Matsutec®

MARINE GPS/SBAS NAVIGATOR

HP-33

SAFETY INSTRUCTIONS

Safety instructions for the Operator

WARNING

Do not open the equipment.

Only qualified personnel should work inside the equipment.

Do not disassemble or modify the equipment.

Fire,electrical shock or serious injury can result.

Immediately turn off the power at the switchboard if the equipment is emitting smoke or fire.

Continued use of the equipment can cause fire or electrical shock.Contact a Matsutec agent for service.

Use the proper fuse.

Use of a wrong fuse can damage the equipment or cause fire.

WARNING

Be sure the power supply is compatible with the equipment.

Incorrect power supply may cause the equipment to overheat.

The useable temperature range for the antenna unit is -25℃ to 70℃; -15℃ to 55℃ for the display unit.

Use of the equipment out of those ranges may damage the equipment.

Safety Instructions for the Installer

WARNING

Do not open the cover unless totally familiar with electrical circuits and service manual.

Improper handling can result in electrical shock.

Turn off the power at the switchboard before beginning the installation.

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

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

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

Use the proper fuse.

Use of a wrong fuse can damage the equipment or cause fire.

NOTICE

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

	Standard compass	Steering compass
Display unit	0.80 m	0.55 m

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FOREWORD

A Word to the Owner of the HP-33

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

For over 10 years Matsutec has enjoyed an enviable reputation for innovative and dependable marine electronics is furthered by our extensive global network of agents and dealers.

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

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

Thank you for considering and purchasing Matsutec equipment.

Features

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

- High-resolution color LCD,4.3"sunlight viewable color LCD GoTo track navigation
- WAAS capability
- Storage for 10,000 waypoints, 100 routes and 3,000 track points
- Alarms: Arrival/Anchor, XTE (Cross-track Error), Trip, Odometer, Time, WAAS and Speed
- Man overboard feature records position at time of man overboard and provides continuous updates of range and bearing when navigating to the MOB position.
- Unique Highway display provides a graphic presentation of boat's progress toward a waypoint.
- User-programmable nav data displays provide analog and digital navigation data.
- Navigation data output to the autopilot when connecting.
- Waypoint and route data can be uploaded from a PC and downloaded to a PC.

SYSTEM CONFIGURATION

Antenna Unit
HA-017

NMEA0183 devices

Radar
Video Plotter
Echo Sounder
Autopilot
Instruments
etc

Display Unit
HP-33

888 ○

12-24VDC
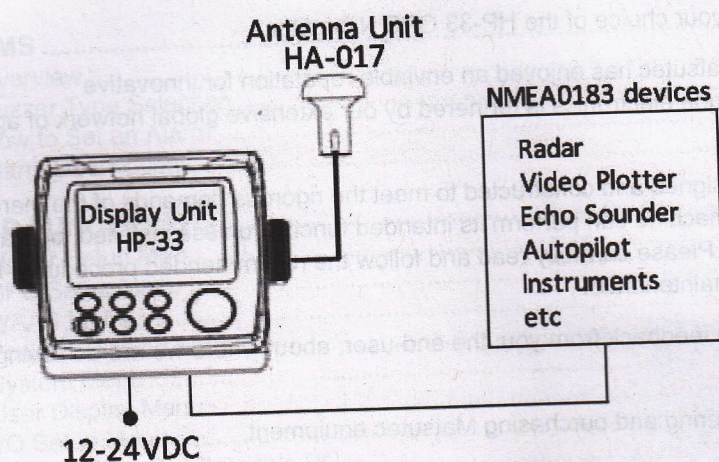
1. OPERATIONAL OVERVIEW

1.1 Controls

Key	Description
DISP	Selects display mode.
GO TO	Sets destination.
MENU ZOOM	-Opens the Menu. (plotter and highway displays: twice, others: once) -Shows the zoom window (plotter and highway displays only).
(Cursorpad)	-Shifts the cursor.(up, down, left, right) -Selects item on menus.
BRILL	-Long press: Turns power off.(3 seconds) -Momentary press: Turns power on./Shows Brill window.
WPT MOB	-Long press: Inscribes MOB mark. -Momentary press: Registers own boat position as MOB position.
ENT	-Long press: Returns own boat position to center (plotter display only). -Momentary press: Confirms selection on menus.

