FURUNO

OPERATOR'S MANUAL

GPS NAVIGATOR

Model **GP-170**

FURUNO ELECTRIC CO., LTD.

www.furuno.com

(Elemental Chlorine Free)

The paper used in this manual
is elemental chlorine free.

FURUNO ELECTRIC CO., LTD.

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・FURUNO Authorized Distributor/Dealer

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(YOTA) GP-170

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IMPORTANT NOTICE

General

- This manual has been authored with simplified grammar, to meet the needs of international users.
- 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.
- The following concern acts as our importer in Europe, as defined in DECISION No 768/2008/EC.
  - Name: FURUNO EUROPE B.V.
  - Address: Ridderhaven 19B, 2984 BT Ridderkerk, The Netherlands
- All brand and product names are trademarks, registered trademarks or service marks of their respective holders.

How to discard this product

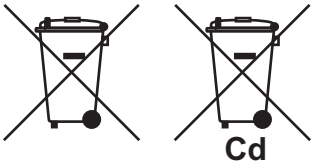
Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (http://www.eiae.org/) for the correct method of disposal.

How to discard a used battery

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

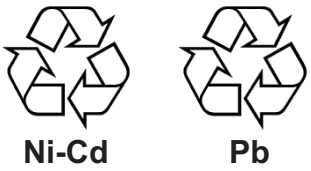
In the European Union

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.

Warning, Caution Prohibitive Action Mandatory Action

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.

Use the correct fuse.

A wrong fuse can cause fire or serious damage to the equipment.

CAUTION

Do not connect/disconnect the signal cable while turning the power on.

The unit may be damaged.

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.

About the TFT LCD

The TFT LCD is constructed using the latest LCD techniques, and displays 99.99% of its pixels. The remaining 0.01% of the pixels may drop out or blink, however this is not an indication of malfunction.

Caution Label(s)

Caution label(s) is(are) attached to the equipment. Do not remove the label(s). If a label is missing or damaged, contact a FURUNO agent or dealer about replacement.

Do not remove cover.
No user-serviceable parts inside.

サービスマン以外の方はカバーを開けないで下さい。

请不要打开盖子。
内部无用户可以维修的器件。

Name: Caution Label
Type: 20-035-1003-0
Code No.: 100-386-200-10

TABLE OF CONTENTS

FOREWORD

A Word to the Owner of the GP-170

Congratulations on your choice of the FURUNO GP-170 GPS Navigator. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

Since 1948, FURUNO Electric Company has enjoyed an enviable reputation for innovative and dependable marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

Your equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless properly installed and maintained. Please carefully read and follow the operation and maintenance procedures set forth in this manual.

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-170 are as shown below.

- High-resolution color LCD
- Comprehensive navigation data displays
- A DGPS beacon receiver (internal or external) can be connected to the GP-170 to add DGPS capability.
- Storage for 1,000 waypoints, 100 routes (99 for creating, one for external input), 1,000 tracks and 2,000 marks
- External USB flash memory capability
- Notices: Arrival/Anchor, XTE (Cross-track Error), Ship speed, Trip
- Alerts: Warning, Caution
- 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 ship's progress toward a waypoint.
- User-programmable nav data displays provide digital navigation data.
- Two dual differential GPS navigator systems are available.
- Ethernet port for connection to a LAN

Program No.

MAIN: 2051542-01.XX, GPS: 48504650XX,
BEACON: 2051544-01.XX (Requires internal DGPS beacon receiver.)
XX: Minor change

Open Source Acknowledgement

This product makes use of the following open source software:
b64: Base-64 Encoding Library (http://synesis.com.au/software/b64.html)

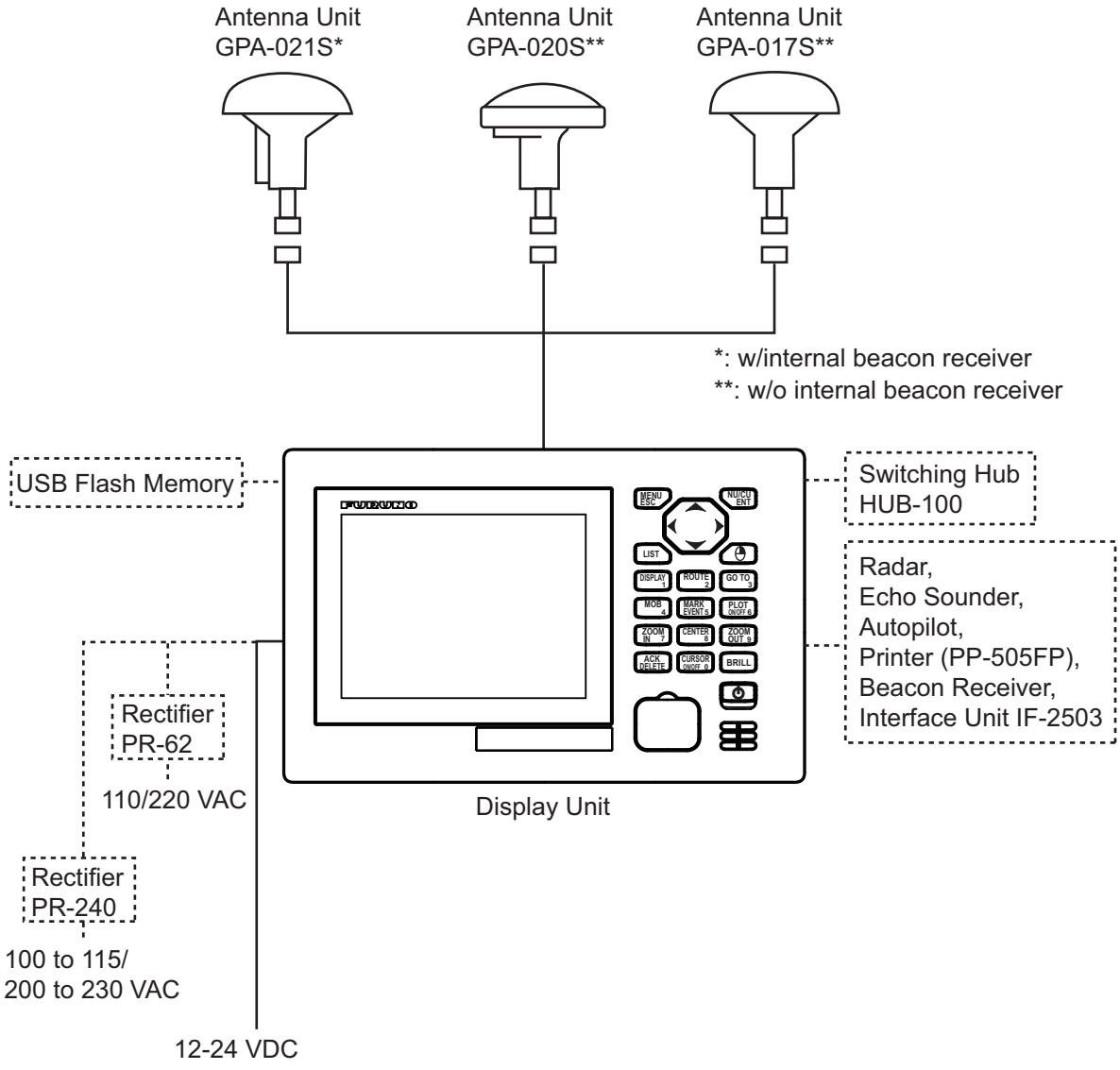
CE declaration

With regards to CE declarations, please refer to our website (www.furuno.com) for further information about RoHS conformity declarations.

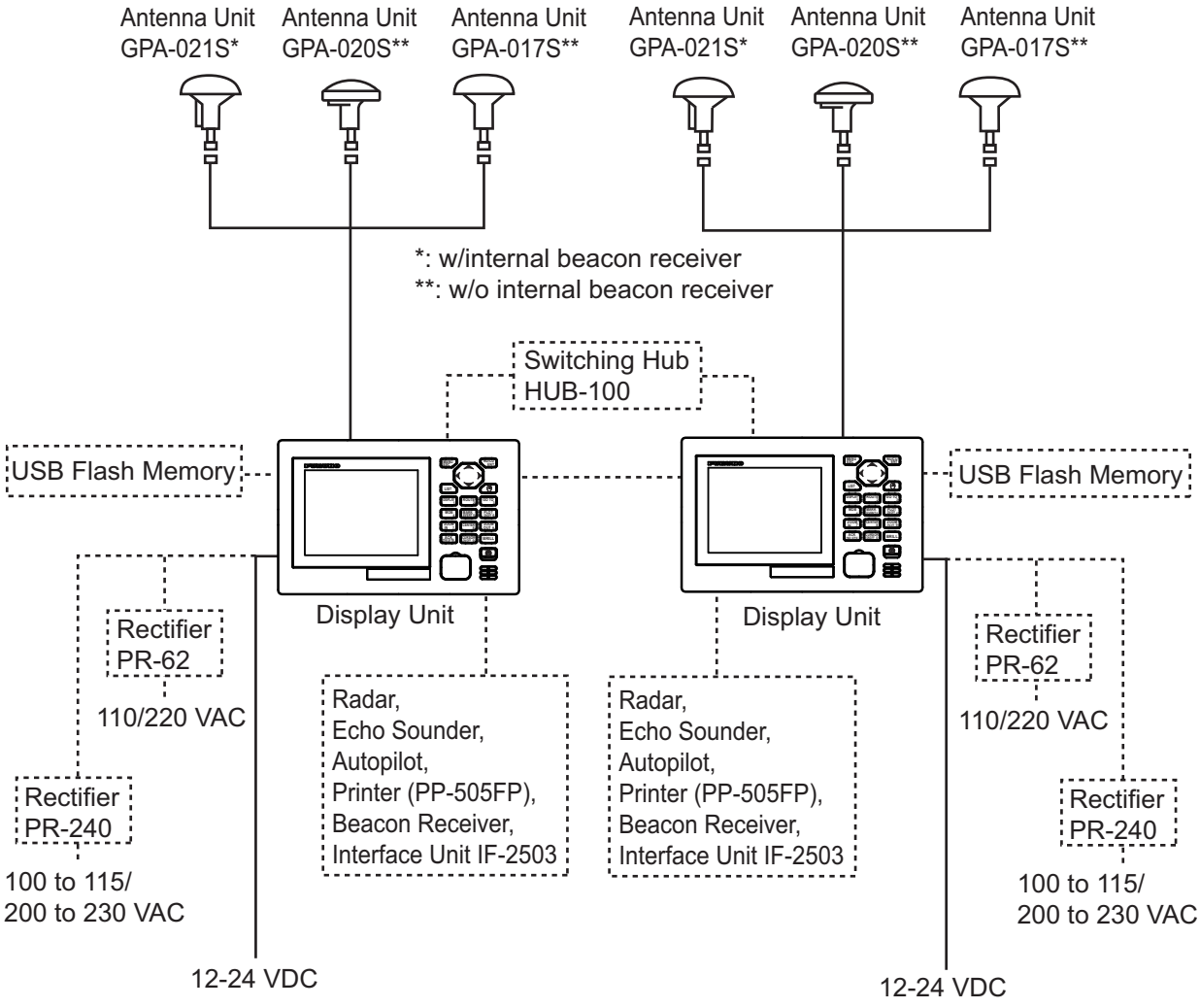
SYSTEM CONFIGURATIONS

Basic configuration is shown with solid line.

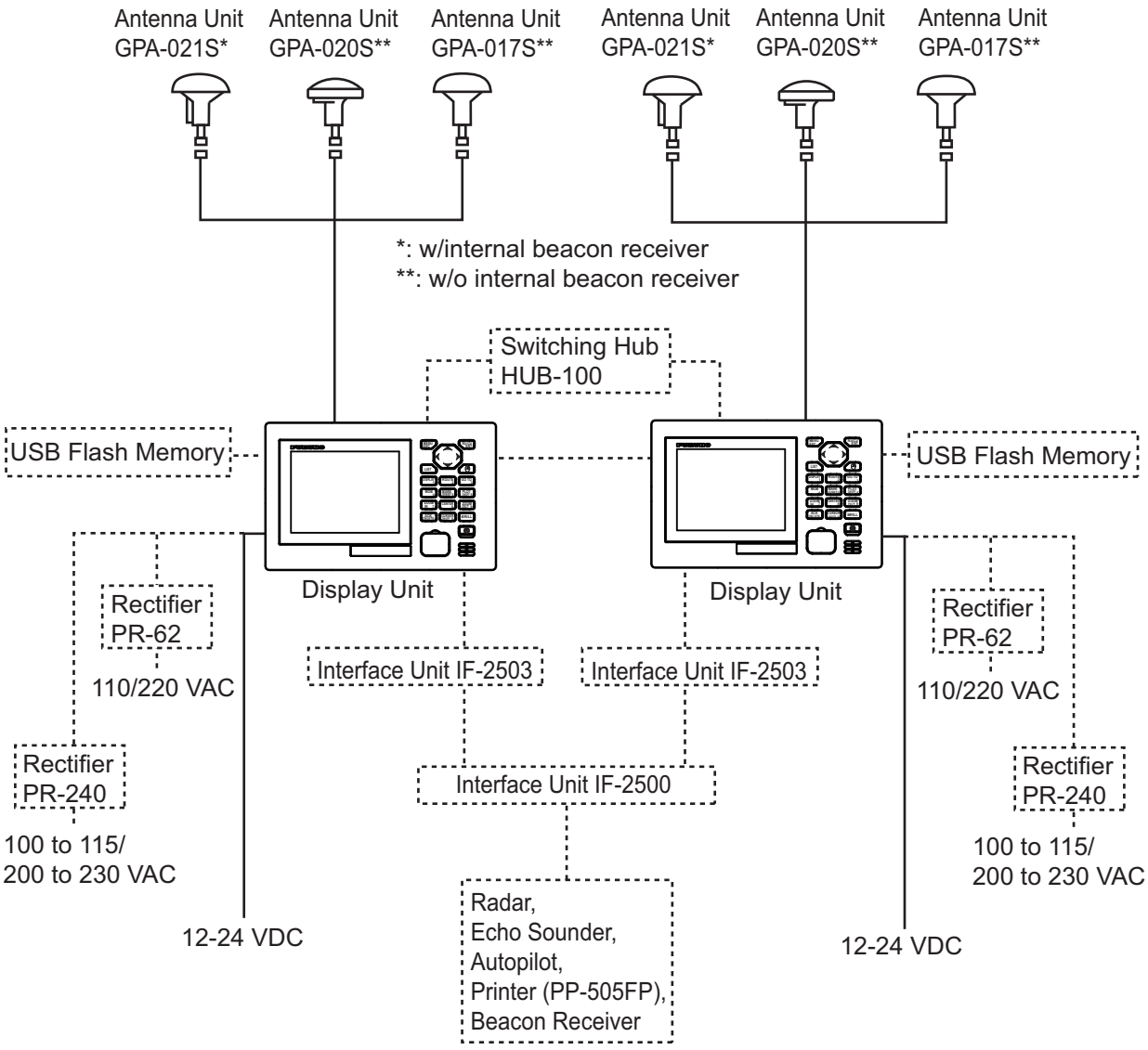
Single configuration



Dual configuration (Without IF-2500)



Dual configuration (With IF-2500)

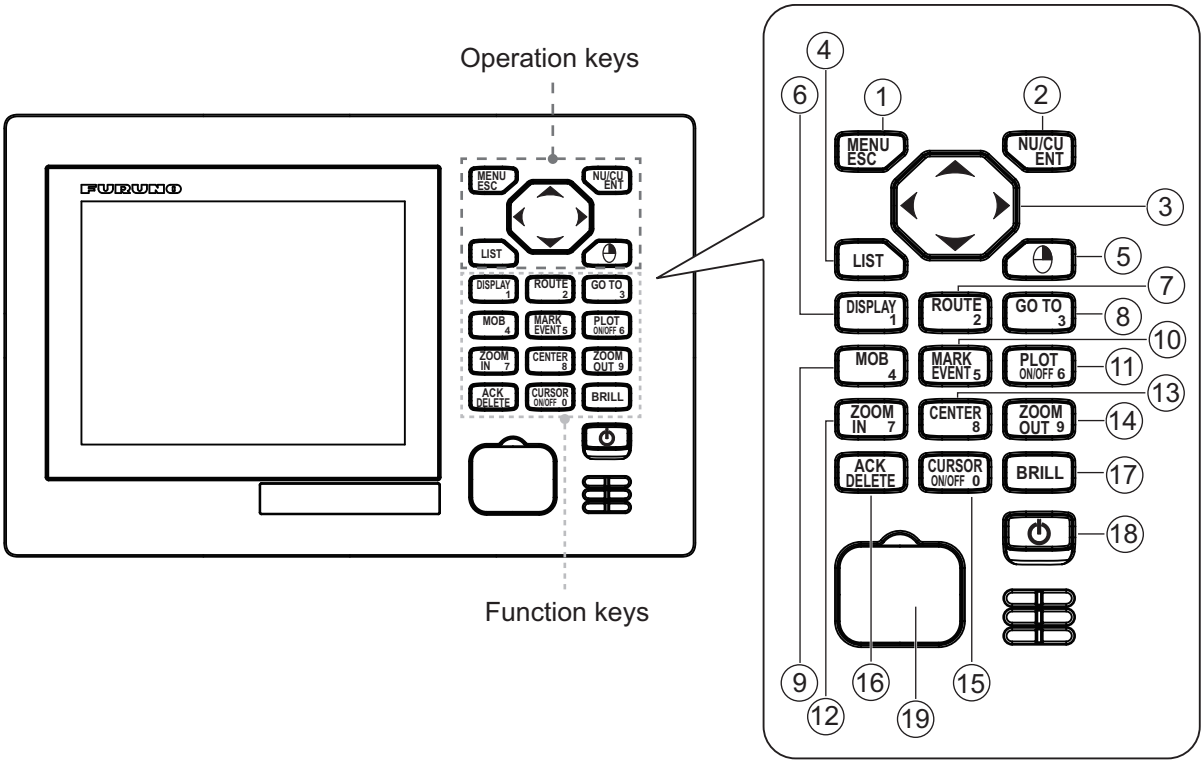


Environmental category

Units	Category
Antenna Unit	Exposed to the weather
Display Unit	Protected from the weather

1. OPERATIONAL OVERVIEW

1.1 Controls



The keys are arranged according to the function.

No.	Control	Function	
		Menu screen	Display mode
1	MENU/ESC	• Closes the menu. • Quits current operation.	• Opens the menu. • Quits current operation.
2	NU/CU ENT	Confirms a selection.	• Switches the orientation mode between north-up and course-up on the plotter display. • Confirms a selection then closes the setting window.
3	Cursorpad	• ▲ or ▼: Selects the menu item. • ◀: Goes back one layer in multi-layer menu. • ▶: Goes forward one layer in multi-layer menu.	• Shifts display or cursor on the plotter display. • Switches display on the integrity display.
4	LIST	• Opens the list. • Switches the list (any display → mark list → route list → station list (requires internal DGPS beacon receiver) → any display). Long-press to switch the list in reverse order.	
5	(Right-click)	–	Opens the context menu on the plotter display.

No.	Control	Function	
		Menu screen	Display mode
6	DISPLAY/1	• Selects and confirms the selected menu item. • Enters a numeric character.	Selects the display mode.
7	ROUTE/2		Starts/stops the registration of a route on the plotter display.
8	GO TO/3		• Sets a destination at the cursor position on the plotter display with cursor on. • Opens the context menu for Go To on the plotter display with cursor off.
9	MOB/4		Marks a man overboard position and sets a destination on the plotter display.
10	MARK EVENT/5		• Puts a mark at the cursor position on the plotter display with cursor on. • Puts an event mark at own ship's position on the plotter display with cursor off.
11	PLOT ON/OFF/ 6		Resumes/stops track plotting on the plotter display.
12	ZOOM IN/7		Zooms in the plotter display.
13	CENTER/8		• Centers the cursor position on the plotter display with cursor on. • Centers own ship's position on the plotter display with cursor off.
14	ZOOM OUT/9		Zooms out the plotter display.
15	CURSOR ON/OFF/ 0		Turns the cursor on or off on the plotter display.
16	ACK/DELETE	• Acknowledges an unacknowledged alert when the pop-up appears. • Deletes all setting values on the setting window when there is no unacknowledged alerts.	• Acknowledges an unacknowledged alert when the pop-up appears. • Deletes registered data (marks, etc.) at the cursor-selected position on the plotter display when there are no unacknowledged alerts.
17	BRILL	Opens the brilliance adjustment window. Adjusts the display brilliance when the adjustment window opens.	
18	⏻ (Power)	Turns the power on or off.	
19	USB port	For connection of USB flash memory.	

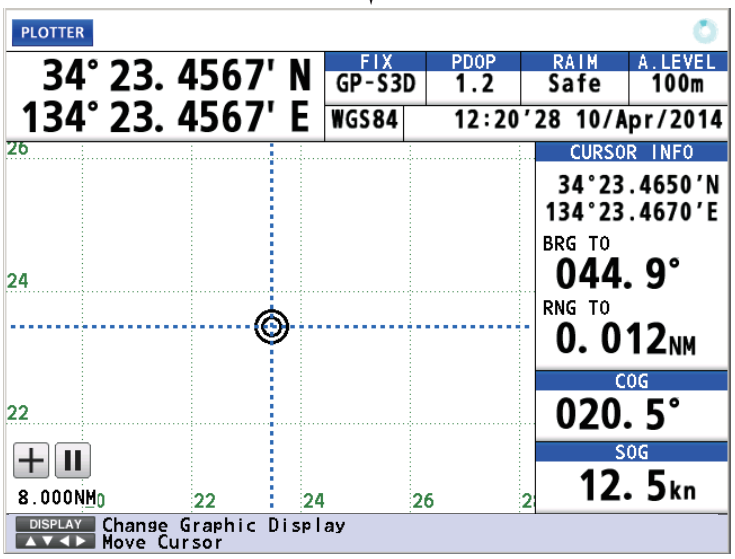
Key sound

When you operate a key, a single beep sounds. If you do not need the key beep, deactivate the beep sound as follows (see section 1.5):

1. Press the **MENU/ESC** key to open the main menu.
2. Select [4 Notice Setting] then [9 Sound].
3. Select [2 Key Sound].
4. Select [2 Off].
5. Press the **MENU/ESC** key to close the main menu.

1.2 How to Turn the Power On/Off

Press the ⏻ key to turn the power on. The start-up screen appears for 30 seconds then the last-used screen appears.



Last-used screen (example: plotter display)

DGPS beacon receiver

The GP-170 is available in two specifications, with DGPS beacon receiver and no DGPS beacon receiver. Only the beacon receiver equipped GP-170 has DGPS capability. To get DGPS capability, install the optional internal DGPS beacon receiver (name: DGPS beacon receiver set, type: OP20-42, code no.: 000-023-637) or connect an external beacon receiver.

Status indications

Indication		System
2D positioning	3D positioning	
GP-2D	GP-3D	GPS
GP-S2D	GP-S3D	GPS + SBAS
GP-D2D	GP-D3D	GPS + Differential

Indication		System
2D positioning	3D positioning	
GP-D2D (Yellow)	GP-D3D (Yellow)	GPS + Differential (WER>10%)
GP-D2D! (Yellow)	GP-D3D! (Yellow)	GPS + Differential (Unmonitored)
GP-Q2D	GP-Q3D	GPS + QZSS
GA-2D	GA-3D	GALILEO
GA-S2D	GA-S3D	GALILEO + SBAS
GA-D2D	GA-D3D	GALILEO + Differential
GA-D2D (Yellow)	GA-D3D (Yellow)	GALILEO + Differential (WER>10%)
GA-D2D! (Yellow)	GA-D3D! (Yellow)	GALILEO + Differential (Unmonitored)
GL-2D	GL-3D	GLONASS
GL-S2D	GL-S3D	GLONASS + SBAS
GL-D2D	GL-D3D	GLONASS + Differential
GL-D2D (Yellow)	GL-D3D (Yellow)	GLONASS + Differential (WER>10%)
GL-D2D! (Yellow)	GL-D3D! (Yellow)	GLONASS + Differential (Unmonitored)
GN-2D	GN-3D	Multi
GN-S2D	GN-S3D	Multi + SBAS
GN-D2D	GN-D3D	Multi + Differential
GN-D2D (Yellow)	GN-D3D (Yellow)	Multi + Differential (WER>10%)
GN-D2D! (Yellow)	GN-D3D! (Yellow)	Multi + Differential (Unmonitored)
GN-Q2D	GN-Q3D	Multi + QZSS
No Fix		No fixed

2D positioning: Three satellites are used.
3D positioning: More than four satellites are used.

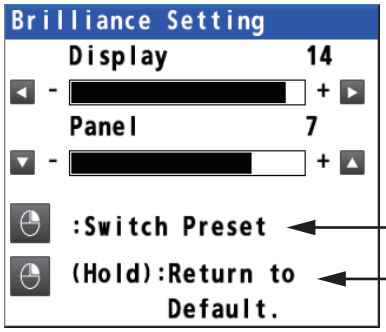
Note 1: GLONASS*, GALILEO** and Multi are reserved for future use.
*: Satellite positioning system managed by Russia
**: Satellite positioning system managed by European Union

Note 2: The screen refreshes slower in low ambient temperature.

To turn the power off, press the ⏻ key.

1.3 How to Adjust the Brilliance of the Display and Panel

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



Switch the color mode between day mode and night mode.

Long-press to restore the settings to default of day mode.

2. To adjust the display brilliance, use the cursorpad (◀ or ▶) or the **BRILL** key (setting range: 0 to 15, default: 14 for day mode/6 for night mode).
3. To adjust the panel brilliance, use the cursorpad (▲ or ▼) (setting range: 0 to 9, default: 7 for day and night modes).

4. Press the **MENU/ESC** key to close the setting window.

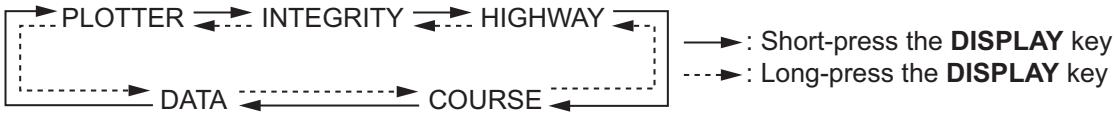
Note 1: The default settings for night mode is 6 for [Display] and 7 for [Panel]. If the display is difficult to see when switching to the night mode, use the cursorpad (▶) to increase the display brilliance.

Note 2: Whenever the brilliance mode is changed, the last-used brilliance for the selected mode is set.

Note 3: When the brilliance is preset, the background color is also preset (see paragraph 2.1.1). So both the brilliance and the background color are restored to the default when long-pressing the key.

1.4 How to Select the Display Mode

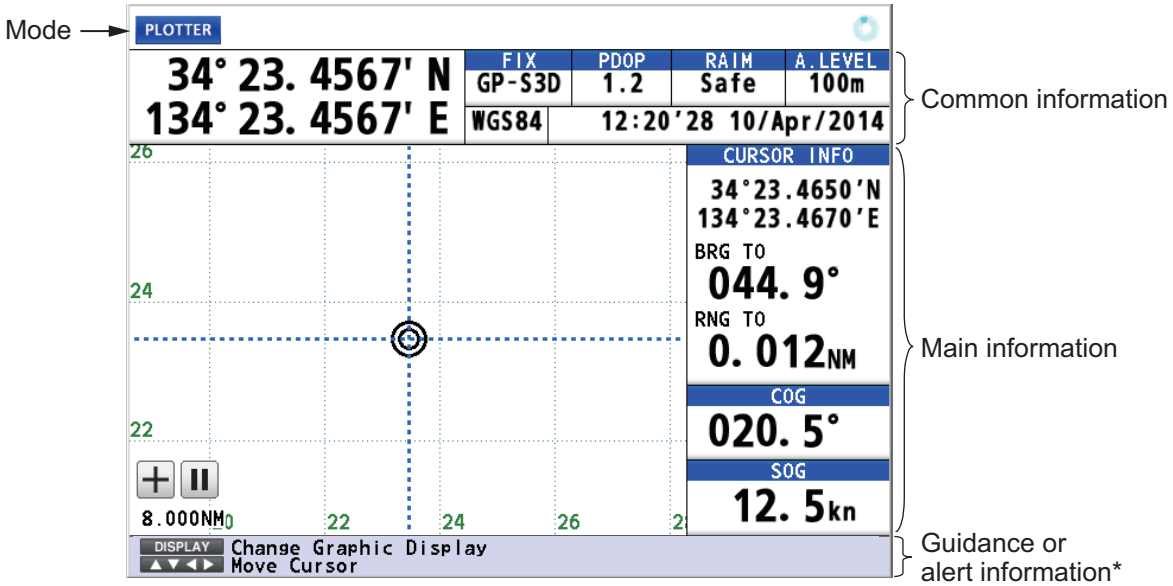
There are five display modes: PLOTTER, INTEGRITY, HIGHWAY, COURSE and DATA. Press the **DISPLAY** key to select the display mode, in the following sequence. To reverse the order, long-press the **DISPLAY** key.



You can turn off the highway, course or data display if its use is not required.

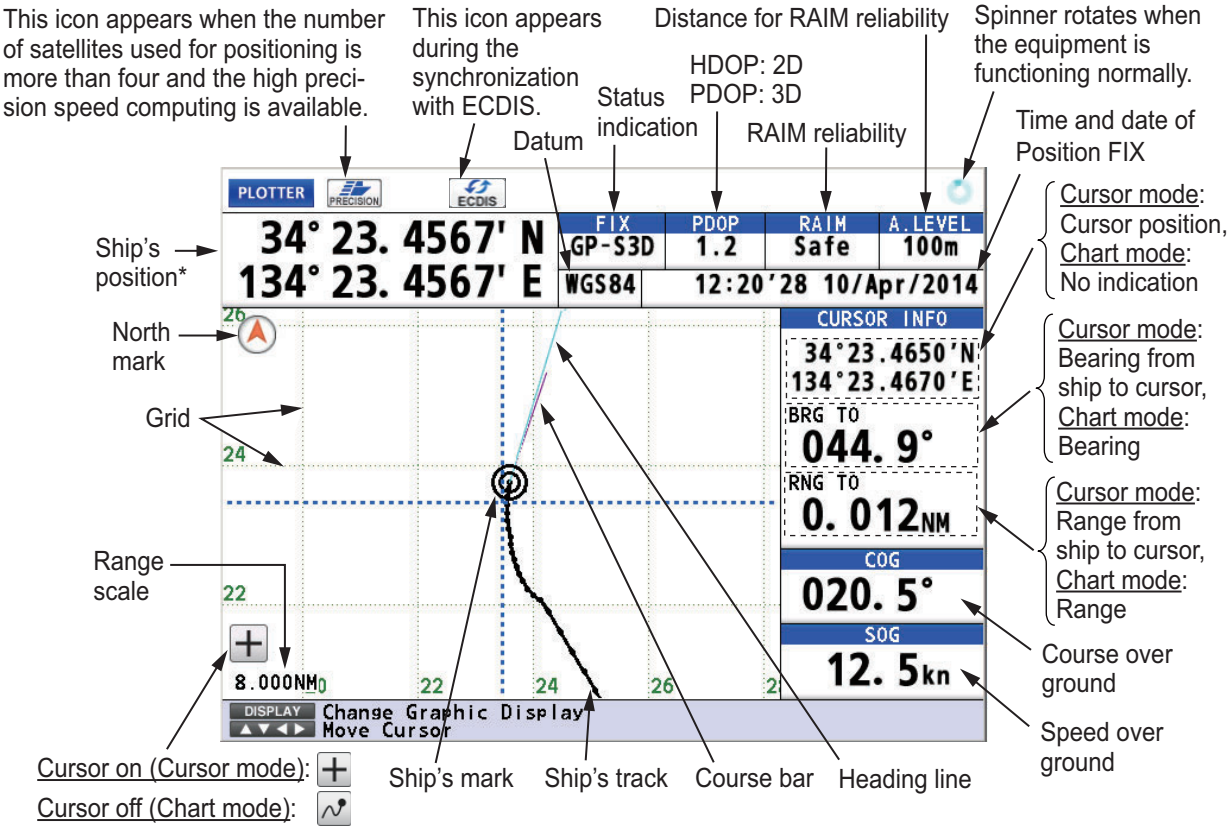
1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [9 Display Select].
3. Select [3 Highway], [4 Course] or [5 Data].
4. Select [1 On] or [2 Off]. The display modes which are set to off are skipped when operating the **DISPLAY** key.
   Note: The plotter and integrity displays can not be disabled.
5. Press the **MENU/ESC** key to close the main menu.

The data is arranged according to data type.



*: The alert information is displayed when an alert occurs.

Plotter Display



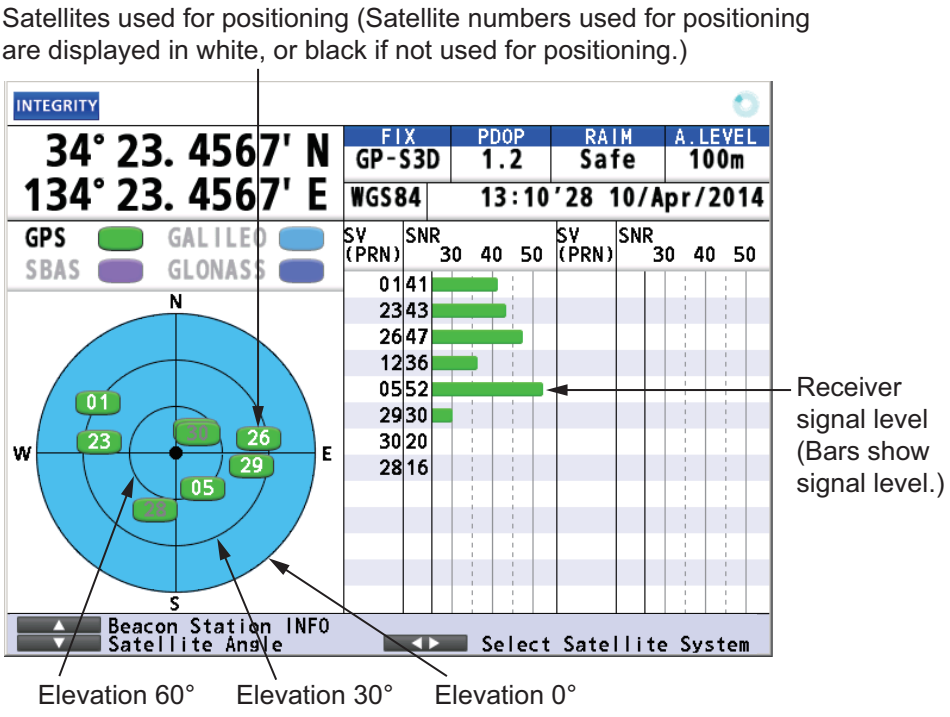
*: Shows the ship's position adjusted with the setting position offset based on the selected datum (refer to paragraph 9.3.5).

Note: The color of the ship's position data depends on positioning status.

