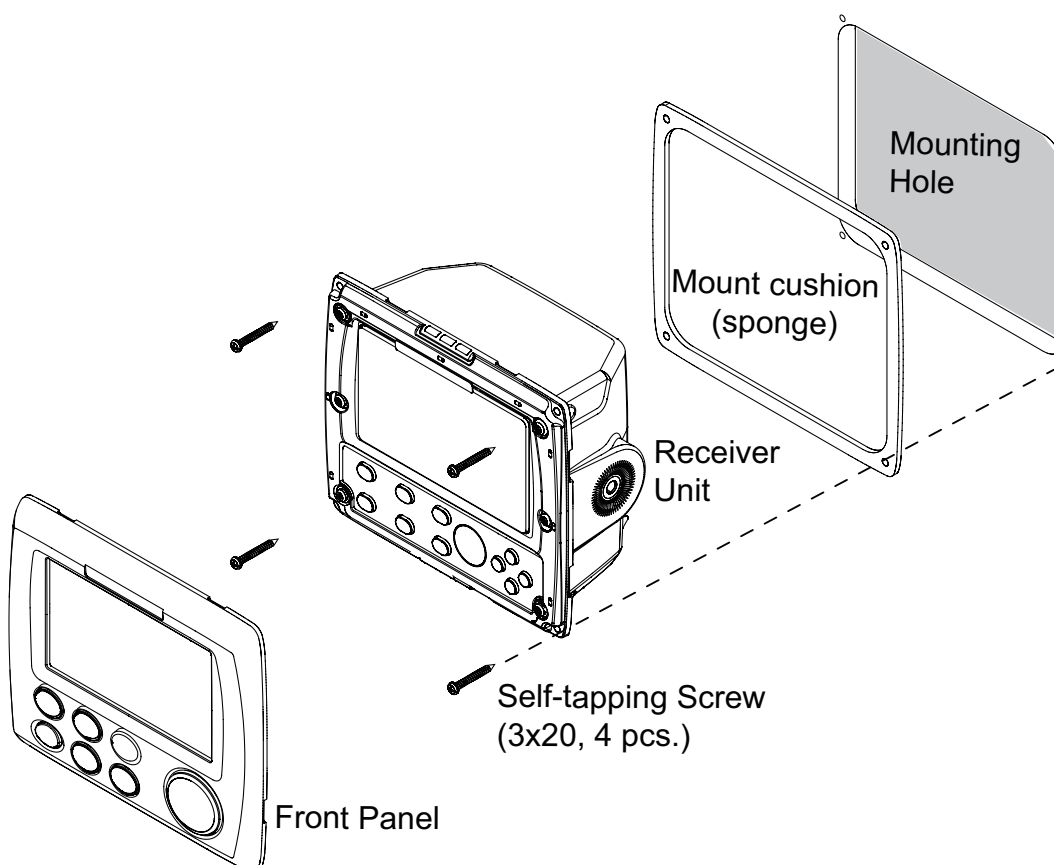


9.2.3 Flush mount

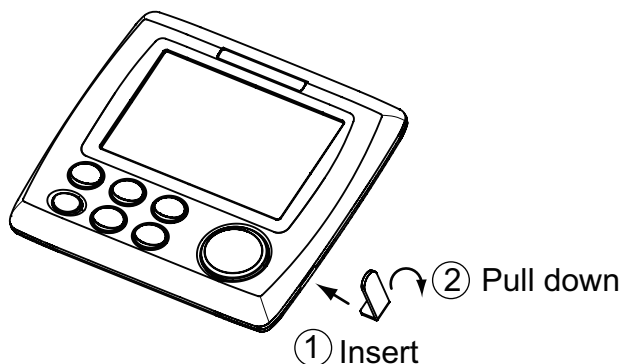
1. Using the template (supplied), cut out a hole in the mounting location.
2. Prepare four pilot holes (for 3x20 self-tapping screws) at the mounting location.
3. Unscrew knobs to dismount the receiver unit from the hanger.
This hanger can be discarded.
4. Remove the front panel from the receiver unit by unfastening the catches at the rear of the panel by hands, in the order shown in the figure below.



5. Attach the mount cushion (sponge) to the hole made at step 1, or receiver unit.
6. Connect cables to the back of the receiver unit (see section 9.4).
7. Use four self-tapping screws (3x20, supplied) to fasten the receiver unit to the mounting location, and re-attach the front panel.



Note: When removing the equipment from the flush mounted location, use the remover (supplied) to remove the panel as shown below.



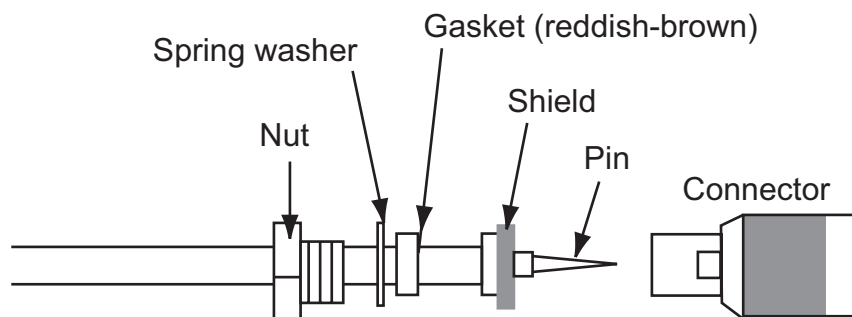
9.3 Installation of Antenna Unit

Install the antenna unit referring to the antenna installation diagram at the back of this manual. When choosing a mounting location for the antenna unit, keep in mind the following points:

- Select a location out of the radar beam. The radar beam will obstruct or prevent reception of the GPS signal.
- The location should be well away from a VHF/UHF antenna. A GPS receiver is interfered by a harmonic wave of a VHF/UHF antenna.
- There should be no interfering object within the line-of-sight to the satellites. An object within line-of-sight to satellites, for example, a mast, may block reception or prolong acquisition time.
- Mount the antenna unit as high as possible to keep it free from interfering objects and water spray. Freezing water can interrupt reception of the GPS satellite signal.

Note 1: Do not shorten the antenna cable.

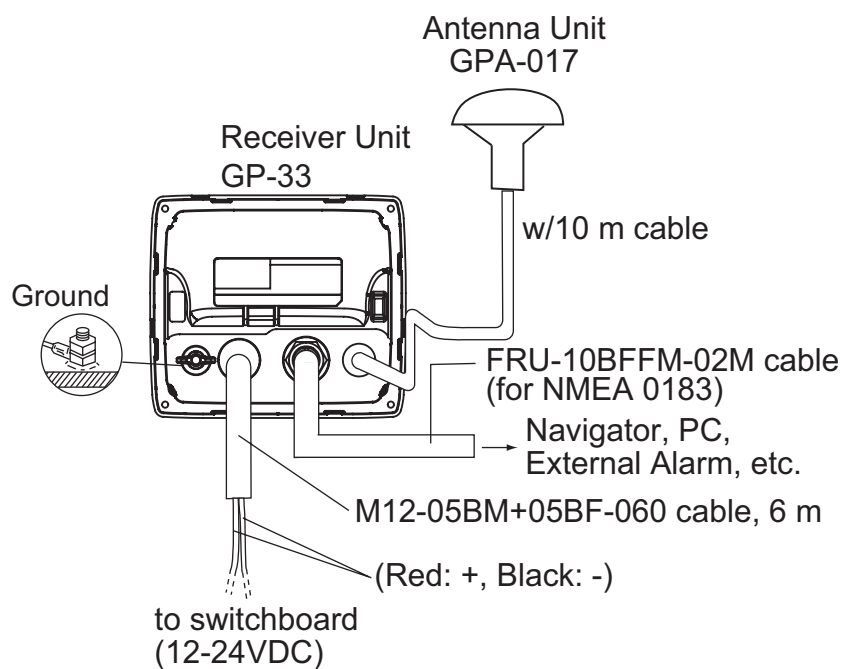
Note 2: If the antenna cable is to be passed through a hole which is not large enough to pass the connector, unfasten the connector with a needle nose pliers and 3/8-inch open-end wrench. Refasten it as shown below, after running the cable through the hole.