How to detach the hard cover from the unit

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

Notes: If you don't use the GPS navigator for long period, pls keep cover the screen to avoid screen damage.
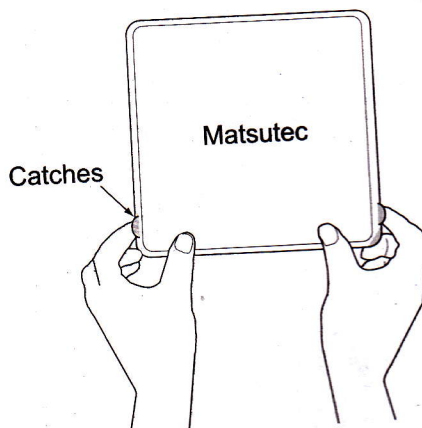
1.2 How to Turn Power On/Off

1. Press the ⏻/**BRILL** key to turn on the power. The unit beeps and then starts up with the last-used display mode. Your equipment takes about 60 seconds to find its position. The equipment shows receiver status indication at the top left-hand corner in most display modes. Below shows these indications and their meanings.

Status indications

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

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

2. To turn off the power, press and hold down the ⏻/**BRILL** key for three seconds. The time remaining until the power is turned off is counted down on the display. The display will display the time count back words from 3 seconds to 1 seconds and then power off.

1.3   How to Adjust LCD and Key Panel Brilliance

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

```
Brill

LCD  ◀ Min        Max  ▶
4    ████████▉
KEY  ▼ Min        Max  ▲
3    ██████▉
```
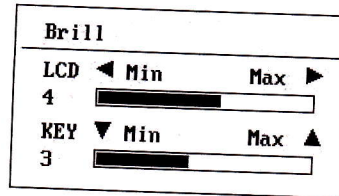
2.   To adjust the LCD brilliance, press ⏻ /**BRILL** key.
     The setting changes "0→1→…→7→6…0→1…" continuously. Maximum setting
     is 7. You can use also the cursorpad (◀, ▶) to adjust the brilliance.
3.   To adjust the panel brilliance, press the cursorpad (▲, ▼, max: 7).
4.   Press **ENT** or **MENU/ZOOM** key. to choose and return back other menu.

1.4   Display Modes

The unit has seven display modes: Plotter Display, Highway Display, Steering Display, Nav Data Display, Satellite Monitor Display and User Display 1/2. Press the **DISP** key to select a display mode. Each time the key is pressed, the display mode will change in sequence shown below. To step through the displays in a reverse order, press the **DISP** key more than three seconds.
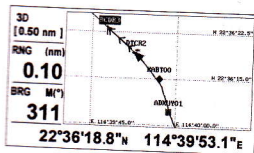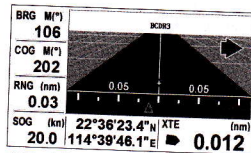
[1]: Plotter display → [2]: Highway display → [3]: Steering display → [4]: Nav Data display → [5]: Satellite Monitor display → [6]: User display 1 → [7]: User display 2 → [1]: Plotter display
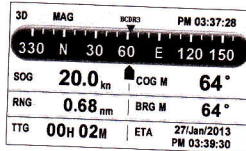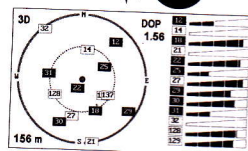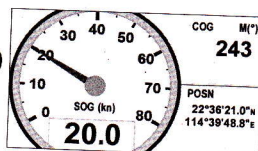
Plotter Display

The plotter display can trace own boat¡¯s track, please see below picture.