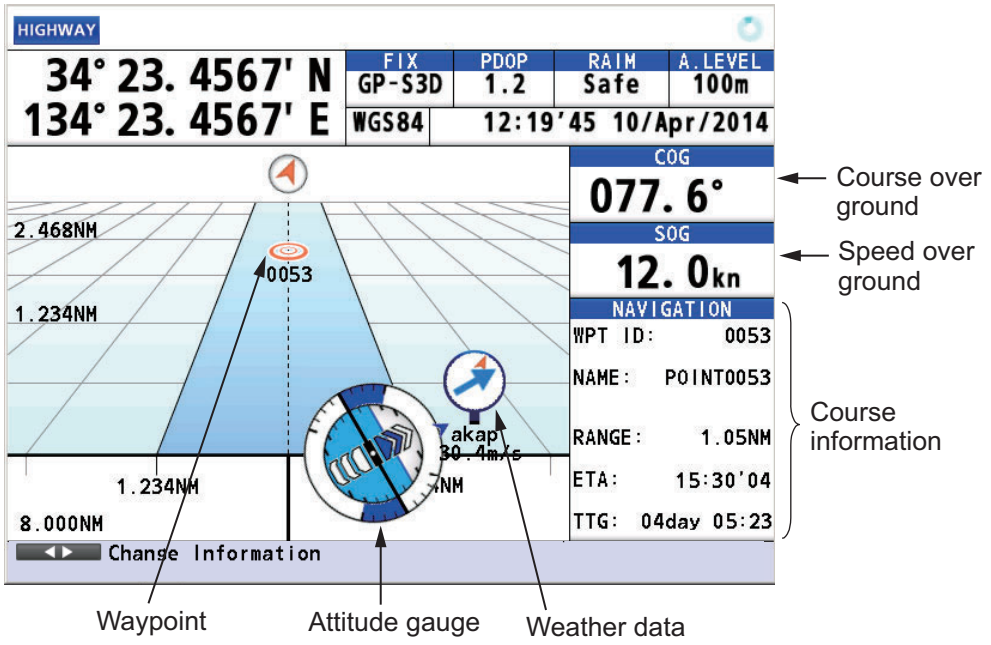
Black: GPS position fix

Red: No GPS position fix

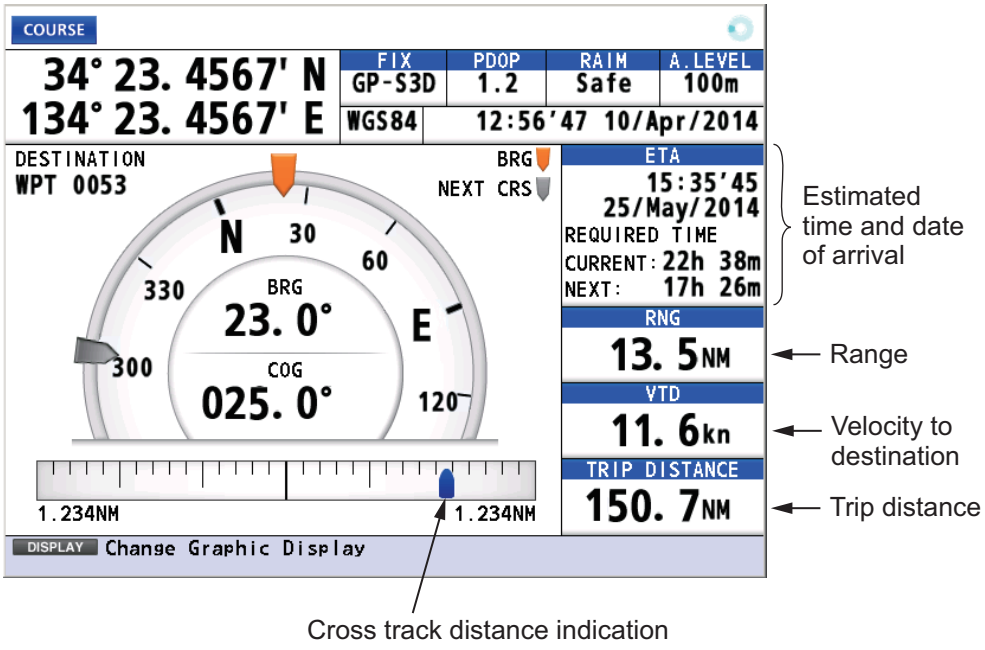
Integrity Display



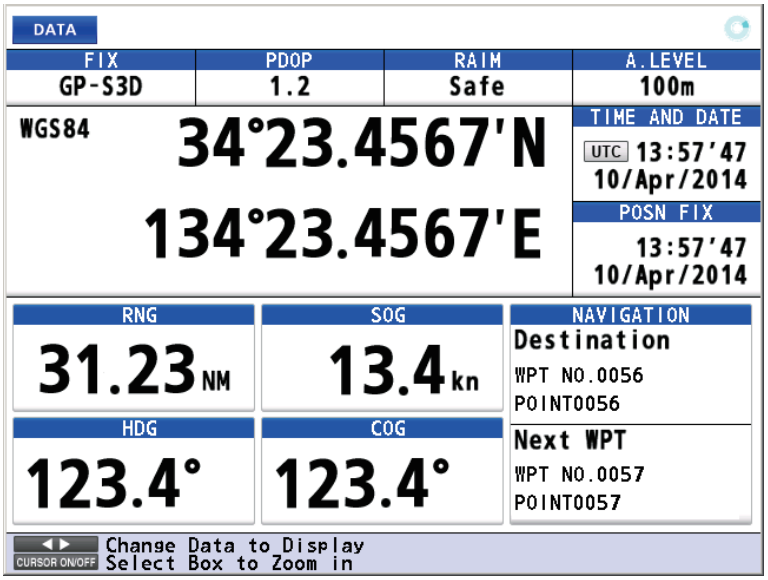
Highway Display



Course Display



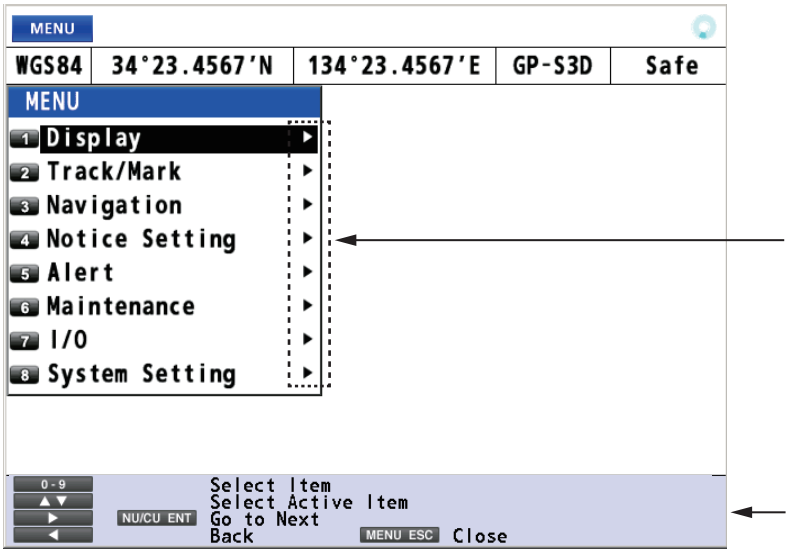
Data Display



Note: When invalid data is input, "- - - -" is displayed.

1.5 Main Menu Overview

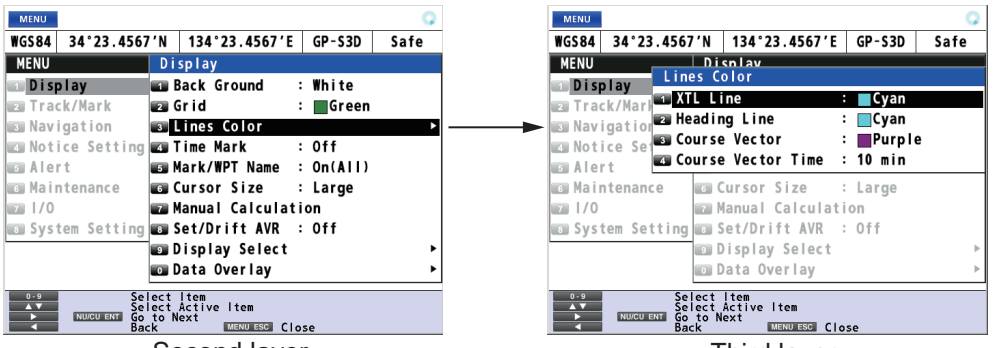
1. Press the **MENU/ESC** key to open the main menu.



These marks indicate additional menus.

Basic operation or alert information

2. Use the cursorpad (▲ or ▼) to select a menu item then press the **NU/CU ENT** key. You can also select a menu item by pressing the numeric keys. This manual states this operating procedure as "Select [No. menu name]." The menu items that have a ▶ indicate additional menus.



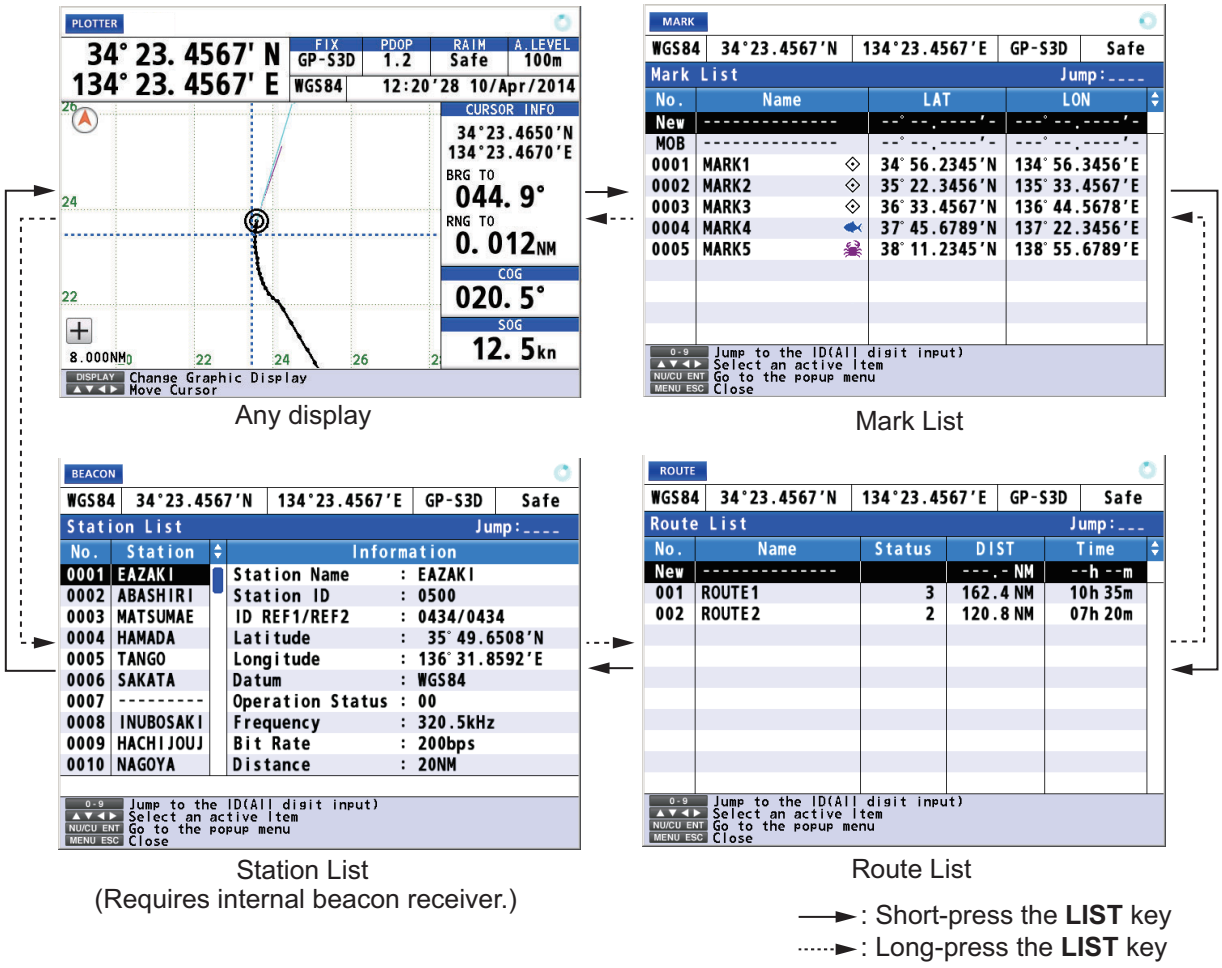
Second layer

Third layer

3. Select an option.
4. Press the **MENU/ESC** key to close the main menu.

1.6 List Overview

The **LIST** key displays the mark list, route list and station list, in the sequence shown below.



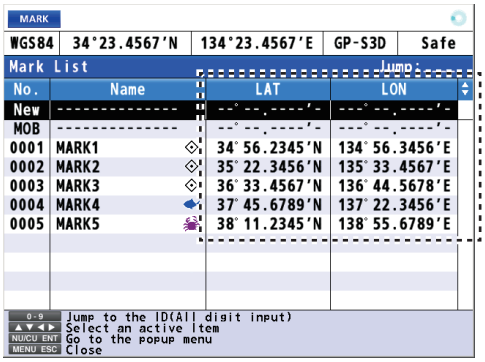
How to save position in a list

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].
3. Select [7 List Number].
4. Select [1 Keeping] or [2 Not Saved].
   [Keeping]: Saves position in lists.
   [Not Saved]: No. 0001 is always displayed at the top of the list.

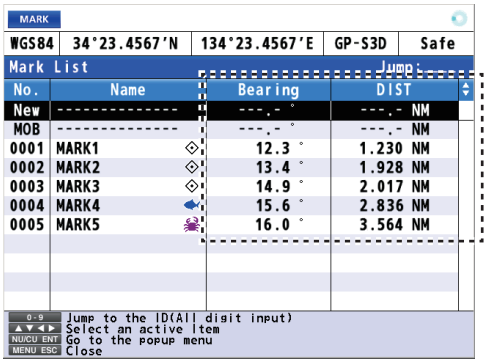
5. Press the **MENU/ESC** key to close the main menu.

How to change the data to display on the mark list

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].
3. Select [8 List Information].
4. Select [1 L/L] or [2 Range/Bearing].
   [L/L]: Displays latitude and longitude.
   [Range/Bearing]: Displays the bearing and distance from own ship to a mark or a waypoint.
5. Press the **MENU/ESC** key to close the main menu.



L/L



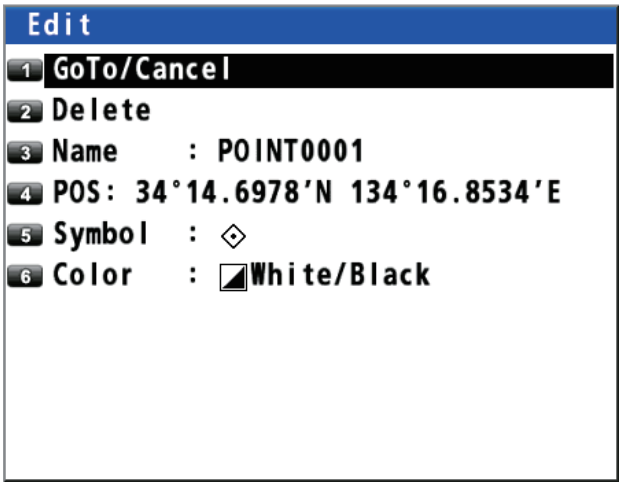
Range/Bearing

1.7 Context Menu Overview

When you select an object on the screen with the cursor, a context menu (list of available operations) is displayed. Select an appropriate operation from the context menu.

You can display a context menu for track, mark, route, waypoint or MOB. For example, do the following to open the context menu for a mark.

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to select a mark then press the key. The context menu opens.



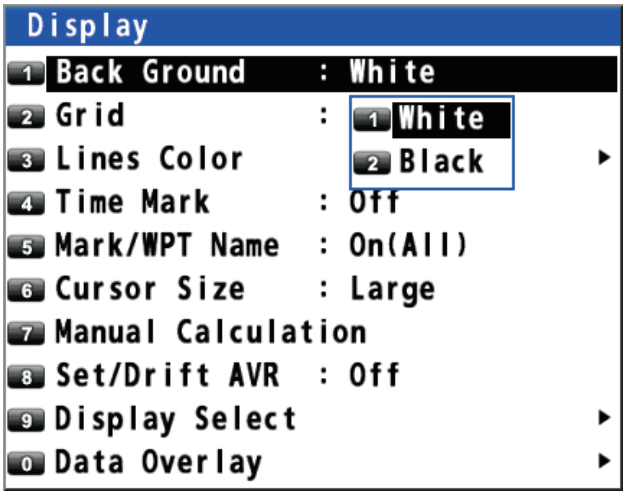
2. PLOTTER DISPLAY OVERVIEW, TRACK

2.1 How to Set the Display

2.1.1 How to select the background color

You can select the background color to suit lighting conditions or environment (see section 1.3).

1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [1 Back Ground].



3. Select [1 White] or [2 Black].
4. Press the **MENU/ESC** key to close the main menu.

2.1.2 How to zoom in or out the display

You can change the range scale on the plotter display. Press the **ZOOM IN** key to zoom in the display and the **ZOOM OUT** key to zoom out the display. The horizontal range is available among 0.125, 0.25, 0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256, 512 and 1024 NM.

2.1.3 How to change the display orientation

The display orientation for the plotter display can be selected to north-up or course-up. Press the **NU/CU ENT** key to change the display orientation.

North-up

True north (0°) is at the top of the display. Own ship moves on the display in accordance with true motion. The land is stationary.

Course-up

When the destination is set, the destination is at the top of the display and the north mark ( ) appears at the left side of the display.

When the destination is not set, own ship's course is upward on the display at the moment you select the course-up and the north mark ( ) appears at the left side of the display.

2.1.4 How to turn the cursor on/off, change cursor size

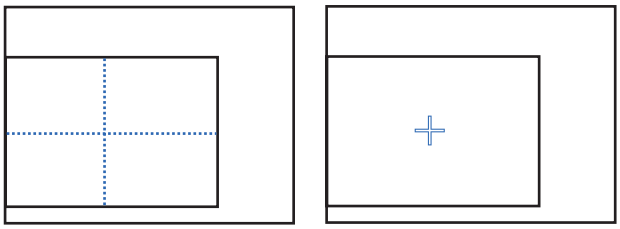
Press the **CURSOR ON/OFF** key to turn the cursor on or off.

Cursor size

You can change the cursor size.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [6 Cursor Size].

3. Select [1 Large] or [2 Small].



4. Press the **MENU/ESC** key to close the main menu.

2.1.5 How to move the cursor

You can move the cursor with the cursorpad.

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Press or hold down the cursorpad. The cursor moves in the direction of the arrow or diagonal. The display shifts when the cursor reaches an edge of the display, in the direction opposite of the arrow pressed on the cursorpad. When the cursor is turned on, the cursor position, the bearing and range from own ship to the cursor appear at the right side of the display (see the plotter display on page 1-6).

2.1.6 How to shift the display

You can shift the display on the plotter display.

1. Press the **CURSOR ON/OFF** key to turn the cursor off.
2. Press or hold down the cursorpad.

2.1.7 How to center the cursor position or ship's position

Cursor position

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Press the **CENTER** key.

Ship's position

1. Press the **CURSOR ON/OFF** key to turn the cursor off.
2. Press the **CENTER** key.

Note: When own ship reaches an edge of the display, own ship's mark is automatically centered.

2.1.8 How to show or hide the grid and change its color

You can show or hide the grid and change its color (see "Plotter Display" on page 1-6).

1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [2 Grid].

3. Select the grid color. To turn the grid off, select [8 Off]. When selecting [7 White/Black], the grid color depends on the background color.

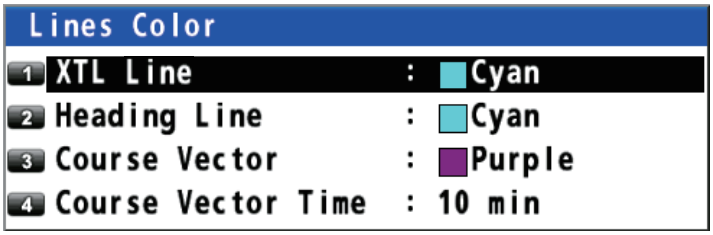
Background color	Grid color
White	Black
Black	White

4. Press the **MENU/ESC** key to close the main menu.

2.1.9 How to show or hide the XTL line and change its color

The XTL lines (see the illustration on page 5-1) straddle the intended course line and they mark the XTL range. You can show or hide the lines and change their color.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [3 Lines Color].



3. Select [1 XTL Line].
4. Select the XTL line color. To turn the XTL line off, select [8 Off].
5. Press the **MENU/ESC** key to close the main menu.

2.1.10 How to show or hide the heading line and change its color

You can show or hide the heading line and change its color.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [3 Lines Color].
3. Select [2 Heading Line].
4. Select the heading line color. To turn the heading line off, select [8 Off].
5. Press the **MENU/ESC** key to close the main menu.

2.1.11 How to set the COG vector

The COG vector is a vector line that runs from own ship's icon. This vector shows speed and course of own ship. The top of a vector shows estimated position of own ship after the selected vector time elapses.

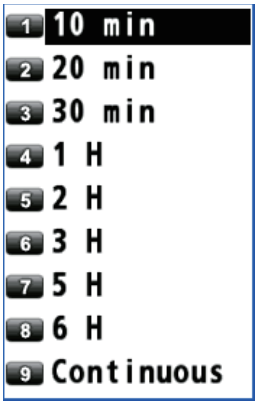
Note: The COG vector is not displayed when there is no position data.

How to show or hide the COG vector and change its color

1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [3 Lines Color].
3. Select [3 Course Vector].
4. Select the COG vector color. To turn the COG vector off, select [8 Off].
5. Press the **MENU/ESC** key to close the main menu.

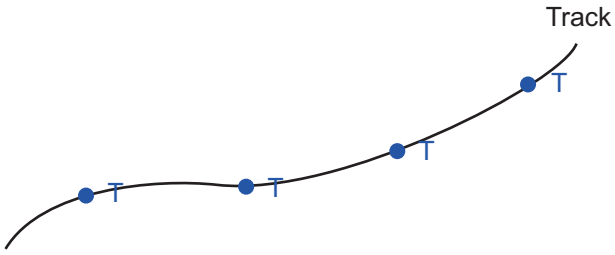
How to set the COG vector time

1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [3 Lines Color].
3. Select [4 Course Vector Time].
4. Select the time for the COG vector. If you select [9 Continuous], the COG vector extends to the edge of the display.
5. Press the **MENU/ESC** key to close the main menu.



2.1.12 How to display the time mark

You can display the time mark on the track every hour on the hour.



1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [4 Time Mark].
3. Select the color for the time mark. To turn the time mark off, select [8 Off].
4. Press the **MENU/ESC** key to close the main menu.

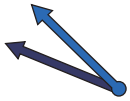
2.1.13 How to display the names for marks and waypoints

You can display the names for marks and waypoints.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [5 Mark/WPT Name].
3. Select [1 On (All)], [2 On (WPT)] or [3 Off].
   [On (All)]: Displays the names for marks and waypoints.
   [On (WPT)]: Displays the waypoint names.
   [Off]: Turns off the names.
4. Press the **MENU/ESC** key to close the main menu.

2.1.14 How to show or hide the weather data

You can display the direction and the speed of the wind analyzed from type 16 message when the weather data is received from a beacon station (see page 7-2).



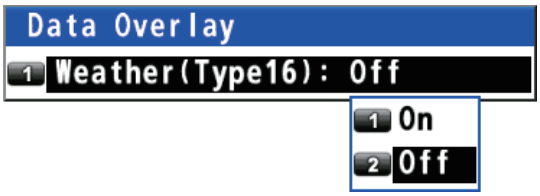
Plotter display

Highway display

The arrow points in wind direction and its length changes according to wind speed.

Note: This menu requires internal or external DGPS beacon receiver.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [0 Data Overlay].
3. Select [1 Weather (Type16)], then [1 On] or [2 Off].
   [On]: Displays the weather data (type 16 message) on the plotter display.
   [Off]: Turns off the weather data (type 16 message) on the plotter display.
   Note: On the highway display, the weather data is displayed regardless of on/off.
4. Press the **MENU/ESC** key to close the main menu.



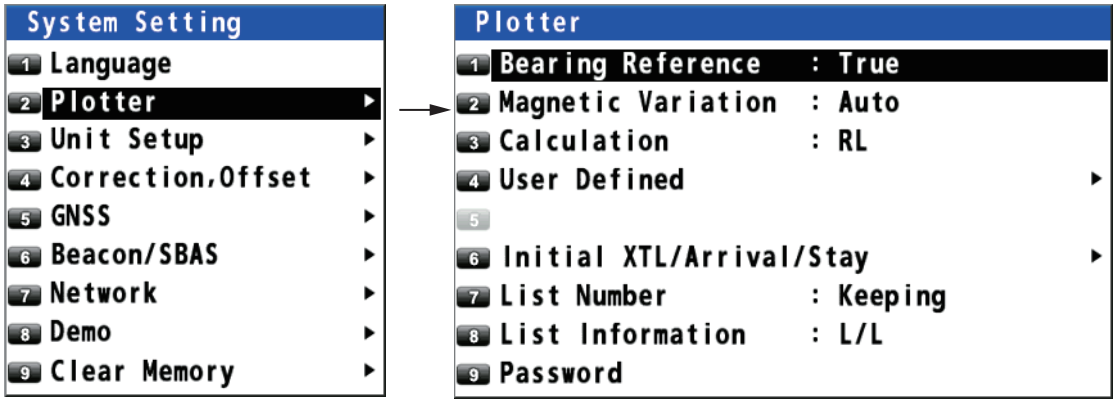
2.2 Bearing Reference

Ship'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.

2.2.1 How to select bearing reference

The default setting displays true bearing.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].



3. Select [1 Bearing Reference].
4. Select [1 True] or [2 Magnetic].
   [True]: Gyrocompass or satellite compass using true bearing
   [Magnetic]: Magnetic compass

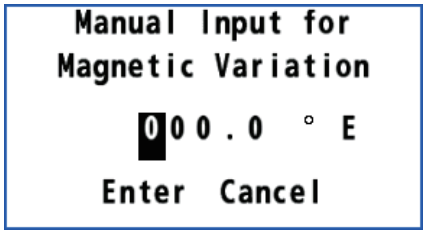
5. Press the **MENU/ESC** key to close the main menu.
   When selecting [2 Magnetic] at step 4, follow the steps at paragraph 2.2.2.

2.2.2 How to set the 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. This difference is called magnetic variation, and varies with respect to the observation point on the earth. Magnetic variation is entered automatically or manually.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].
3. Select [2 Magnetic Variation].
4. Select [1 Auto] or [2 Manual]. If you select [1 Auto], go to step 7. For [2 Manual], go to step 5.

5. Enter the variation with the numeric keys. To change the coordinate, select "E" then press one of keys from **0** to **9**.
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.



2.3 About Tracks

The GP-170 stores 1,000 points of track.

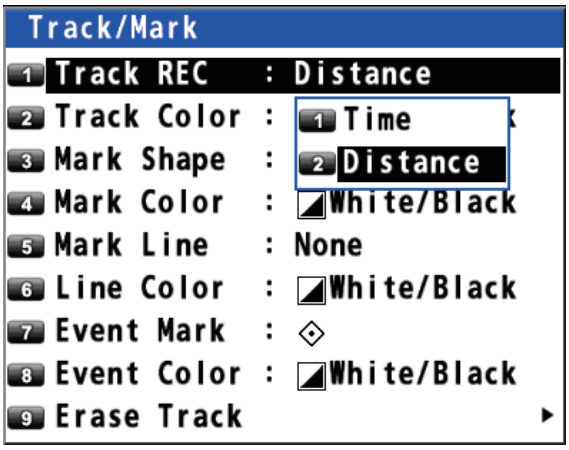
2.3.1 How to start or stop plotting and recording of the track

Press the **PLOT ON/OFF** key to start or stop plotting and recording of the track. The pop-up message "Resuming Track Plot" or "Stopping Track Plot" appears at the left side of the display for two seconds. When track plotting is stopped, the ⏸ icon appears at the bottom left corner of the display.

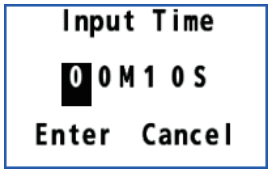
2.3.2 How to set the track plotting interval

In drawing the track, the position of your ship is stored into the memory of this equipment at an interval of time or distance. A shorter interval provides better reconstruction of the track, but the storage time of the track is reduced. When the track memory becomes full, the oldest track is erased to make room for the latest.

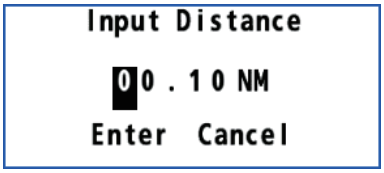
1. Press the **MENU/ESC** key to open the main menu.
2. Select [2 Track/Mark] then [1 Track REC].



3. Select [1 Time] or [2 Distance].
   [Time]: Enter the time interval with the numeric keys (setting range: 0001 (1 sec) to 6000 (60 min)).
   [Distance]: Enter the distance interval with the numeric keys (setting range: 00.01 to 99.99 NM).



Time



Distance

4. Move the cursor to [Enter] then press the **NU/CU ENT** key.
5. Press the **MENU/ESC** key to close the main menu.

2.3.3 How to set the track color

You can select the track color as follows:

1. Press the **MENU/ESC** key to open the main menu.
2. Select [2 Track/Mark] then [2 Track Color].
3. Select the track color.
4. Press the **MENU/ESC** key to close the main menu.

How to change the color of selected track

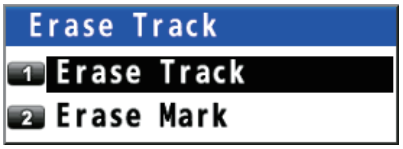
1. Put the cursor on the track.
2. Press the key to open the context menu.

3. Select [1 Color].
4. Select the color to change.
5. Press the **MENU/ESC** key to close the context menu.

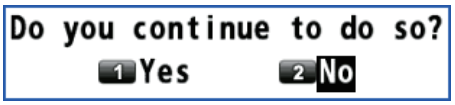
2.3.4 How to erase the track

How to erase all tracks from the main menu

1. Press the **MENU/ESC** key to open the main menu.
2. Select [2 Track/Mark] then [9 Erase Track].



3. Select [1 Erase Track]. The confirmation message appears.



4. Select [1 Yes].
5. Press the **MENU/ESC** key to close the main menu.

How to erase all tracks from the context menu

1. Put the cursor on a track.
2. Press the key to open the context menu.
3. Select [2 Erase All]. The confirmation message appears.
4. Select [1 Yes].

3. MARKS

You can put marks on the plotter display to indicate good fishing spot, location of traps, etc. Marks have 16 shapes and seven colors. Also, marks can be connected with lines.

3.1 How to Enter a Mark on the Plotter Display

3.1.1 How to preset mark appearance

Set the default mark shape, color, line type to use when entering a mark.

Mark shape

You can select a mark shape from 16 types.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [2 Track/Mark] then [3 Mark Shape].

3. Use the cursorpad to select the shape then press the **NU/CU ENT** key.
4. Press the **MENU/ESC** key to close the main menu.

Mark color

You can select a mark color from seven colors.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [2 Track/Mark] then [4 Mark Color].

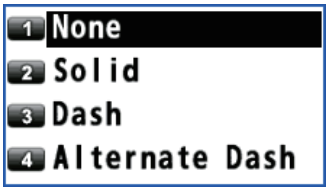
3. Select the color.
4. Press the **MENU/ESC** key to close the main menu.

Mark line

Marks can be connected with lines, and three types of lines are available.

1. Press the **MENU/ESC** key to open the main menu.

2. Select [2 Track/Mark] then [5 Mark Line].



3. Select the line type.
   - [None]: None
   - [Solid]: ————————
   - [Dash]: – – – – – – – –
   - [Alternate Dash]: –·–·–·–·–·–
4. Press the **MENU/ESC** key to close the main menu.

When continuously entering marks by the method described in paragraph 3.1.2, the marks are connected with the selected line.

Mark line color

You can select a mark line color from seven colors.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [2 Track/Mark] then [6 Line Color].
3. Select the color.
4. Press the **MENU/ESC** key to close the main menu.

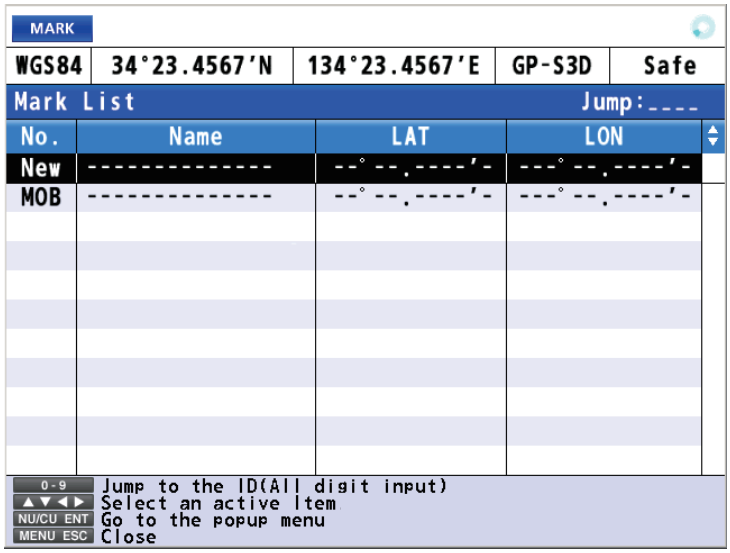
3.1.2 How to enter a mark at the cursor position

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to place the cursor on the location for a mark.
3. Press the **MARK EVENT** key to put the mark. This mark is named with the youngest unused mark number (for example, "POINT0001"), and saved to the mark list.

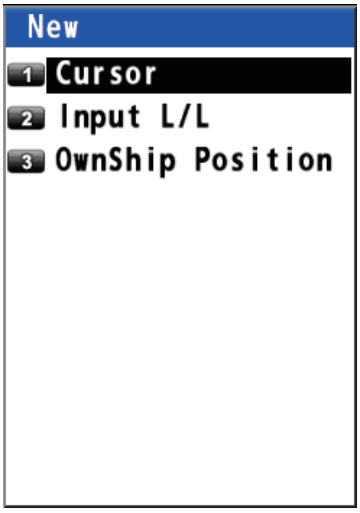
3.1.3 How to enter a mark from the mark list

At the cursor position

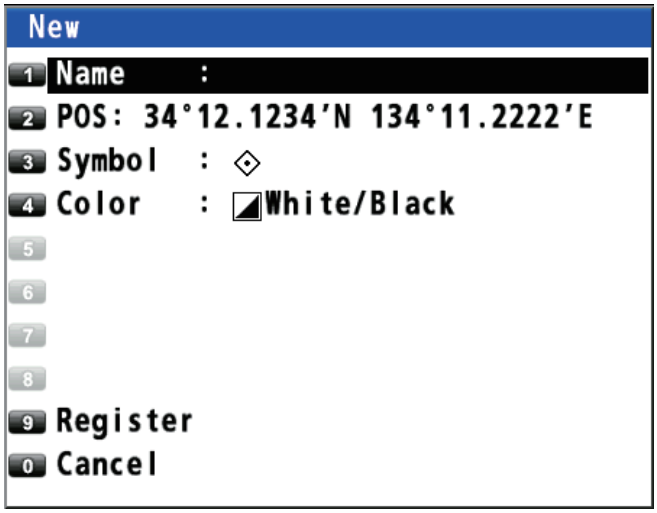
1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [1 Mark Registration].



3. With the cursor on the [New] line, press the **NU/CU ENT** key.



4. Select [1 Cursor].
5. Use the cursorpad to select the position for the mark.
6. Press the **NU/CU ENT** key.



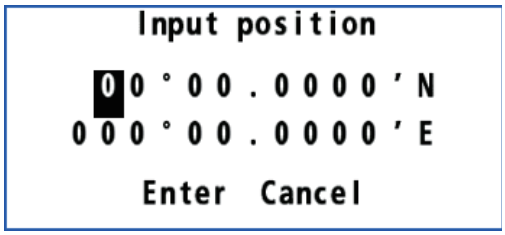
7. Change the name (see page 4-6), position, symbol or color if necessary.
8. Select [9 Register]. The confirmation message appears.

9. Select [1 Yes] or [2 No].
   [Yes]: Marks are registered with connection lines.
   [No]: Marks are registered without connection lines.
10. Press the **MENU/ESC** key to close the main menu.

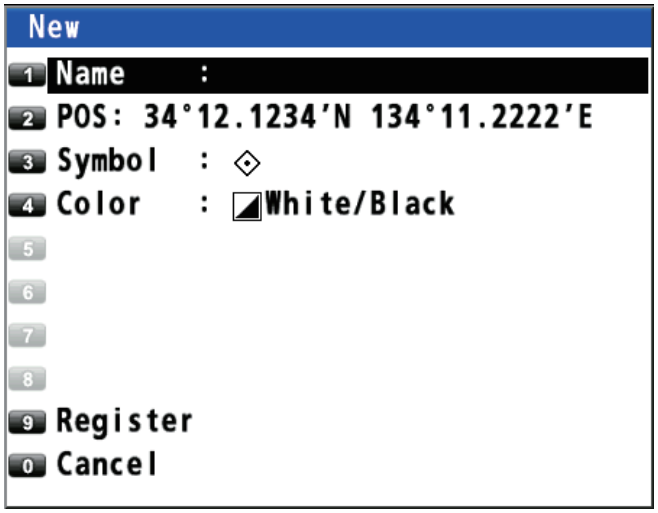
By entering L/L

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [1 Mark Registration].
3. With the cursor on the [New] line, press the **NU/CU ENT** key.

4. Select [2 Input L/L].



5. Enter latitude and longitude with the numeric keys. (To change the coordinate, select "N" or "E" then press one of keys from **0** to **9**.)
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.



7. Change the name (see page 4-6), position, symbol or color if necessary.
8. Select [9 Register]. The confirmation message appears.

9. Select [1 Yes] or [2 No].
   [Yes]: Marks are registered with connection lines.
   [No]: Marks are registered without connection lines.
10. Press the **MENU/ESC** key to close the main menu.

3.2 How to Enter an Event Mark

Event marks can be used to mark an important present position on the plotter display.

3.2.1 How to preset event mark appearance

Set the default event mark shape and color to use when entering an event mark.

Event mark shape

You can select an event mark shape from 16 types.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [2 Track/Mark] then [7 Event Mark].

3. Use the cursorpad to select the shape then press the **NU/CU ENT** key.
4. Press the **MENU/ESC** key to close the main menu.

Event mark color

You can select an event mark color from seven colors.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [2 Track/Mark] then [8 Event Color].

3. Select the color.
4. Press the **MENU/ESC** key to close the main menu.

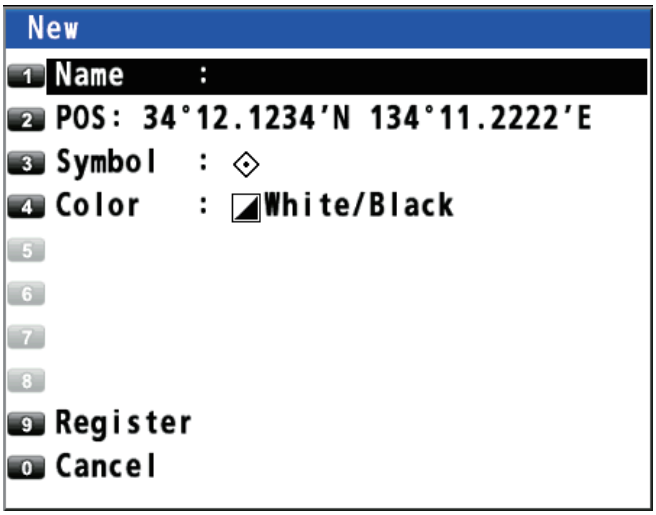
3.2.2 How to enter an event mark at own ship's position

1. Press the **CURSOR ON/OFF** key to turn the cursor off.
2. Press the **MARK EVENT** key on the plotter display. This mark is named with the youngest unused mark number (for example, "POINT0001"), and saved to the mark list.

3.2.3 How to enter an event mark from the mark list

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [1 Mark Registration].
3. With the cursor on the [New] line, press the **NU/CU ENT** key.

4. Select [3 OwnShip Position].



5. Change the name (see page 4-6), position, symbol or color if necessary.
6. Select [9 Register]. The confirmation message appears.

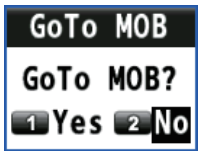
7. Select [1 Yes] or [2 No].
   [Yes]: Marks are registered with connecting lines.
   [No]: Marks are registered without connecting lines.
8. Press the **MENU/ESC** key to close the main menu.

3.3 How to Enter a MOB Mark on the Plotter Display

The MOB mark denotes man overboard position. You can use it as an aid to rescue.

Note: When the ECDIS synchronization is on, a MOB mark can not be entered from the GP-170 (see section 9.8).

Press the **MOB** key to put a MOB mark. When the key is pressed, own ship's position is registered as a MOB mark (⊠). The following message appears.