9.4 Wiring

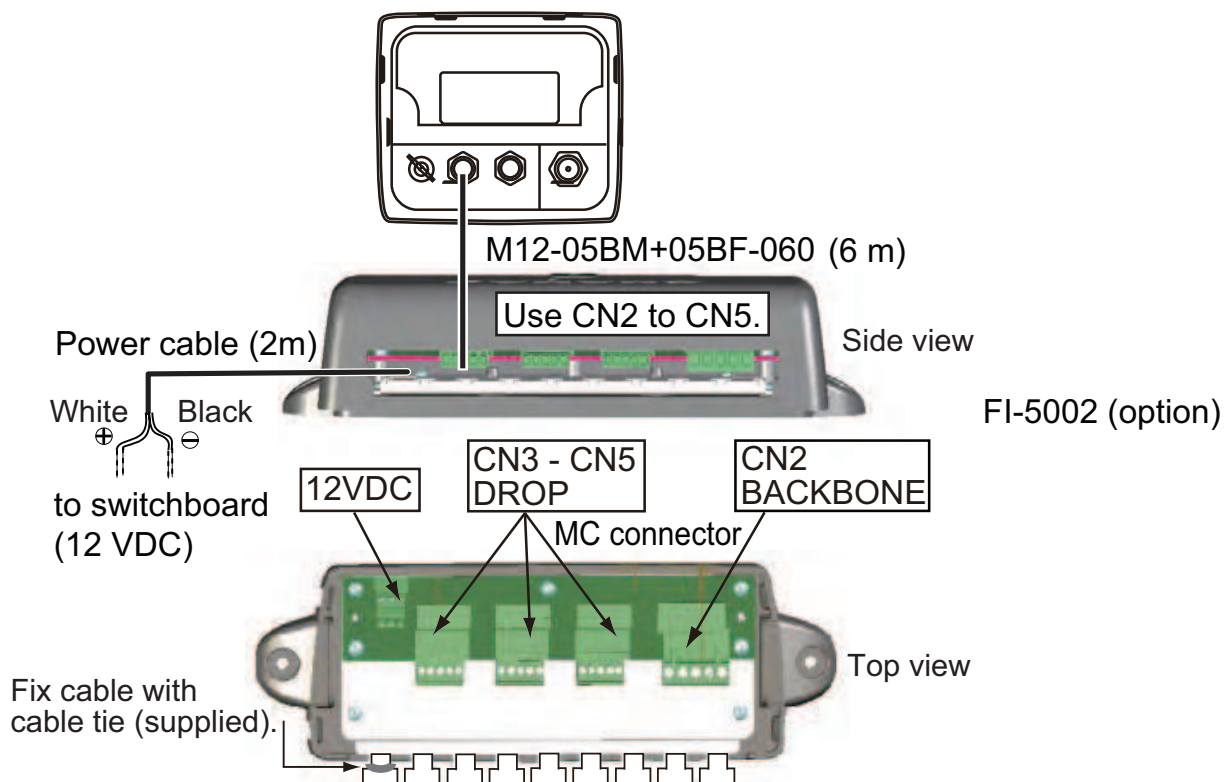
When no CAN bus equipment is connected

When connecting no CAN bus equipment, use the red and black-colored cores of M12-05BM+05BF-060 cable to connect to the 12-24 VDC switch board. (For other cores, cut them and tape individually.)

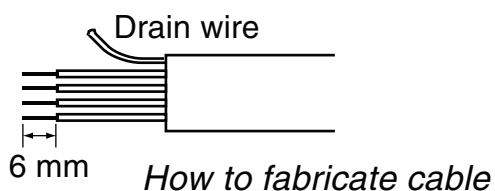


Connection with the optional junction box FI-5002

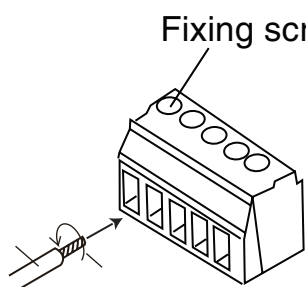
Detailed information for the service technician about CAN bus wiring is in the document titled “Furuno CAN bus Network Design Guide (TIE-00170-*)” separately.



- Fabrication of M12-05BM+05BF-060 cable and MC connector



Drain	#1
Red	#2
Black	#3
White	#4
Blue	#5

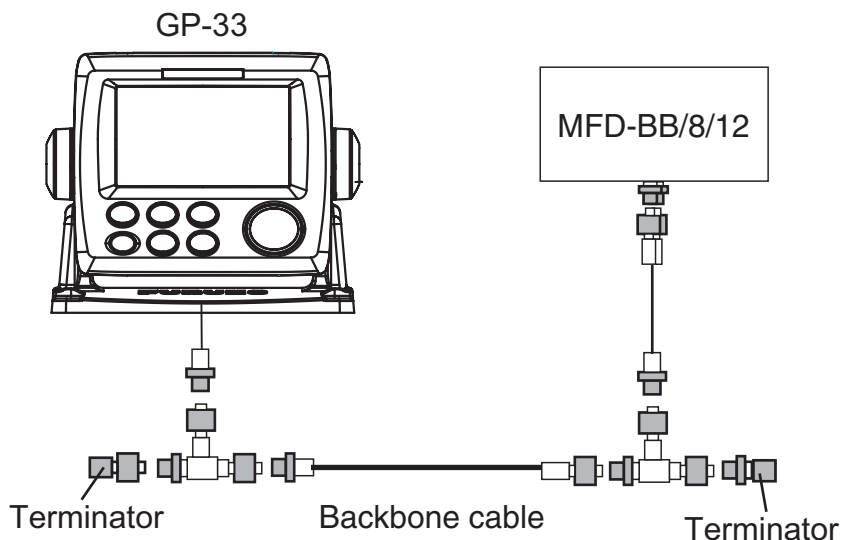


1. Twist wires.
2. Loosen fixing screw in plug.
3. Insert wire into hole.
4. Tighten fixing screw.
5. Pull wire to confirm the connection.

How to insert wire

Terminator

- When connecting to backbone cable



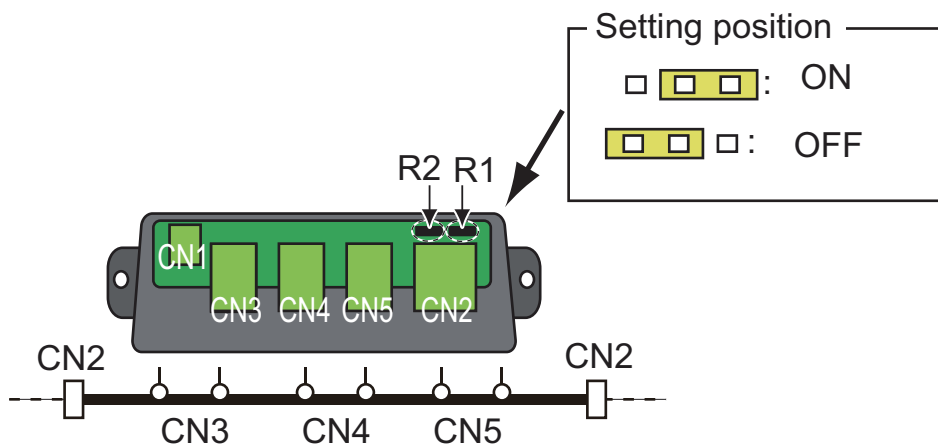
Attach the following terminators to both ends of the backbone cable.

Name	Type	Code No.	Remarks
Terminator (male)	LTWMN-05AMMT-SL8001	000-160-508-10	Mini connector
Terminator (female)	LTWMN-05AFFT-SL8001	000-160-509-10	Mini connector
Terminator (male)	LTWMC-05BMMT-SL8001	000-168-604-10	Micro connector
Terminator (female)	LTWMC-05BFFT-SL8001	000-168-605-10	Micro connector

When connecting to the optional junction box FI-5002

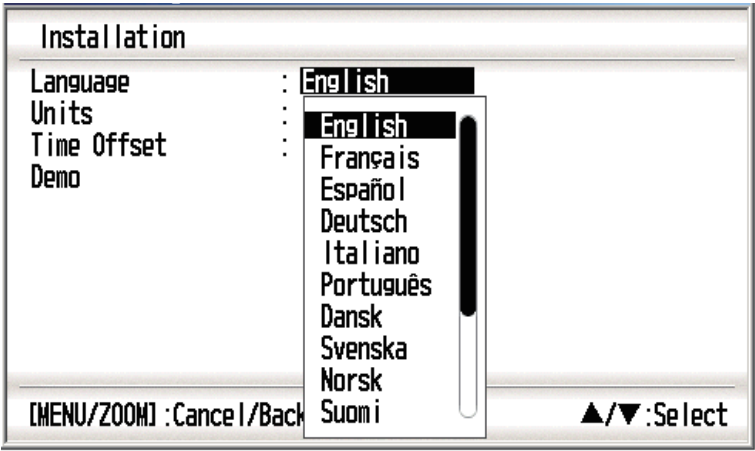
There are two terminal resistors (R1 and R2) inside the FI-5002.

- No backbone cable is connected: Set both R1 and R2 to "ON".
- Backbone cable is connected: Set a resistor to "ON".
- Two backbone cables are connected: Set both R1 and R2 to "OFF".



9.5 Language Setting

When you first turn the power on after installation, you are asked the language to use on the equipment. Press ▲ or ▼ to select the language, and press the **ENT** key.



9.6 Input/Output Data

This equipment inputs/outputs NMEA0183 or CAN bus data shown below. Note that NMEA 0183 version (2.0 or 3.0) can be selected from the I/O setup screen.