Cursor position
(When cursor is not displayed,it will display own boat's position.)
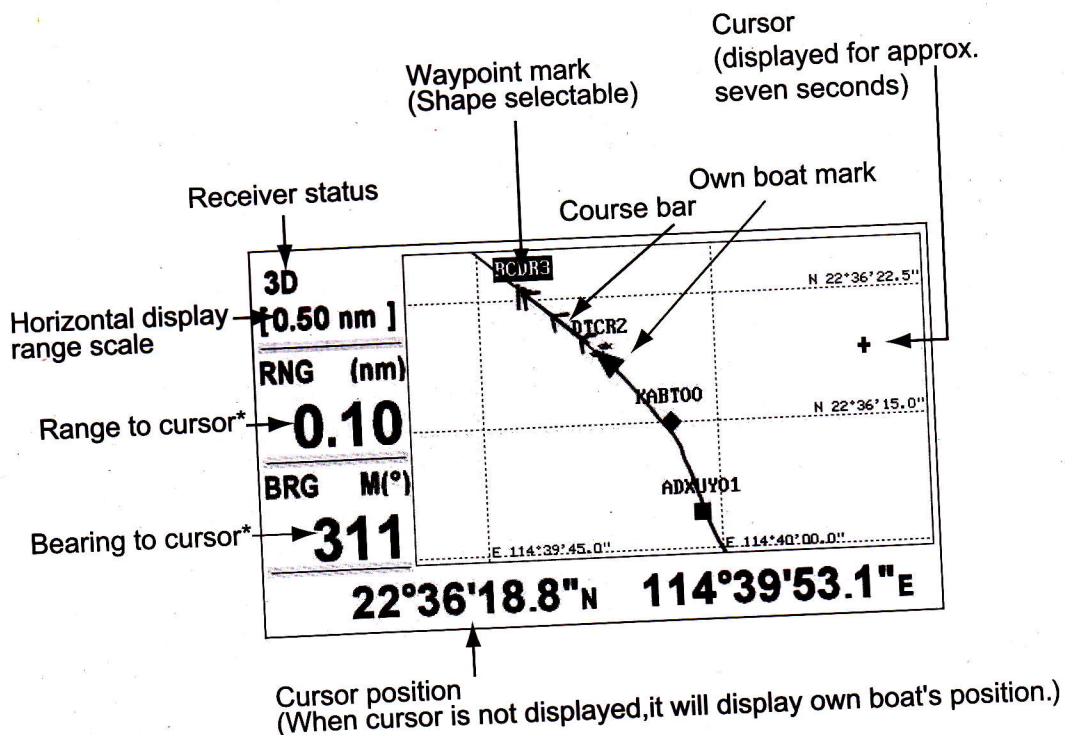
*:COG and SOG replace bearing to cursor and
range to cursor when the cursor is not displayed.

Highway Display

The highway display provides a 3-D view of own boat toward the destination.

XTE (Cross-track error) scale and arrow mark
Arrow shifts with boat's XTE. When the arrow is aligned with the center line the boat is on course. The arrow blinks if boat's XTE is greater than XTE scale range.

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

Direction to steer
(to return to course)
◄ : Steer right. ► : Steer left.

Bearing from
own boat to
destination
waypoint

Destination
waypoint name

Course
over
ground

BRG M(°)		
106	BCDR3	►
COG M(°)		
► **202**		
RNG (nm)	0.05 0.05	
► **0.03**		
SOG (kn)	22°36'23.4"N	XTE (nm)
20.0	114°39'46.1"E	► **0.012**

Speed
over
ground

Current
position

Digital XTE indication
(in nautical miles)