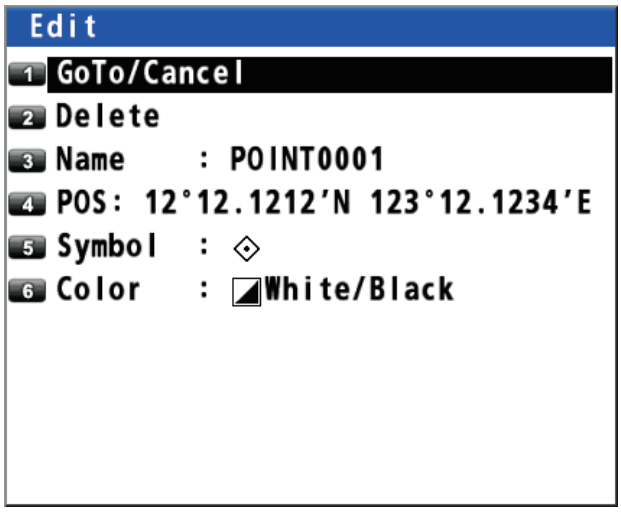
Select [1 Yes]. The position for the MOB mark becomes the destination. A line is drawn between own ship and the MOB mark. This line shows the shortest course to go to the MOB position. The bearing and range from own ship to the MOB position are displayed at the right of the display. Only one MOB mark can be put on the plotter display, and each time the **MOB** key is operated the previous MOB mark and its position data are written over.

3.4 How to Edit a Mark or an Event Mark

You can edit name, position, shape and color for a mark or an event mark on the plotter display or through the mark list.

On the plotter display

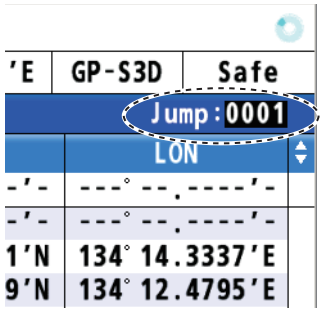
1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to select the (event) mark to edit then press the key to open the context menu.



3. Select appropriate options to edit then set them.
4. Press the **MENU/ESC** key to close the context menu.

From the mark list

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [1 Mark Registration].
3. Use the cursorpad (▲ or ▼) to select the (event) mark to edit then press the **NU/CU ENT** key. The [Edit] window same as above appears.
   Note: You can select the (event) mark to edit by entering its mark no. with the numeric keys.



Enter the mark no. (e.g. "0001") with the numeric key then press the **NU/CU ENT** key.

4. Select appropriate options to edit then set them.
5. Press the **MENU/ESC** key to close the main menu.

3.5 How to Erase Marks

You can erase a mark(s), an event mark(s) or a MOB mark.

Note: You cannot erase the mark used as the current destination except the MOB mark.

How to erase a mark from the context menu

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to select the mark to erase then press the key to open the context menu.
3. Select [2 Delete].

How to erase a mark with the ACK/DELETE key

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to select the mark to erase then press the **ACK/DELETE** key. The confirmation message appears.
3. Select [1 Yes].

For (event) mark

For MOB mark

How to erase a mark from the mark list

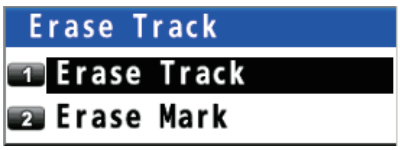
Note: This menu is not available for a MOB mark.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [1 Mark Registration].
3. Use the cursorpad (▲ or ▼) to select the mark to erase then press the **NU/CU ENT** key.
4. Select [2 Delete].
5. Press the **MENU/ESC** key to close the main menu.

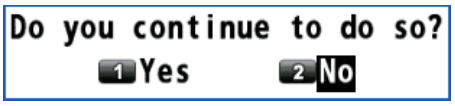
How to erase all marks

Note: This menu is not available for a MOB mark.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [2 Track/Mark] then [9 Erase Track].



3. Select [2 Erase Mark]. The confirmation message appears.



4. Select [1 Yes].
5. Press the **MENU/ESC** key to close the main menu.

4. ROUTES

To navigate from one place to another, several course changes are required. The point for course change is called a waypoint. The sequence of waypoints (marks for course changes) leading to the last destination is called a route.

4.1 How to Create a Route

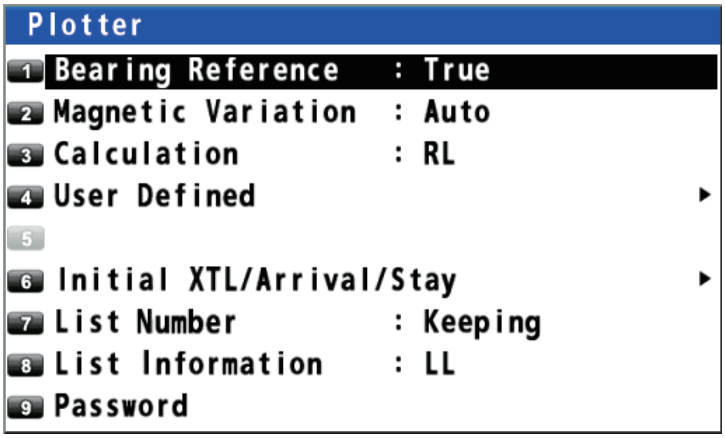
A maximum of 99 routes can be created and a route can have a maximum of 1,000 waypoints.

4.1.1 How to preset the settings for routes

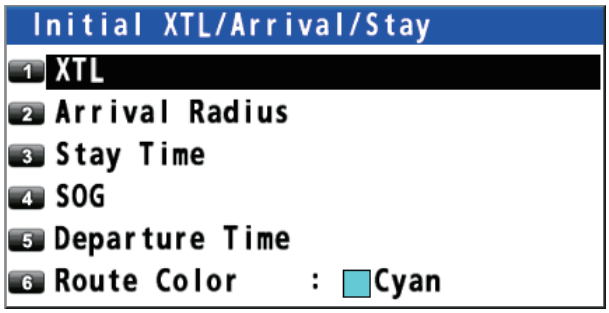
XTL (Cross-track limit) range

The XTL range is the maximum distance your boat is allowed to go off course before the XTE notice (see section 6.3) is given.

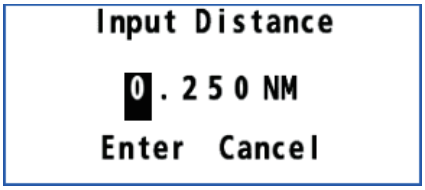
1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].



3. Select [6 Initial XTL/Arrival/Stay].



4. Select [1 XTL].
5. Enter the XTL distance with the numeric keys (setting range: 0.001 to 9.999 NM).
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.



7. Press the **MENU/ESC** key to close the main menu.

Arrival radius

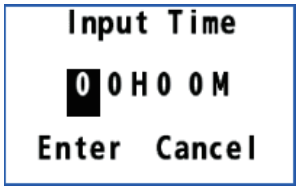
You can receive an audiovisual notice when you are within the specified distance from a waypoint (see section 6.2).

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].
3. Select [6 Initial XTL/Arrival/Stay].
4. Select [2 Arrival Radius].
5. Enter the arrival radius with the numeric keys (setting range: 0.001 to 9.999 NM).
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.

Staying time

You can set the time the GP-170 waits at a waypoint in a followed route before it switches to the next waypoint. See the note in "Departure time" on this page.

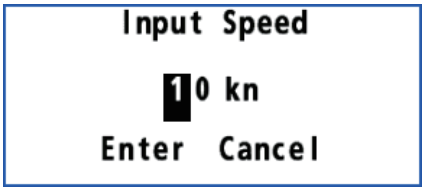
1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].
3. Select [6 Initial XTL/Arrival/Stay].
4. Select [3 Stay Time].
5. Enter the staying time at the waypoint with the numeric keys.
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.



SOG

Set the speed to use to follow a route.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].
3. Select [6 Initial XTL/Arrival/Stay].
4. Select [4 SOG].
5. Enter the speed with the numeric keys.
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.



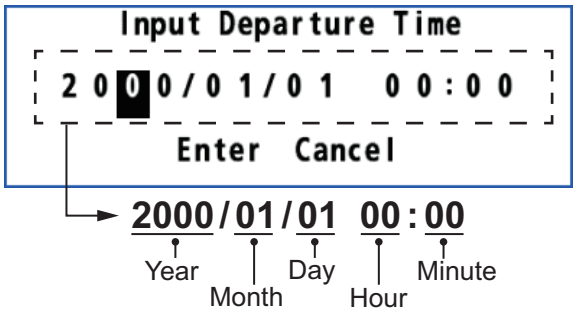
Departure time

You can set the date and time to depart from the waypoint on the route.

Note: When the departure date and time set is before the current date and time, the staying time has priority. When the departure date and time set is after the current date and time, the departure time has priority.

1. Press the **MENU/ESC** key to open the main menu.

2. Select [8 System Setting] then [2 Plotter].
3. Select [6 Initial XTL/Arrival/Stay].
4. Select [5 Departure Time].
5. Enter the date and time departing from the starting point with the numeric keys.
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.



Range and bearing calculation method

When you set a destination, the equipment displays the range, bearing and course to the destination. Range and bearing are calculated by the Rhumb Line or Great Circle method.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].
3. Select [3 Calculation].
4. Select [1 RL] or [2 GC].
   [RL] (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.
   [GC] (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.
5. Press the **MENU/ESC** key to close the main menu.

Route color

You can select the route color from seven colors.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].
3. Select [6 Initial XTL/Arrival/Stay].
4. Select [6 Route Color].
5. Select a color for route lines and waypoints.
6. Press the **MENU/ESC** key to close the main menu.

4.1.2 How to create a new route with the cursor and the ROUTE key

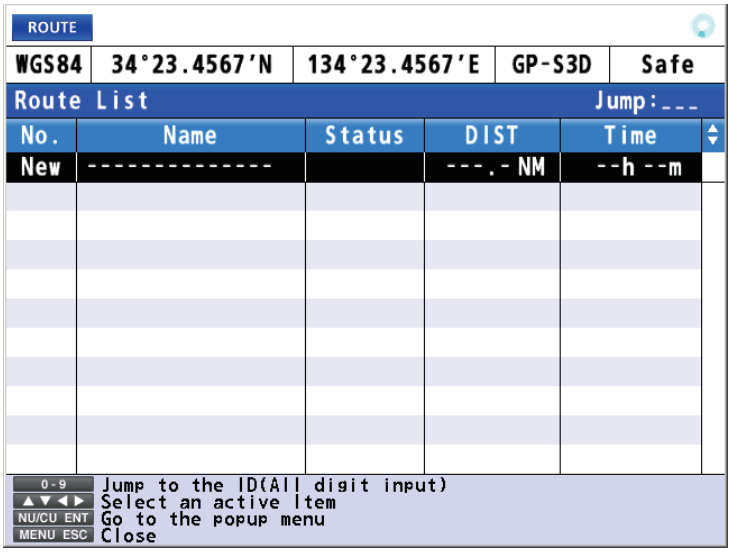
1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Long-press the **ROUTE** key. The message "Route Setting" appears on the display.
3. Use the cursorpad to place the cursor on the location for the first waypoint then press the **NU/CU ENT** key.

4. Use the cursorpad to place the cursor on the location for the next waypoint then press the **NU/CU ENT** key. Repeat this step to enter all waypoints.
5. At the last waypoint, press the **ROUTE** key to complete the route.

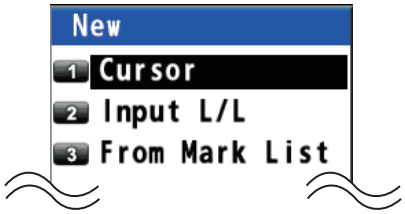
4.1.3 How to create a new route from the route list

With the cursorpad

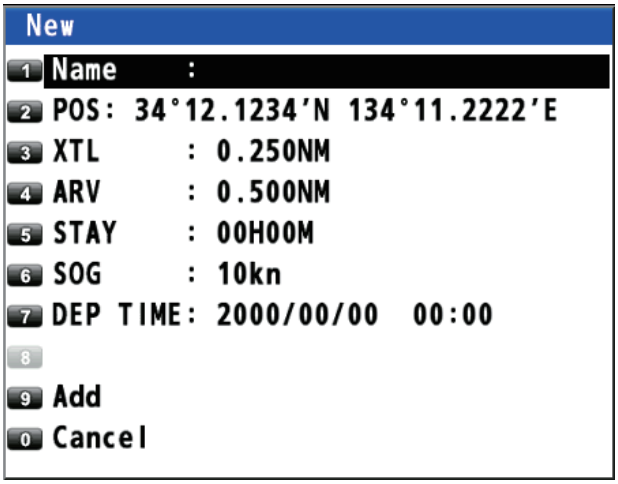
1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [2 Route Registration].



3. With the cursor on the [New] line, press the **NU/CU ENT** key.



4. Select [1 Cursor].
5. Use the cursorpad to select the position for the first waypoint.
6. Press the **NU/CU ENT** key.

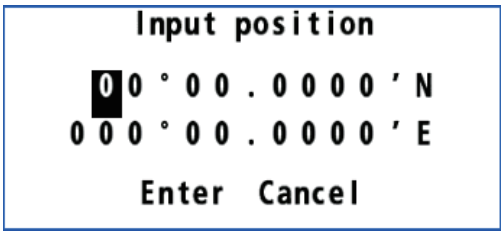


The values set in paragraph 4.1.1 are displayed at the menu items [3 XTL] to [7 DEP TIME]. You can change these values for each waypoint if required.

7. Select [9 Add] to enter the waypoint.
8. Repeat steps 4 to 7 to enter all waypoints.
9. Press the **MENU/ESC** key to complete the route and close the main menu.

By entering L/L

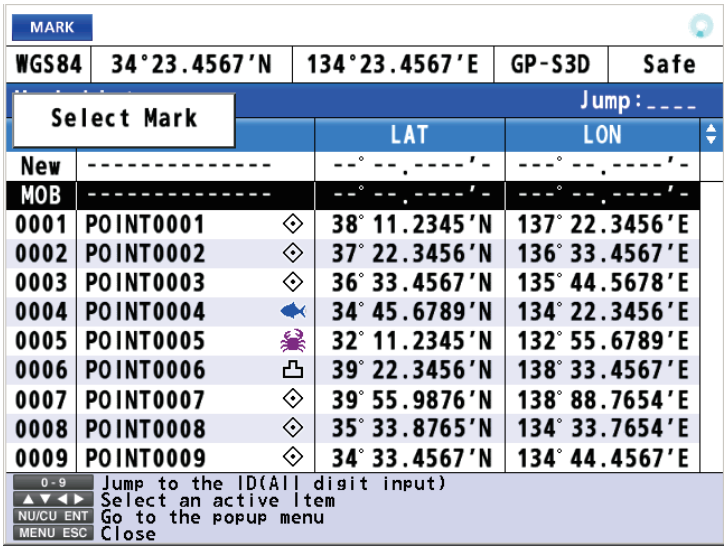
1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [2 Route Registration].
3. With the cursor on the [New] line, press the **NU/CU ENT** key.
4. Select [2 Input L/L].
5. Enter latitude and longitude for the first waypoint with the numeric keys. (To change the coordinate, select "N" or "E" then press one of keys from **0** to **9**.)
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.



7. If necessary, change the settings of the route.
8. Select [9 Add] to enter the waypoint.
9. Repeat steps 4 to 8 to enter all waypoints.
10. Press the **MENU/ESC** key to complete the route and close the main menu.

From the mark list

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [2 Route Registration].
3. With the cursor on the [New] line, press the **NU/CU ENT** key.
4. Select [3 From Mark List] to show the mark list.



5. Use the cursorpad (▲ or ▼) to select the mark to use for the route.
6. Press the **NU/CU ENT** key.
7. If necessary, change the settings of the route.
8. Select [9 Add] to enter the waypoint.
9. Repeat steps 4 to 8 to enter all waypoints.
10. Press the **MENU/ESC** key to complete the route and close the main menu.

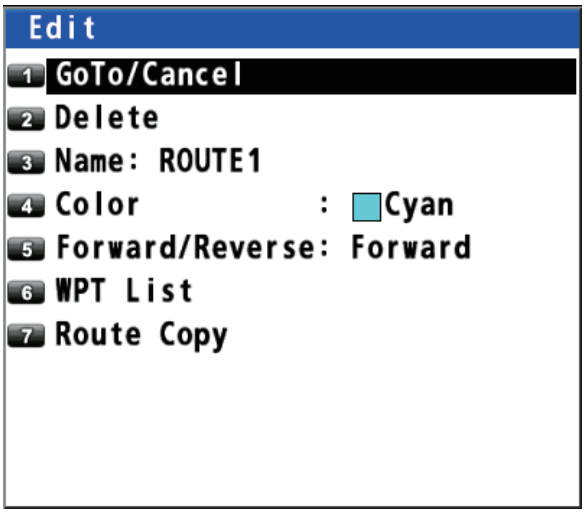
4.2 How to Edit a Route

You can edit a route from the plotter display or through the route list.

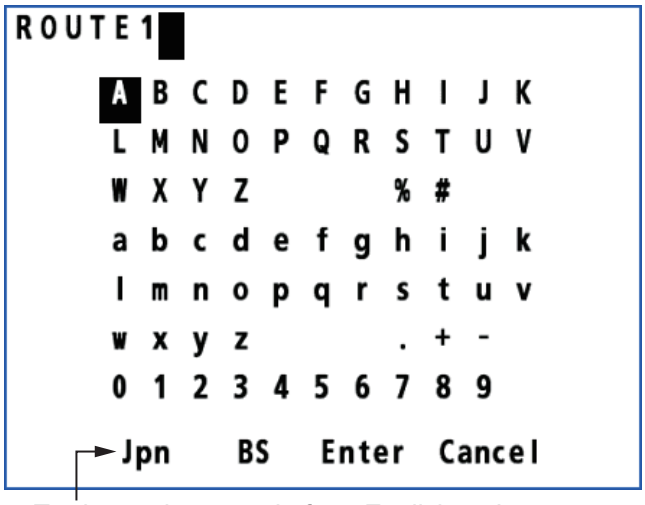
4.2.1 How to change the route name or color

From the route list

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [2 Route Registration] to display the route list.
3. Use the cursorpad (▲ or ▼) or enter the route no. at the "Jump" position to select the route to edit then press the **NU/CU ENT** key.



4. To change the name, select [3 Name].



To change input mode from English to Japanese, select [Jpn] then press the **NU/CU ENT** key.

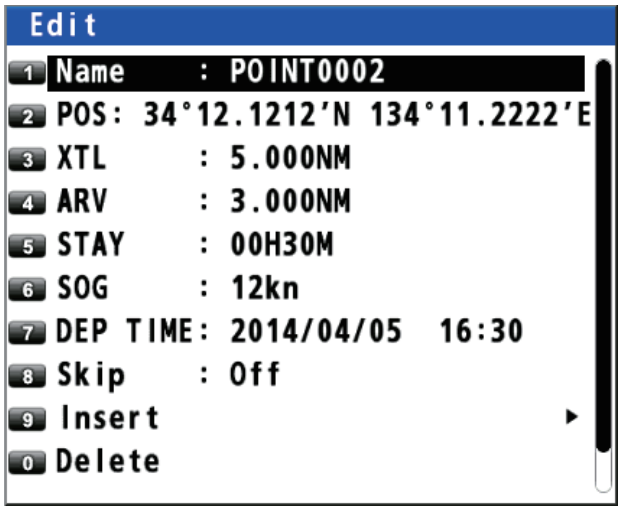
5. To add characters, use the cursorpad to select a character to add then press the **NU/CU ENT** key.
   To delete characters, use the cursorpad to select [BS] then press the **NU/CU ENT** key.
6. Use the cursorpad to select [Enter] then press the **NU/CU ENT** key.
7. To change the color, select [4 Color], then select the new color.
8. Press the **MENU/ESC** key to close the main menu.

On the plotter display

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Put the cursor on any route line of the route to edit then press the key. The context menu opens.
3. Do steps 4 to 7 in "From the route list" on page 4-6 as appropriate.
4. Press the **MENU/ESC** key to close the context menu.

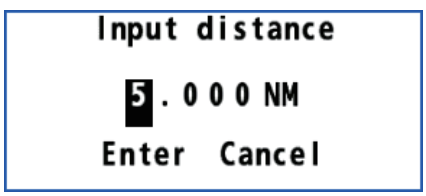
4.2.2 How to edit a waypoint in a route

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to select the waypoint in the route to edit then press the key to open the context menu.



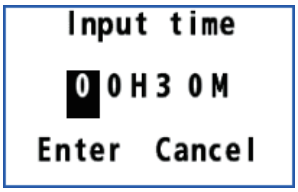
Note: If setting a waypoint at the own ship's position, the context menu for track edit is preferentially displayed when selecting the waypoint then pressing the key (see section 2.3.3).

3. To change the name, select [1 Name].
4. To add characters, use the cursorpad to select a character to add then press the **NU/CU ENT** key.
   To delete characters, use the cursorpad to select [BS] then press the **NU/CU ENT** key.
5. Use the cursorpad to select [Enter] then press the **NU/CU ENT** key.
6. To change the position, select [2 POS], then enter latitude and longitude for the waypoint with the numeric keys. (To change the coordinate, select "N" or "E" then press one of keys from **0** to **9**.)
7. Use the cursorpad to select [Enter] then press the **NU/CU ENT** key.
8. To change the XTL range scale, select [3 XTL], then enter the XTL range scale with the numeric keys.
9. Use the cursorpad to select [Enter] then press the **NU/CU ENT** key.

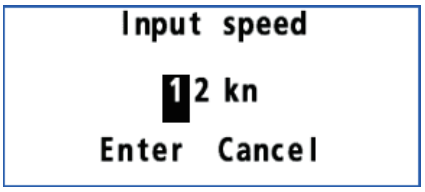


10. To change the arrival radius, select [4 ARV], then enter the arrival radius with the numeric keys.

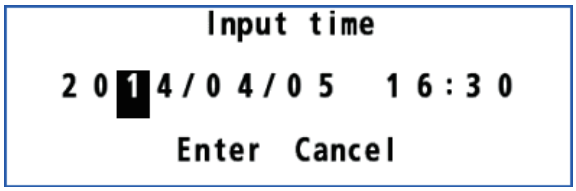
11. Use the cursorpad to select [Enter] then press the **NU/CU ENT** key.
12. To change the staying time, select [5 STAY], then enter the staying time at the waypoint with the numeric keys.
13. Use the cursorpad to select [Enter] then press the **NU/CU ENT** key.



14. To change the SOG, select [6 SOG], then enter the speed with the numeric keys.
15. Use the cursorpad to select [Enter] then press the **NU/CU ENT** key.



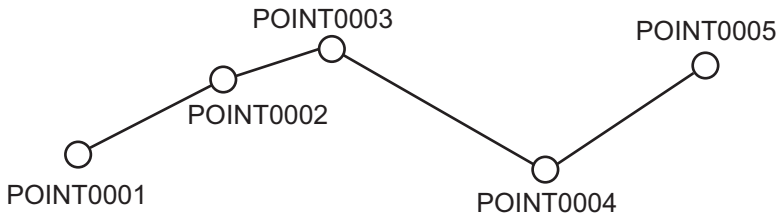
16. To change the departure time, select [7 DEP TIME], then enter the date and time departing from the waypoint with the numeric keys



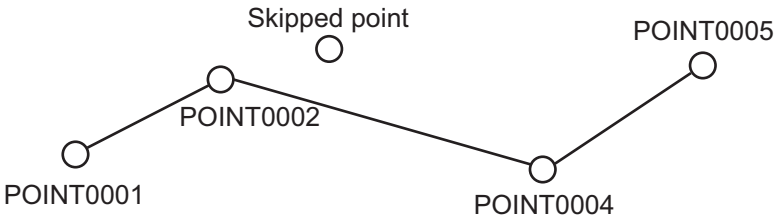
17. Use the cursorpad to select [Enter] then press the **NU/CU ENT** key.
18. Press the **MENU/ESC** key to close the context menu.

4.2.3 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 "POINT0003".



If you reconstruct the route without "POINT0003" it would look like the illustration below.

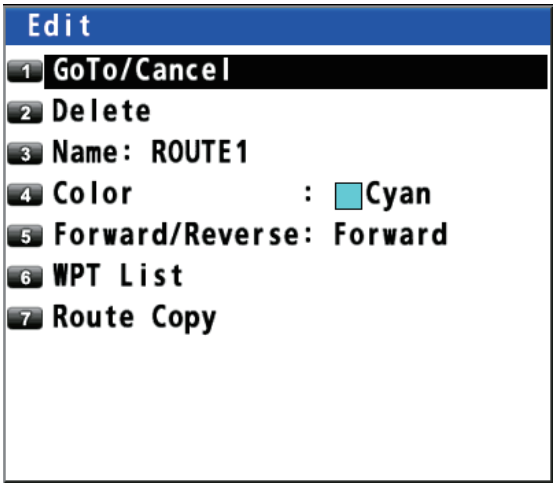


1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to select the waypoint in the route to skip then press the key. The context menu opens.
3. Select [8 Skip].
4. Select [2 On].
5. Press the **MENU/ESC** key to close the context menu.

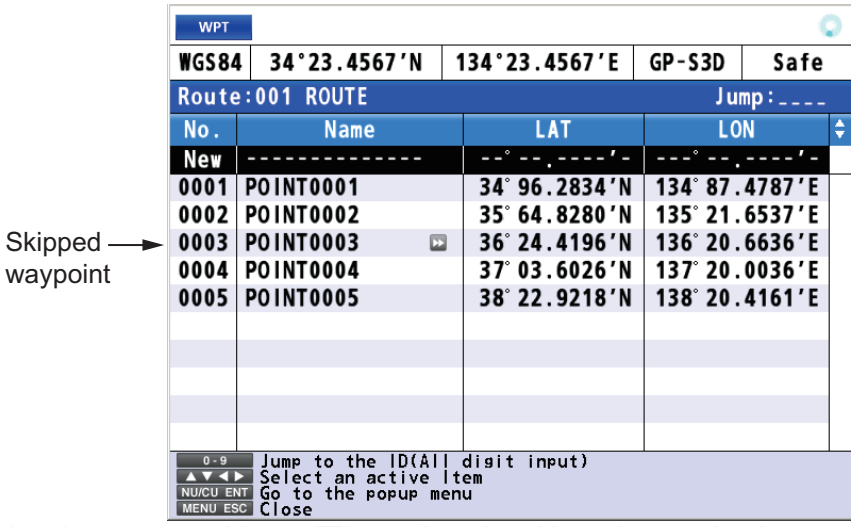
How to restore the skipped waypoint

To restore the skipped waypoint if you have not passed it, do the following:

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Put the cursor on any route line of the route which contains the skipped waypoint then press the key to open the context menu.



3. Select [6 WPT List]. The ( ) icon is displayed on the skipped waypoint.



Skipped waypoint

4. Use the cursorpad (▲ or ▼) to select the skipped waypoint then press the **NU/CU ENT** key.
5. Select [8 Skip].
6. Select [1 Off].
7. Press the **MENU/ESC** key to close the context menu.

4.2.4 How to delete a waypoint from a route

How to erase a waypoint from the context menu

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to select the waypoint to delete then press the key to open the context menu.
3. Select [0 Delete].

How to erase a waypoint with the ACK/DELETE key

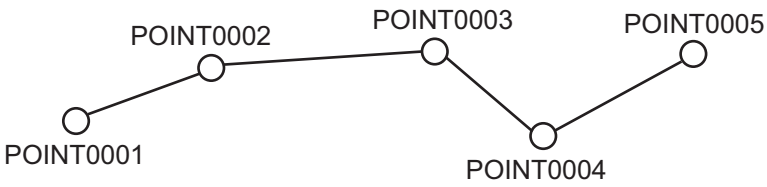
1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to select the waypoint to delete then press the **ACK/DELETE** key. The confirmation message appears.
3. Select [1 Yes].

How to erase a waypoint from the route list

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [2 Route Registration].
3. Use the cursorpad (▲ or ▼) to select the route no. which contains the waypoint to delete then press the **NU/CU ENT** key.
4. Select [6 WPT List].
5. Use the cursorpad (▲ or ▼) to select the waypoint to delete then press the **NU/CU ENT** key.
6. Select [0 Delete].
7. Press the **MENU/ESC** key to close the main menu.

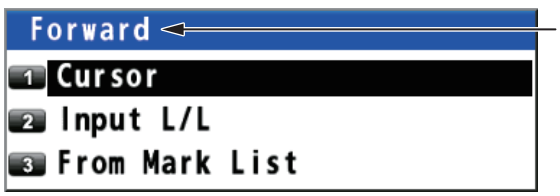
4.2.5 How to insert a waypoint in a route

You can insert a waypoint backward or forward of the selected waypoint in a route. For example, to insert a waypoint backward or forward of "POINT0003", do the following:



1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to select the waypoint (in this example, "POINT0003") then press the key to open the context menu.
3. Select [9 Insert].

4. Select [1 Forward] or [2 Back].
   [Forward]: Insert a waypoint forward of the selected waypoint.
   [Back]: Insert a waypoint backward of the selected waypoint.



"Back" when selecting [2 Back].

5. Select [1 Cursor], [2 Input L/L] or [3 From Mark List].
6. Set a waypoint position refer to paragraph 4.1.3. The context menu closes after selecting [9 Add].

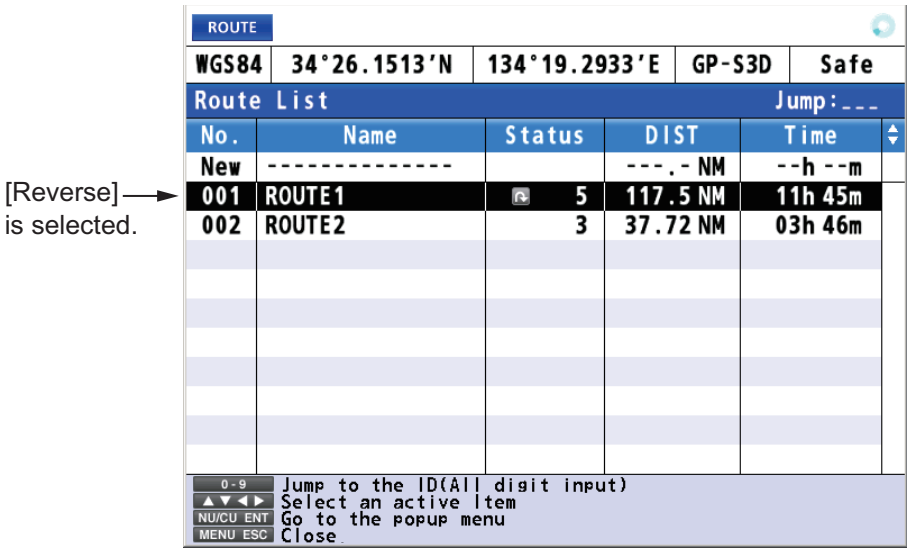
4.2.6 How to change the route direction

You can change the direction to travel a route.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [2 Route Registration] to show the route list.
3. Use the cursorpad (▲ or ▼) to select the route to change its direction then press the **NU/CU ENT** key to display the [Edit] window. This window can be opened as the context menu (see "On the plotter display" in paragraph 4.2.1).
4. Select [5 Forward/Reverse].
5. Select [1 Forward] or [2 Reverse].
   [Forward]: Follow the waypoints in the order they were entered.
   [Reverse]: Follow the waypoints in reverse order. The arrows on the route point in the direction to follow the route (see the illustration on page 5-1).

6. Press the **MENU/ESC** key to close the main menu.

The ( ) icon is displayed on the route for which [Reverse] is selected.



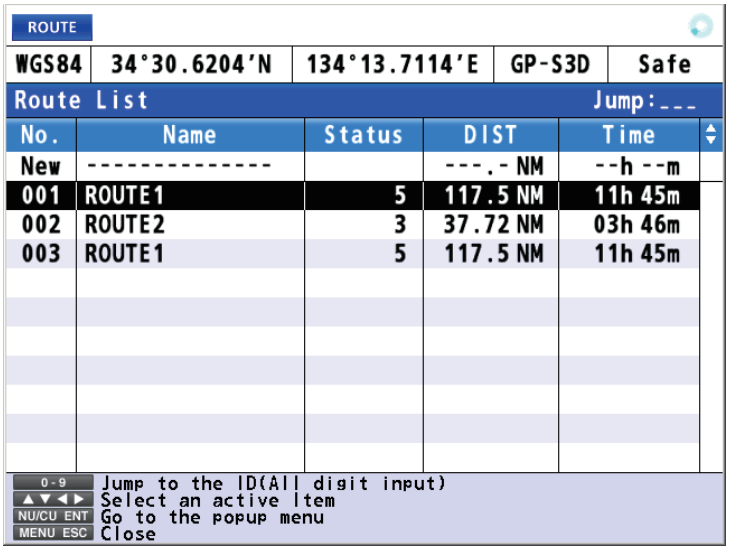
4.2.7 How to copy the route

The copy feature lets you save a registered route under a new route number. This is useful for creating a new route with parts of a previously registered route.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [2 Route Registration] to show the route list.
3. Use the cursorpad (▲ or ▼) to select the route to copy then press the **NU/CU ENT** key to display the [Edit] window. This window can be opened as the context menu (see "On the plotter display" in paragraph 4.2.1).

4. Select [7 Route Copy]. "ROUTE1" is copied in the illustration below.

[ROUTE1] is copied here.

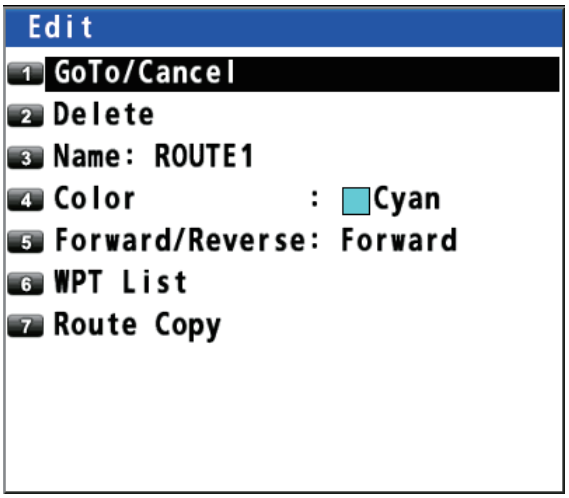


5. Edit the route as appropriate (see section 4.2).
6. Press the **MENU/ESC** key to close the main menu.

4.3 How to Erase a Route

How to erase a route from the context menu

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Put the cursor on any route line of the route to delete then press the key to open the context menu.



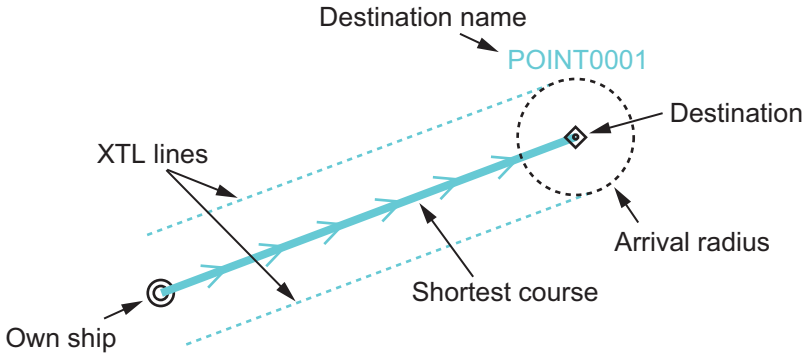
3. Select [2 Delete].

How to erase a route from the route list

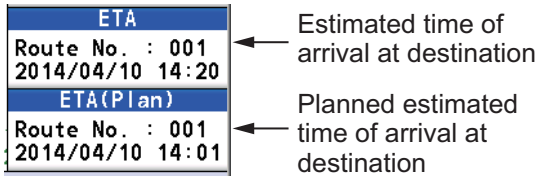
1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [2 Route Registration].
3. Use the cursorpad (▲ or ▼) to select the route to delete then press the **NU/CU ENT** key.
4. Select [2 Delete].
5. Press the **MENU/ESC** key to close the main menu.

5. DESTINATION

Destination can be set five ways: by cursor, by waypoint, by mark, by route and by MOB position. The setting by MOB position is described in section 3.3. When setting a destination, a line (shortest course) appears between own ship and the destination selected.



Note: When a destination is set, ETA and ETA(Plan) are displayed instead of COG and SOG at the bottom right of the plotter display with the cursor off.



When setting a route as a destination

5.1 How to Set a Destination

Note: When the ECDIS synchronization is on, the destination can not be set on the GP-170 (see section 9.8).

5.1.1 How to set a cursor position as a destination

You can set a destination at the position selected with the cursor.

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to place the cursor on the location for a destination.
3. Press the **GO TO** key.

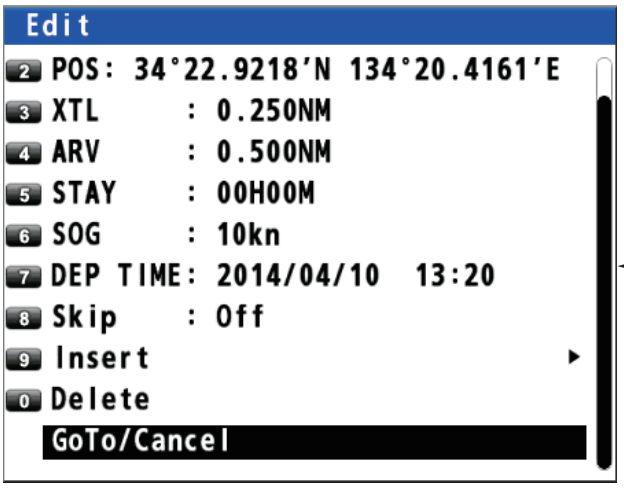
Note: This destination set is erased when a new destination is entered.

5.1.2 How to set a waypoint as a destination

You can set a waypoint as a destination.

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to place the cursor on a waypoint as a destination.
3. Press the key to open the context menu.