Data 1: CAN bus port (input)

PGN	Description	Remark
059904	ISO Request	
060928	ISO Address Claim	
061184 #4=0	Self Test Group Function	
065286	Proprietary; Boot State Request	
126208	Request Group Function	
	Command Group Function	
126720 #4=1	Memory Clear Group Function	
126720 #4=2	Reset Group Function	

Data 1: CAN bus port (output)

PGN	Description	Output cycle
059392	ISO Acknowledgement	N/A
060928	ISO Address Claim	N/A
061184	Self Test Group Function	N/A
126208	NMEA-Acknowledge group function	N/A
126464	PGN List Transmit and Received PGNs Group Function	N/A
126720-1	Memory Clear Group Function	N/A
126720-2	Reset Group Function	N/A
126992	System Time	1000
126996	Product Information	N/A
127258	Magnetic Variation	1000
129026	COG & SOG, Rapid Update	1000
129029	GNSS Position Data	1000
129033	Time & Date	1000
129044	Datum	10000
129283	Cross Track Error	1000
129284	Navigation Data	1000
129285	Navigation -Route/WP information	N/A
129538	GNSS Control Status	N/A
129539	GNSS DOPs	1000
129540	GNSS Sats in View	1000
130822	Unit Division Code	N/A
130823	Browser Control Status	N/A

Data 2/Data 3: NMEA Output Sentence

Format**	REM1	REM2	AP	GPS
AAM*			ON	
APB*			ON	
BOD*			ON	
BWC*		ON	ON	
BWR*		ON	ON	
DTM	ON	ON		
GGA	ON	ON		ON
GLL	ON		ON	
GSA				ON
GSV				ON
RMB*	ON	ON		
RMC	ON	ON		
VTG	ON	ON	ON	ON
XTE			ON	
ZDA	ON	ON	ON	
RTE	For PC only. (See Chapter 7.)			

REM1/REM2: Radar, echo sounder, etc.

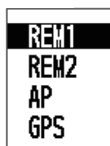
AP: Autopilot

*: Not output when no waypoint is set.

**: Talker; GP

Output setting

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [I/O Setup], then press the **ENT** key.
3. Select [Data 2], [Data 3] or [NMEA0183 Version] depending on the equipment connected.
4. Press the **ENT** key. One of the following screens appears depending on the item selected at step 3.



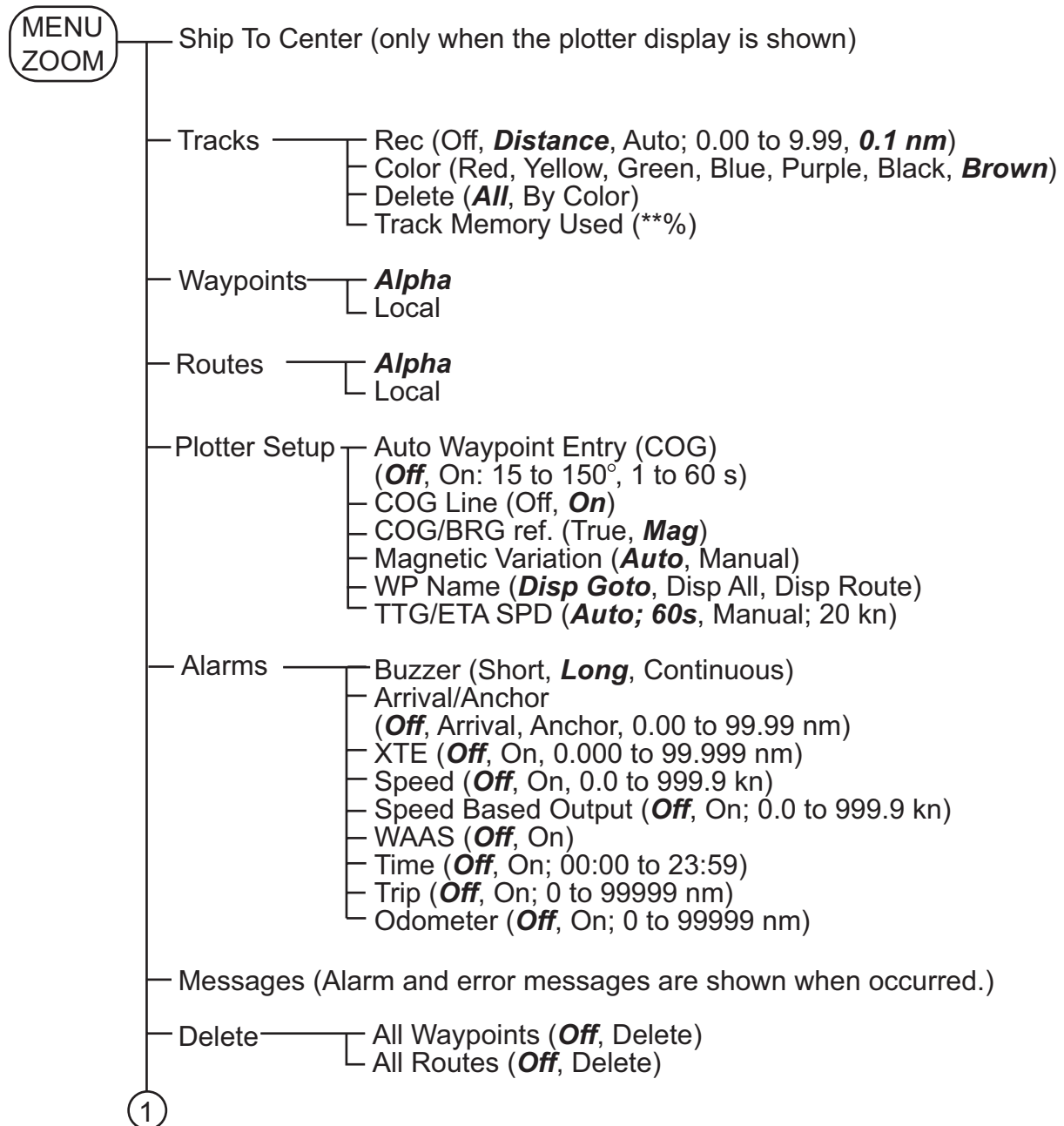
“Data2/Data3” “NMEA0183 Version”

5. Press ▲ or ▼ to select the option.
 REM1, 2: Output data to radar, echo sounder.
 AP: Output data to an autopilot.
 GPS: Output GPS data (used for the service)
 2.0, 3.0: select the NMEA version of external equipment. If you are unsure of the version number, try both and select the one which successfully outputs data.
6. Press the **ENT** key.
7. Press the **MENU/ZOOM** key twice to close the menu.

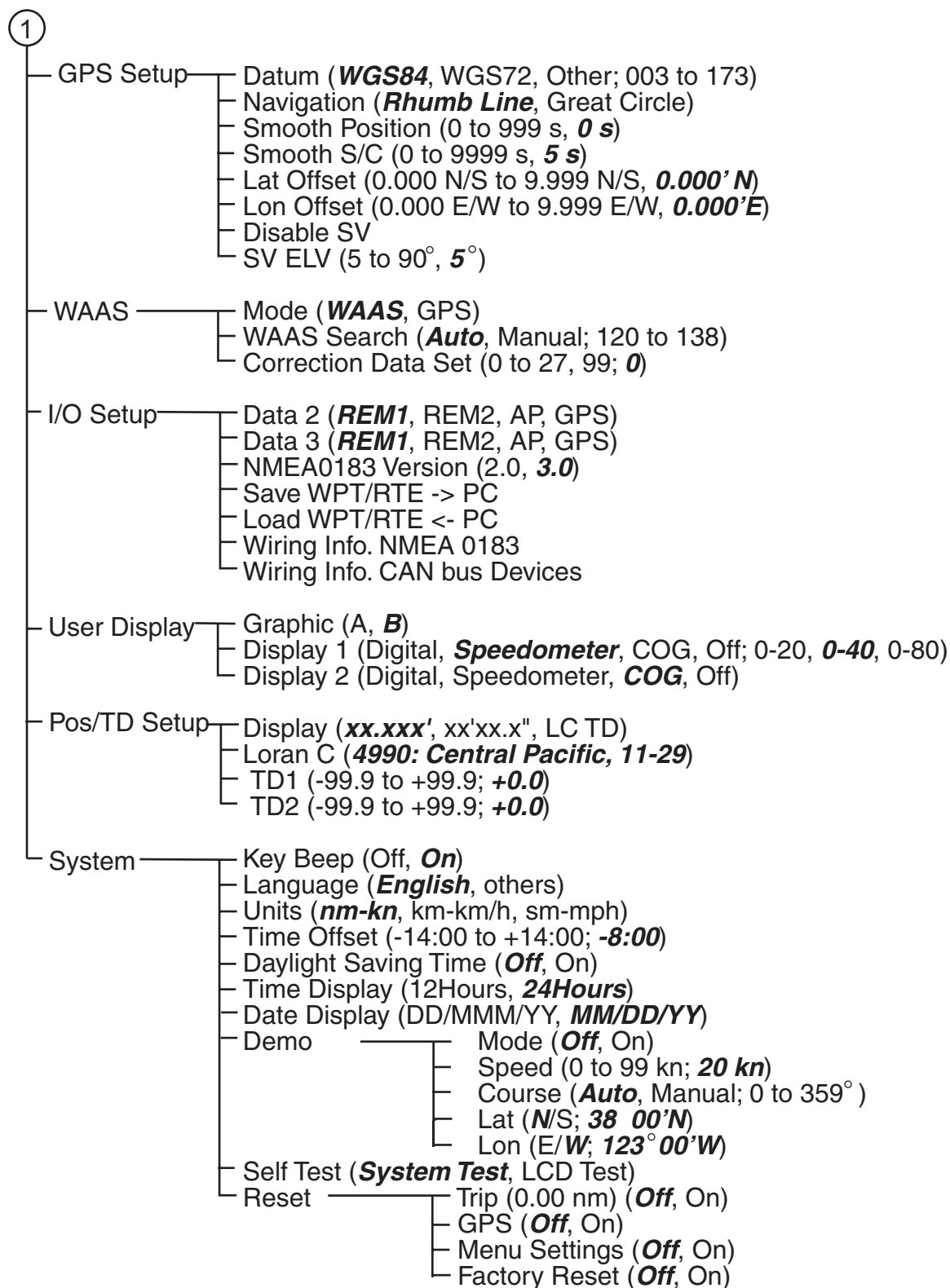
9. INSTALLATION

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APPENDIX 1 MENU TREE

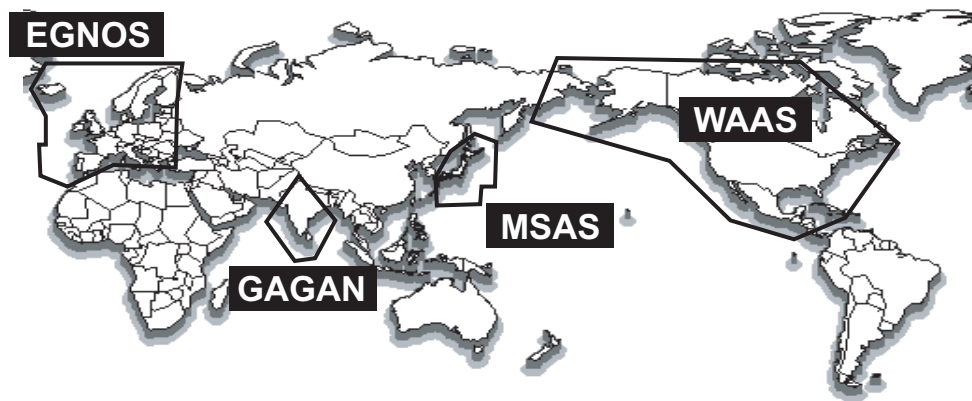


Bold: Default setting



APPENDIX 2 WHAT IS WAAS?



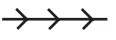
WAAS, available in North America, is a provider in the worldwide SBAS (Satellite Based Augmentation System) navigation system. CBAS provides GPS signal corrections to SBAS users, for even better position accuracy, typically better than three meters. There are three more SBAS providers, MSAS (Multi-Functional Satellite Augmentation System) for Japan, EGNOS (Euro Geostationary Navigation Overlay Service) for Europe and GAGAN (GPS And GEO Augmented Navigation) for India. The illustration below shows the coverage area. (Accuracy may be affected when using a GEO satellite not within your current location.) This manual uses “WAAS” for these three providers generically.



Provider	Satellite type	Longitude	Satellite No.
WAAS	Intelsat Galaxy XV	133°W	135
	TeleSat Anik F1R	107.3°W	138
	Inmarsat-4-F3	98°W	133
EGNOS	Inmarsat-3-F2/AOR-E	15.5°W	120
	Artemis	21.5°E	124
	Inmarsat-4-F2	25°E	126
MSAS	MTSAT-1R	140°E	129
	MTSAT-2	145°E	137
GAGAN	Inmarsat-4-F1	64°E	127

APPENDIX 3 LIST OF TERMS

The following table shows the terms used in GP-33.

Terms/Symbols	Meaning	Terms/Symbols	Meaning
	Waypoints	Lat	Latitude
	Own Boat	Lon	Longitude
"M"	Man Overboard	LC	Loran-C
	Shortest course to the destination	M, Mag	Magnetic
+	Cursor	MAR	March
%	Percentage	MAY	May
2D	2D GPS position fix	MM (MMM)	Month
3D	3D GPS position fix	mph	mile per hour
W2D	2D WAAS position fix	N	North
W3D	3D WAAS position fix	nm	Nautical Mile
AP	Autopilot	NMEA	National Marine Electronics Association
APR	April	NOV	November
AUG	August	OCT	October
Auto	Automatic	Odo	Odometer
Brill	Brilliance	PDOP	Position Dilution Of Precision
BRG	Bearing	Pos	Position
Cmnt	Comment	ref.	Reference
COG	Course Over Ground	QP	Quick Point
DD	Day	REM	Remote
DEC	December	RNG	Range
Demo, SIM	Demonstration Mode	RTE, RT	Route
Disp	Display	S	South
DOP	Dilution Of Precision	s	seconds
E	East	S/C	Speed/Course
ELV	Elevation	SEP	September
ENT	Enter	sm	Statute Mile
ETA	Estimated Time of Arrival	SOG	Speed Over Ground
FEB	February	SPD	Speed
G	Go to	T	True
GPS	Global Positioning System	TD	Time Difference
I/O	Input/Output	TTG	Time To Go
HDOP	Horizontal Dilution Of Precision	Volt	Voltage
JAN	January	W	West
JUL	July	WAAS	Wide Area Augmentation System
JUN	June	WPT, WP	Waypoint
km	kilometer	XTE	Cross Track Error
kn	knot	YY	Year