4. Use the cursorpad to select [GoTo/Cancel] then press the **NU/CU ENT** key.



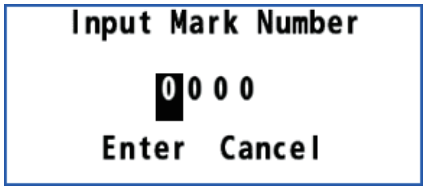
Scroll bar (Indicates menus currently not shown in menu window. You can see the menus currently not shown by pressing the cursorpad (▲ or ▼.))

5.1.3 How to set a registered mark as a destination

You can set a registered mark as a destination.

From the main menu

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [6 Goto (Mark Number)].



3. Enter the mark number to set as a destination with the numeric keys.
4. Move the cursor to [Enter] then press the **NU/CU ENT** key.
5. Press the **MENU/ESC** key to close the main menu.

From the context menu

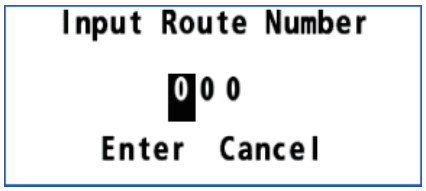
1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to place the cursor on a mark as a destination.
3. Press the key to open the context menu.
4. Select [1 GoTo/Cancel].

5.1.4 How to set a registered route as a destination

You can set a registered route as a destination.

From the main menu

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [7 Goto (Route Number)].



3. Enter the route number to set as a destination with the numeric keys.
4. Move the cursor to [Enter] then press the **NU/CU ENT** key.
5. Press the **MENU/ESC** key to close the main menu.

From the context menu

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Put the cursor on any route line of the route as a destination.
3. Press the key to open the context menu.
4. Select [1 GoTo/Cancel].

5.2 How to Cancel a Destination

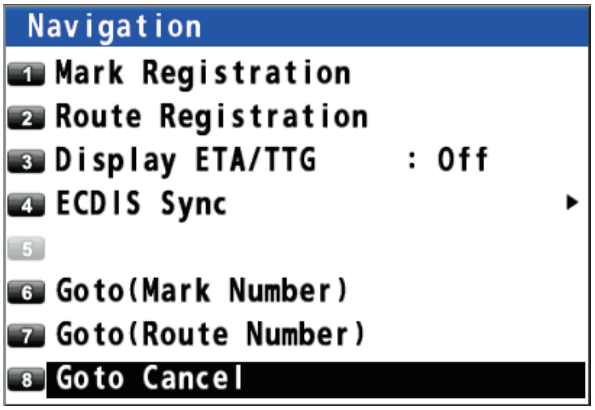
To cancel a destination, do one of the following three methods.

5.2.1 How to cancel a destination with the GO TO key

1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to place the cursor on a destination.
3. Press the **GO TO** key.

5.2.2 How to cancel a destination from the main menu

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [8 Goto Cancel].

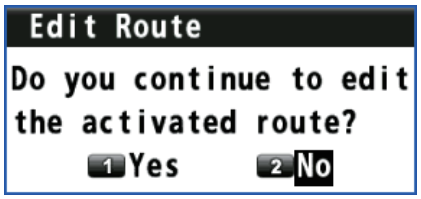


3. Press the **MENU/ESC** key to close the main menu.

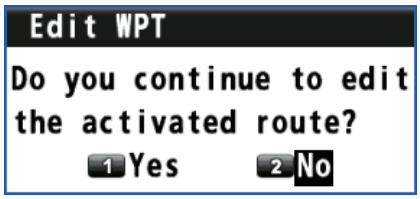
5.2.3 How to cancel a destination from the context menu

Note: This procedure is not available for the destination set with a mark (excluding the MOB mark).

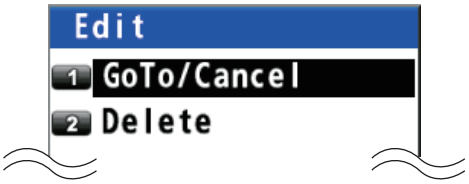
1. Press the **CURSOR ON/OFF** key to turn the cursor on.
2. Use the cursorpad to place the cursor on a destination.
3. Press the key to open the context menu.



On a route line



On a waypoint



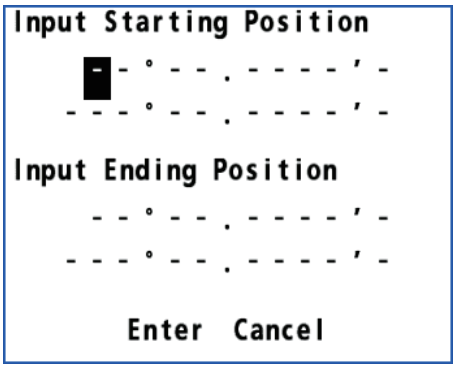
On a MOB mark

4. For a route line or a waypoint, select [1 Yes] then [GoTo/Cancel]. For a MOB mark, select [1 GoTo/Cancel].

5.3 How to Calculate the Distance, Bearing and TTG (Time To Go) Between Two Points

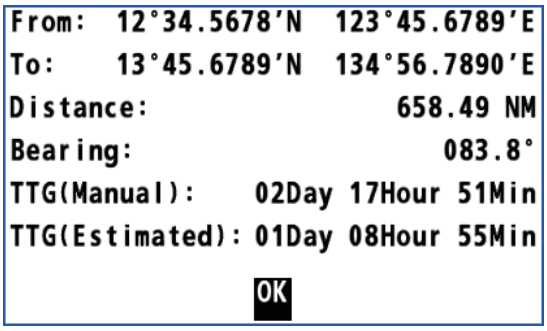
You can display the distance, bearing and time to go between two points.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [7 Manual Calculation].



3. Enter latitude and longitude for the starting and ending positions with the numeric keys. To change the coordinate, select "N" or "E" then press one of keys from **0** to **9**.

4. Move the cursor to [Enter] then press the **NU/CU ENT** key.



[TTG (Manual)]: Time to go calculated by SOG set on page 4-2
[TTG (Estimated)]: Time to go calculated by actual SOG

5. Press the **NU/CU ENT** key then press the **MENU/ESC** key to close the main menu.

5.4 How to Display the ETA and TTG

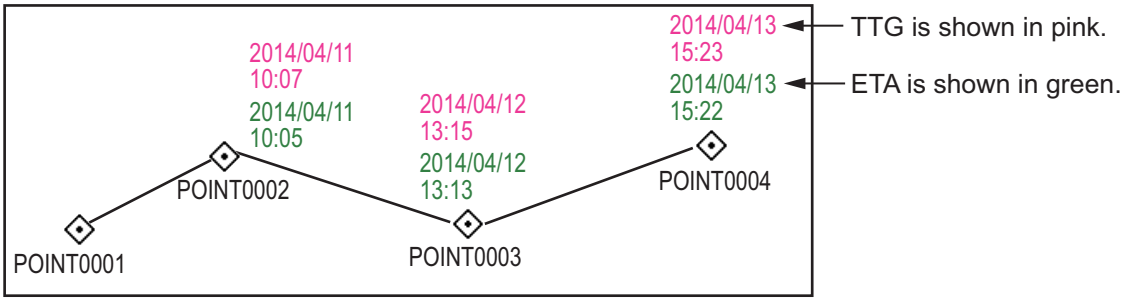
You can display the ETA and TTG to waypoints on the plotter display.

ETA: The arrival date and time calculated by SOG set on page 4-2
TTG: The arrival date and time calculated by actual SOG (TTG is displayed when the SOG is 0.4 kn or above.)

When the departure date and time set is before the current date and time, the ETA and TTG are calculated by the staying time set. When the departure date and time set is after the current date and time, the ETA and TTG are calculated by the departure time set. See "Staying time" and "Departure time" on page 4-2.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [3 Display ETA/TTG].

3. Select [1 Off], [2 ETA] or [3 ETA+TTG].
[Off]: Hides the ETA and TTG.
[ETA]: Shows the ETA.
[ETA+TTG]: Shows the ETA and TTG.
4. Press the **MENU/ESC** key to close the main menu.



5.5 How to Calculate the Trip Distance

You can calculate the trip distance as follows:

1. Press the **MENU/ESC** key to open the main menu.
2. Select [4 Notice Setting] then [4 Trip].

3. Select [1 Status].

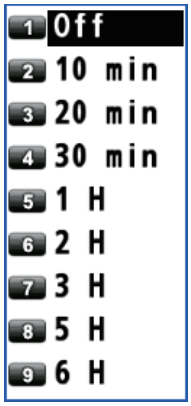
4. Select [1 Stop], [2 Start/Restart] or [3 Clear].
   [Stop]: Stops the trip distance calculation.
   [Start/Restart]*: Starts or restarts the trip distance calculation.
   [Clear]: Resets the trip distance.
5. Press the **MENU/ESC** key to close the main menu.

*: You can receive a notice, when your ship has travelled a preset distance. See section 6.5 for details.

5.6 How to Set the Drift

You can set the time for which the drift value is averaged. The longer the time setting, the more stable the drift value.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [1 Display] then [8 Set/Drift AVR].

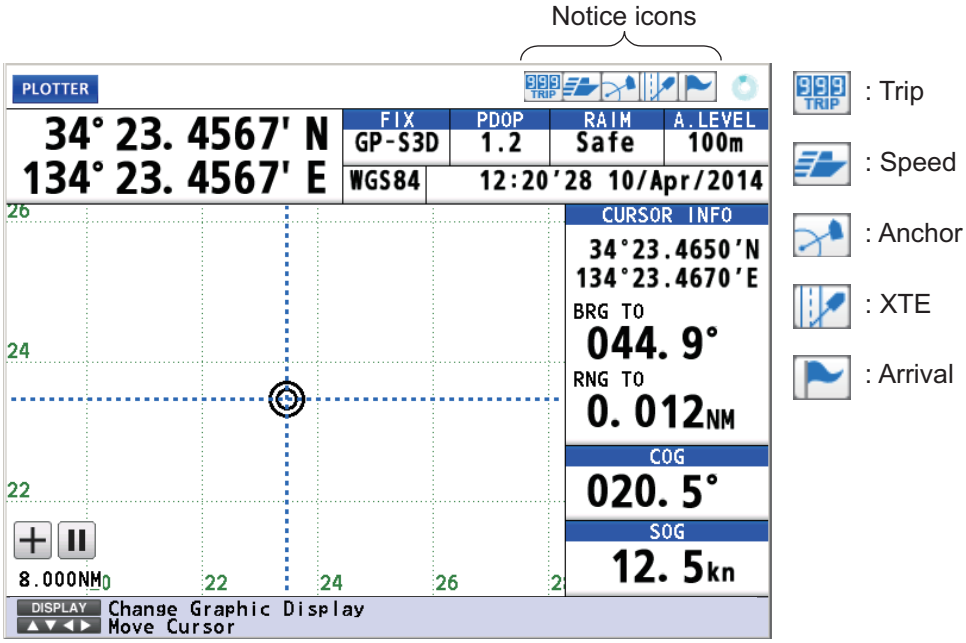


3. Select an option.
   [Off]: Displays the latest drift value.
   Others: Displays the average drift value per the setting time.
4. Press the **MENU/ESC** key to close the main menu.

6. NOTICES

There are five notice conditions which generate both audio and visual notices: Arrival, Anchor, XTE, Ship Speed and Trip. When the conditions of a notice are met, the buzzer sounds according to the notice sound setting and the icon related to the notice turns from gray to blue at the top right-hand corner of the display.

You can silence the buzzer by pressing the **ACK/DELETE** key.

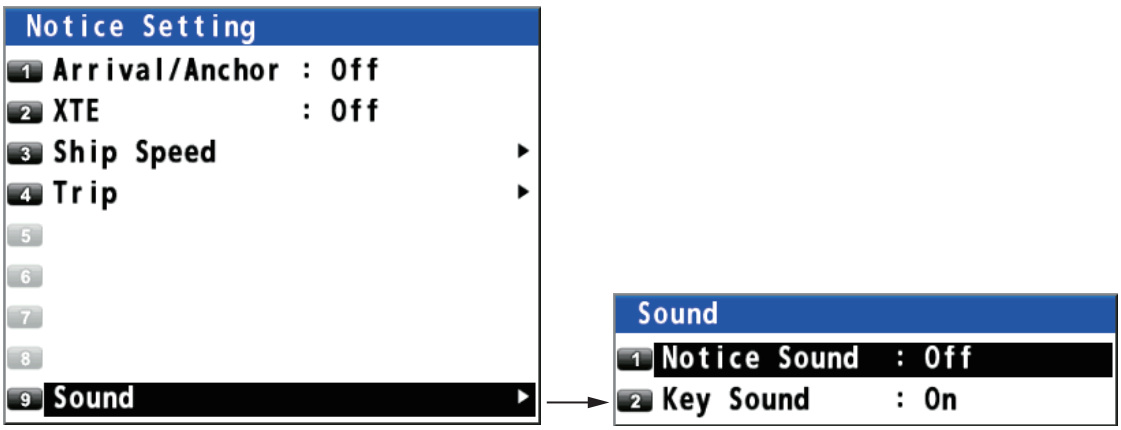


Note: You can not set both arrival and anchor notices at the same time.

6.1 Audio Notice Type

You can select the audio notice type as follows. When the conditions of a notice are met, the icon color related to the notice changes regardless of the audio notice type.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [4 Notice Setting] then [9 Sound].



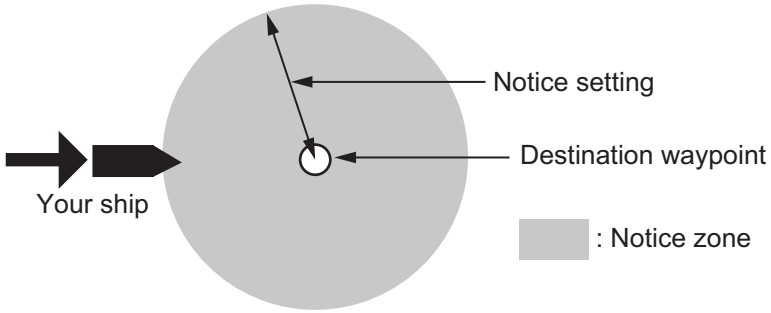
3. Select [1 Notice Sound].
4. Select [1 Off], [2 On] or [3 Continuous].
   [Off]: No sound, only visual notice (an icon turns blue)
   [On]: Three long beeps and visual notice (related icon turns blue)
   [Continuous]: This buzzer sounds until the **ACK/DELETE** key is operated to acknowledge the notice. Visual notice (related icon turns blue).
5. Press the **MENU/ESC** key to close the main menu.

6.2 Arrival/Anchor Notice

Note: You can not set both arrival and anchor notices at the same time.

6.2.1 Arrival notice

The arrival notice alerts you when you are within the specified distance from a destination waypoint.



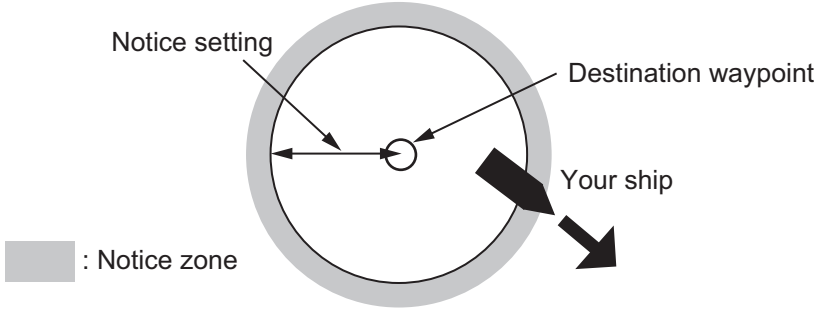
Before setting arrival notice, set the arrival radius (see "Arrival radius" on page 4-2).

1. Press the **MENU/ESC** key to open the main menu.
2. Select [4 Notice Setting] then [1 Arrival/Anchor].
3. Select [1 Arrival]. The arrival notice icon ( ) appears at the top right-hand corner of the display.
4. Press the **MENU/ESC** key to close the main menu.

To turn off the arrival notice, select [3 Off] at step 3.

6.2.2 Anchor notice

The anchor notice alerts you that your ship is moving when your ship should be at rest.



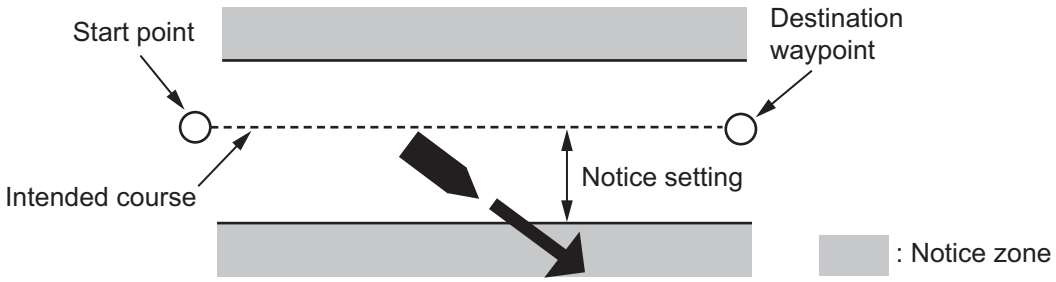
Before setting anchor notice, set the arrival radius (see "Arrival radius" on page 4-2).

1. Press the **MENU/ESC** key to open the main menu.
2. Select [4 Notice Setting] then [1 Arrival/Anchor].
3. Select [2 Anchor]. The anchor notice icon ( ) appears at the top right-hand corner of the display.
4. Press the **MENU/ESC** key to close the main menu.

To turn off the anchor notice, select [3 Off] at step 3.

6.3 XTE Notice

The XTE (Cross-track error) notice alerts you when your ship is off its intended course (the line from the start point to the destination waypoint) by the distance specified.



Before setting XTE notice, set the XTL range (see "XTL (Cross-track limit) range" on page 4-1).

1. Press the **MENU/ESC** key to open the main menu.
2. Select [4 Notice Setting] then [2 XTE].
3. Select [2 On]. The XTE notice icon ( ) appears at the top right-hand corner of the display.
4. Press the **MENU/ESC** key to close the main menu.

To turn off the XTE notice, select [1 Off] at step 3.

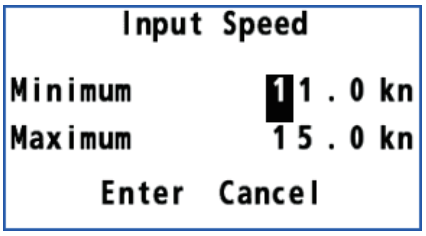
6.4 Ship Speed Notice

The ship speed notice alerts you when your ship's speed is lower or higher than the speed notice setting or within the range set.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [4 Notice Setting] then [3 Ship Speed].

3. Select [1 Status].

4. Select [2 In] or [3 Out]. The ship speed notice icon ( ) appears at the top right-hand corner of the display.
   [In]: The notice alerts you when your ship's speed is within the range set.
   [Out]: The notice alerts you when your ship's speed is lower or higher than the range set.
5. Select [2 Speed].
6. Enter the minimum and maximum speeds with the numeric keys.
7. Move the cursor to [Enter] then press the **NU/CU ENT** key.
8. Press the **MENU/ESC** key to close the main menu.



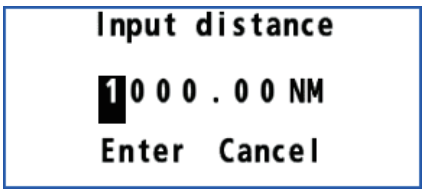
To turn off the ship speed notice, select [1 Off] at step 4.

6.5 Trip Notice

The trip notice alerts you when your ship's trip has travelled the distance specified.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [4 Notice Setting] then [4 Trip].

3. Select [2 Range].



4. Enter the trip distance with the numeric keys.
5. Move the cursor to [Enter] then press the **NU/CU ENT** key.
6. Select [1 Status] then [2 Start/Restart]. The trip notice icon ( ) appears at the top right-hand corner of the display.
7. Press the **MENU/ESC** key to close the main menu.

To turn off the trip notice, select [1 Stop] at step 6.

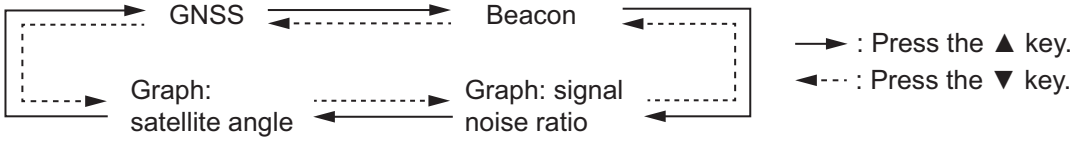
7. DISPLAYS

There are five display modes: PLOTTER, INTEGRITY, HIGHWAY, COURSE and DATA. This chapter describes the display modes except for PLOTTER.

7.1 Integrity Display

The integrity display provides information about GPS satellite position, DGPS beacon station information and signal quality. There are four integrity displays: GNSS, beacon, graph for signal noise ratio and graph for satellite angle.

Use the cursorpad (▲ or ▼) to change the displays, in the following sequence.



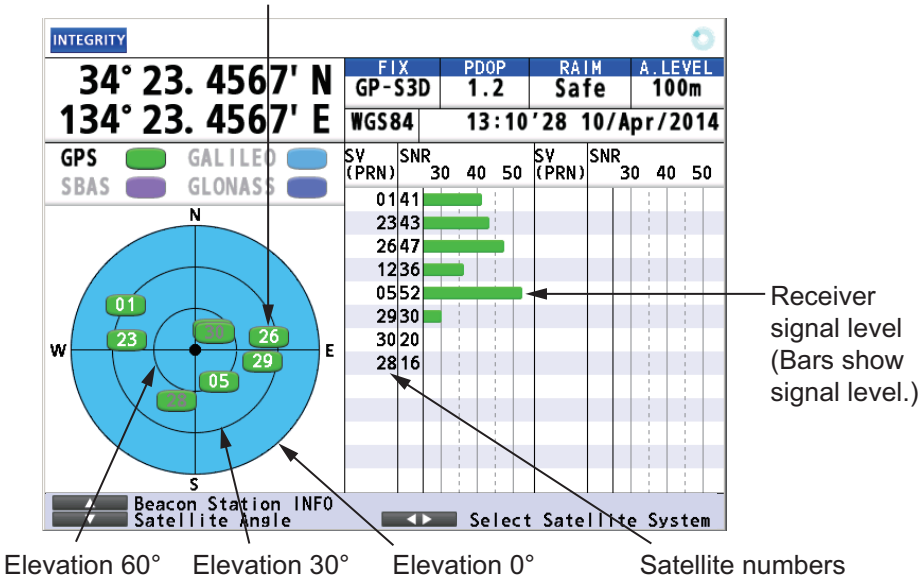
GNSS

The GNSS display shows the condition of satellite positioning system. Number, azimuth and elevation angle of all satellites (if applicable) in view of your receiver appear.

Use the cursorpad (◀ or ▶) to change the satellite positioning system in the following sequence.

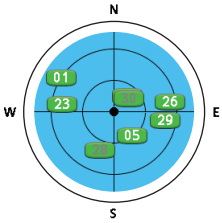
The following illustration is an example integrity display for GPS.

Satellites used for positioning (Satellite numbers used for positioning are displayed in white, or black if not used for positioning.)
QZSS L1S satellites (numbered in the 180 series) are not displayed, however, their signal level appears on the screen.

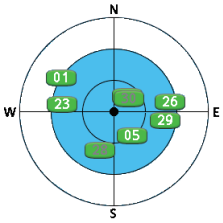


Elevation

The area set on [Elevation Mask] is displayed in white. See "Satellite elevation" on page 9-5 for how to set elevation mask.



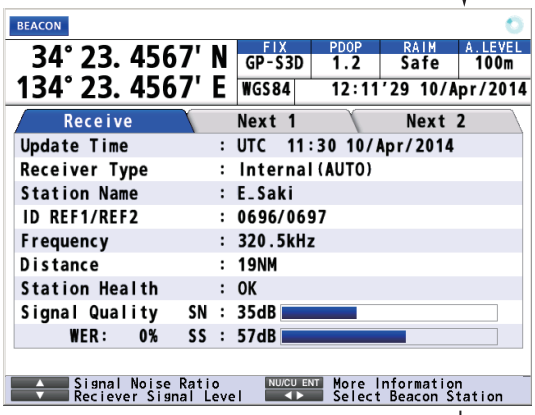
Elevation mask is set to 10°



Elevation mask is set to 30°

Beacon

The beacon display shows the DGPS beacon station information.



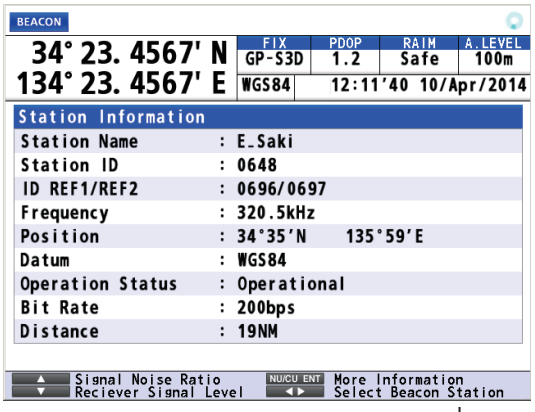
Beacon station information

← Press the ◄ or ► key to select [Next 1]* or [Next 2]*.

[Receive]: Station used for positioning (the nearest station)
[Next 1]: Second nearest station
[Next 2]: Third nearest station

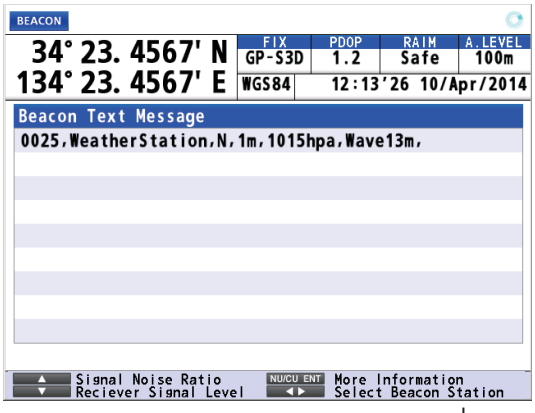
*: w/internal beacon receiver

↓ Press the **NU/CU ENT** key.



Detailed beacon station information

↓ Press the **NU/CU ENT** key.

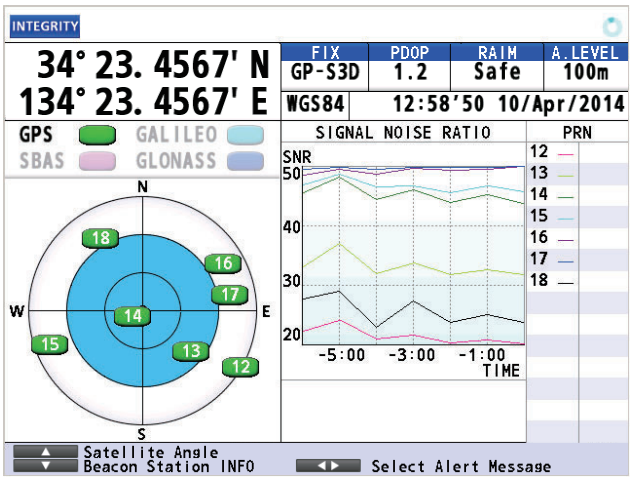


Type 16 message

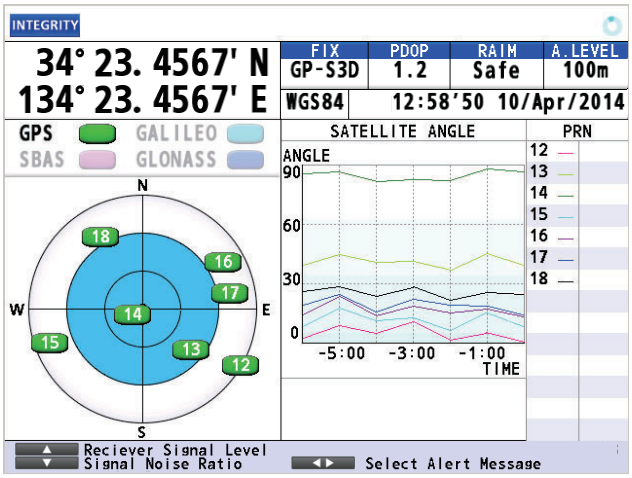
↓ Press the **NU/CU ENT** key.

Graph

The graph displays show signal to noise ratio and satellite angle used for positioning for the last six hours.

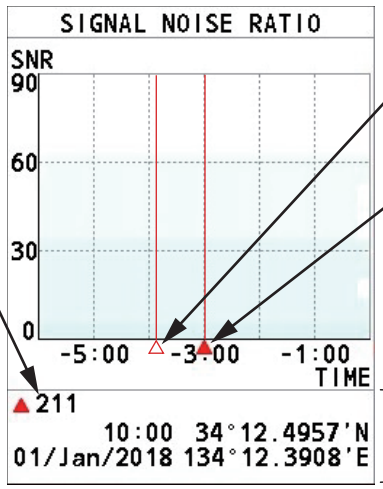


Signal to noise ratio



Satellite angle

An alert (see chapter 8), which informs you to various types of errors, may appear on a graph display, with a red bar and triangle. Below is an example of an alert on the signal noise ratio graph.



A hollow triangle marks an alert that occured within the past six hours.

Filled red trinagle marks the latest alert.

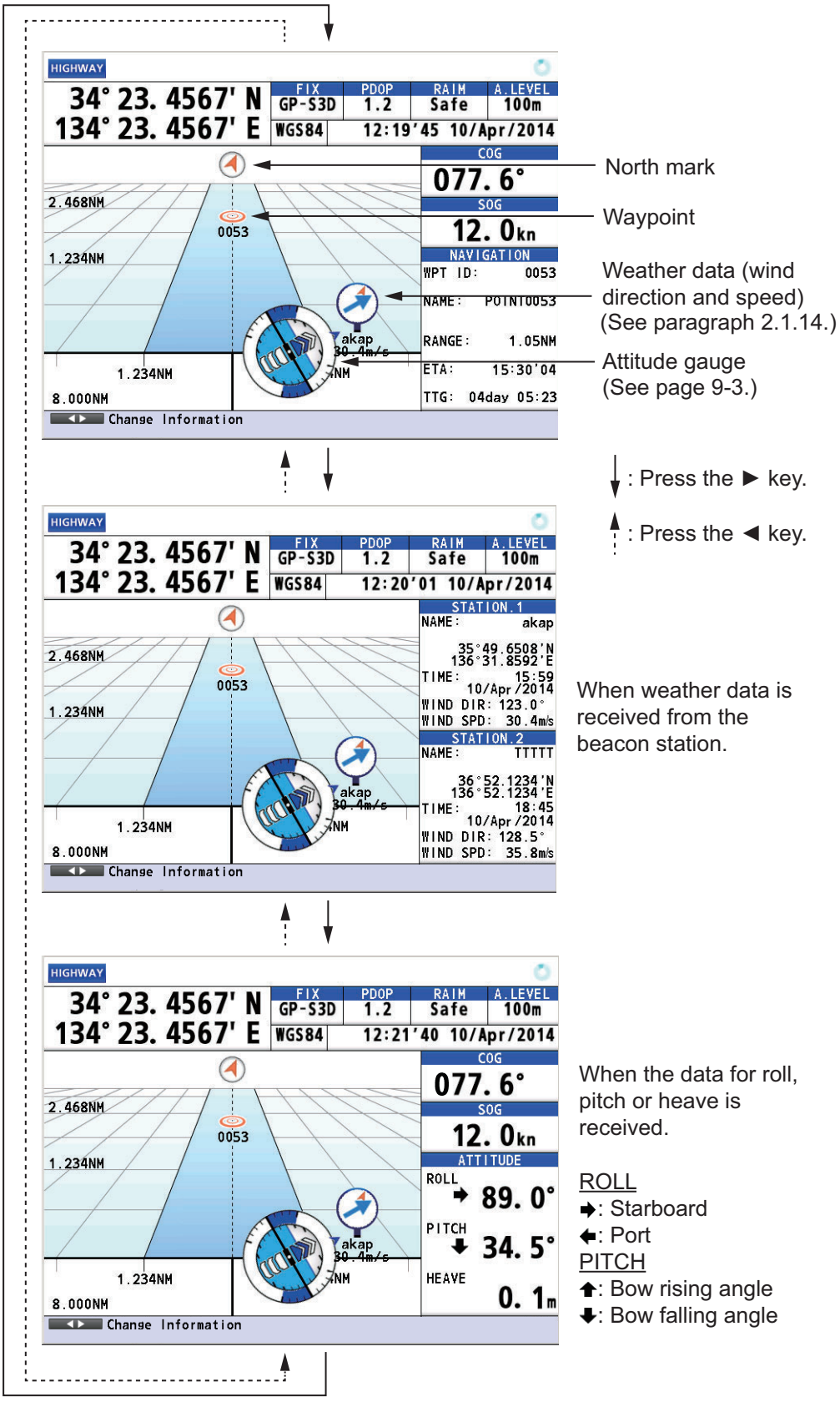
This indication differs according to the alert mode (see section 8.1).
- Alert I/F 1: Alert no.
- Alert I/F 2: Alert no. and instance no.
- Legacy: Alert name

Information about the latest alert, which is saved in the alert log and occurs within the past six hours, appears here. The reason for the alert, the time of the alert and the position at the time of the alert are displayed.

7.2 Highway Display

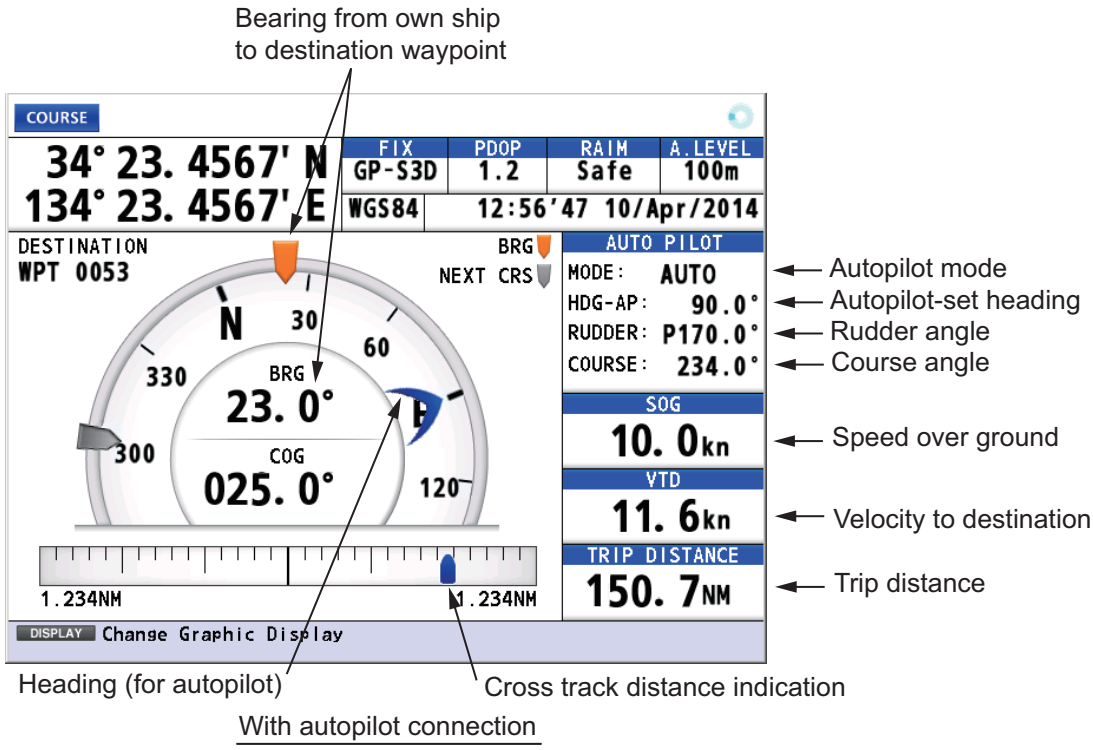
The highway display provides a 3-D view of own ship's progress toward destination.

Use the cursorpad (◄ or ►) to change the data at the right-hand of the display.

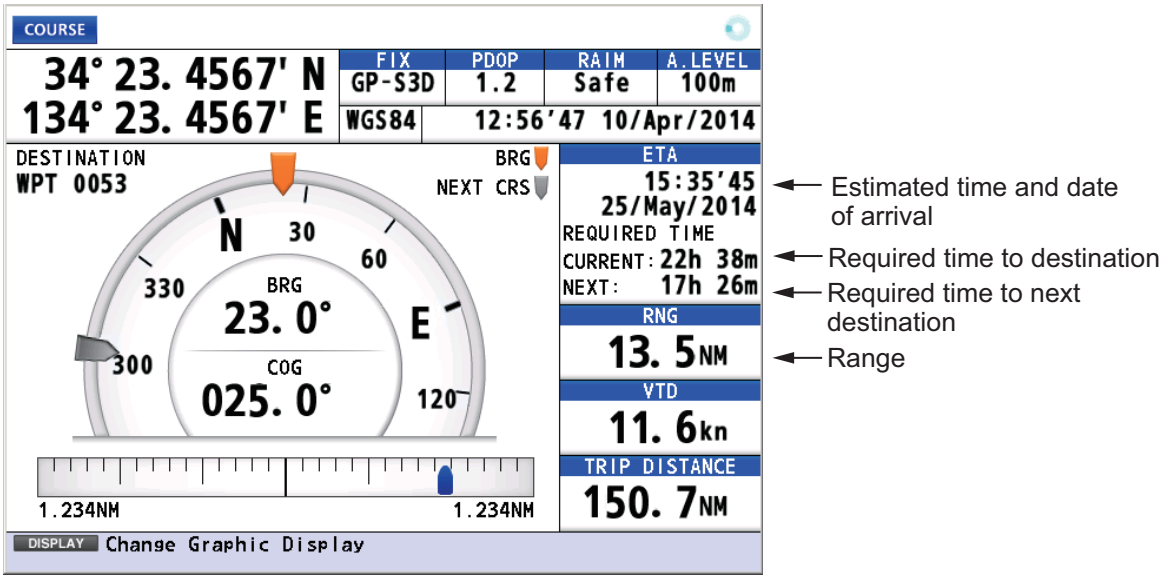


7.3 Course Display

The course display shows the course information. The information at the right-hand side of the display is different between autopilot connection and no autopilot connection.