APPENDIX 4 GEODETIC CHART LIST

001: WGS84		090: NORTH AMERICAN 1927	: Alaska
002: WGS72		091: NORTH AMERICAN 1927	: Bahamas (excl. San Salvador Is.)
003: TOKYO	: Mean Value (Japan, Korea & Okinawa)	092: NORTH AMERICAN 1927	: Bahamas, San Salvador Is.
004: NORTH AMERICAN 1927	: Mean Value (CONUS)	093: NORTH AMERICAN 1927 (Cont'd)	: Canada (incl. Newfoundland Is.)
005: EUROPEAN 1950	: Mean Value	094: NORTH AMERICAN 1927 (Cont'd)	: Alberta & British Columbia
006: AUSTRALIAN GEODETIC 1984	: Australia & Tasmania	095: NORTH AMERICAN 1927 (Cont'd)	: East Canada
007: ADINDAN	: Mean Value (Ethiopia & Sudan)	096: NORTH AMERICAN 1927 (Cont'd)	: Manitoba & Ontario
008: ADINDAN	: Ethiopia	097: NORTH AMERICAN 1927 (Cont'd)	: Northwest Territories & Saskatchewan
009: ADINDAN	: Mali	098: NORTH AMERICAN 1927 (Cont'd)	: Yukon
010: ADINDAN	: Senegal	099: NORTH AMERICAN 1927 (Cont'd)	: Canal Zone
011: ADINDAN	: Sudan	100: NORTH AMERICAN 1927 (Cont'd)	: Caribbean
012: AFG	: Somalia	101: NORTH AMERICAN 1927 (Cont'd)	: Central America
013: AIN EL ABD 1970	: Bahrain Is.	102: NORTH AMERICAN 1927 (Cont'd)	: Cuba
014: ANNA 1 ASTRO 1965	: Cocos Is.	103: NORTH AMERICAN 1927 (Cont'd)	: Greenland
015: ARC 1950	: Mean Value	104: NORTH AMERICAN 1927 (Cont'd)	: Mexico
016: ARC 1950	: Botswana	105: NORTH AMERICAN 1983	: Alaska
017: ARC 1950	: Lesotho	106: NORTH AMERICAN 1983	: Canada
018: ARC 1950	: Malawi	107: NORTH AMERICAN 1983	: CONUS
019: ARC 1950	: Swaziland	108: NORTH AMERICAN 1983	: Mexico, Central America
020: ARC 1950	: Zaire	109: OBSERVATORIO 1966	: Corvo & Flores Is. (Azores)
021: ARC 1950	: Zambia	110: OLD EGYPTIAN 1930	: Egypt
022: ARC 1950	: Zimbabwe	111: OLD HAWAIIAN	: Mean Value
023: ARC 1960	: Mean Value (Kenya & Tanzania)	112: OLD HAWAIIAN	: Hawaii
024: ARC 1960	: Kenya	113: OLD HAWAIIAN	: Kauai
025: ARC 1960	: Tanzania	114: OLD HAWAIIAN	: Maui
026: ASCENSION IS. 1958	: Ascension Is.	115: OLD HAWAIIAN	: Oahu
027: ASTRO BEACON "E"	: Iwo Jima Is.	116: OMAN	: Oman
028: ASTRO B4 SOR. ATOLL	: Tern Is.	117: ORDNANCE SURVEY OF GREAT BRITAIN 1936: Mean Value	
029: ASTRO POS 71/4	: St. Helena Is.	118: ORDNANCE SURVEY OF GREAT BRITAIN 1936: England	
030: ASTRONOMIC STATION 1952	: Marcus Is.	119: ORDNANCE SURVEY OF GREAT BRITAIN 1936: England, Isle	
031: AUSTRALIAN GEODETIC 1966	: Australia & Tasmania		of Man & Wales
032: BELLEVUE (IGN)	: Efate & Erromango Is.	120: ORDNANCE SURVEY OF GREAT BRITAIN 1936: Scotland &	
033: BERMUDA 1957	: Bermuda Is.		Shetland Is.
034: BOGOTA OBSERVATORY	: Columbia	121: ORDNANCE SURVEY OF GREAT BRITAIN 1936 : Wales	
035: CAMPO INCHAUSPE	: Argentina	122: PICO DE LAS NIVIES	: Canary Is.
036: CANTON IS. 1966	: Phoenix Is.	123: PITCAIRN ASTRO 1967	: Pitcairn Is.
037: CAPE	: South Africa	124: PROVISIONAL SOUTH CHILEAN 1963: South Chile (near 53°S)	
038: CAPE CANAVERAL	: Mean Value (Florida & Bahama Is.)	125: PROVISIONAL SOUTH AMERICAN 1956: Mean Value	
039: CARTHAGE	: Tunisia	126: PROVISIONAL SOUTH AMERICAN 1956: Bolivia	
040: CHATHAM 1971	: Chatham Is. (New Zealand)	127: PROVISIONAL SOUTH AMERICAN 1956: Chile-Northern Chile	
041: CHUA ASTRO	: Paraguay		(near 19°S)
042: CORREGO ALEGRE	: Brazil	128: PROVISIONAL SOUTH AMERICAN 1956: Chile-Southern Chile	
043: DJAKARTA (BATAVIA)	: Sumatra Is. (Indonesia)		(near 43°S)
044: DOS 1968	: Gizo Is. (New Georgia Is.)	129: PROVISIONAL SOUTH AMERICAN 1956: Columbia	
045: EASTER IS. 1967	: Easter Is.	130: PROVISIONAL SOUTH AMERICAN 1956: Ecuador	
046: EUROPEAN 1950 (Cont'd)	: Western Europe	131: PROVISIONAL SOUTH AMERICAN 1956: Guyana	
047: EUROPEAN 1950 (Cont'd)	: Cyprus	132: PROVISIONAL SOUTH AMERICAN 1956: Peru	
048: EUROPEAN 1950 (Cont'd)	: Egypt	133: PROVISIONAL SOUTH AMERICAN 1956: Venezuela	
049: EUROPEAN 1950 (Cont'd)	: England, Scotland, Channel & Shetland Is.	134: PUERTO RICO	: Puerto Rico & Virgin Is.
050: EUROPEAN 1950 (Cont'd)	: England, Ireland, Scotland & Shetland Is.	135: QATAR NATIONAL	: Qatar
051: EUROPEAN 1950 (Cont'd)	: Greece	136: QORNOQ	: South Greenland
052: EUROPEAN 1950 (Cont'd)	: Iran	137: ROME 1940	: Sardinia Is.
053: EUROPEAN 1950 (Cont'd)	: Italy, Sardinia	138: SANTA BRAZ	: Sao Miguel, Santa Maria Is. (Azores)
054: EUROPEAN 1950 (Cont'd)	: Italy, Sicily	139: SANTO (DOS)	: Espirito Santo Is.
055: EUROPEAN 1950 (Cont'd)	: Norway & Finland	140: SAPPER HILL 1943	: East Falkland Is.
056: EUROPEAN 1950 (Cont'd)	: Portugal & Spain	141: SOUTH AMERICAN 1969	: Mean Value
057: EUROPEAN 1979	: Mean Value	142: SOUTH AMERICAN 1969	: Argentina
058: GANDAJIKA BASE	: Republic of Maldives	143: SOUTH AMERICAN 1969	: Bolivia
059: GEODETIC DATUM 1949	: New Zealand	144: SOUTH AMERICAN 1969	: Brazil
060: GUAM 1963	: Guam Is.	145: SOUTH AMERICAN 1969	: Chile
061: GUX 1 ASTRO	: Guadalcanal Is.	146: SOUTH AMERICAN 1969	: Columbia
062: HJORSEY 1955	: Iceland	147: SOUTH AMERICAN 1969	: Ecuador
063: HONG KONG 1963	: Hong Kong	148: SOUTH AMERICAN 1969	: Guyana
064: INDIAN	: Thailand & Vietnam	149: SOUTH AMERICAN 1969	: Paraguay
065: INDIAN	: Bangladesh, India & Nepal	150: SOUTH AMERICAN 1969	: Peru
066: IRELAND 1965	: Ireland	151: SOUTH AMERICAN 1969	: Trinidad & Tobago
067: ISTS 073 ASTRO 1969	: Diego Garcia	152: SOUTH AMERICAN 1969	: Venezuela
068: JOHNSTON IS. 1961	: Johnston Is.	153: SOUTH ASIA	: Singapore
069: KANDAWALA	: Sri Lanka	154: SOUTHEAST BASE	: Porto Santo & Madeira Is.
070: KERGUELEN IS.	: Kerguelen Is.	155: SOUTHWEST BASE	: Faial, Graciosa, Pico, Sao Jorge & Terceira Is.
071: KERTAU 1948	: West Malaysia & Singapore	156: TIMBALAI 1948	: Brunei & East Malaysia (Sarawak & Sabah)
072: LA REUNION	: Mascarene Is.	157: TOKYO	: Japan
073: L. C. 5 ASTRO	: Cayman Brac Is.	158: TOKYO	: Korea
074: LIBERIA 1964	: Liberia	159: TOKYO	: Okinawa
075: LUZON	: Philippines (excl. Mindanao Is.)	160: TRISTAN ASTRO 1968	: Tristan da Cunha
076: LUZON	: Mindanao Is.	161: VITI LEVU 1916	: Viti Levu Is. (Fiji Is.)
077: MAHE 1971	: Mahe Is.	162: WAKE-ENIWETOK 1960	: Marshall Is.
078: MARCO ASTRO	: Salvage Islands	163: ZANDERIJ	: Surinam
079: MASSAWA	: Eritrea (Ethiopia)	164: BUKIT RIMPAH	: Bangka & Belitung Is. (Indonesia)
080: MERCHICH	: Morocco	165: CAMP AREA ASTRO	: Camp Monardo Area, Antarctica
081: MIDWAY ASTRO 1961	: Midway Is.	166: G. SEGARA	: Kalimantan Is. (Indonesia)
082: MINNA	: Nigeria	167: HERAT NORTH	: Afghanistan
083: NAHRWAN	: Masirah Is. (Oman)	168: HU-TZU-SHAN	: Taiwan
084: NAHRWAN	: United Arab Emirates	169: TANANARIVE OBSERVATORY 1925	: Madagascar
085: NAHRWAN	: Saudi Arabia	170: YACARE	: Uruguay
086: NAMIBIA	: Namibia	171: RT-90	: Sweden
087: MAPARIMA, BWI	: Trinidad & Tobago	172: PULKOVO 1942	: Russia
088: NORTH AMERICAN 1927	: Western United States	173: FINNISH KKJ	: Finland
089: NORTH AMERICAN 1927	: Eastern United States		

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SPECIFICATIONS OF GPS NAVIGATOR GP-33

1 GENERAL

1.1	Display system	4.3-inch color LCD
1.2	Effective area	95.04 x 53.85 mm, 480 x 272 dots (WQVGA)
1.3	Projection	Mercator
1.4	Display mode	Plotter, Steering, Highway, NAV data, Destination, User display
1.5	Memory capacity	Track: 3,000 pts, Waypoint: 10,000 pts w/ comment (13 character)
1.6	Storage capacity	100 routes w/ 30 waypoint each
1.7	Alarms	Arrival and anchor watch, Cross track error, Odometer alarm, Ship's speed, Timer, Trip, WAAS, Voltage
1.8	Display scale	
	Plotter display	0.02/0.05/0.1/0.2/0.5/1/2/5/10/20/40/80/160/320 NM
	Highway display	0.2/0.4/0.8/1/02/4/8/16 NM

2 GPS RECEIVER

2.1	Receiving channels	
	GPS	12 channels parallel, 12 satellites tracking
	WAAS	2 channel
2.2	Rx frequency	1575.42 MHz
2.3	Rx code	C/A code, WAAS
2.4	Position fixing system	All in view, 8-state Kalman filter
2.5	Position accuracy	
	GPS	10 m (95% of the time, 2drms)
	WAAS	3 m (95% of the time, 2drms)
2.6	Tracking velocity	999.9 kn
2.7	Position fixing time	Within 90 s (cold start)
2.8	Position update interval	1 s

3 INTERFACE

3.1	Number of port	CAN bus: 1 port, NMEA0183: 2 ports
3.2	Serial output	NMEA0183 Ver2.0/3.0 (current loop and RS-232C)
	Data sentences	AAM,APB,BOD,BWC,BWR,DTM,GGA,GLL,GSV,RMB,RMC,RTE, VTG,XTE,ZDA
3.3	CAN bus PGN (NMEA2000)	
	Input data	059904, 060928, 061184, 065286, 126208/720
	Output data	059392, 060928, 061184, 126208/464/720/992/996, 127258, 129026/029/033/044/283/284/285/538/539/540, 130822/823
3.4	Contact signal	Event switch (MOB input), Speed alarm (output)