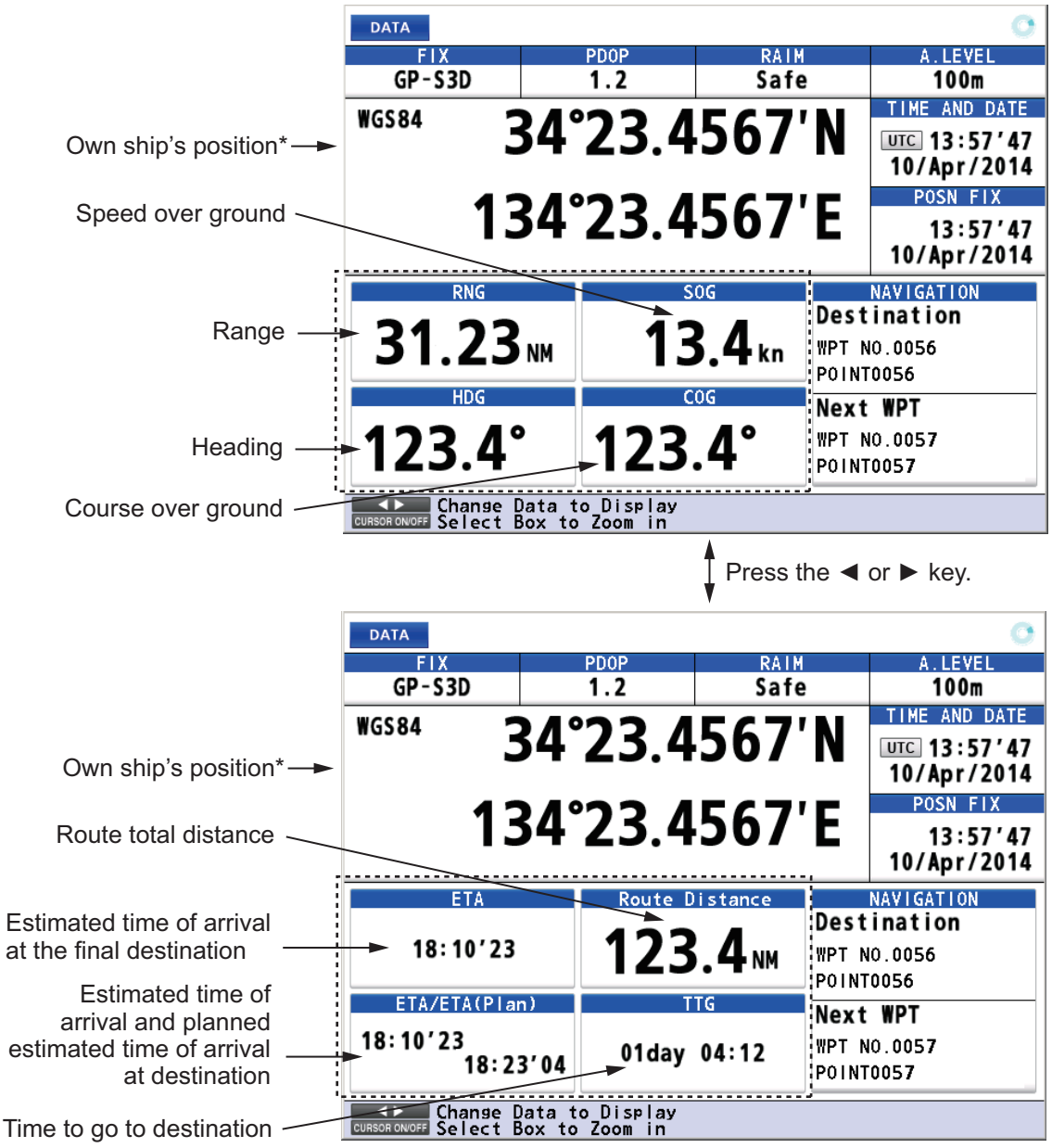
With autopilot connection



No autopilot connection

7.4 Data Display

The data display shows the navigation data. Use the cursorpad (◄ or ►) to change the data to display.



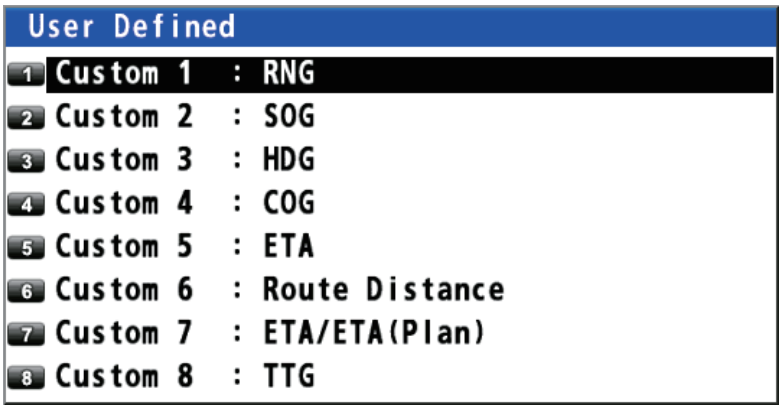
*: Shows the ship's position adjusted with the setting position offset based on the selected datum (refer to paragraph 9.3.5).

How to customize the display

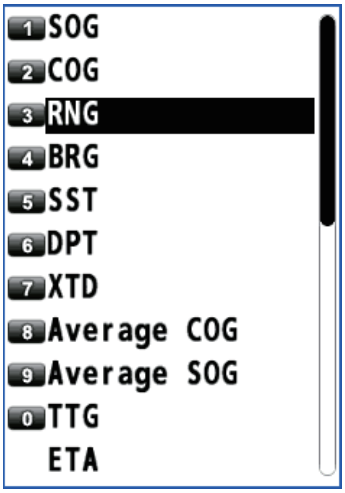
You can arrange the data to display and show the data in the order desired. Availability of data depends on the sensors connected.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].

3. Select [4 User Defined].

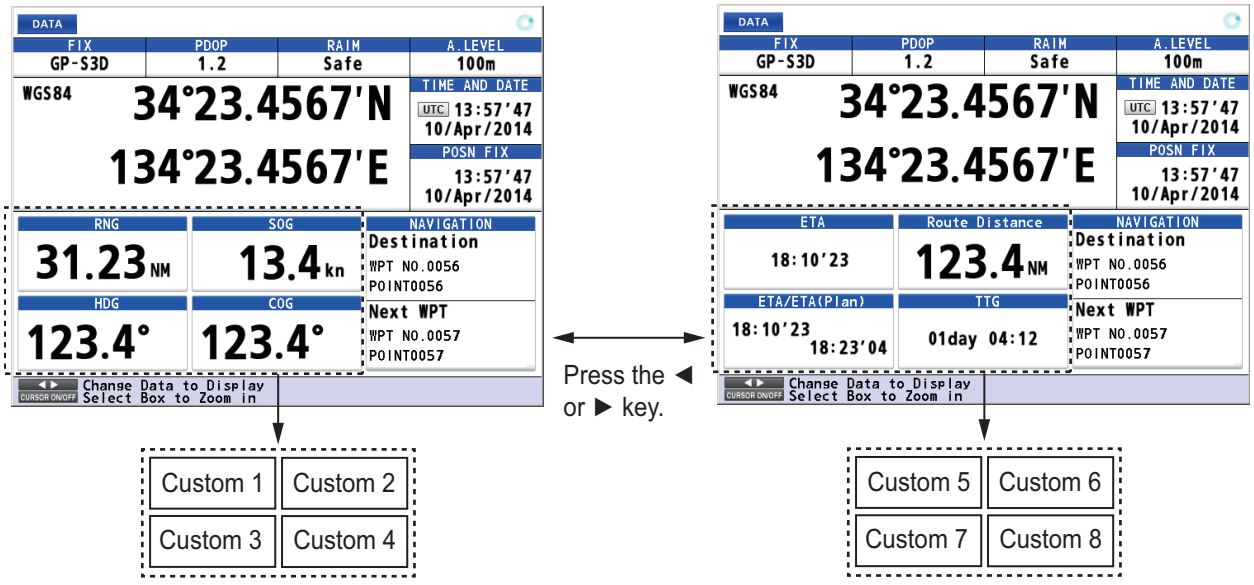


4. Select [1 Custom 1].



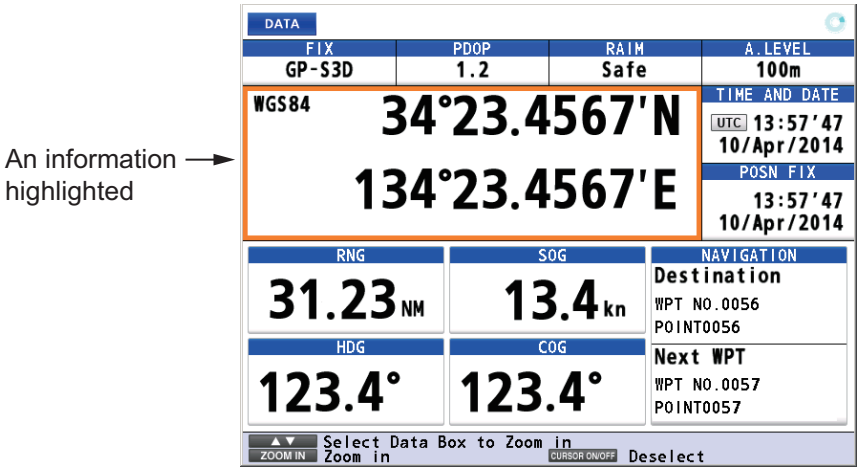
- [TTG]: Time to go to destination
- [TRIP]: Distance to go to destination
- [TRIP TIME]: Time elapsed since the destination was set
- [Route TTG]: Time to go to the final destination
- [VTD]: Velocity to destination
- [ETA/ETA(Plan)]: ETA is estimated time of arrival at destination. ETA(Plan) is planned estimated time of arrival at destination.

5. Select an option.
6. Repeat steps 4 and 5 to select options for [2 Custom 2] to [8 Custom 8].
7. Press the **MENU/ESC** key to close the main menu.

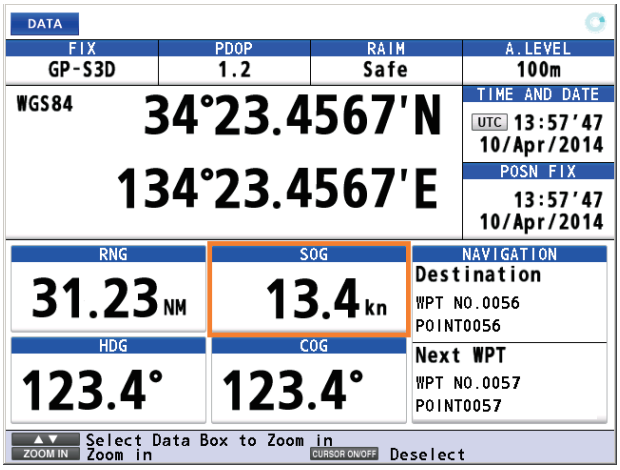


How to zoom information

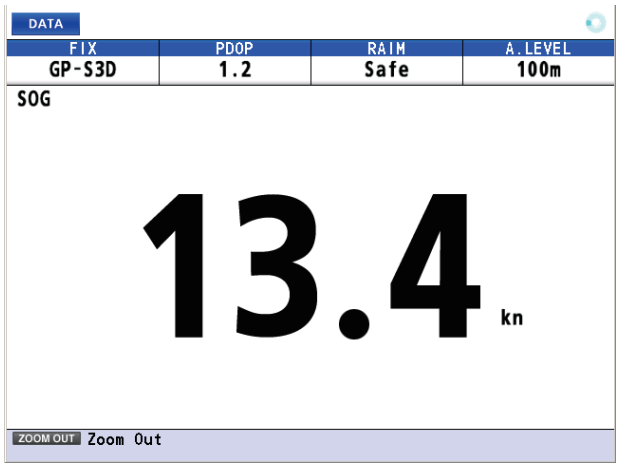
1. Press the **CURSOR ON/OFF** key. An information is highlighted as follows.



2. Use the cursorpad (▲ or ▼) to select the information to zoom in. SOG is highlighted in the following example.



3. Press the **ZOOM IN** key to zoom in the SOG information.



To go to the original display, press the **ZOOM OUT** key.

4. Press the **CURSOR ON/OFF** key to deselect the SOG information.

8. ALERTS

"Alert" is a generic name for a notice to any unusual or potentially dangerous situation generated within the system. There are two types of alerts, warning and caution.
Warning: Conditions or situations which require immediate attention for precautionary reasons.
Caution: Awareness of a condition which continues to require attention out of the ordinary consideration of the situation.

8.1 Overview

The GP-170 has the alerts according to the alert mode Alert I/F 1, Alert I/F 2 or Legacy as follows. The alert mode is set at installation. For full lists of the alerts for each alert mode, see "ALERT LIST" on page AP-15.

Alert I/F 2

No.	Inst.	Text	Priority
210	0	HDOP exceeded.	Caution/B
212	1	GNSS core fault.	Warning/B
	2	Too few tracking Satellites.	
	3	Antenna short-circuited.	
213	0	Loss of differential signal.	Caution/B
215	0	Differential integrity status.	Caution/B

Note 1: "Inst." denotes "Instance number" for the alert.

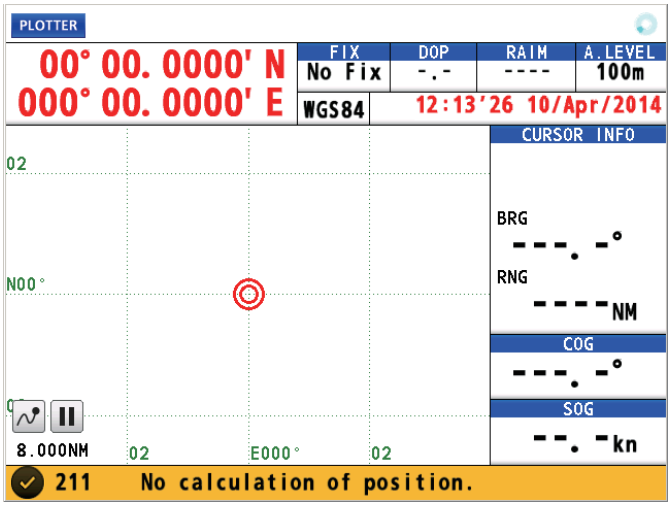
Note 2: When a warning is not acknowledged within three minutes, the warning is repeated.

Alert I/F 1, Legacy

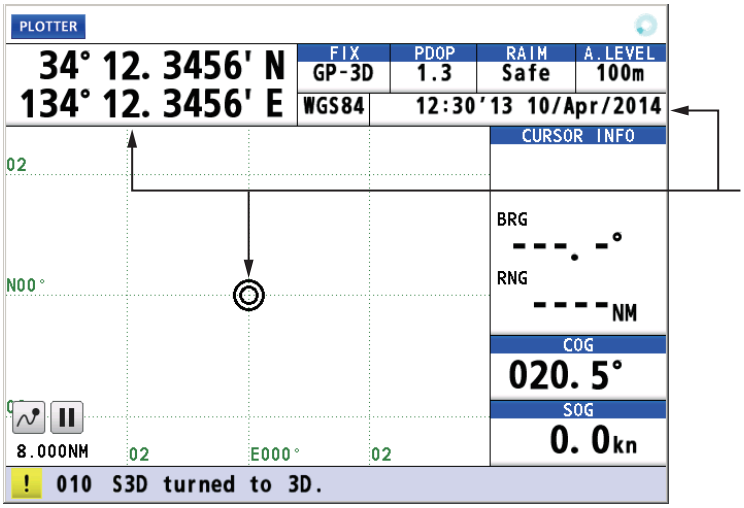
No.	Text	Priority
009	Antenna short-circuited.	Warning/B
010	• D3D turned to 3D. • D3D turned to 2D. • D2D turned to 3D. • D2D turned to 2D. • S3D turned to 3D. • S3D turned to 2D. • S2D turned to 3D. • S2D turned to 2D. • Q3D turned to 3D. • Q3D turned to 2D. • Q2D turned to 3D. • Q2D turned to 2D. • D3D turned to "No Fix". • D2D turned to "No Fix". • S3D turned to "No Fix". • S2D turned to "No Fix". • Q3D turned to "No Fix". • Q2D turned to "No Fix".	Caution/B
210	HDOP exceeded.	Caution/B

No.	Text	Priority
211	No calculation of position.	Warning/B
212	Loss of position.	Warning/B
213	Loss of differential signal.	Caution/B
215	Differential integrity status.	Caution/B

When an alert condition occurs, the buzzer sounds (except for a caution), and the number of alert and the alert message appear at the bottom of the display. The examples in the figures below are for Alert I/F 1.



Example 1: Warning



Ship's position, ship's mark and time of position fix are displayed in red for the caution "210 HDOP exceeded".

Example 2: Caution

Alert category

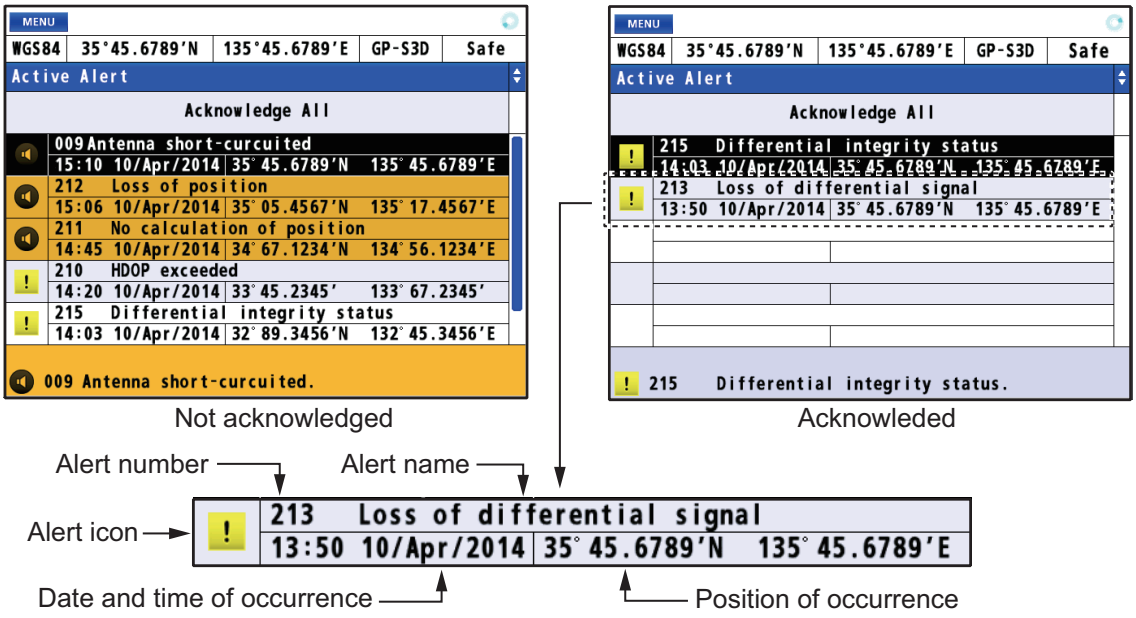
Priority	Icon	Visual indication
Warning	Circle	• Acknowledged: Yellow-orange • Not acknowledged: Yellow-orange, flashing
Caution	Square	Yellow

For details, see page AP-8.

8.2 Alert List

The alert list shows all currently violated alerts and state of acknowledgment. All unacknowledged alerts are shown, even those whose reason for alert has passed (except for a caution).

1. Press the **MENU/ESC** key to open the main menu.
2. Select [5 Alert] then [1 Active Alert] to show the alert list. Unacknowledged alerts flash (except for a caution).

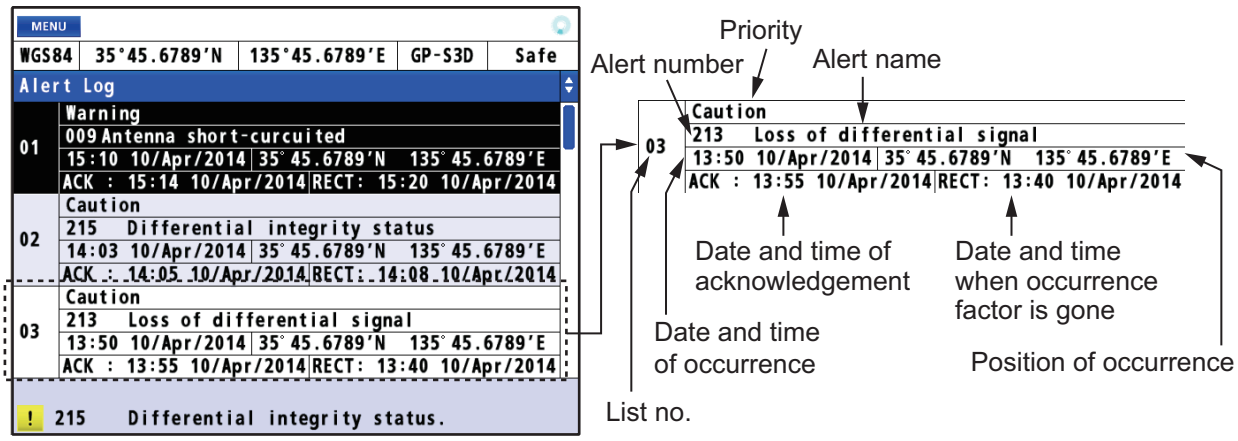


3. Press the **MENU/ESC** key to close the alert list.

8.3 Alert Log

The alert log shows the latest 50 alerts. When the log becomes full, the oldest entry is erased to make room for current alerts.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [5 Alert] then [4 Alert Log] to show the alert log.



3. Press the **MENU/ESC** key to close the alert log.

8.4 How to Acknowledge Alerts

With the ACK/DELETE key

When an alert condition occurs, the buzzer sounds (except for a caution) and the name of the alert appears at the bottom of the display. Press the **ACK/DELETE** key to acknowledge the alert. The buzzer stops for a warning. If multiple alerts are violated, a high-priority alert is acknowledged in order.

How to acknowledge an alert from the alert list

1. Open the alert list (see section 8.2).
2. Use the cursorpad (▲ or ▼) to select the alert to acknowledge then press the **NU/CU ENT** key.

How to acknowledge all alerts from the alert list

1. Open the alert list (see section 8.2).
2. Use the cursorpad (▲) to select [Acknowledge All] then press the **NU/CU ENT** key.

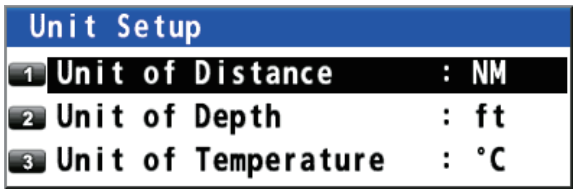
9. OTHER FUNCTIONS

This chapter describes menu items not described in other chapters.

9.1 Unit Setup Menu

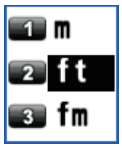
You can set the units of measurement for distance, depth and water temperature.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [3 Unit Setup].

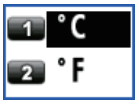


3. **Distance**: Select [1 Unit of Distance].
   Depth: Select [2 Unit of Depth].
   Water temperature: Select [3 Unit of Temperature].

Distance



Depth



Water temperature

4. Select the unit.
5. Press the **MENU/ESC** key to close the main menu.

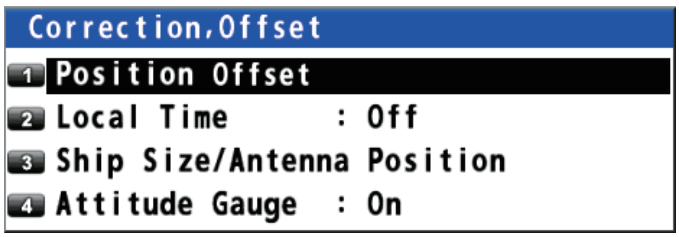
Note: When changing the units of measurement, the setting values for the notice setting can exceed the setting range. Reset the values (see paragraph 4.1.1 and chapter 6).

9.2 Correction, Offset Menu

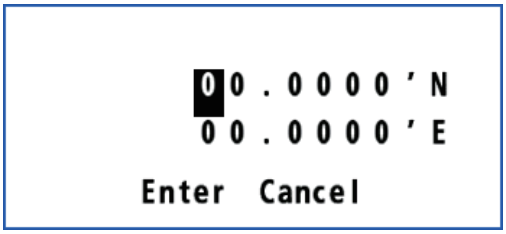
Position offset

You may apply an offset to the position to further refine its accuracy.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [4 Correction, Offset].



3. Select [1 Position Offset].



4. Enter the offset value with the numeric keys. Mark your ship's position on the chart to calculate the error with latitude and longitude, and enter the values. To change the coordinate, select "N" or "E" then press one of keys from **0** to **9**.
5. Move the cursor to [Enter] then press the **NU/CU ENT** key.
6. Press the **MENU/ESC** key to close the main menu.

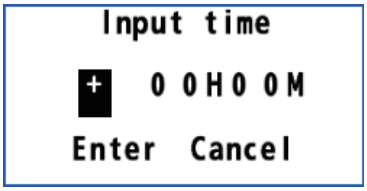
Note: When you set the position offset, the Datum indication changes to 999 (User Defined).

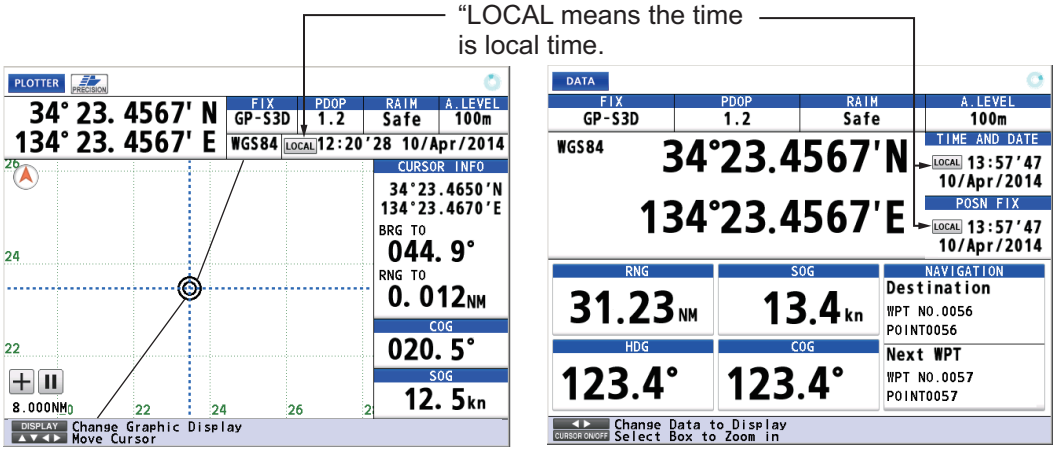
Time difference

You can display time in UTC or local. For local time, enter the time difference between local time and UTC.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [4 Correction, Offset].
3. Select [2 Local Time].
4. Select [1 Off] or [2 Manual Input].
   [Off]: Uses UTC (Universal Time Coordinated). Go to step 7.
   [Manual Input]: Sets the time manually. Go to step 5.

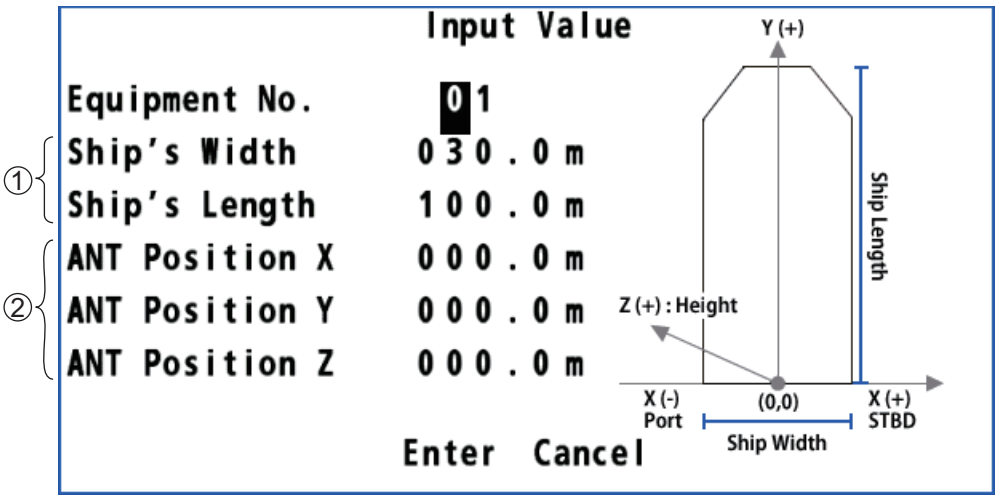
5. Enter the difference time with the numeric keys. (If necessary, switch + and - with pressing one of keys from **0** to **9**.)
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.





Ship size and antenna position

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [4 Correction, Offset].
3. Select [3 Ship Size/Antenna Position].



①: Set the width and length of your ship. Enter the values as correct as possible because these values influence the output sentence "POS". Note that these values are the upper limits for the values of ②.

②: Set the mounting location for the antenna unit.
X: The horizontal distance from the reference position "0" to the antenna position.
Y: The forward distance from the reference position "0" to the antenna position.
Z: The height from the summer load line to the antenna unit.

4. Enter the value for each item with the numeric keys. Refer to the figure at the right-hand of the display.
5. Move the cursor to [Enter] then press the **NU/CU ENT** key.
6. Press the **MENU/ESC** key to close the main menu.

Attitude gauge

The attitude gauge is displayed when the data for roll, pitch or heave is received.

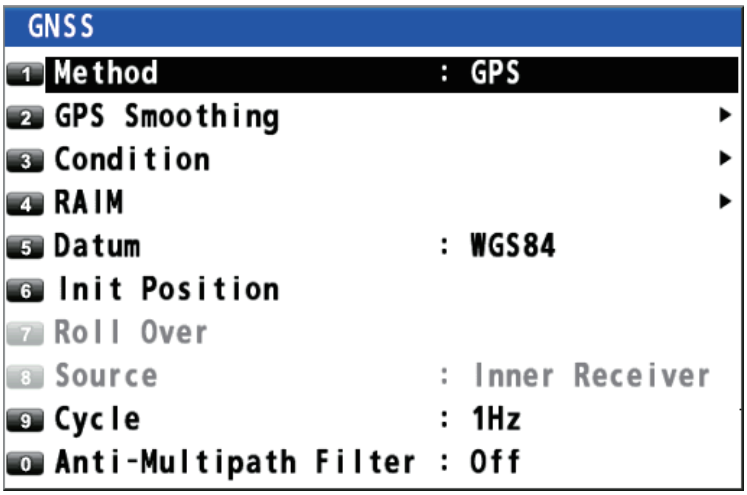
1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [4 Correction, Offset].
3. Select [4 Attitude Gauge].

4. Select [1 On] or [2 Off].
[On]: Displays the attitude gauge (see the illustration in "Highway Display" on page 1-7) instead of the ship's icon on the highway display. When the data for roll, pitch or heave is not received, the ship's icon is displayed.
[Off]: Hides the attitude gauge on the highway display.
5. Press the **MENU/ESC** key to close the main menu.

9.3 GNSS Menu

9.3.1 How to select the positioning system

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [5 GNSS].



3. Select [1 Method].
4. Select [1 GPS].
5. Press the **MENU/ESC** key to close the main menu.

No. 2, 3 and 4 are reserved for future use.

9.3.2 How to set the time for smoothing of position, speed and speed average

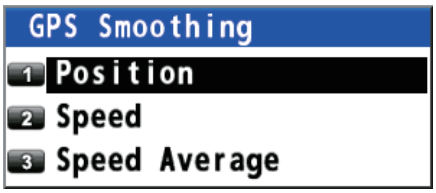
Position smoothing: When the receiving condition is unfavorable, the GPS fix may change randomly, even if the ship is dead in water. This change can be reduced by smoothing the raw GPS fixes. The higher the setting the more smoothed the raw data, however too high a setting slows response time to change in latitude and longitude. This is especially noticeable at high ship's speeds. Increase the setting if the GPS fix changes randomly.

Speed smoothing: During position fixing, ship'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.

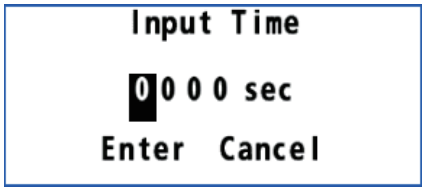
Speed average: This speed is used to calculate the COG and SOG on the data display (see page 7-6).

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [5 GNSS].

3. Select [2 GPS Smoothing].



4. Select [1 Position], [2 Speed] or [3 Speed Average].
5. Enter the time for smoothing with the numeric keys.
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.

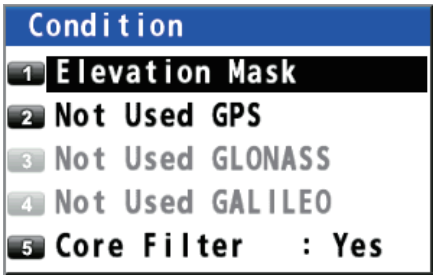


9.3.3 How to set the positioning condition

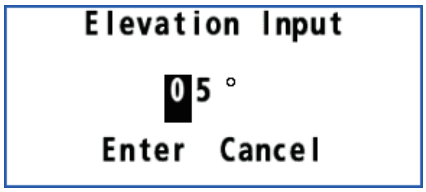
Satellite elevation

You can set the minimum elevation of satellites to use to fix position.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [5 GNSS].
3. Select [3 Condition].



4. Select [1 Elevation Mask].
5. Enter the elevation with the numeric keys.
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.

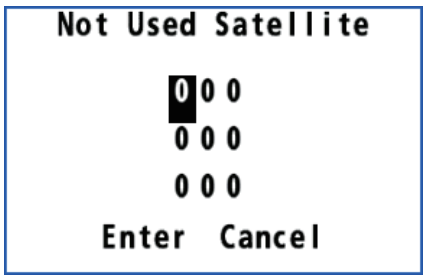


Disable satellite

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 (up to three satellites) in three digits.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [5 GNSS].
3. Select [3 Condition].

4. Select [2 Not Used GPS].
5. Enter the satellite numbers with the numeric keys.
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.



Core filter

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [5 GNSS].
3. Select [3 Condition].
4. Select [5 Core Filter].
5. Select [1 No] or [2 Yes].
   [No]: The tracking sensitivity is better than [Yes], however the ship's track is traced less smoothly than [Yes].
   [Yes]: The ship's track is traced smoother than [No], however the tracking sensitivity is not as good as [No].
6. Press the **MENU/ESC** key to close the main menu.

9.3.4 How to select the RAIM function

RAIM (Receiver Autonomous Integrity Monitoring) is a diagnostic function which tests the accuracy of the GPS signal. To use the RAIM function, enter the range (from own ship in meters) for which you want to know position confidence. The receiver estimates position confidence using range value and detected satellite error, and displays (provided the RAIM function is active) the results as one of three levels of position confidence, at the top right-hand corner of the display. The three levels are as follows:

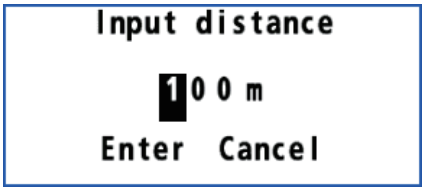
- **Safe**: GPS signal is normal. The positioning accuracy satisfies the setting value.
- **Caution**: RAIM accuracy cannot be calculated. (Signals from more than five GPS satellites are necessary.) The positioning accuracy does not satisfy the setting value.
- **Unsafe**: GPS signal is abnormal, therefore the positioning accuracy is not reliable.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [5 GNSS].
3. Select [4 RAIM].

4. Select [1 Setting].

5. Select [1 On] or [2 Off].
   [On]: Use RAIM function. Go to step 6.
   [Off]: Don't use RAIM function. Go to step 9.

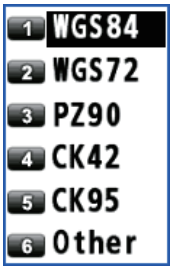
6. Select [2 Accuracy Level].
7. Enter the distance with the numeric keys.
8. Move the cursor to [Enter] then press the **NU/CU ENT** key.
9. Press the **MENU/ESC** key to close the main menu.



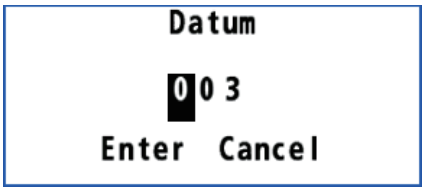
9.3.5 How to select the datum

Your unit is programmed to recognize most of the major chart systems of the world. Although the WGS84 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] (enter the datum number).

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [5 GNSS].
3. Select [5 Datum].
4. Select an option. For [6 Other], go to step 5. For others, go to step 7.



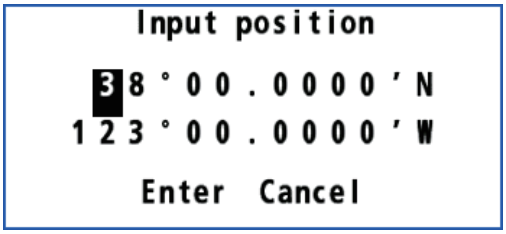
5. Enter the datum number with the numeric keys.
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.



9.3.6 How to set the initial position

You can set the initial position to use when the equipment is restarted. If you restart the equipment in the vicinity of the set position, obtaining a position fix is faster.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [5 GNSS].
3. Select [6 Init Position].
4. Enter the position with the numeric keys. To change the coordinate, select "N" or "E" then press one of keys from **0** to **9**.
5. Move the cursor to [Enter] then press the **NU/CU ENT** key.
6. Press the **MENU/ESC** key to close the main menu.

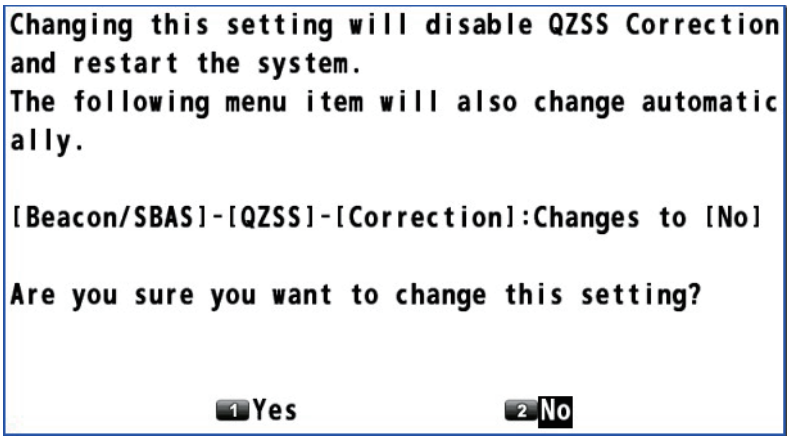


9.3.7 How to set the positioning cycle

You can set the positioning cycle. Position is updated faster with the 5Hz or 10Hz setting, however the accuracy may not be as good as with the 1Hz setting. It is recommended to use the 1Hz setting for vessels other than high speed craft.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [5 GNSS].
3. Select [9 Cycle].

4. Select [1 1Hz], [2 5Hz] or [3 10Hz]. The confirmation message appears.



Note: When [Correction] of [QZSS] in the [Beacon/SBAS] menu is set to [Yes], this setting is fixed to [1Hz] (see section 9.4.4).

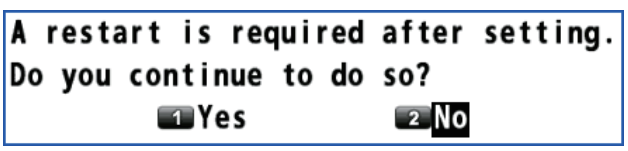
5. Select [1 Yes]. The GP-170 restarts.

9.3.8 How to turn the anti-multipath mode on/off

You can prevent multipath, reflection of the satellite signal by some object, to prevent position “jump”.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [5 GNSS].
3. Select [0 Anti-Multipath Filter].

4. Select [1 On] or [2 Off]. The confirmation message appears.



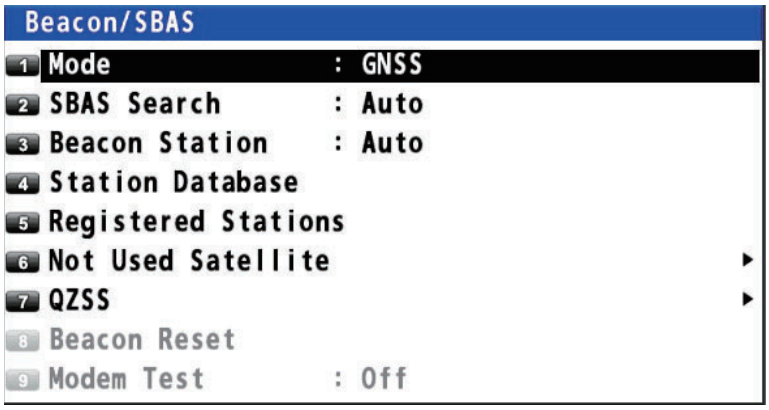
5. Select [1 Yes]. The GP-170 restarts.

9.4 Beacon/SBAS Menu

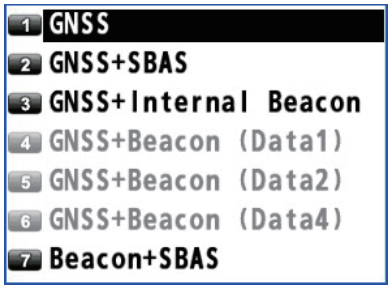
This menu sets the beacon and SBAS.

9.4.1 How to select the differential corrections to use

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [6 Beacon/SBAS].



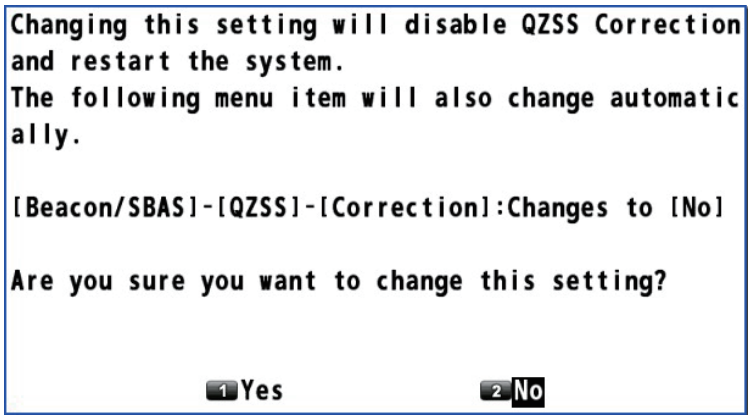
3. Select [1 Mode].
4. Select an option.



[GNSS]: Uses neither beacon nor SBAS for positioning.
[GNSS+SBAS]: Uses SBAS.
[GNSS+Internal Beacon]*: Uses internal beacon.
[GNSS+Beacon (Data1, Data2 or Data4)]*: Uses external beacon.
[Beacon+SBAS]: Switches mode among differential (beacon), SBAS and no use. The priority is Differential (beacon) > SBAS > No use.
*: See the table below.

Menu item	With internal DGPS beacon receiver	Without internal DGPS beacon receiver
GNSS+Internal Beacon	Selectable	Not selectable
GNSS+Beacon (Data1, Data2 or Data4)	Not selectable	Selectable

If you select other than [1 GNSS], the following confirmation message appears.



Select [1 Yes] to restart the GP-170. Also, the setting for [Correction] of [QZSS] in the [Beacon/SBAS] menu is automatically set to [No] (see section 9.4.4).

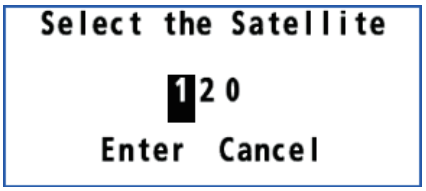
5. Press the **MENU/ESC** key to close the main menu.

9.4.2 How to set SBAS and beacon

SBAS

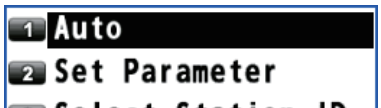
1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [6 Beacon/SBAS].
3. Select [2 SBAS Search].

4. Select [1 Auto] or [2 Manual].
   [Auto]: Automatically selects the satellite on the highest elevation among available satellites. Go to step 7.
   [Manual]: Selects the satellite manually. Go to step 5.
5. Enter the satellite number with the numeric keys (setting range: 120 to 138).
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.

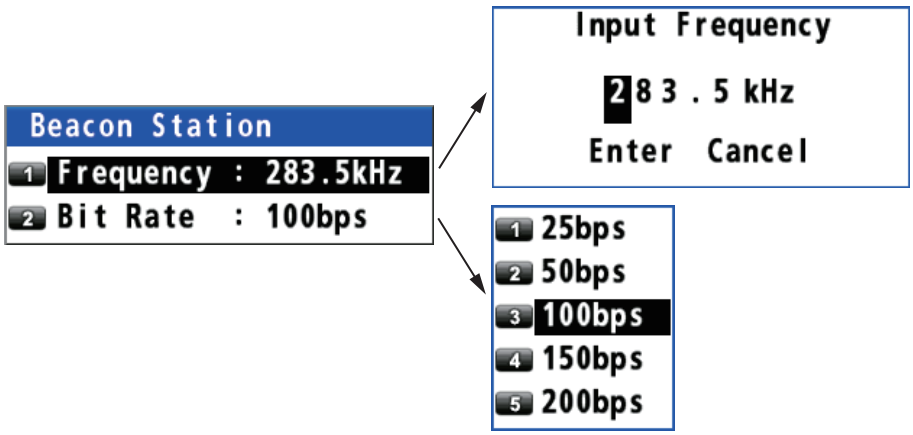


Beacon

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [6 Beacon/SBAS].
3. Select [3 Beacon Station].
4. Select [1 Auto], [2 Set Parameter] or [3 Select Station ID].
   [Auto]: Automatically selects the nearest station among available stations. Go to step 8.
   [Set Parameter]: Selects the station with entering the frequency or selecting the bit rate. Go to step 5.
   [Select Station ID]: Selects the station from the station list (requires DGPS internal beacon receiver). Go to step 7.



5. Select [1 Frequency] or [2 Bit Rate].



6. For [Frequency], enter the frequency with the numeric keys and move the cursor to [Enter] then press the **NU/CU ENT** key.
   For [Bit Rate], select the bit rate from five options.
   Go to step 8.

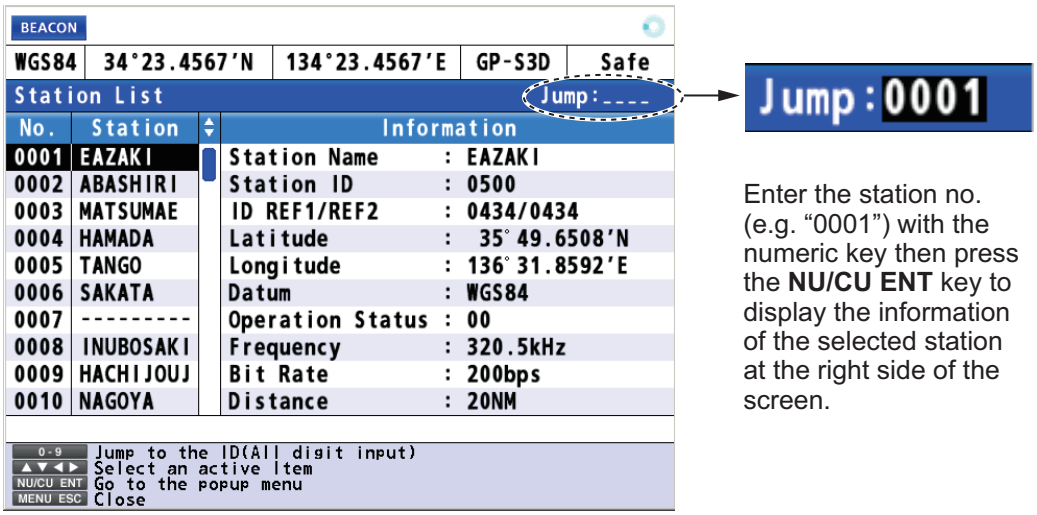
7. Use the cursorpad (▲ or ▼) to select the station ID then press the **NU/CU ENT** key.
8. Press the **MENU/ESC** key to close the main menu.

9.4.3 How to open the station data

Station database

Note: This menu requires internal DGPS beacon receiver.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [6 Beacon/SBAS].
3. Select [4 Station Database] to show the [Station List] for 1020 station data.



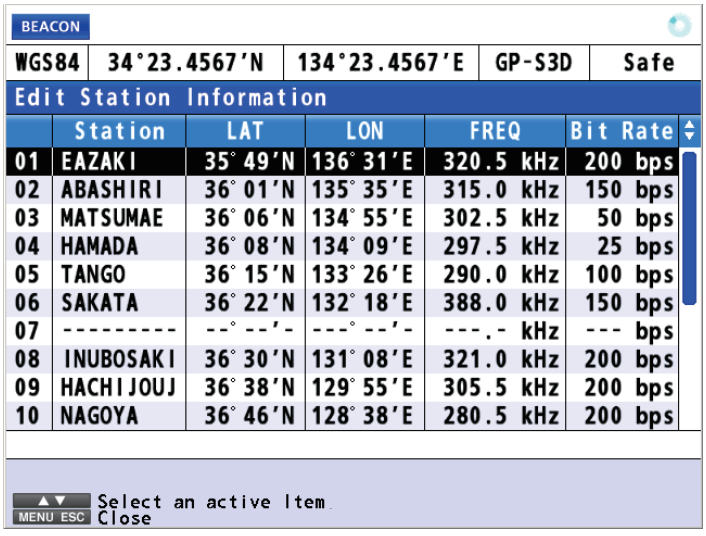
4. Press the **MENU/ESC** key to close the main menu.

Registered stations

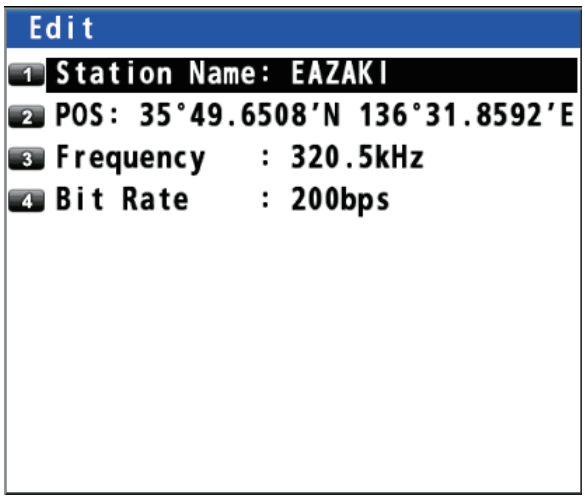
You can register up to 20 beacon stations.

Note: This menu requires internal DGPS beacon receiver.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [6 Beacon/SBAS].
3. Select [5 Registered Stations] to show the [Edit Station Information] list.



4. Use the cursorpad (▲ or ▼) to select ID no. then press the **NU/CU ENT** key.

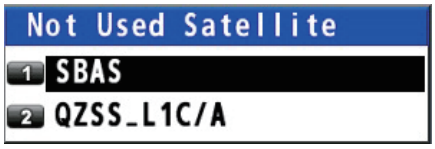


5. Edit the name, position, frequency or bit rate.
6. Press the **MENU/ESC** key to close the main menu.

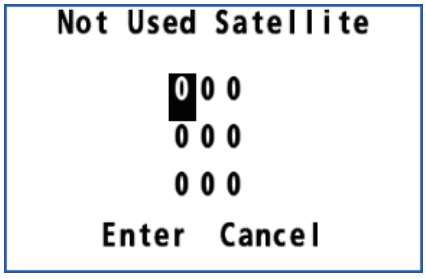
Disable satellite

You can disable a maximum of three satellites.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [6 Beacon/SBAS].
3. Select [6 Not Used Satellite].

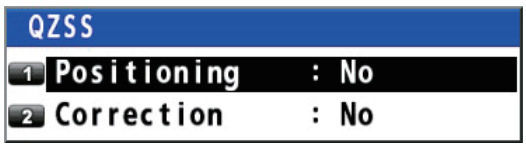


4. Select [1 SBAS] or [2 QZSS_L1C/A].
5. Enter the disable satellite numbers with the numeric keys (setting range: 120 to 138 for SBAS, 193 to 196 and 199 for QZSS_L1C/A).
6. Move the cursor to [Enter] then press the **NU/CU ENT** key.
7. Press the **MENU/ESC** key to close the main menu.



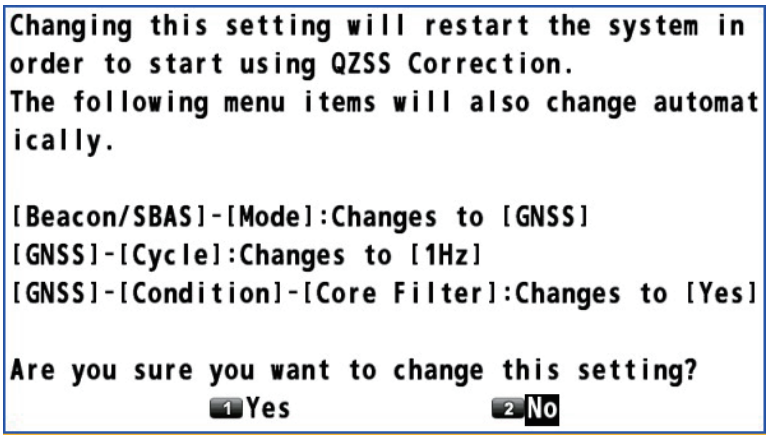
9.4.4 How to set QZSS

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [6 Beacon/SBAS].
3. Select [7 QZSS]. For [Positioning], go to step 4. For [Correction], go to step 6.



4. Select [1 Positioning].
5. Select [1 Yes] to use QZSS for positioning, [2 No] if you do not use QZSS. The menu closes and the setting is reflected.
6. Select [2 Correction].

7. Select [1 Yes] to use QZSS correction for positioning, [2 No] if you do not use QZSS correction. If you select [1 Yes], the following confirmation message appears.



   Select [1 Yes] to restart the GP-170. Also, the following menu settings automatically change.

   - [Beacon/SBAS] – [Mode]: [GNSS] (See section 9.4.1.)
   - [GNSS] – [Cycle]: [1Hz] (See section 9.3.7.)
   - [GNSS] – [Condition] – [Core Filter]: [Yes] (See "Core filter" on page 9-6.)

8. Press the **MENU/ESC** key to close the main menu.

9.5 Language

The available languages are English and Japanese.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [1 Language].
3. Select a language.
4. Press the **MENU/ESC** key to close the main menu.

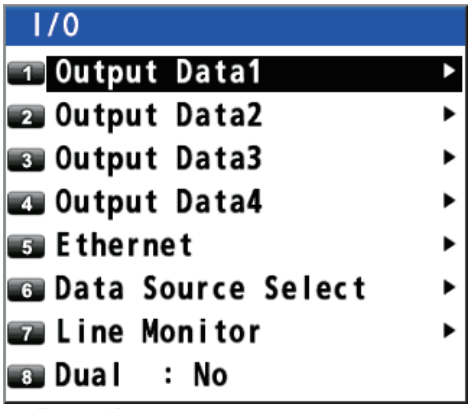
9.6 I/O Menu

Besides its fundamental function of displaying position, the GP-170 can also output various data to external equipment. Before outputting data to external equipment, first determine what data the external equipment requires. Output only necessary data to ensure data will be output correctly.

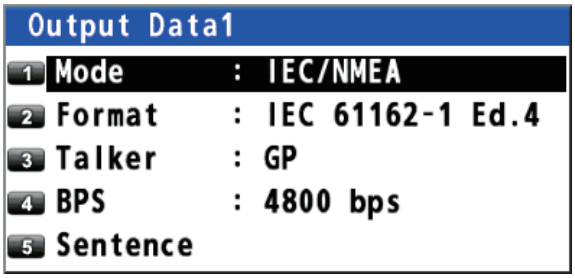
All data transmitted by marine electronics equipment are prefixed with a two character code called a talker. The same talker must be shared by the transmitting and receiving equipment to transmit and receive data successfully.

9.6.1 How to set the output 1, 2, 3 or 4

1. Press the **MENU/ESC** key to open the main menu.
2. Select [7 I/O].

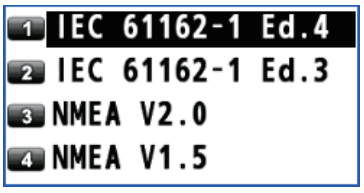


3. Select [1 Output Data1].



4. Select [1 Mode].
5. Select [1 IEC/NMEA] or [2 RTCM].
   [IEC/NMEA]: NMEA sentence output
   [RTCM]: Binary output

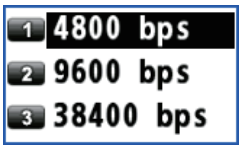
6. Select [2 Format].
7. Select [1 IEC 61162-1 Ed.4], [2 IEC 61162-1 Ed.3], [NMEA V2.0] or [NMEA V1.5].



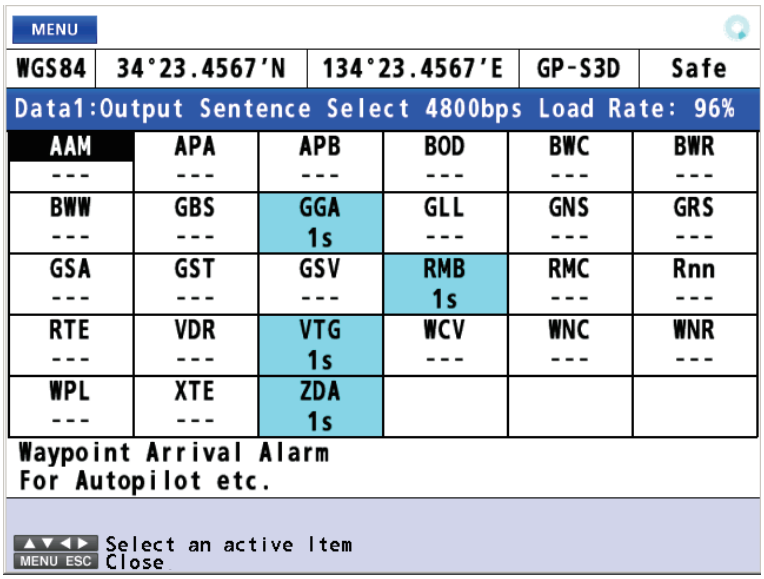
8. Select [3 Talker].
9. Select [1 GP] or [4 GN].

No. 2 and 3 are reserved for future use.

10. Select [4 BPS].
11. Select [1 4800 bps], [2 9600 bps] or [3 38400 bps].



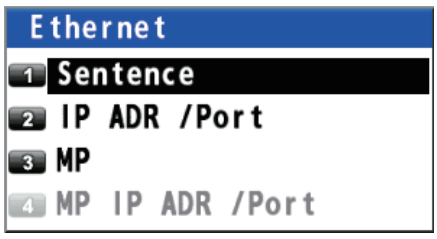
12. Select [5 Sentence].



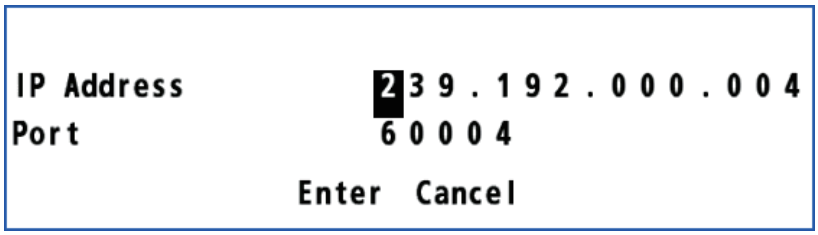
13. Use the cursorpad to select the sentence then press the **NU/CU ENT** key.
14. Use the cursorpad (◀ or ▶) to select the TX interval. TX interval is available in [- - -] (off), [0.1s]*, [0.2s]*, [1s], [2s], [3s], [4s], [5s], [6s], [10s], [15s], [20s], [30s], [60s] and [90s].
    *: Only for GGA, GLL, GNS, RMC and VTG when selecting [38400 bps] at step 11.
15. Press the **NU/CU ENT** key.
    Note 1: Keep the Load Rate below 100% when setting the TX intervals. The TX interval for other than the ZDA sentence cannot be guaranteed if the rate exceeds 100%.
    Note 2: For the TX interval of [0.1s] or [0.2s], set the positioning cycle (refer to paragraph 9.3.7) as follows:
    - For [0.1s], set the positioning cycle at 10Hz.
    - For [0.2s], set the positioning cycle at 5Hz or 10Hz.
16. Set [2 Output Data2], [3 Output Data3] and [4 Output Data4] as well.
17. Press the **MENU/ESC** key to close the main menu.

9.6.2 How to set the Ethernet

1. Press the **MENU/ESC** key to open the main menu.
2. Select [7 I/O] then [5 Ethernet].
3. Select [1 Sentence].
4. Use the cursorpad to select the sentence then press the **NU/CU ENT** key.
5. Use the cursorpad (◀ or ▶) to select the TX interval. TX interval is available in [- - -] (off), [0.1s]*, [0.2s]*, [1s], [2s], [3s], [4s], [5s], [6s], [10s], [15s], [20s], [30s], [60s] and [90s].
   *: Only for GGA, GLL, GNS, RMC and VTG.



6. Press the **NU/CU ENT** key.
   Note: For the TX interval of [0.1s] or [0.2s], set the positioning cycle (refer to paragraph 9.3.7) as follows:
   - For [0.1s], set the positioning cycle at 10Hz.
   - For [0.2s], set the positioning cycle at 5Hz or 10Hz.
7. Press the **MENU/ESC** key to close the sentence window.
8. Press the **MENU/ESC** key to open the main menu.
9. Select [7 I/O] then [5 Ethernet].
10. Select [2 IP ADR /Port].

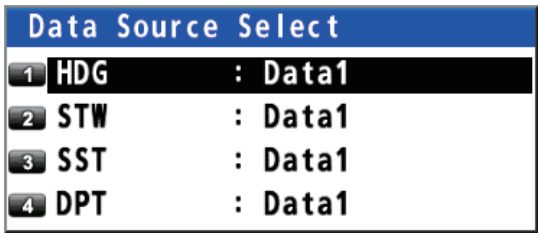


11. Enter the IP address and port (setting range: 49152 to 65535) with the numeric keys. When setting dual configuration (see section 9.7), set “239.192.000.004” for IP address and “60004” for port.
12. Move the cursor to [Enter] then press the **NU/CU ENT** key.
13. Select [3 MP].
14. Select [1 Enable] or [2 Disable]. For [1 Enable], go to step 15. For [2 Disable], go to step 18.

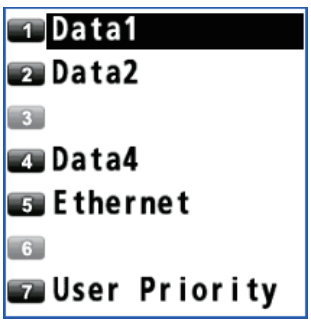
15. Select [4 MP IP ADR /Port].
16. Enter the MP IP address and port with the numeric keys.
17. Move the cursor to [Enter] then press the **NU/CU ENT** key.
18. Press the **MENU/ESC** key to close the main menu.

9.6.3 How to select the input data

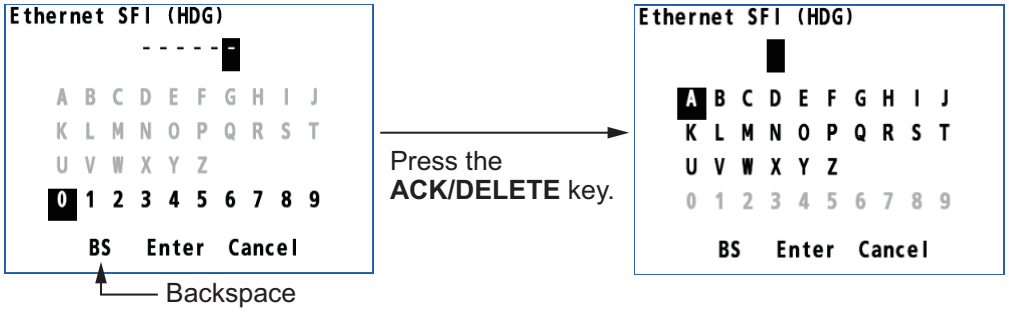
1. Press the **MENU/ESC** key to open the main menu.
2. Select [7 I/O] then [6 Data Source Select].



3. Select [1 HDG].
4. Select the port for heading data. For [5 Ethernet], go to step 5. For [1 Data1], [2 Data2] or [4 Data4], go to step 6.



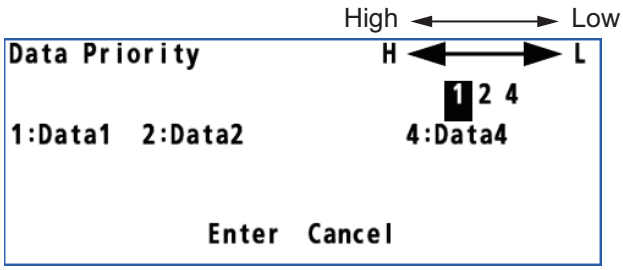
5. When selecting [5 Ethernet], do the following:
   1) Press the **ACK/DELETE** key to move the cursor to the leftmost of the input position.



   2) Enter the Ethernet SFI with the cursorpad and the numeric keys (combination of two alphabets and four numerals). SFI (System Function ID) is an identification code used by the system.
   3) Move the cursor to [Enter] then press the **NU/CU ENT** key. Go to step 9.

   Note: Set the SFI to eliminate overlap with other ones.

6. Select [1 HDG].
7. Select [7 User Priority].
8. Enter the priority for heading data by data number. For example, to set the priority order as Data1, Data2, Data4, enter 1, 2, 4.



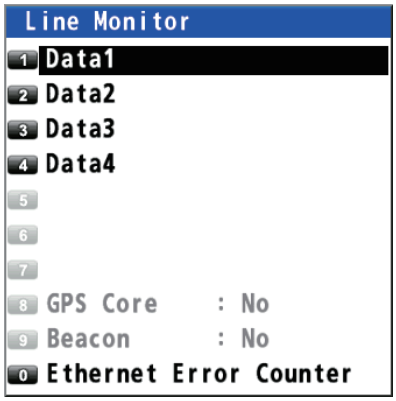
9. Set the input data for [2 STW] (speed through water),
   [3 SST] (sea surface temperature) and [4 DPT] (water depth) as well.
10. Press the **MENU/ESC** key to close the main menu.

9.6.4 Line monitor log

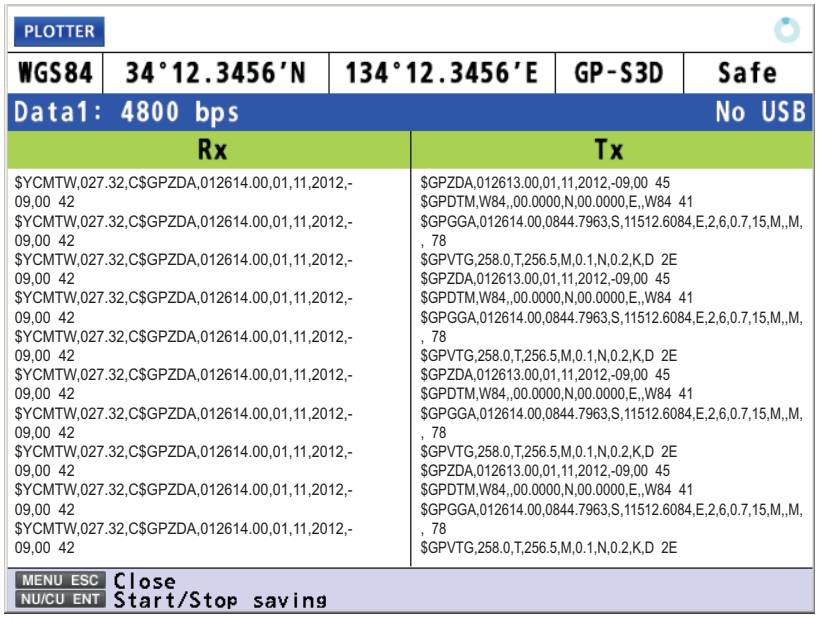
Line monitor

The data output from the data ports (Data1 - Data4) can be monitored, and the data can be saved to a USB flash memory.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [7 I/O] then [7 Line Monitor].



3. Select [Data1] (or 2, 3, 4).

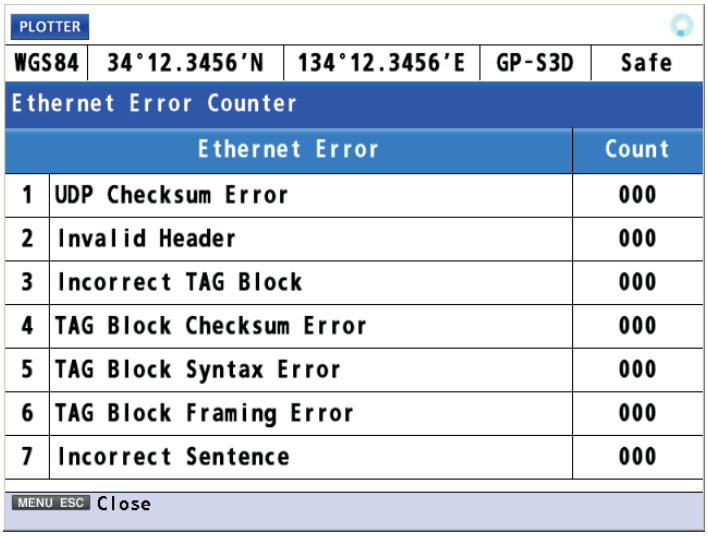


To save the log data to a USB flash memory, go to step 4. Otherwise, go to step 7.

4. Connect a USB flash memory in the USB port.
   Note 1: Do not use an encrypted USB flash memory.
   Note 2: Keep water away from the unit when the USB flash memory is inserted. The USB port is not waterproof while its cover is removed.
5. Press the **NU/CU ENT** key.
   Note: Do not save the log from multiple ports simultaneously. The log data may not be saved correctly depending on the specification or capacity of the USB flash memory.
6. Press the **NU/CU ENT** key to complete the saving.
   Note: Remove the USB flash memory after the saving is completed.
7. Press the **MENU/ESC** key to close the main menu.

Ethernet error counter

1. Press the **MENU/ESC** key to open the main menu.
2. Select [7 I/O] then [7 Line Monitor].
3. Select [0 Ethernet Error Counter].
   Press the **ACK/DELETE** key to reset all counts to 0.
4. Press the **MENU/ESC** key to close the main menu.



9.7 How to Set Dual Configuration

You can configure two dual differential GPS navigator systems and an interface unit (IF-2500).

The information shared between two display units is as follows:

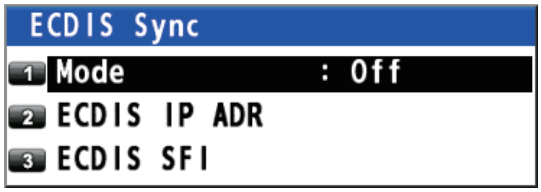
- Destination
- Mark
- Waypoint
- Route
- [Not Used Satellite] (Only for GPS satellites)
- [Arrival/Anchor] setting
- Specified distance for the arrival notice
- Specified distance for the anchor notice
- [XTE] setting ([Off], [On])
- Specified distance for the XTE notice
- [Trip] setting ([Stop], [Start/Reset], [Clear])
- [Range] setting for [Trip]
- Alert [Mode] ([Alert I/F 1], [Alert I/F 2], [Legacy])
- [Remote Ack I/F] ([Ack], [BuzzerStop])
- [Ship Speed] setting ([Off], [In], [Out])
- [Ship Speed] range setting
- [RAIM] setting ([On], [Off])
- RAIM [Accuracy Level]
- ECDIS sync [Mode] ([On], [Off])
- [ECDIS IP ADR]
- [ECDIS SFI]

1. Press the **MENU/ESC** key to open the main menu.
2. Select [7 I/O] then [8 Dual].
3. Select [1 No], [2 Serial (Data2)] or [3 Ethernet].
   [No]: Don't set dual configuration.
   [Serial (Data2)]: Sets dual configuration using data2.
   [Ethernet]: Sets dual configuration using Ethernet.
4. Press the **MENU/ESC** key to close the main menu.

9.8 How to Set ECDIS Sync Configuration

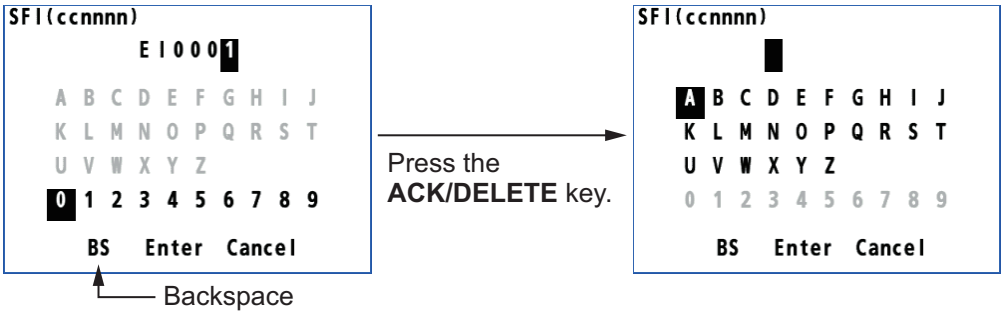
When connecting the ECDIS (FMD-3x00 series) via LAN, you can display the ECDIS-set monitored route on the display of the GP-170.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [3 Navigation] then [4 ECDIS Sync].



3. Select [2 ECDIS IP ADR].

4. Enter the IP address for the connected ECDIS with the numeric keys.
5. Move the cursor to [Enter] then press the **NU/CU ENT** key.
6. Select [3 ECDIS SFI].
7. Press the **ACK/DELETE** key to move the cursor to the leftmost of the input position.



8. Enter the SFI for the connected ECDIS with the cursorpad and the numeric keys (combination of two alphabets and four numerals).
9. Move the cursor to [Enter] then press the **NU/CU ENT** key.
10. Select [1 Mode].

11. Select [2 On].
    Note: When selecting [2 On], you can not set a destination on the GP-170.
12. Press the **MENU/ESC** key to close the main menu.

To turn the synchronization off, select [1 Off] at step 11.

Note 1: When selecting [1 Off] during the synchronization with the ECDIS, the destination is canceled on the GP-170.

Note 2: The GP-170 uses waypoint information from the ECDIS when they are synched to one another. Therefore, some delay occurs between the arrival notice and

next waypoint. This is not an indication of malfunction but the difference of criterion for waypoint updating between the ECDIS and the GPS receiver. If you do not need the arrival notice on the GP-170, turn it off (see paragraph 6.2.1).

Note 3: The no. 100 route on the route list is reserved for the monitored route output from the ECDIS. This route is automatically written over when the GP-170 receives a new monitored route.

9.9 How to Change the User Password

You can set a four-character password to prevent unauthorized entry into certain menus. The default setting is no password.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [2 Plotter].
3. Select [9 Password].
   Note: The default setting is "0000", which means no password is set. When the password is "0000", the [Input Password] screen does not appear.