4 POWER SUPPLY

15 VDC: LEN 7 (CAN bus)

12-24 VDC: 0.24-0.12 A (Non CAN bus)

5 ENVIRONMENTAL CONDITION**5.1 Ambient temperature**

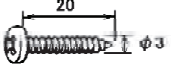
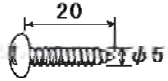
Antenna unit -25°C to +70°C

Receiver unit -15°C to +55°C

5.2 Relative humidity 93% at 40°C**5.3 Degree of protection** IP56**5.4 Vibration** IEC 60945**6 UNIT COLOR****6.1 Antenna unit** N9.5**6.2 Receiver unit** N2.5

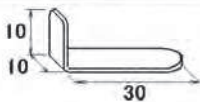
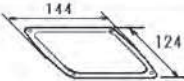
FURUNO

CODE NO.	001-087-240-00	20BE-X-9401 -0
TYPE	CP20-03310	1/1

工事材料表 INSTALLATION MATERIALS		GP-33/RD-33			
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	+selfタッピングネジ 1ｼｬ SELF-TAPPING SCREW		3X20 SUS304 CODE NO. 000-163-884-10	4	
2	+トラスタッピングネジ 1ｼｬ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	4	

FURUNO

CODE NO.	001-087-250-00	20BE-X-9501 -1
TYPE	FP20-01200	1/1

付属品表 ACCESSORIES		GP-33/RD-33			
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾊﾞﾈﾙﾘﾓｰﾊﾞｰ PANEL REMOVER		19-028-3124-1 CODE NO. 100-340-471-10	1	
2	F_MOUNT CUSHION F_MOUNT CUSHION		20-032-1064-1 CODE NO. 100-357-181-10	1	

型式／コード番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO ELECTRIC CO., LTD.

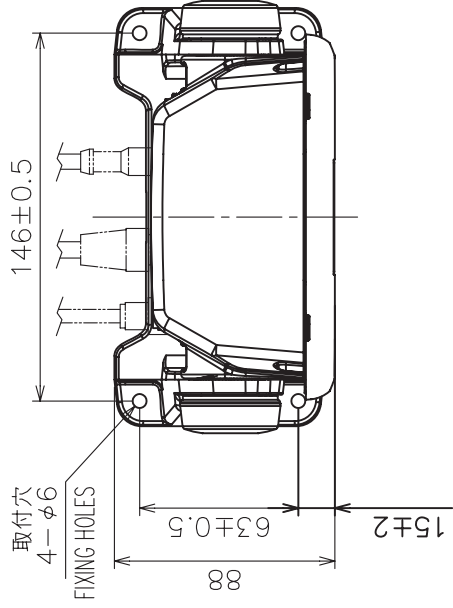
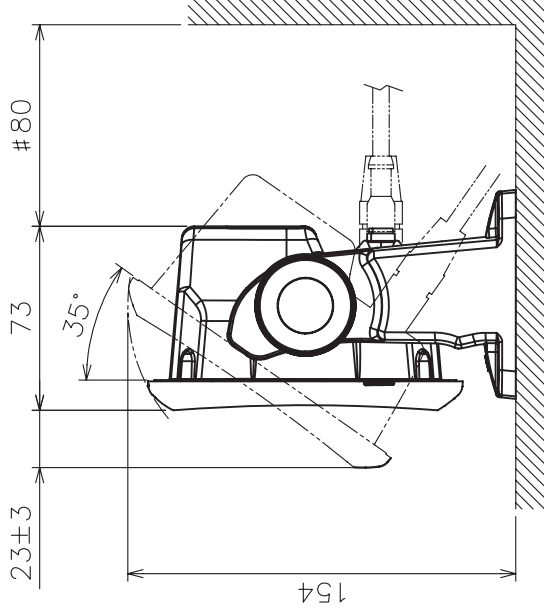
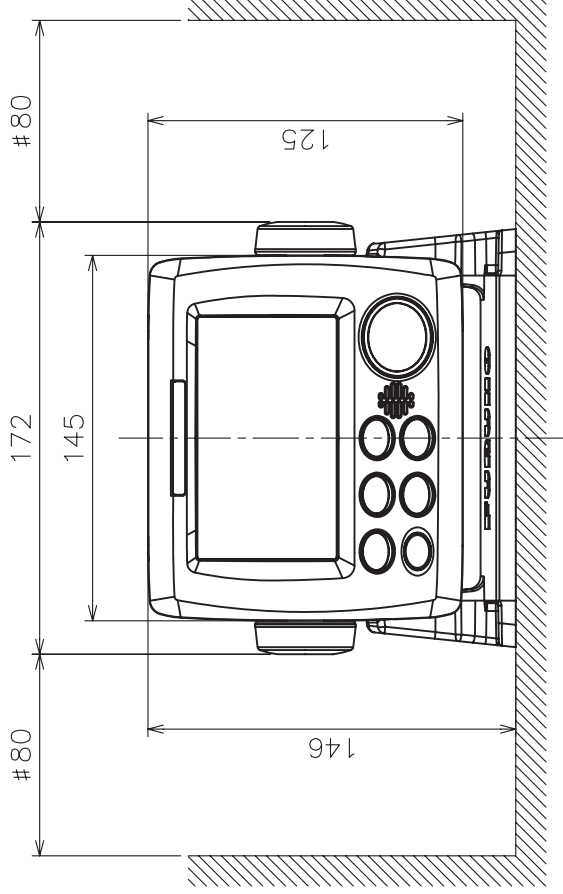
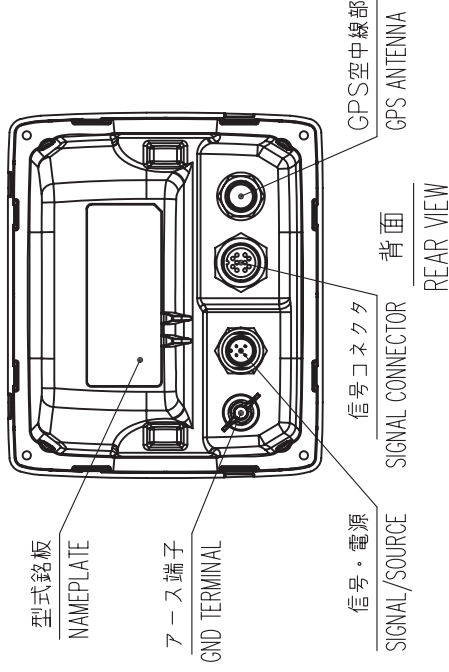


表 1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
$L \leq 50$	± 1.5
$50 < L \leq 100$	± 2.5
$100 < L \leq 500$	± 3



注 記

- 1) 指定外寸法公差は表 1 による。
- 2) # 印寸法は、最小サービスク間寸法とする。
- 3) 取付にはトラスタッピンネジ呼び径 5×20 を使用のこと。

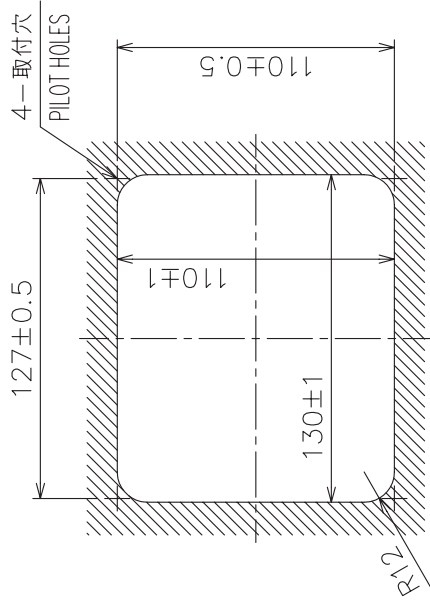
NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS $\phi 5 \times 20$ FOR FIXING THE UNIT.