4. Enter the password (four characters) with the numeric keys.

5. Enter the new password (four characters) with the numeric keys.

6. Enter the password (four characters) with the numeric keys again.

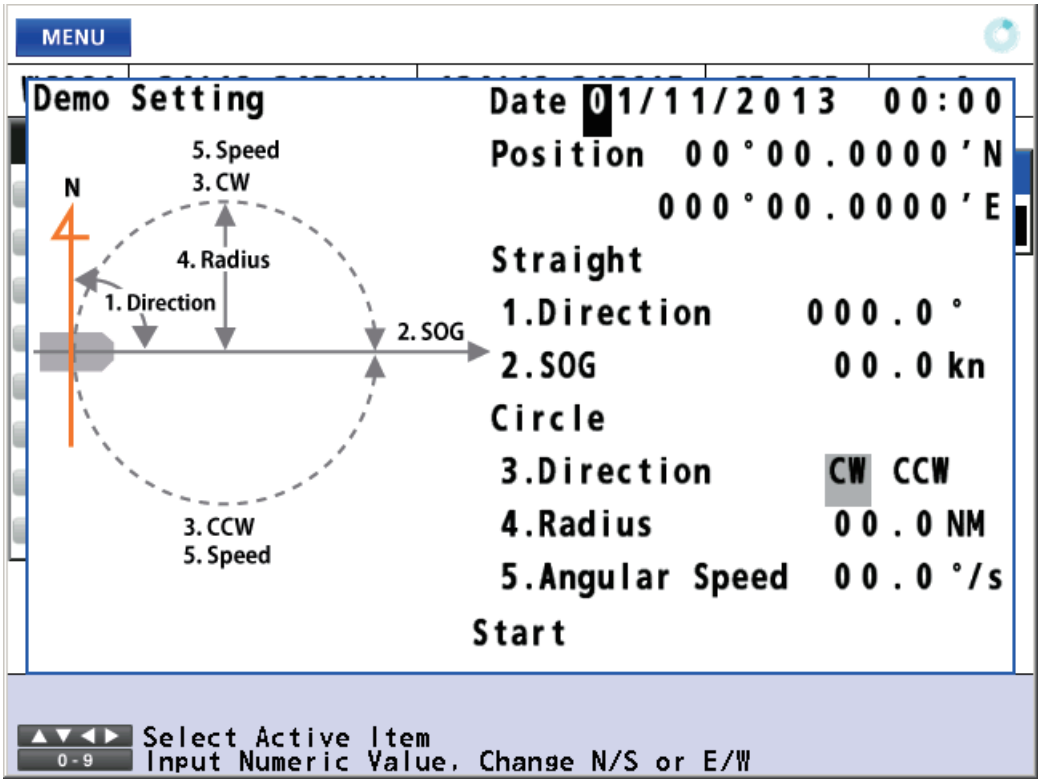
7. Press the **NU/CU ENT** key.
8. Press the **MENU/ESC** key to close the main menu.

9.10 How to Set the Demo Mode

A demo mode, which shows internally generated navigation data, is provided to acquaint you with the features of the GP-170. You can set the demo mode as follows:

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [8 Demo].

3. Select [1 Parameter].



4. Enter each setting with the numeric keys referring to the above figure.
   [Date]: Set the starting date and time in UTC.
   [Position]: Set the starting position. To change the coordinate, select "N" or "E" then press one of keys from **0** to **9**.
   [1. Direction]: Set the direction for translatory movement.
   [2. SOG]: Set the speed for translatory movement in kn.
   [3. Direction]: Select the direction for rotary motion from [CW] (clockwise) and [CCW] (counterclockwise).
   [4. Radius]: Set the radius for rotary motion in NM.
   [5. Angular Speed]: Set the angular speed for rotary motion.
5. Move the cursor to [Start] then press the **NU/CU ENT** key. The equipment restarts. The SIM icon (simulation) appears at the top left corner of the screen.

Note: To cancel the demo mode, turn the power off and on.

10. 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.

10.1 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.
- Check if the antenna unit is damaged. If damaged, replace.
- Dust or dirt may be removed from the cabinet with a 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 60,000 hours. The actual number of hours depends on ambient temperature and humidity. When the brilliance cannot be raised sufficiently, ask your dealer about replacement.

10.2 Fuse Replacement

⚠ WARNING

Use the proper fuse.

A wrong fuse can damage the equipment and cause fire.

The fuse (type: FGBO-A 125V 3A PBF, code no.: 000-155-850-10) in the power cable protects against overvoltage and equipment trouble. If you cannot turn on the power, first check the fuse. If the fuse has blown, replace the fuse with the specified fuse. If the fuse blows again after replacement, contact your dealer.

10.3 Troubleshooting

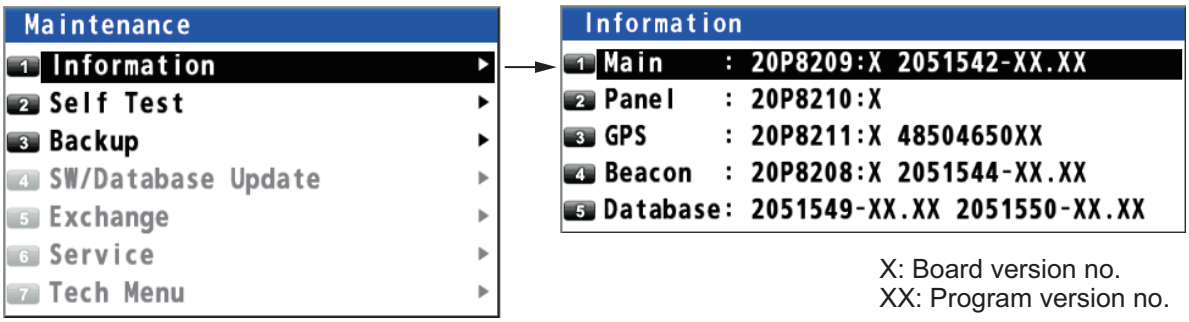
This section provides simple troubleshooting procedures which the user can follow to restore normal operation. If you cannot restore normal operation, do not attempt to check inside the unit. Any trouble should be referred to a qualified technician.

Symptom	Remedy
You cannot turn on the power.	• Check for damaged power cable and connector. • Check if the power cable is firmly fastened. • Check the battery for proper voltage output. • Check if the fuse in the power cable has blown.
No picture appears.	Adjust the brilliance using the **BRILL** key.
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.	• Check if the antenna connector is firmly fastened. • Check the number of satellites on the integrity display. If there are two or less, check for obstructions between antenna unit and satellites. • Clear the GPS memory on the [8 System Setting] - [9 Clear Memory] - [2 Clear GPS] menu.
Position is wrong.	• Check if the correct geodetic chart system is selected on the [8 System Setting] - [5 GNSS] - [5 Datum] menu. • Enter the position offset on the [8 System Setting] - [4 Correction, Offset] - [1 Position Offset] menu.
Bearing is wrong.	Check the magnetic variation on the [8 System Setting] - [2 Plotter] - [2 Magnetic Variation] menu.
Data are not transmitted to external equipment.	• Check if the data format is correct on the [7 I/O] menu. • The TX interval may be set to off. Select the proper interval. • Check the appropriate settings on the external equipment. • Check the connections: GP-170 External equipment TD4-A RD4-A TD4-B RD4-B

10.4 Equipment Information

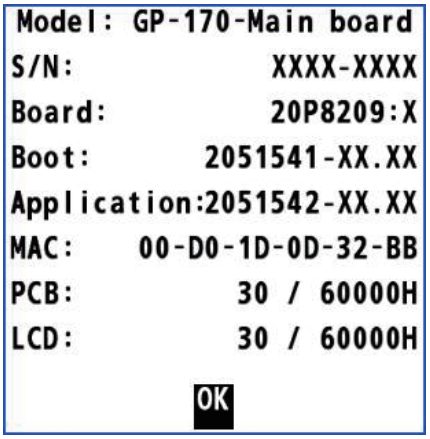
You can display information about this equipment from the menu.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [6 Maintenance] then [1 Information].

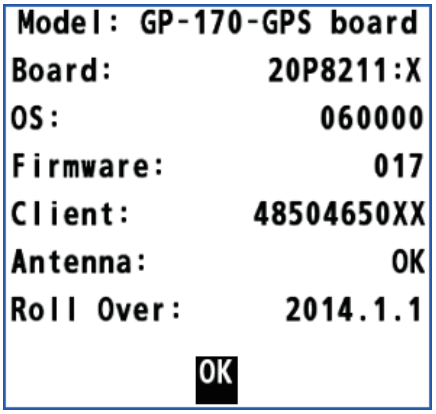


X: Board version no.
XX: Program version no.

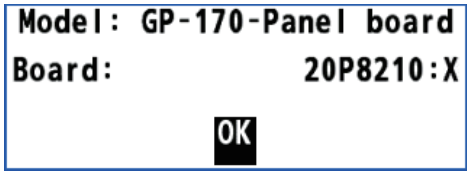
3. Select [1 Main], [2 Panel], [3 GPS], [4 Beacon] (requires internal DGPS beacon receiver) or [5 Database].



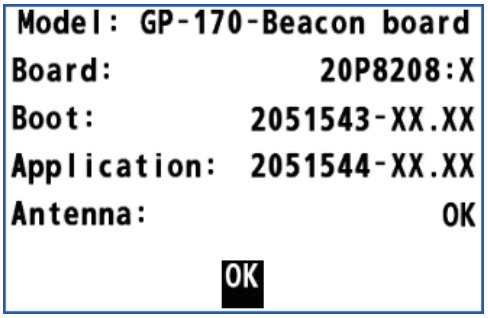
Main



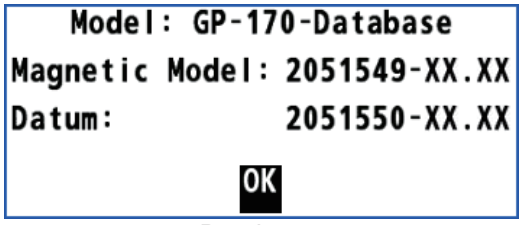
GPS



Panel



Beacon



Database

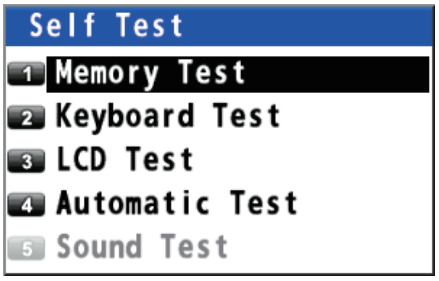
4. Press the **NU/CU ENT** key to close each information window.
5. Press the **MENU/ESC** key to close the main menu.

10.5 Self Test

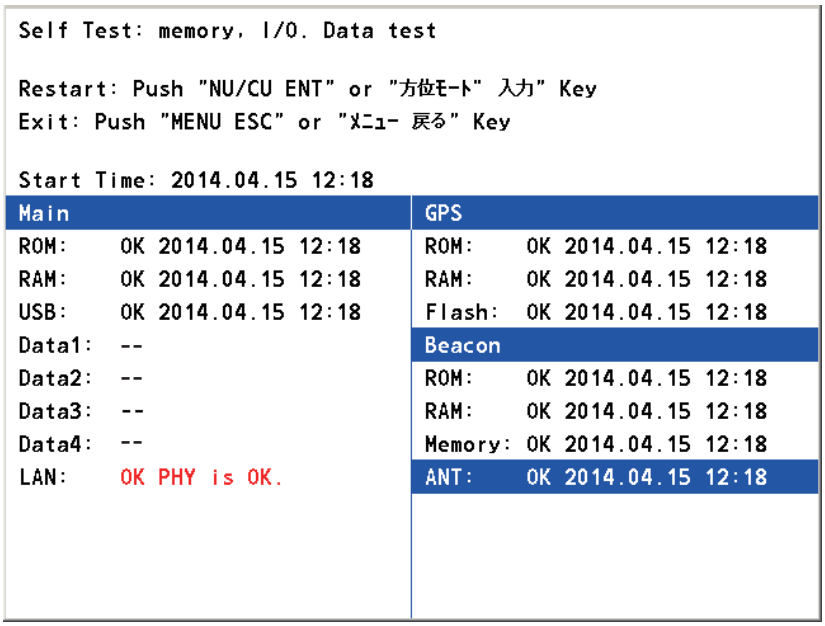
The self test checks the ROM, RAM, input/output data, GPS core, Beacon core, keyboard and LCD performance. The user can do the tests to help the service technician in troubleshooting.

Memory test

1. Press the **MENU/ESC** key to open the main menu.
2. Select [6 Maintenance] then [2 Self Test].



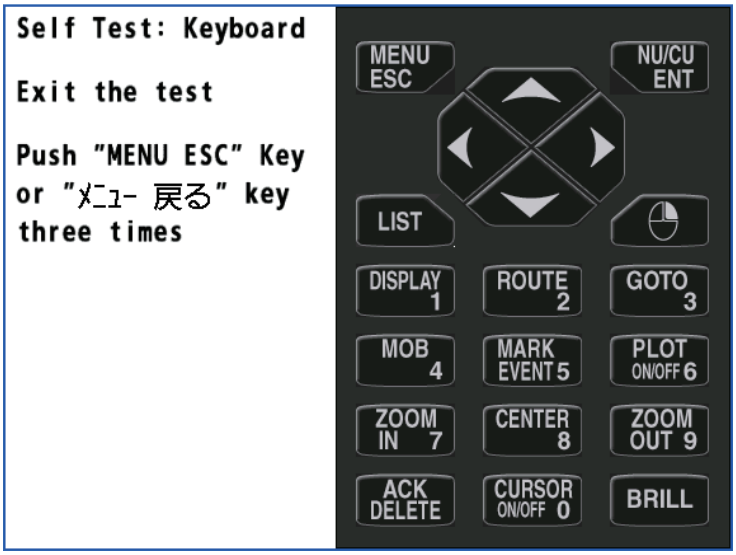
3. Select [1 Memory Test]. The test results are displayed as "OK", "NG" (No Good) or "– –". If any NG is displayed, contact your dealer. The test result of Data1 - 4, checked using a dedicated connector at the factory, is normally displayed as "--".



4. Press the **MENU/ESC** key to close the memory test window.

Keyboard test

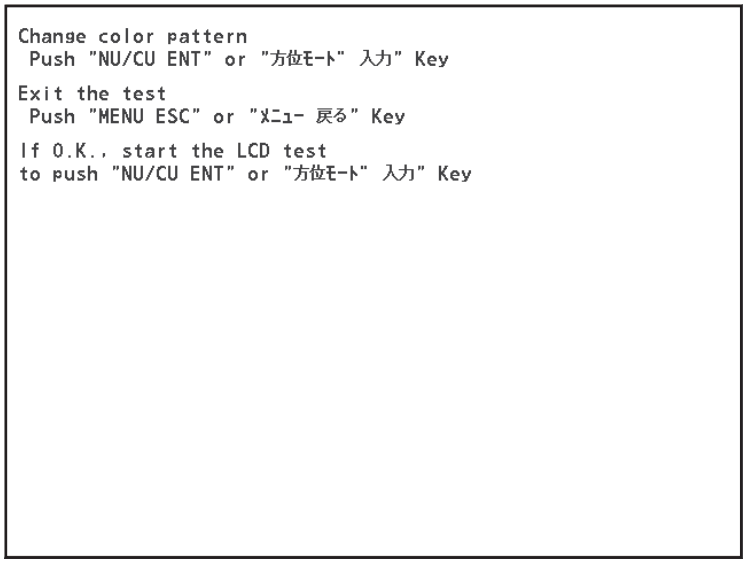
1. Press the **MENU/ESC** key to open the main menu.
2. Select [6 Maintenance] then [2 Self Test].
3. Select [2 Keyboard Test].



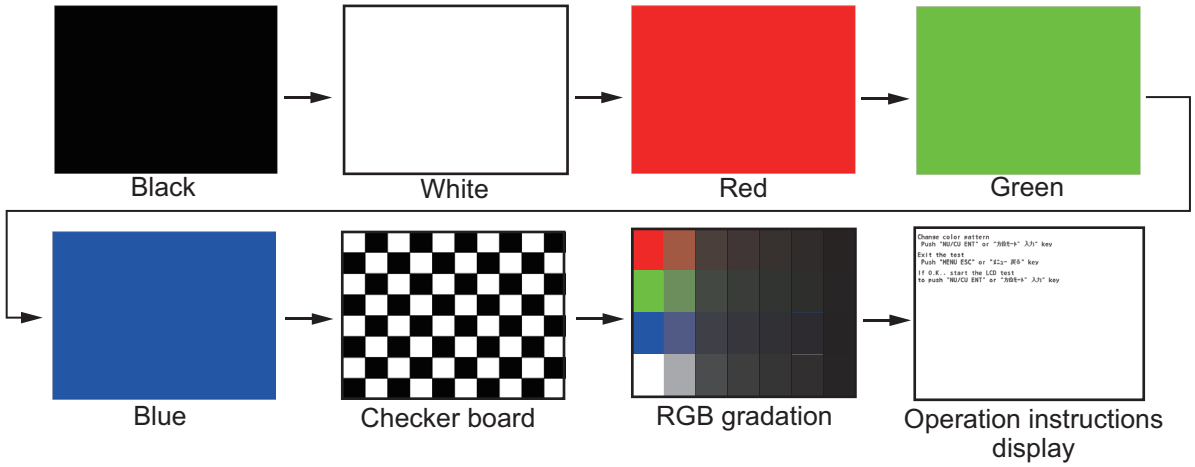
4. Press each key one by one. A key's corresponding location on the display turns blue if the key is normal.
5. Press the **MENU/ESC** key three times to close the keyboard test window.

LCD test

1. Press the **MENU/ESC** key to open the main menu.
2. Select [6 Maintenance] then [2 Self Test].
3. Select [3 LCD Test]. The operation instructions display opens.



4. Press the **NU/CU ENT** key. Each press of this key changes the LCD pattern in the sequence shown below.



Note: You can cancel the test at any time by pressing the **MENU/ESC** key.

5. Press the **MENU/ESC** key to close the test pattern window.

Automatic test

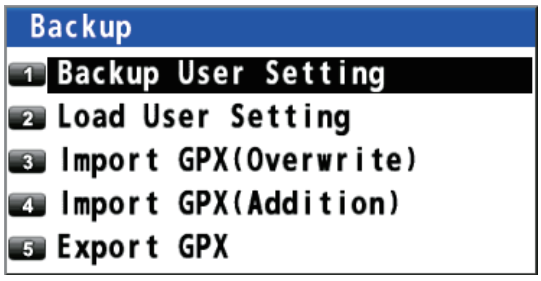
The memory, keyboard and LCD tests are automatically tested.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [6 Maintenance] then [2 Self Test].
3. Select [4 Automatic Test]. The GP-170 automatically repeats the following sequence.
   Information screen (refer to section 10.4) →Memory → Keyboard → LCD
   Note 1: You can cancel the test at any time by pressing the **MENU/ESC** key.
   Note 2: The test stops if the check result for an item other than [Data3] is "NG" or "– –".
4. Press the **MENU/ESC** key to close the automatic test window.

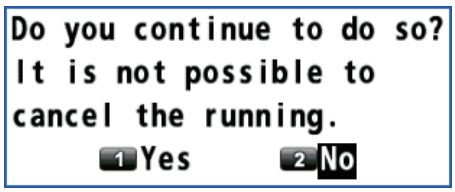
10.6 Backup

The GP-170 can save or load the settings and registered data.

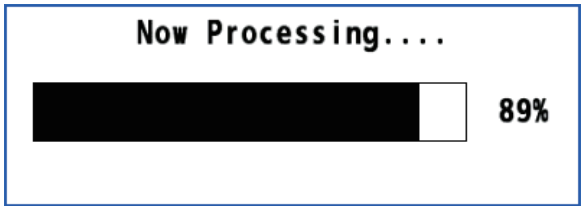
1. Connect a USB flash memory in the USB port.
   Note 1: Do not use an encrypted USB flash memory.
   Note 2: Keep water away from the unit when the USB flash memory is inserted. The USB port is not waterproof while its cover is removed.
2. Press the **MENU/ESC** key to open the main menu.
3. Select [6 Maintenance] then [3 Backup].



4. Select [1 Backup User Setting], [2 Load User Setting], [3 Import GPX (Overwrite)], [4 Import GPX (Addition)] or [5 Export GPX].
   [Backup User Setting]: Saves the current settings to a USB flash memory.
   [Load User Setting]: Loads the saved settings from a USB flash memory.
   [Import GPX (Overwrite)]: Imports the GPX data (marks, waypoints and routes) from a USB flash memory. The GPX data in the GP-170 are deleted.
   [Import GPX (Addition)]: Imported data is added to the GPX data in the GP-170. (You can store a maximum of 2,000 marks, 100 routes, and 1,000 waypoints.)
   [Export GPX]: Exports the GPX data (marks, waypoints and routes) in the GP-170 to a USB flash memory.
   The confirmation message appears.



5. Select [1 Yes]. The message "Now Processing.... "appears.



   After the process is complete, the GP-170 operates as follows, or do the following according the menu item selected at step 4:

   - [Backup User Setting]: The message window automatically closes.
   - [Load User Setting], [Import GPX (Overwrite)], [Import GPX (Addition)]: The GP-170 restarts.
   - [Export GPX]: After the message window shows 100%, press the **MENU/ESC** key to close the message window.

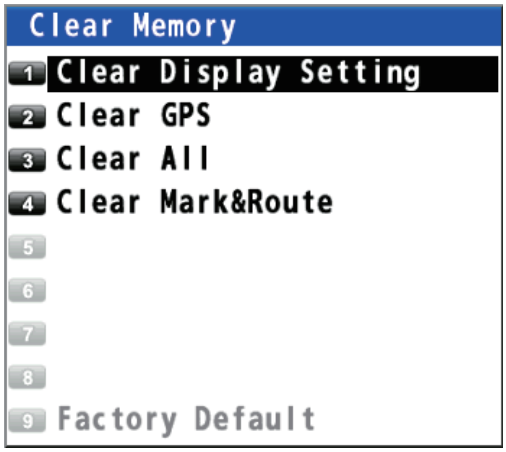
   Note: If a USB flash memory is not set, the following message appears.

Note: Route no. 100 is reserved for the monitored route sent from an ECDIS. A route imported from a USB flash memory may also be assigned this number when that route becomes the 100th route registered in the GP-170. Whenever a monitored route is received, route no. 100 is written over to import the monitored route.

10.7 How to Clear the Memory

You can clear display setting, GPS memory, marks and routes to start afresh.

1. Press the **MENU/ESC** key to open the main menu.
2. Select [8 System Setting] then [9 Clear Memory].



3. Select [1 Clear Display Setting], [2 Clear GPS], [3 Clear All] or [4 Clear Mark&Route].
   [Clear Display Setting]: Clears the display setting.
   [Clear GPS]: Clears the GPS memory.
   [Clear All]: Clears both display setting and GPS memory.
   [Clear Mark&Route]: Clears marks and routes.
   The confirmation message appears.

4. Select [1 Yes]. The equipment restarts.

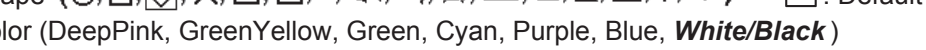
APPENDIX 1 MENU TREE

Note: If setting invalid data in numerical entry, two beeps sound. Reenter the correct data.

1 Display — ***Bold Italic***: Default

- Back Ground (***White***, Black)
- Grid (DeepPink, GreenYellow, ***Green***, Cyan, Purple, Blue, White/Black, Off)
- Lines Color
  - XTL Line (DeepPink, GreenYellow, Green, ***Cyan***, Purple, Blue, White/Black, Off)
  - Heading Line (DeepPink, GreenYellow, Green, ***Cyan***, Purple, Blue, White/Black, Off)
  - Course Vector (DeepPink, GreenYellow, Green, Cyan, ***Purple***, Blue, White/Black, Off)
  - Course Vector Time (***10 min***, 20 min, 30 min, 1 H, 2 H, 3 H, 5 H, 6 H, Continuous)
- Time Mark (DeepPink, GreenYellow, Green, Cyan, Purple, Blue, White/Black, ***Off***)
- Mark/WPT Name (***On (All)***, On (WPT), Off)
- Cursor Size (***Large***, Small)
- Manual Calculation (Open the setting window.)
- Set/Drift AVR (***Off***, 10 min, 20 min, 30 min, 1 H, 2 H, 3 H, 5 H, 6 H)
- Display Select
  - Main*[1] (***On***) — *1: Can not be changed.
  - Integrity*[1] (***On***)
  - Highway (***On***, Off)
  - Course (***On***, Off)
  - Data (***On***, Off)
- Data Overlay
  - Weather (Type16) (On, ***Off***)

2 Track/Mark

- Track REC (Time, ***Distance***)
- Track Color (DeepPink, GreenYellow, Green, Cyan, Purple, Blue, ***White/Black***)
- Mark Shape  □: Default
- Mark Color (DeepPink, GreenYellow, Green, Cyan, Purple, Blue, ***White/Black***)
- Mark Line (***None***, Solid, Dash, Alternate Dash)
- Line Color (DeepPink, GreenYellow, Green, Cyan, Purple, Blue, ***White/Black***)
- Event Mark (Same as Mark Shape.)
- Event Color (DeepPink, GreenYellow, Green, Cyan, Purple, Blue, ***White/Black***)
- Erase Track
  - Erase Track (Yes, ***No***)
  - Erase Mark (Yes, ***No***)

3 Navigation

- Mark Registration (Open the mark list.)
- Route Registration (Open the route list.)
- Display ETA/TTG (***Off***, ETA, ETA+TTG)
- ECDIS Sync
  - Mode (***Off***, On)
  - ECDIS IP ADR (Open the entry window.)
  - ECDIS SFI (Open the entry window.)
- Goto (Mark Number) (Open the entry window.)
- Goto (Route Number) (Open the entry window.)
- Goto Cancel

4 Notice Setting

- Arrival/Anchor (Arrival, Anchor, ***Off***)
- XTE (***Off***, On)
- Ship Speed
  - Status (***Off***, In, Out)
  - Speed (Open the setting window.)

①

①
- Trip
  - Status (***Stop***, Start/Restart, Clear)
  - Range (Open the setting window.)
- Sound
  - Notice Sound (***Off***, On, Continuous)
  - Key Sound (***On***, Off)

5 Alert
- Active Alert (Open the active alert list.)
- Mode*2 (***Alert I/F 1***, Alert I/F 2, Legacy)
- Remote Ack I/F*2 (***Ack***, BuzzerStop)
- Alert Log (Open the alert log.)

*2: For serviceman.

6 Maintenance
- Information
  - Main (Open the information for main board.)
  - Panel (Open the information for panel board.)
  - GPS (Open the information for GPS board.)
  - Beacon (Open the information for beacon board.)
  - Database (Open the information for database.)
- Self Test
  - Memory Test
  - Keyboard Test
  - LCD Test
  - Automatic Test
  - Sound Test*2
- Backup
  - Backup User Setting (Yes, ***No***)
  - Load User Setting (Yes, ***No***)
  - Import GPX (Overwrite) (Yes, ***No***)
  - Import GPX (Addition) (Yes, ***No***)
  - Export GPX (Yes, ***No***)
- SW/Database Update*2
  - Chk the available software
    - Main: Application
    - Main: Boot
    - GPS: Application
    - Beacon: Application
    - Beacon: Boot
  - Chk the new data table
    - Datum
    - WMM
- Exchange*2
- Service*2
- Tech Menu*2

7 I/O

*3: Reserved for future use.

- Output Data1 to 4
  - Mode (***IEC/NMEA***, RTCM)
  - Format (***IEC 61162-1 Ed.4***, IEC 61162-1 Ed.3, NMEA V2.0, NMEA V1.5)
  - Talker (***GP***, GL*3, GA*3, GN)
  - BPS (***4800 bps***, 9600 bps, 38400 bps) (38400 bps is default for Output Data4.)
  - Sentence (AAM: Off, APA: Off, APB: Off, BOD: Off, BWC: Off, BWR: Off, BWW: Off, GBS: Off, GGA: 1s, GLL: Off, GNS: Off, GRS: Off, GSA: Off, GST: Off, GSV: Off, RMB: 1s, RMC: Off, Rnn: Off, RTE: Off, VDR: Off, VTG: 1s, WCV: Off, WNC: Off, WNR: Off, WPL: Off, XTE: Off, ZDA: 1s)

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- Ethernet
  - Sentence (Options are same as Output Data1 excluding APA, Rnn and WNR.)
  - IP ADR/Port (Open the entry window.)
  - MP (Enable, ***Disable***)
  - MP IP ADR/Port (Open the entry window.)
- Data Source Select
  - HDG (***Data1***, Data2, Data4, Ethernet, User Priority)
  - STW (***Data1***, Data2, Data4, Ethernet, User Priority)
  - SST (***Data1***, Data2, Data4, Ethernet, User Priority)
  - DPT (***Data1***, Data2, Data4, Ethernet, User Priority)
- Line Monitor
  - Data1 (Open the line monitor for serial data1.)
  - Data2 (Open the line monitor for serial data2.)
  - Data3 (Open the line monitor for serial data3.)
  - Data4 (Open the line monitor for serial data4.)
  - GPS Core*2 (***No***, Yes)
  - Beacon*2 (***No***, Yes)
  - Ethernet Error Counter (Open the Ethernet Error data list.)
- Dual (***No***, Serial (Data2), Ethernet)

*2: For serviceman.

8 System Setting
- Language (***English***, 日本語)
- Plotter
  - Bearing Reference (***True***, Magnetic)
  - Magnetic Variation (***Auto***, Manual)
  - Calculation (***RL***, GC)
  - User Defined
    - Custom 1 (SOG, COG, ***RNG***, BRG, SST, DPT, XTD, Average COG, Average SOG, TTG, ETA, TRIP, TRIP TIME, Route Distance, Route TTG, ETA (Next), VTD, SET, DRIFT, STW, HDG, Mark/MAX Mark, Track/MAX Track, ETA/ETA (Plan))
    - Custom 2 (Same as Custom 1; ***SOG***)
    - Custom 3 (Same as Custom 1; ***HDG***)
    - Custom 4 (Same as Custom 1; ***COG***)
    - Custom 5 (Same as Custom 1; ***ETA***)
    - Custom 6 (Same as Custom 1; ***Route Distance***)
    - Custom 7 (Same as Custom 1; ***ETA/ETA (Plan)***)
    - Custom 8 (Same as Custom 1; ***TTG***)
  - Initial XTL/Arrival/Stay
    - XTL (Open the setting window.)
    - Arrival Radius (Open the setting window.)
    - Stay Time (Open the setting window.)
    - SOG (Open the setting window.)
    - Departure Time (Open the setting window.)
    - Route Color (DeepPink, GreenYellow, Green, ***Cyan***, Purple, Blue, White/Black)
  - List Number (***Keeping***, Not Saved)
  - List Information (***L/L***, Range/Bearing)
  - Password (Open the setting window.)
- Unit Setup
  - Unit of Distance (***NM***, km, SM)
  - Unit of Depth (m, ***ft***, fm)
  - Unit of Temperature (°***C***, °F)
- Correction, Offset
  - Position Offset (Open the setting window.)
  - Local Time (***Off***, Manual Input)
  - Ship Size/Antenna Position (Open the setting window.)
  - Attitude Gauge (***On***, Off)

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- GNSS
  - Method (***GPS***, GLONASS*[3], GALILEO*[3], Multi*[3])
  - GPS Smoothing
    - Position (Open the setting window.)
    - Speed (Open the setting window.)
    - Speed Average (Open the setting window.)
  - Condition
    - Elevation Mask (Open the setting window.)
    - Not Used GPS (Open the setting window.)
    - Not Used GLONASS*[3] (Open the setting window.)
    - Not Used GALILEO*[3] (Open the setting window.)
    - Core Filter (No, ***Yes***)
  - RAIM
    - Setting (***On***, Off)
    - Accuracy Level (Open the setting window.)
  - Datum (***WGS84***, WGS72, PZ90, CK42, CK95, Other)
  - Init Position (Open the setting window.)
  - Roll Over*[2] (Open the setting window.)
  - Source*[2] (***Inner Receiver***, Data1, Data2, Data4)
  - Cycle (***1Hz***, 5Hz, 10Hz)
  - Anti-Multipath Filter (On, ***Off***)
- Beacon/SBAS
  - Mode (***GNSS***, GNSS+SBAS, GNSS+Internal Beacon*[4], GNSS+Beacon (Data1)*[4], GNSS+Beacon (Data2)*[4], GNSS+Beacon (Data4)*[4], Beacon+SBAS)
  - SBAS Search (***Auto***, Manual)
  - Beacon Station
    - ***Auto***
    - Set Parameter
      - Frequency (Open the setting window.)
      - Bit Rate (25bps, 50bps, ***100bps***, 150bps, 200bps)
    - Select Station ID*[5] (Open the station list.)
  - Station Database*[5] (Open the station list.)
  - Registered Stations*[5] (Open the station information list.)
  - Not Used Satellite
    - SBAS (Open the setting window.)
    - QZSS_L1C/A (Open the setting window.)
  - QZSS
    - Positioning (Yes, ***No***)
    - Correction (Yes, ***No***)
  - Beacon Reset*[2]
  - Modem Test*[2] (***Off***, On)
- Network
  - SNTP Server (***On***, Off)
  - Ethernet*[2]
  - Equipment ID (Open the setting window.)
  - SFI*[2]
- Demo
  - Parameter (Open the setting window.)
- Clear Memory
  - Clear Display Setting (Yes, ***No***)
  - Clear GPS (Yes, ***No***)
  - Clear All (Yes, ***No***)
  - Clear Mark&Route (Yes, ***No***)
  - Factory Default*[2] (Yes, ***No***)

*3: Reserved for future use.

*2: For serviceman.

*4: See the table below.

*5: Requires internal DGPS beacon receiver.

*4

Menu item	w/internal DGPS beacon receiver	w/o internal DGPS beacon receiver
GNSS+Internal Beacon	Selectable	Not selectable
GNSS+Beacon (Data1, Data2 or Data4)	Not selectable	Selectable

APPENDIX 2 LIST OF TERMS/SYMBOLS

The following table shows the terms and symbols used in the GP-170.