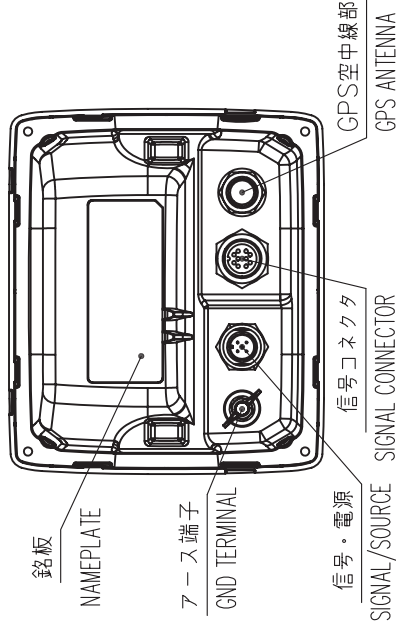
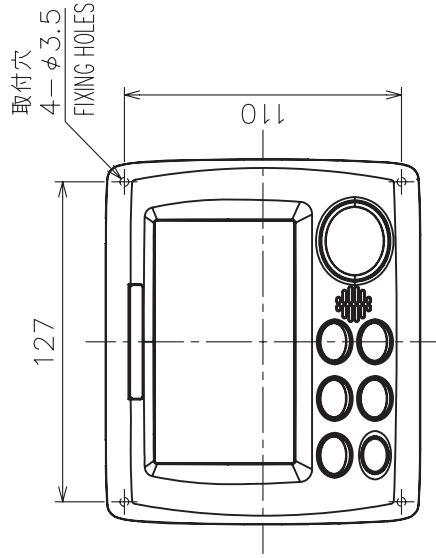
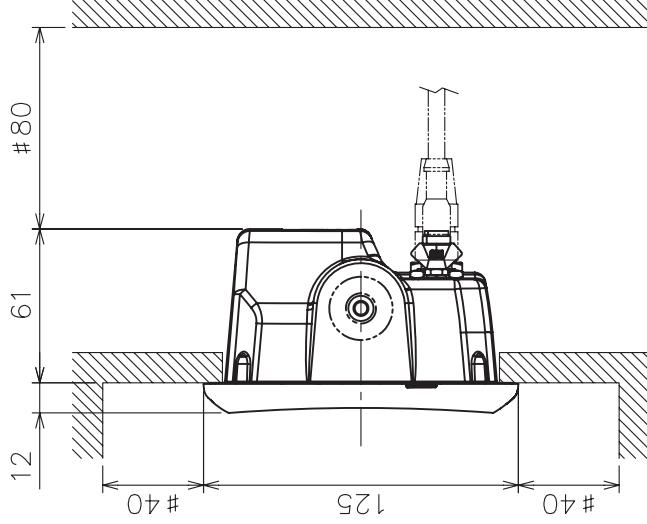
DRAWN	18/Oct/2010	T. YAMASAKI	TITLE	GP-33
CHECKED	19/Oct/2010	T. TAKAHASHI	名称	受信演算部 (卓上装備)
APPROVED	19/Oct/2010	Y. NISHIYAMA	外寸図	
SCALE	MASS 0.72 kg	質量はケーブルを含みます MASS W/O CABLE	NAME	RECEIVER UNIT (TABLETOP MOUNT)
DWG.No.	C4458-G01-B	REF.No.	20-032-100G-3	OUTLINE DRAWING

表 1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	± 1.5
50 < L ≤ 100	± 2.5
100 < L ≤ 500	± 3



取付穴寸法図
CUTOUT DIMENSIONS



注 記

- 1) 指定外寸法公差は表 1 による。
- 2) # 印寸法は、最小サービス空間寸法とする。
- 3) 取付にはナベタツピンネジ呼び径 3×20 を使用のこと。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS $\phi 3 \times 20$ FOR FIXING THE UNIT.

DRAWN	18/Oct/2010	T. YAMASAKI	TITLE	GP-33
CHECKED	19/Oct/2010	T. TAKAHASHI	名称	受信演算部 (埋込装備)
APPROVED	19/Oct/2010	Y. NISHIYAMA	外寸図	
SCALE	MASS	0.61 kg	質量はケーブルを含みます MASS W/O CABLE	NAME
DWG. No.	C4458-G02-B	REF. No.	20-032-110G-3	RECEIVER UNIT (FLUSH MOUNT)
				OUTLINE DRAWING

表1 TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
$L \leq 50$	± 1.5
$50 < L \leq 100$	± 2.5
$100 < L \leq 500$	± 3

1-14UNS1B

ねじ山数 (25.4mmにつき) : 14
ピッチ: 1.8143 mm
オネジ有効長さ: 19 mm以上
オネジ有効径: 24.17mm

THREAD PER 25.4mm (1 INCH): 14
PITCH: 1.8143 mm
THREAD LENGTH: 19 mm OR MORE
PITCH DIAMETER: 24.17mm

注記
指定外の寸法公差は表1による。

NOTE

TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

表2 TABLE 2

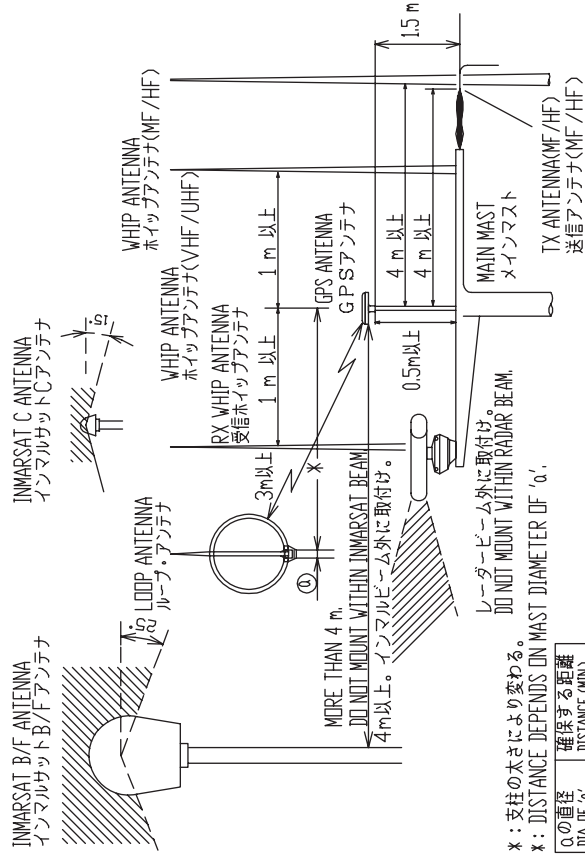
型式 TYPE	ケーブル長(m) CABLE LENGTH	プラグ PLUG	質量(kg±10%) MASS
GPA-017	10	TNC-P-3	0.6
GPA-017S	0.2	TNC-J-3	0.15

DRAWN	Mar. 27 '07 T.YAMASAKI	TITLE	GPA-017/017S
CHECKED	Mar. 27 '07 T.TAKENO	名称	空中線部
APPROVED	Mar. 27 '07 R.Esumi		外寸図
SCALE	1/1	NAME	ANTENNA UNIT
DWG.No.	C4384-G04- L		OUTLINE DRAWING

取付位置
MOUNTING LOCATION

他の機器のアンテナから下の図の距離以上離す。

THIS FIGURE SHOWS THE SEPARATION DISTANCES FROM OTHER ANTENNAS
TO AVOID MUTUAL INTERFERENCE.



*: 支柱の太さにより変わる。

*: DISTANCE DEPENDS ON MAST DIAMETER OF 'a'.

αの直径 DIA. OF 'α'	確保する距離 DISTANCE (MIN.)
10 cm	1.5 m
30 cm	3 m

B) スタンションやパルピットにつけるとき

レール用アンテナベース No.13-RC5160

〈取付可能し〜ル直径: Ø19~Ø32〉

(コード番号: 000-806-114)

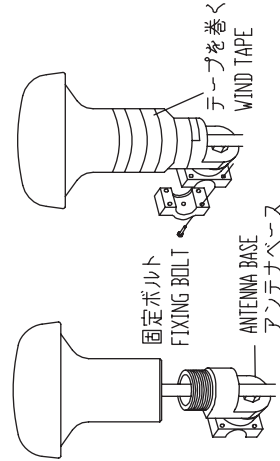
HANDRAI MOUNTING

HOUSE HANDBOOK PRINTING BASE NO.13-RC5160

СЕРТИФИКАТ № 000-806-114 ПРТИПН)

THE DIAMETER OF THE HANDRAIL MAY BE

FROM $\phi 19\text{mm}$ TO $\phi 32\text{mm}$.



注記 1) パイプやアンテナベースはアンテナユニットにねじ込んだ後に固定する。

2) アンテナを固定するときはパイプ(アンテナベース)をアンテナにねじ込むこと。アンテナ側をねじるとコネクタ部やケーブルに無理がかかり、故障の原因となる。

NOTE 1. FASTEN PIPE (ANTENNA BASE) TO ANTENNA UNIT FIRST THEN FIX THEM TO MAST OR HANDRAIL.

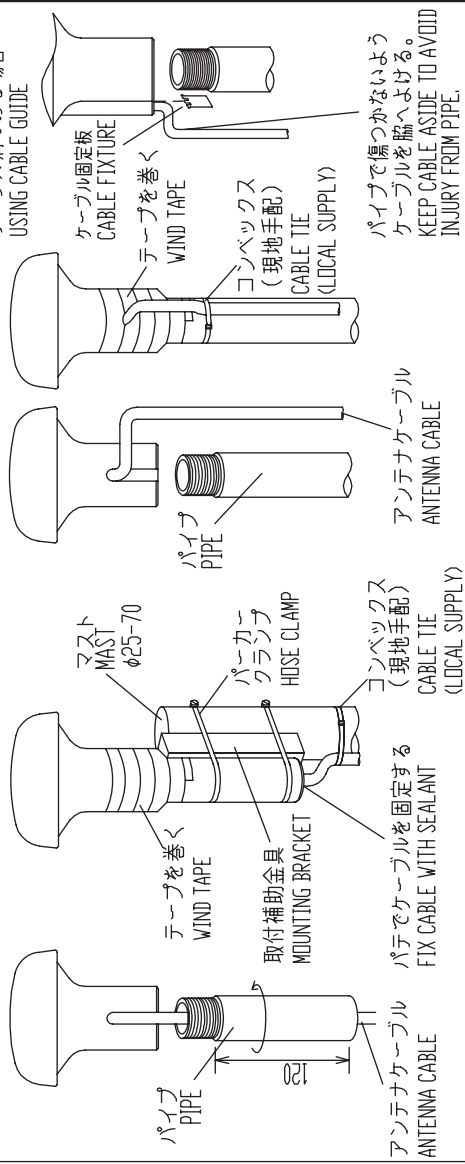
2. WHEN FIXING ANTENNA, TURN PIPE OR ANTENNA BASE; NOT THE ANTENNA.

TURNING THE ANTENNA MAY TWIST THE CABLE AND PLACE STRESS ON CONNECTOR;

A) マストへの取付け

A) マストへの取付け
MAST MOUNTING
Q) マスト取付金具CP20-01111(工事材料)でマストに固定する。

くパイプのみを使うとき
USE A PIPE ONLY.






(C) 取付ける場所が傾斜しているとき

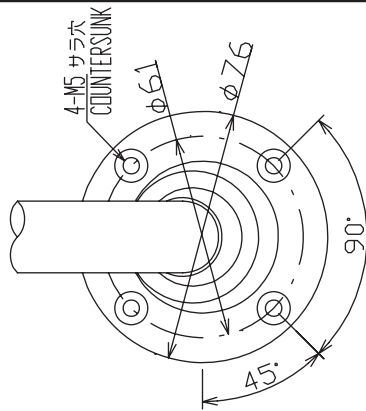
オプションのアンテナベースを使う。

USE OPTIONAL ANTENNA BASE.

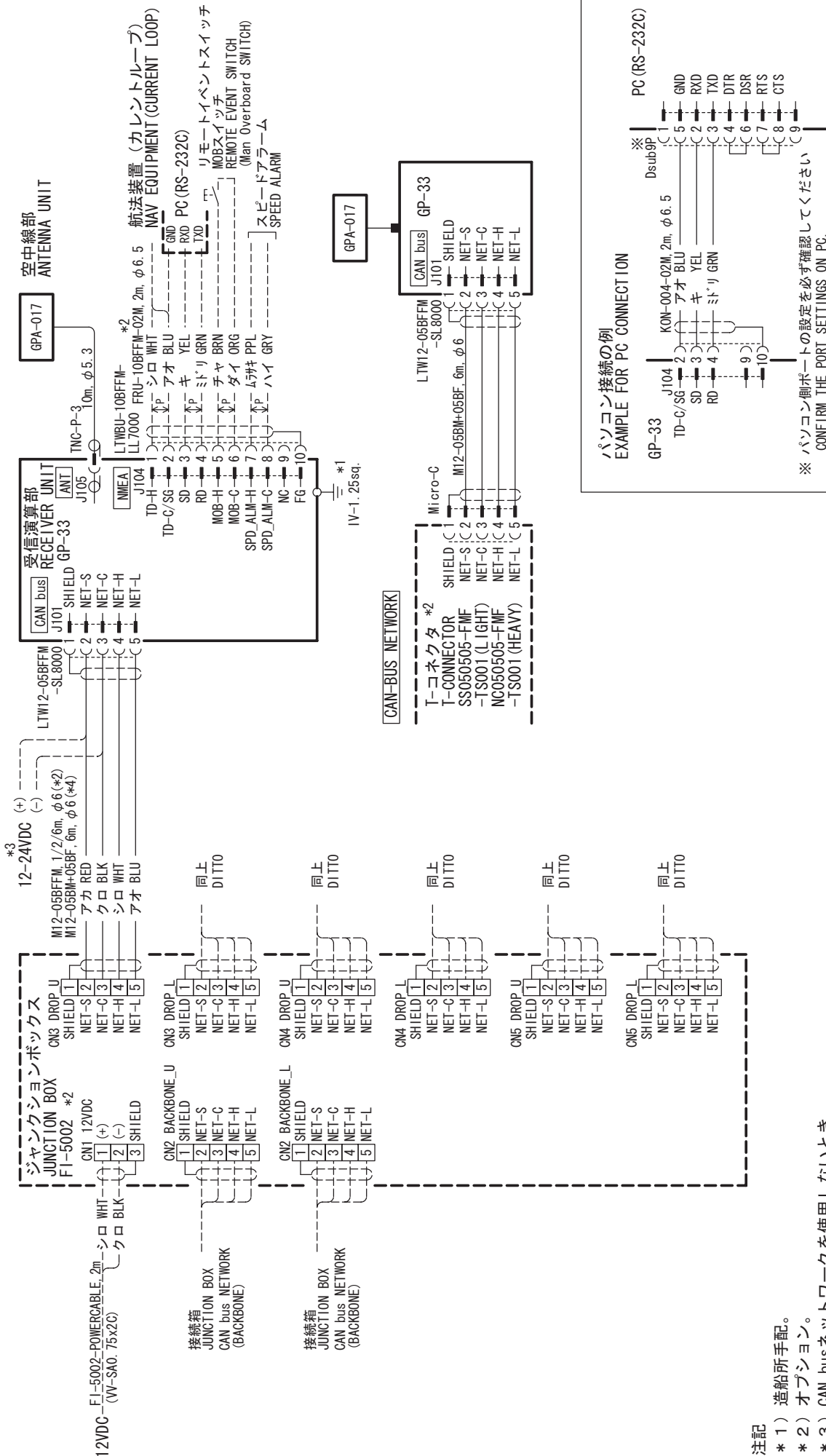
アハテス基礎部

MOUNTING DIMENSIONS OF ANTENNA BASE.

傾斜 INCLINATION	-5° - 33°	32° - 65°	65° - 98°
装備方法 MOUNTING METHOD			
アンテナ ベース形式 ANT. BASE TYPE	直型アンテナベース RIGHT ANGLE ANTENNA BASE No.13-QA330	L型アンテナベース L-TYPE ANTENNA BASE No.13-QA310	L型アンテナベース L-TYPE ANTENNA BASE No.13-QA310
コード番号 CODE No.	000-803-239	000-803-240	000-803-240



DRAWN	Dec. 14, '05	E. MIYOSHI				TITLE	GPA series
CHECKED		TAKAHASHI, T				名称	空中線部
APPROVED		Y. Hatai					装備要領図
SCALE		MASS				NAME	ANTENNA UNIT
DWG.No.	C 4384-Y01-E						INSTALLATION PROCEDURE



注記

- * 1) 造船所手配。
 - * 2) オプション。
 - * 3) CAN busネットワークを使用しないとき。
 - * 4) コネクタプラグを切断して接続のこと。
- NOTE**
- *1: SHIPYARD SUPPLY.
- *2: OPTION.
- *3: WHEN CAN bus NETWORK IS NOT USED.
- *4: CONNECT WIRES AFTER CONNECTOR PLUG REMOVED.

DRAWN	10/Sep/2010 T. YAMASAKI	TITLE	GP-33
CHECKED	10/Sep/2010 T. TAKAHASHI	名称	GPS航法装置
APPROVED	10/Sep/2010 Y. NISHIYAMA	相互接続図	
SCALE	MASS kg	NAME	GPS NAVIGATOR
DWG. No.	C4458-001-F	REF. No.	20-032-5001-1
		INTERCONNECTION DIAGRAM	

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Declaration of ConformityWe **FURUNO ELECTRIC CO., LTD.**

(Manufacturer)

9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan

(Address)

declare under our sole responsibility that the product

GPS NAVIGATOR GP-33

(Model name, type number)

is in conformity with the essential requirements as described in the Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment (R&TTE Directive) and satisfies all the technical regulations applicable to the product within this Directive

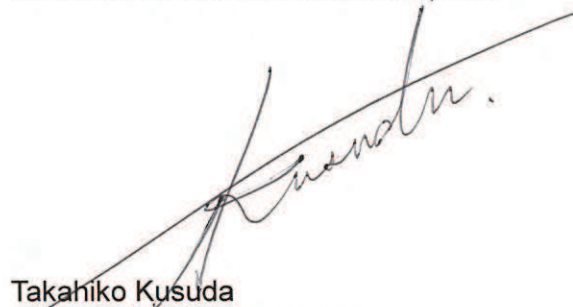
EN 300 440-1 V1.5.1: 2009 Spurious related items
IEC 60945 Ed.4.0: 2002 EMC related items
IEC 60950-1 Ed.2.0: 2005 Safety related items
IEC 60950-1 Ed.2.0 A1: 2009 Safety related items

(title and/or number and date of issue of the standard(s) or other normative document(s))

For assessment, see

- Statement of Opinion No: 10214092 issued by Telefication, The Netherlands.

On behalf of Furuno Electric Co., Ltd.



Takahiko Kusuda
Manager, QMS Secretariat
Quality Assurance Department

Nishinomiya City, Japan
January 27, 2011

(Place and date of issue)

(name and signature or equivalent marking of authorized person)