Terms

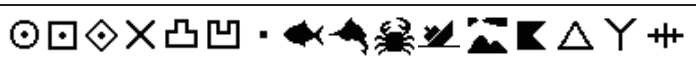
Terms	Meaning
ACK	Acknowledge
ADR	Automotive Dead Reckoning
ALARM	Alarm
ANCH	Anchor Watch
ANT	Antenna
APR	April
AUG	August
AUTO	Automatic
AVR	Average
BRG	North-referenced bearing
BRILL	Brilliance
CAL	Calibrate
CCRP	Consistent Common Reference Point
CLR	Clear
CNCL	Cancel
COG	Course Over the Ground
CONT	COntrast
CPU	Central Processing Unit
CRS	Course
CU	Course Up
CURS	Cursor
DATE	Date
DAY	Day
DEC	December
DEL	Delete
DEP	Departure
DEST	Destination
DGLONASS	Differential GLONASS
DGNSS	Differential GNSS
DGPS	Differential GPS
DISP	Display
DIST	Distance
DNV	Det Norske Veritas
DPT	Depth
DR	Dead Reckoning, Dead Reckoning Position
DRIFT	Drift
DTM	Datum
E	East
EGNOS	European Geo-Stationary Navigational Overlay System
ENT	Enter

Terms	Meaning
EQUIP	Equipment
ERR	Error
ETA	Estimated Time of Arrival
EVENT	Event
EXT	External
FEB	February
FIX	Fix
FREQ	Frequency
FULL	Full
GC	Great Circle
GCD	Great Circle Distance
GLONASS	Global Opening Navigation Satellite System
GND	Ground
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GPX	GPS eXchange Format
GRID	Grid
HDG	Heading
HDOP	Horizontal Dilution Of Precision
HL	Heading Line
H UP	Head Up
ID	Identification
IEC	International Electrotechnical Commission
IN	In
IND	Indication
INFO	Information
INP	Input
INT	Interval
I/O	Input/Output
JAN	January
JUL	July
JUN	June
LAT	Latitude
L/L	Latitude and Longitude
LOG	Log
LON	Longitude
MAG	Magnetic
MAN	Manual
MAR	March
MAY	May
MENU	Menu
MIN	Minimum
MOB	Man Overboard
MSTR	Master
N	North
NAV	Navigation
NMEA	National Marine Electronics Association
NOV	November
NT	Night

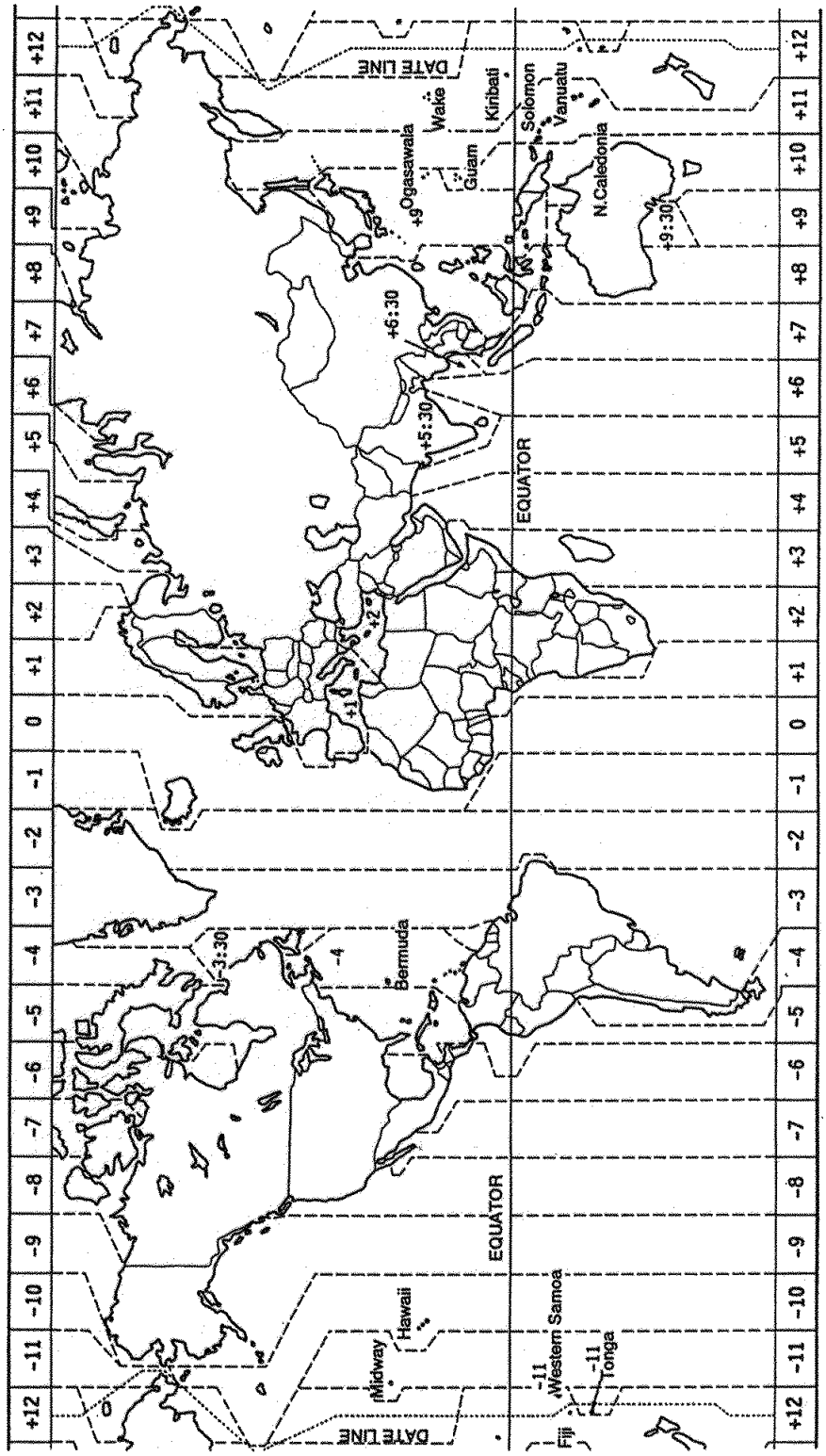
Terms	Meaning
NTP	Network Time Protocol
NU	North Up
OCT	October
OFFSET	Offset
ON	On
OS	Own Ship
OUT	Out/Output
PDOP	Positional Dilution Of Precision
POSN	Position
PRN	Pseudo-Random-Noise
PWR	Power
QZSS	Quasi-Zenith Satellite System
RAIM	Receiver Autonomous Integrity Monitoring
REF	Reference
RL	Rhumb Line
RLD	Rhumb Line Distance
RM	Relative Motion
RMS	Root Mean Square
RNG	Range
ROT	Rate Of Turn
ROUTE	Route
Rx, RX	Receive
S	South
SAT	Satellite
SBAS	Satellite Base Augmentation System
SEL	Select
SEP	September
SET	Set (i.e., set and drift, or setting a value)
SIM	Simulation
SLAS	Sub Meter Level Augmentation Service
SNR	Signal to Noise Ratio
SOG	Speed Over the Ground
SPD	Speed
SST	Sea Surface Temperature
STN	Station
STW	Speed Through the Water
SV	Space Vehicle
SYM	Symbol(s)
T	True
TCPA	Time to CPA
TIME	Ship’s Time, Time
TM	True Motion
TOA	Time Of Arrival
TOD	Time Of Departure
TTG	Time To Go
UTC	Coordinated Universal Time, Universal Time Coordinated
VAR	Variation
VECT	Vector
VTD	Velocity to Destination

Terms	Meaning
W	West
WARNING	Warning
WAT	Water
WER	Word Error Rate
WGS	World Geodetic System
WPT	Waypoint
XTD	Cross (=X) Track Distance
XTL	Cross (=X) Track Limit
XTE	Cross (=X) Track Error

Symbols

Symbols	Meaning
	Marks
	Cursor (Left: Large size, Right: Small size)
	Own ship
	MOB (Man Overboard) mark
	North mark
	Chart mode (The cursor is turned off.)
	Cursor mode (The cursor is turned on.)
	Plotting stopped
	Skipped waypoint
	Reversed route
	Active unacknowledged warning
	Active acknowledged warning
	Active responsibility transferred warning
	Rectified unacknowledged warning
	Silenced warning
	Caution
	Attitude gauge
	Anchor notice
	Arrival notice
	Ship speed notice
	Trip notice
	XTE notice
	High precision speed computing
	Synchronization with ECDIS
	Demo mode
	Correcting by SLAS

APPENDIX 3 TIME DIFFERENCES



APPENDIX 4 GEODETIC CHART LIST

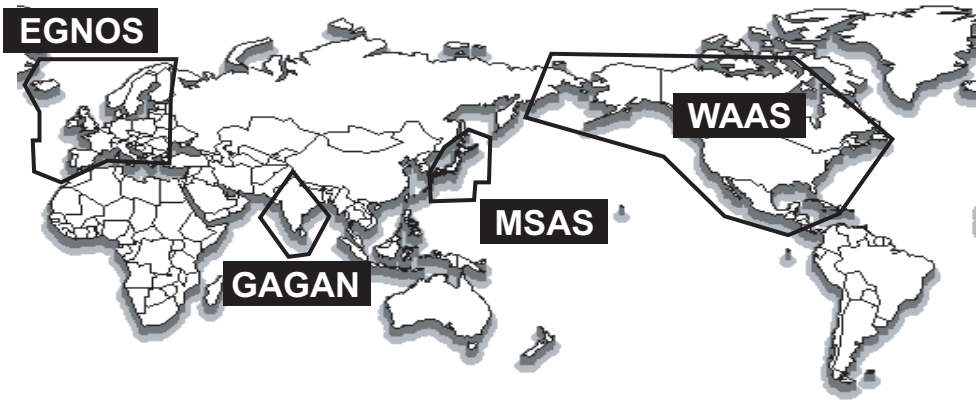
001: WGS84
002: WGS72
003: TOKYO : Mean Value (Japan, Korea & Okinawa)
004: NORTH AMERICAN 1927 : Mean Value (CONUS)
005: EUROPEAN 1950 : Mean Value
006: AUSTRALIAN GEODETIC 1984 : Australia & Tasmania
007: ADINDAN : Mean Value (Ethiopia & Sudan)
008: ADINDAN : Ethiopia
009: ADINDAN : Mali
010: ADINDAN : Senegal
011: ADINDAN : Sudan
012: AFG : Somalia
013: AIN EL ABD 1970 : Bahrain Is.
014: ANNA 1 ASTRO 1965 : Cocos Is.
015: ARC 1950 : Mean Value
016: ARC 1950 : Botswana
017: ARC 1950 : Lesotho
018: ARC 1950 : Malawi
019: ARC 1950 : Swaziland
020: ARC 1950 : Zaire
021: ARC 1950 : Zambia
022: ARC 1950 : Zimbabwe
023: ARC 1960 : Mean Value (Kenya & Tanzania)
024: ARC 1960 : Kenya
025: ARC 1960 : Tanzania
026: ASCENSION IS. 1958 : Ascension Is.
027: ASTRO BEACON "E" : Iwo Jima Is.
028: ASTRO B4 SOR. ATOLL : Tern Is.
029: ASTRO POS 71/4 : St. Helena Is.
030: ASTRONOMIC STATION 1952 : Marcus Is.
031: AUSTRALIAN GEODETIC 1966 : Australia & Tasmania
032: BELLEVUE (IGN) : Efate & Erromango Is.
033: BERMUDA 1957 : Bermuda Is.
034: BOGOTA OBSERVATORY : Columbia
035: CAMPO INCHAUSPE : Argentina
036: CANTON IS. 1966 : Phoenix Is.
037: CAPE : South Africa
038: CAPE CANAVERAL : Mean Value (Florida & Bahama Is.)
039: CARTHAGE : Tunisia
040: CHATHAM 1971 : Chatham Is. (New Zealand)
041: CHUA ASTRO : Paraguay
042: CORREGO ALEGRE : Brazil
043: DJAKARTA (BATAVIA) : Sumatra Is. (Indonesia)
044: DOS 1968 : Gizo Is. (New Georgia Is.)
045: EASTER IS. 1967 : Easter Is.
046: EUROPEAN 1950 (Cont'd) : Western Europe
047: EUROPEAN 1950 (Cont'd) : Cyprus
048: EUROPEAN 1950 (Cont'd) : Egypt
049: EUROPEAN 1950 (Cont'd) : England, Scotland, Channel & Shetland Is.
050: EUROPEAN 1950 (Cont'd) : England, Ireland, Scotland & Shetland Is.
051: EUROPEAN 1950 (Cont'd) : Greece
052 EUROPEAN 1950 (Cont'd) : Iran
053: EUROPEAN 1950 (Cont'd) : Italy, Sardinia
054: EUROPEAN 1950 (Cont'd) : Italy, Sicily
055: EUROPEAN 1950 (Cont'd) : Norway & Finland
056: EUROPEAN 1950 (Cont'd) : Portugal & Spain
057: EUROPEAN 1979 : Mean Value
058: GANDAJIKA BASE : Republic of Maldives
059: GEODETIC DATUM 1949 : New Zealand
060: GUAM 1963 : Guam Is.
061: GUX 1 ASTRO : Guadalcanal Is.
062: HJORSEY 1955 : Iceland
063: HONG KONG 1963 : Hong Kong
064: INDIAN : Thailand & Vietnam
065: INDIAN : Bangladesh, India & Nepal
066: IRELAND 1965 : Ireland
067: ISTS 073 ASTRO 1969 : Diego Garcia
068: JOHNSTON IS. 1961 : Johnston Is.
069: KANDAWALA : Sri Lanka
070: KERGUELEN IS. : Kerguelen Is.
071: KERTAU 1948 : West Malaysia & Singapore
072: LA REUNION : Mascarene Is.
073: L. C. 5 ASTRO : Cayman Brac Is.
074: LIBERIA 1964 : Liberia
075: LUZON : Philippines (excl. Mindanao Is.)
076: LUZON : Mindanao Is.
077: MAHE 1971 : Mahe Is.
078: MARCO ASTRO : Salvage Islands
079: MASSAWA : Eritrea (Ethiopia)
080: MERCHICH : Morocco
081: MIDWAY ASTRO 1961 : Midway Is.
082: MINNA : Nigeria
083: NAHRWAN : Masirah Is. (Oman)
084: NAHRWAN : United Arab Emirates
085: NAHRWAN : Saudi Arabia
086: NAMIBIA : Namibia
087: MAPARIMA, BWI : Trinidad & Tobago
088: NORTH AMERICAN 1927 : Western United States
089: NORTH AMERICAN 1927 : Eastern United States
090: NORTH AMERICAN 1927 : Alaska
091: NORTH AMERICAN 1927 : Bahamas (excl. San Salvador Is.)
092: NORTH AMERICAN 1927 : Bahamas, San Salvador Is.
093: NORTH AMERICAN 1927 (Cont'd): Canada (incl. Newfoundland Is.)
094: NORTH AMERICAN 1927 (Cont'd): Alberta & British Columbia
095: NORTH AMERICAN 1927 (Cont'd): East Canada
096: NORTH AMERICAN 1927 (Cont'd): Manitoba & Ontario
097: NORTH AMERICAN 1927 (Cont'd): Northwest Territories & Saskatchewan
098: NORTH AMERICAN 1927 (Cont'd): Yukon
099: NORTH AMERICAN 1927 (Cont'd): Canal Zone
100: NORTH AMERICAN 1927 (Cont'd): Caribbean
101: NORTH AMERICAN 1927 (Cont'd): Central America
102: NORTH AMERICAN 1927 (Cont'd): Cuba
103: NORTH AMERICAN 1927 (Cont'd): Greenland
104: NORTH AMERICAN 1927 (Cont'd): Mexico
105: NORTH AMERICAN 1983 : Alaska
106: NORTH AMERICAN 1983 : Canada
107: NORTH AMERICAN 1983 : CONUS
108: NORTH AMERICAN 1983 : Mexico, Central America
109: OBSERVATORIO 1966 : Corvo & Flores Is. (Azores)
110: OLD EGYPTIAN 1930 : Egypt
111: OLD HAWAIIAN : Mean Value
112: OLD HAWAIIAN : Hawaii
113: OLD HAWAIIAN : Kauai
114: OLD HAWAIIAN : Maui
115: OLD HAWAIIAN : Oahu
116: OMAN : Oman
117: ORDNANCE SURVEY OF GREAT BRITAIN 1936 : Mean Value
118: ORDNANCE SURVEY OF GREAT BRITAIN 1936 : England
119: ORDNANCE SURVEY OF GREAT BRITAIN 1936 : England, Isle of Man & Wales
120: ORDNANCE SURVEY OF GREAT BRITAIN 1936 : Scotland & Shetland Is.
121: ORDNANCE SURVEY OF GREAT BRITAIN 1936 : Wales
122: PICO DE LAS NIVIES : Canary Is.
123: PITCAIRN ASTRO 1967 : Pitcairn Is.
124: PROVISIONAL SOUTH CHILEAN 1963: South Chile (near 53°S)
125: PROVISIONAL SOUTH AMERICAN 1956: Mean Value
126: PROVISIONAL SOUTH AMERICAN 1956: Bolivia
127: PROVISIONAL SOUTH AMERICAN 1956: Chile-Northern Chile (near 19°S)
128: PROVISIONAL SOUTH AMERICAN 1956: Chile-Southern Chile (near 43°S)
129: PROVISIONAL SOUTH AMERICAN 1956: Columbia
130: PROVISIONAL SOUTH AMERICAN 1956: Ecuador
131: PROVISIONAL SOUTH AMERICAN 1956: Guyana
132: PROVISIONAL SOUTH AMERICAN 1956: Peru
133: PROVISIONAL SOUTH AMERICAN 1956: Venezuela
134: PUERTO RICO : Puerto Rico & Virgin Is.
135: QATAR NATIONAL : Qatar
136: QORNOQ : South Greenland
137: ROME 1940 : Sardinia Is.
138: SANTA BRAZ : Sao Miguel, Santa Maria Is. (Azores)
139: SANTO (DOS) : Espirito Santo Is.
140: SAPPER HILL 1943 : East Falkland Is.
141: SOUTH AMERICAN 1969 : Mean Value
142: SOUTH AMERICAN 1969 : Argentina
143: SOUTH AMERICAN 1969 : Bolivia
144: SOUTH AMERICAN 1969 : Brazil
145: SOUTH AMERICAN 1969 : Chile
146: SOUTH AMERICAN 1969 : Columbia
147: SOUTH AMERICAN 1969 : Ecuador
148: SOUTH AMERICAN 1969 : Guyana
149: SOUTH AMERICAN 1969 : Paraguay
150: SOUTH AMERICAN 1969 : Peru
151: SOUTH AMERICAN 1969 : Trinidad & Tobago
152: SOUTH AMERICAN 1969 : Venezuela
153: SOUTH ASIA : Singapore
154: SOUTHEAST BASE : Porto Santo & Madeira Is.
155: SOUTHWEST BASE : Faial, Graciosa, Pico, Sao Jorge & Terceria Is.
156: TIMBALAI 1948 : Brunei & East Malaysia (Sarawak & Sabah)
157: TOKYO : Japan
158: TOKYO : Korea
159: TOKYO : Okinawa
160: TRISTAN ASTRO 1968 : Tristan da Cunha
161: VITI LEVU 1916 : Viti Levu Is. (Fiji Is.)
162: WAKE-ENIWETOK 1960 : Marshall Is.
163: ZANDERIJ : Surinam
164: BUKIT RIMPAH : Bangka & Belitung Is. (Indonesia)
165: CAMP AREA ASTRO : Camp Mcmurdo Area, Antarctica
166: G. SEGARA : Kalimantan Is. (Indonesia)
167: HERAT NORTH : Afghanistan
168: HU-TZU-SHAN : Taiwan
169: TANANARIVE OBSERVATORY 1925 : Madagascar
170: YACARE : Uruguay
171: RT-90 : Sweden
172: CK42 (PULKOVO 1942) : Russia
173: FINNISH KKJ : Finland
174: PZ90 : Russia
175: CK95 : Russia

APPENDIX 5 WHAT IS SBAS/ QZSS (SLAS)?

SBAS

A satellite based augmentation system, or SBAS (Satellite Based Augmentation System), is an augmentation system that uses additional messages from satellite broadcasts to support regional and wide area augmentation. SBAS provides GPS signal corrections to SBAS users, for even better position accuracy, through the GPS error corrections that are widely broadcasted from the geostationary satellite.

SBAS is used in America, Europe, Japan and India. These four systems; WAAS, EGNOS, MSAS and GAGAN, have interoperability. The illustration below shows the coverage area for each provider. This manual uses "SBAS" for these four providers generically.



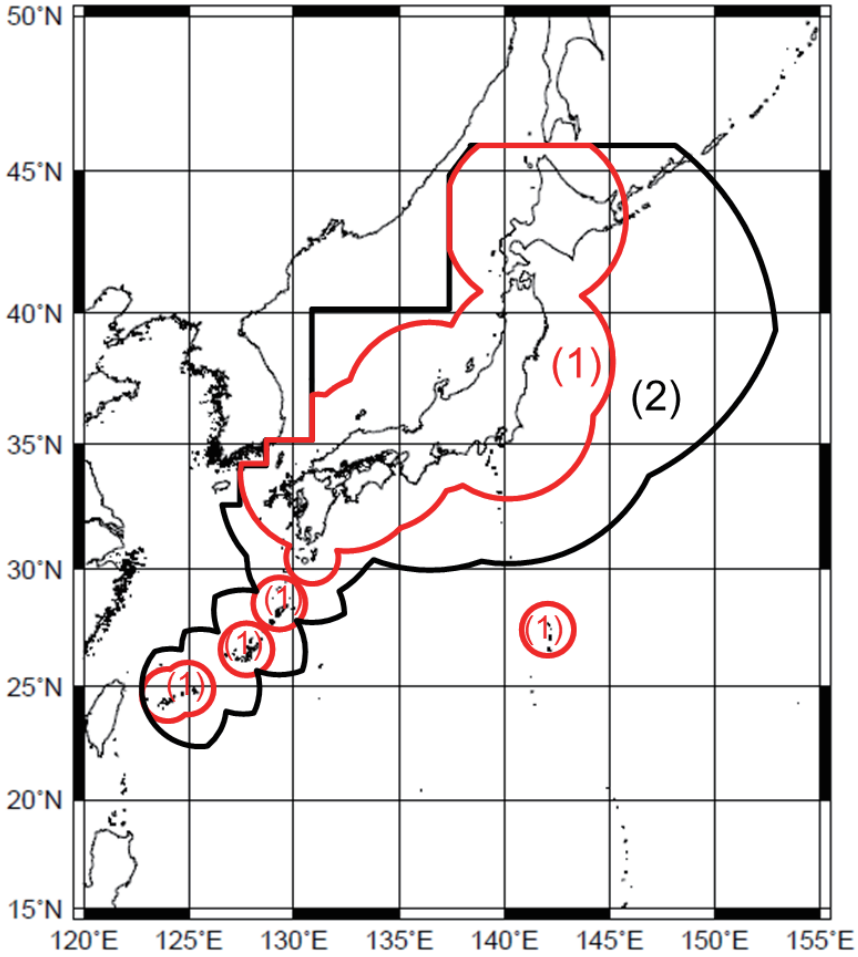
Provider	Satellite type	Longitude	Satellite No.
WAAS (Wide Area Augmentation System, America)	Intelsat Galaxy XV	133°W	135
	TeleSat Anik F1R	107.3°W	138
	Inmarsat-4-F3	98°W	133
EGNOS (Euro Geostationary Navigation Overlay Service, Europe)	Inmarsat-3-F2/AOR-E	15.5°W	120
	Artemis	21.5°E	124
	Inmarsat-4-F2	25°E	126
	SES-5	5°E	136
MSAS (Multi-Functional Satellite Augmentation System, Japan)	MTSAT-1R	140°E	129
	MTSAT-2	145°E	137
GAGAN (GPS And GEO Augmented Navigation, India)	GSAT-8	55°E	127
	GSAT-10	83°E	128

As of March 6th, 2014

QZSS (SLAS)

QZSS (SLAS) (Quasi-Zenith Satellite System) is the Japanese satellite positioning system composed mainly of satellites of quasi-zenith orbit. Since QZSS can be used together with GPS, QZSS secures the number of satellites that can perform stable high-accuracy positioning.

Note: Positioning correction cannot be guaranteed outside of the coverage area.



Source: Cabinet Office, Government of Japan, "PS-QZSS-001", November 5, 2018, Figure 5.2-1 on page 16

The table below shows the positioning accuracy when using SLAS correction.

Positioning accuracy

Area	Positioning error (Horizontal)
Areas (1) and (2)	3.0 m approx. (2 drms)

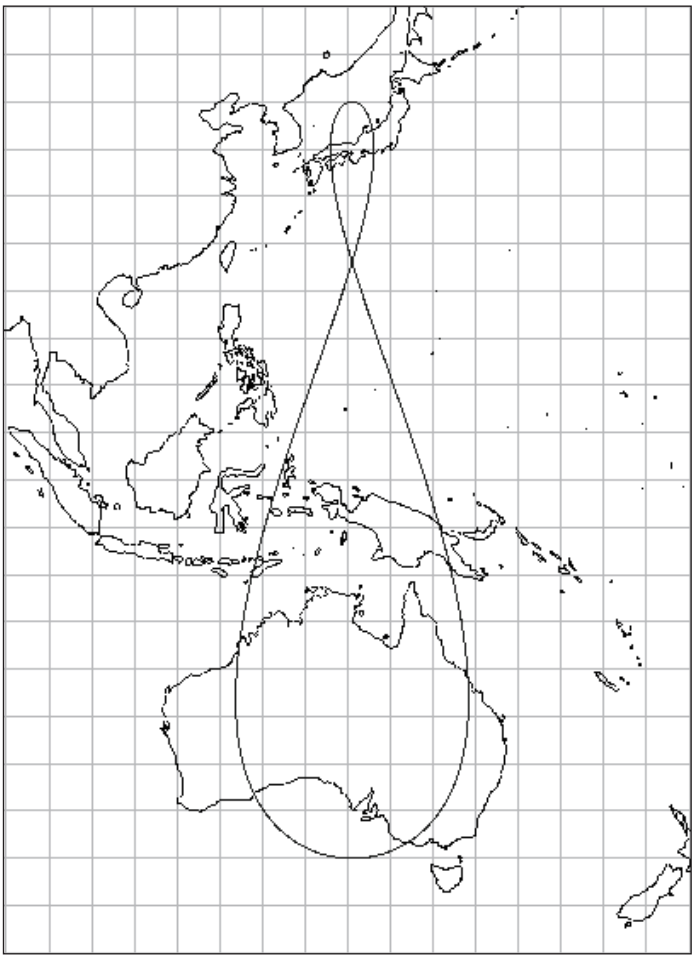
The table below shows the available QZSS (SLAS) satellites.

QZSS (SLAS)

Satellite name	Longitude	Satellite no.	PRN for positioning	PRN for correction
QZS-1	-	J001	193	183
QZS-2	-	J002	194	184
QZS-3	127°E	J003	199	189
QZS-4	–	J004	195	185

As of February 25th, 2019

The QZSS ground track is a figure eight track shown in the figure below. Satellites remain in the northern hemisphere for about 13 hours, and about 11 hours in the southern hemisphere.



QZSS ground track (except for QZS-3)

Source: Cabinet Office, Government of Japan, “PS-QZSS-001”, November 5, 2018, Figure 3.1-2 on page 9

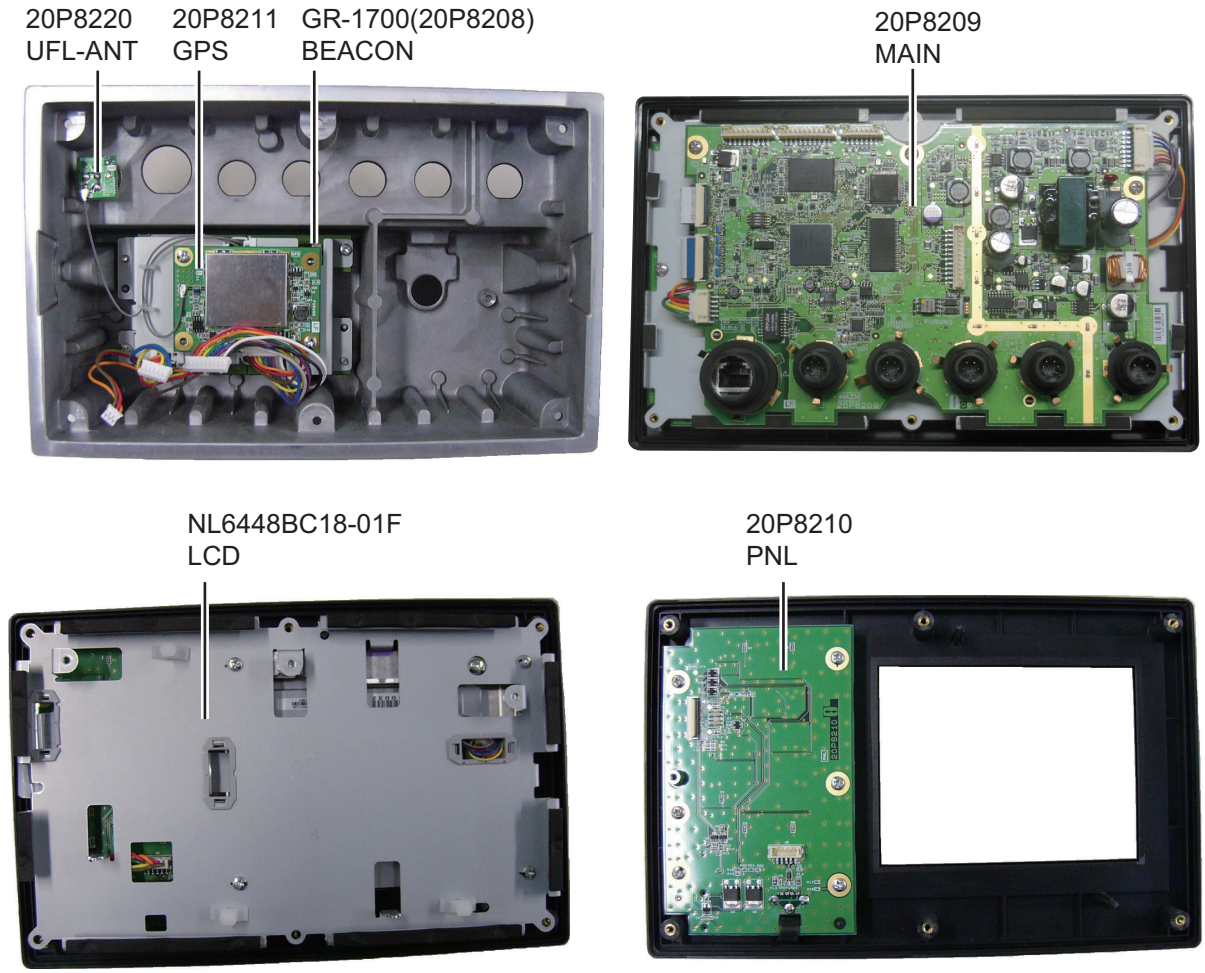
APPENDIX 6 PARTS LIST/LOCATION

Parts list

This equipment contains complex modules in which fault diagnosis and repair down to component level are not practical (IMO A.694(17)/8.3.1). Only some discrete components are used. FURUNO Electric Co., Ltd. Believes identifying these components is of no value for shipboard maintenance; therefore, they are not listed in this manual. Major modules can be located on the parts location photos below.

ELECTRICAL PARTS LIST	Unit	Display Unit GP-170
		Code No.
PRINTED CIRCUIT BOARD		
GR-1700(20P8208), BEACON		—
20P8209, MAIN		—
20P8210, PNL		—
20P8211, GPS		—
20P8220, UFL-ANT		—
LCD		
NL6448BC18-01F		—

Parts location



Display unit, cover opened

APPENDIX 7 ALERT LIST

The table below shows the alert no., alert name (only for Alert I/F 2), text, priority, meaning and remedy for each alert.

Alert I/F 2

No.	Inst.	Alert name	Text	Priority	Meaning	Remedy
210	0	HDOP exceeded	HDOP exceeded.	Caution/ B	The value of HDOP (Horizontal Dilution of Precision) is 4 or above. HDOP threshold being permanently set to 4.	If the same state continues for five minutes, contact your dealer.
212	1	Loss of position	GNSS core fault.	Warning/ B	The signal from GPS core is not received for three seconds.	Restart the GP-170. If the alert occurs again, contact your dealer.
	2		Too few tracking Satellites.		No positioning data.	If the same state continues for five minutes, contact your dealer.
	3		Antenna short-circuited.		The antenna has shorted out.	If this condition frequently occurs, contact your dealer.
213	0	Lost DIF Signal	Loss of differential signal.	Caution/ B	More than 10 seconds have passed since the last beacon message is received.	DGPS fix use If this condition frequently occurs in the service area of the Beacon stations, contact your dealer.
215	0	Doubt DIF Signal	Differential integrity status.	Caution/ B	The beacon station selected automatically is unhealthy.	Change the Beacon station to another available.

Note: "Inst." denotes "Instance number" for the alert.

Alert I/F 1, Legacy

No.	Text	Priority	Meaning	Remedy
009	Antenna short-circuited.	Warning/B	The antenna has shorted out.	If this condition frequently occurs, contact your dealer.
010	• D3D turned to 3D. • D3D turned to 2D. • D2D turned to 3D. • D2D turned to 2D. • S3D turned to 3D. • S3D turned to 2D. • S2D turned to 3D. • S2D turned to 2D. • Q3D turned to 3D. • Q3D turned to 2D. • Q2D turned to 3D. • Q2D turned to 2D. • D3D turned to “No Fix”. • D2D turned to “No Fix”. • S3D turned to “No Fix”. • S2D turned to “No Fix”. • Q3D turned to “No Fix”. • Q2D turned to “No Fix”.	Caution/B	The positioning system turns from DGPS to GPS.	• DGPS fix use If this condition frequently occurs in the service area of the Beacon stations, contact your dealer. • SBAS fix use If this condition frequently occurs in the service area of the SBAS satellites, contact your dealer. • QZSS fix use If this condition frequently occurs in the service area of the QZSS satellites, contact your dealer.
210	HDOP exceeded.	Caution/B	The value of HDOP (Horizontal Dilution of Precision) is 4 or above. HDOP threshold being permanently set to 4.	If the same state continues for five minutes, contact your dealer.
211	No calculation of position.	Warning/B	The signal from GPS core is not received for three seconds.	Restart the GP-170. If the alert occurs again, contact your dealer.
212	Loss of position.	Warning/B	No positioning data.	If the same state continues for five minutes, contact your dealer.
213	Loss of differential signal.	Caution/B	More than 10 seconds have passed since the last beacon message is received.	DGPS fix use If this condition frequently occurs in the service area of the Beacon stations, contact your dealer.
215	Differential integrity status.	Caution/B	The beacon station selected automatically is unhealthy.	Change the Beacon station to another available.

SPECIFICATIONS OF GPS NAVIGATOR
GP-170

1 GPS RECEIVER

1.1	Receiving frequency	1575.42 MHz
1.2	Tracking code	C/A code
1.3	Number of channel	GPS: 12 channels parallel, 12 satellites
1.4	Accuracy (dependent on ionospheric activity and multipath)	
	GPS	10 m approx. (2drms, HDOP<4)
	DGPS	5 m approx. (2drms, HDOP<4)
	WAAS	3 m approx. (2drms, HDOP<4)
	MSAS	7 m approx. (2drms, HDOP<4)
	QZSS (SLAS)	3 m approx. (2drms, HDOP<4)
1.5	Ship's speed accuracy	0.2 kn (10kn or less), 2 % of ship's speed (more than 10kn), excluding influence of roll and pitch
1.6	Course accuracy	±3° (within 1 to 17kn), ±1° (more than 17kn)
1.7	Position fixing time	Cold start: 90 s typical
1.8	Tracking velocity	1000 kn
1.9	Position update Interval*	1 s (standard), 0.1 s (minimum)

*: Set the position update interval 0.1 s or 0.2 s for high-speed craft. Set the positioning cycle 5 or 10 Hz according to the position update interval; 5/10 Hz for 0.2s interval, 10 Hz for 0.1s interval.

2 DISPLAY SECTION

2.1	Display type	Color LCD 116.16 x 87.12 mm, 640 x 480 dot matrix
2.2	Brilliance	700 cd/m^2 typical
2.3	Visible distance	0.625 m nominal
2.4	Display modes	Plotter, Highway, Course, Data, Integrity
2.5	Projection	Mercator
2.6	Track plotter display	
	Scale	0.125 to 1024 NM, 14 steps
	Latitude limits	Between 88° N and 88° S
	Plot interval	By time 0 to 60m00s or by distance 0 to 99.99 NM, sm/km or halt
2.7	Memory capacity	
	Track and marks	Track: 1,000 points, Mark: 2,000 points
	Waypoints	1,000 points with 20 characters comment each
	Route	100 routes (containing 1,000 waypoints each) No. 001 to 099: for registering routes No. 100: for reading from USB flush memory/ synchronizing with ECDIS
2.8	Notice	Arrival and anchor watch, Cross track error, Speed, Trip
2.9	Alerts	Differential positioning interruption, HDOP overshoot, Own ship positioning fail, Own ship position lost, Beacon signal lost, Beacon malfunction, Antenna short-circuit
2.10	Satellite information	Satellite number, Bearing, Elevation, Signal level, DOP, Status

3 DGPS BEACON RECEIVER (for DGPS model)

3.1	Frequency range	283.5 kHz to 325.0 kHz
3.2	Channel separation	500 Hz
3.3	MSK rate	25, 50, 100, 150, 200 bps
3.4	Operation mode	Auto or manual

4 INTERFACE

4.1	Number of ports	Serial: 4 ports (IEC61162-1 I/O: 2, O: 1, IEC61162-2 I/O: 1), Ethernet (IEC61162-450):1 port, USB: 1 port
4.2	Data format	IEC61162-1 Ed.3/4, NMEA0183 Ver1.5/2.0/4.0, IEC61162-450
4.3	Data port 1, 2 and 4	
	IEC/NMEA Mode	
	IN:	ACK, ACN, CRQ, DBT, DPT, HBT, HDG, HDM**, HDT**, MSK, MSS, MTW, THS, TLL, VBW, VHW
	OUT:	AAM, ALC, ALF, ALR, APA**, APB, ARC, BOD, BWC, BWR, BWW, DTM, GBS, GGA, GLL, GNS, GRS, GSA, GST, GSV, HBT, MSK*, MSS*, POS, RMB, RMC, Rnn**, RTE, VDR, VTG, WCV, WNC, WNR, WPL, XTE, ZDA
	RTCM Mode	
	IN/ OUT:	MSK, MSS DGPS correction data in RTCM SC-104 V2.3
4.4	Data port 3	
	IN:	MOB from external device (contact closure)
	OUT:	AAM, ALC, ALF, ALR, APA**, APB, ARC, BOD, BWC, BWR, BWW, DTM, GBS, GGA, GLL, GNS, GRS, GSA, GST, GSV, HBT, MSK*,MSS*, POS, RMB, RMC, Rnn**, RTE, VDR, VTG, WCV, WNC, WNR, WPL, XTE, ZDA
	RTCM Mode Output	MSK, MSS DGPS correction data in RTCM SC-104 V2.3
4.5	Proprietary sentences (output only)	
	PFEC	GPals, GPasc, GPdst, GPmr2, GPmsk, GPrai, GPreq, GPrt2, GPtrp, Ilalr, pidat, rminf
4.6	Ethernet	100Base-TX, RJ45 connector (waterproof)
	IEC61162-450 transmission group	
	IN:	MISC, SATD, NAVD
	OUT:	Arbitrary (default: NAVD)
	Network function (except IEC61162-450)	
		SNTP, HTTP, Furuno Management Protocol (FMP)
	Sentences	
	IN:	ACK, ACN, DBT, DPT, HBT, HDG, HDM**, HDT**, MTW, THS, TLL, VBW, VHW
	OUT:	AAM, ALC, ALF, ALR, APB, ARC, BOD, BWC, BWR, BWW, DTM, GBS, GGA, GLL, GNS, GRS, GSA, GST, GSV, HBT, POS, RMB, RMC, RTE, VDR, VTG, WCV, WNC, WPL, XTE, ZDA

*: MSK: Internal/external beacon receiver required, MSS: internal beacon receiver required.

**: not used for SOLAS ships.

5 POWER SUPPLY

5.1	Display unit	12-24 VDC: 0.8-0.4 A (w/ internal beacon receiver)
5.2	Rectifier (option)	
	PR-240	100-115/220-230 VAC, 1 phase, 50/60Hz
	PR-62	100/110-115/220/230 VAC, 1 phase, 50/60Hz

6 ENVIRONMENTAL CONDITIONS

6.1	Ambient temperature	
	Antenna unit	-25°C to +70°C
	Display unit	-15°C to +55°C
6.2	Relative humidity	95% or less at +40°C
6.3	Degree of protection	
	Antenna unit	IP56
	Display unit	IP25 (USCG CFR-46), IPX0 (USB port cover opened)
6.4	Vibration	IEC 60945 Ed.4

7 UNIT COLOR

7.1	Antenna unit	N9.5
7.2	Display unit	N2.5

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Declaration of Conformity

0560

We 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-170
(Model name, type number)

to which this declaration relates conforms to the following standard(s) or normative document(s)

IMO Resolution A.694(17)	IEC 61108-1 Ed.2.0: 2003
IMO Resolution MSC.112(73)	IEC 61108-4 Ed.1.0: 2004
IMO Resolution MSC.114(73)	IEC 61162-1 Ed.4.0: 2010
IMO Resolution MSC.191(79)	IEC 61162-2 Ed.1.0: 1998
IMO Resolution MSC.302(87)	IEC 61162-450 Ed.1.0: 2011
IMO Resolution MSC.36(63)	IEC 62288 Ed.2.0: 2014
IMO Resolution MSC.97(73)	IEC 60945 Ed.4.0: 2002
	IEC 61924-2 Ed.1.0: 2012 Annex K and M

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

For assessment, see

- EC type-examination (Module B) certificate No. MEDB000039D (GPS) and MEDB000039K (DGPS) issued by DNV GL (0575), Norway.
- Production Quality System (Module D) certificate No. P 112 issued by Telefication, The Netherlands.

This declaration is issued according to the Directive 2014/90/EU of the European Parliament and of the Council on marine equipment, and the Implementing Regulation (EU) 2018/773.

On behalf of Furuno Electric Co., Ltd.

Nishinomiya City, Japan
August 24, 2018
(Place and date of issue)

Yoshitaka Shogaki
Department General Manager
Quality Assurance Department
(name and signature or equivalent marking of authorized person)