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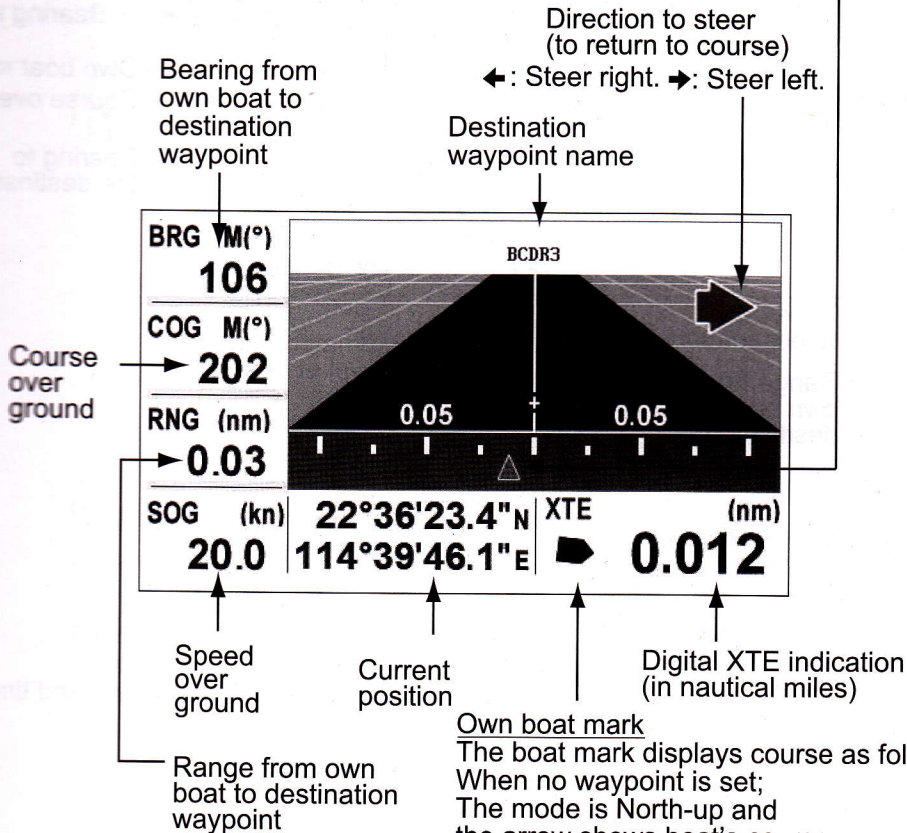
Own boat mark
The boat mark displays course as follows:
When no waypoint is set;
The mode is North-up and
the arrow shows boat's course.
When a waypoint is set;
The arrow shows boat's
course towards destination.

Steering Display

The steering display provides steering information as below.

Speed over ground
Receiver status
Bearing reference; MAG(netic) or TRUE
Time

3D	MAG	BCDR3	PM 03:37:28

Bearing destination

330 N 30 60 E 120 150

Bearing scale

Own boat mark
Course over ground

SOG 20.0 kn | COG M 64°

Bearing to the destination

RNG 0.68 nm | BRG M 64°

TTG 00H 02M | ETA 27/Jan/2013 PM 03:39:30

Time-To-Go to destination

Estimated Time of Arrival at destination

Range from own boat to destination

Nav Data Display

Display receiver status

3D	27/Jan/2013	PM 03:38:22

Date and time

22°36'12.7"N
114°39'25.8"E

Position in latitude and longitude

SOG 20.0 kn | COG M 64°

Course over ground

Speed over ground
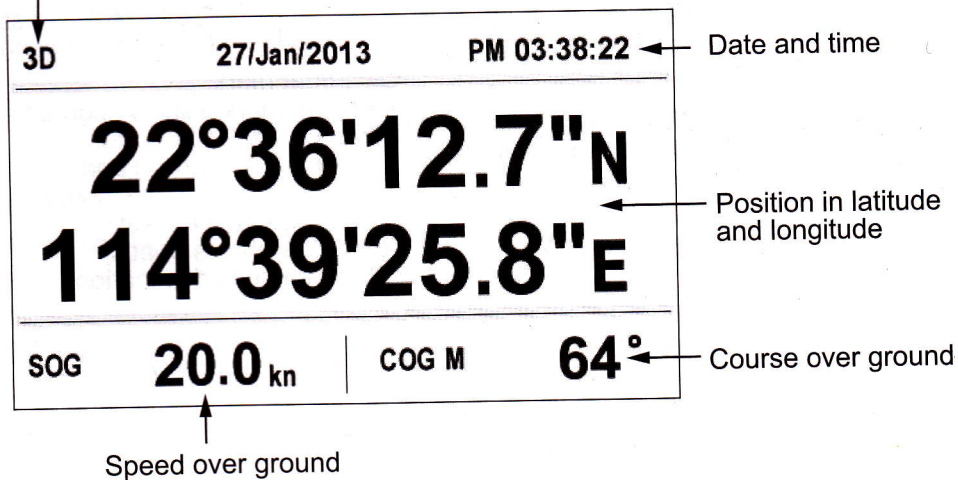
Satellite Monitor Display

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

Elevation 45°

Receiver status

DOP value

3D

DOP 1.56

Receiver signal level
Bars show signal level. Satellites whose signal level are high are used in fixing position.

156 m

Altitude

Area not used for positioning (set at menu)

Elevation 5°

Satellite numbers in reverse video are used for positioning.
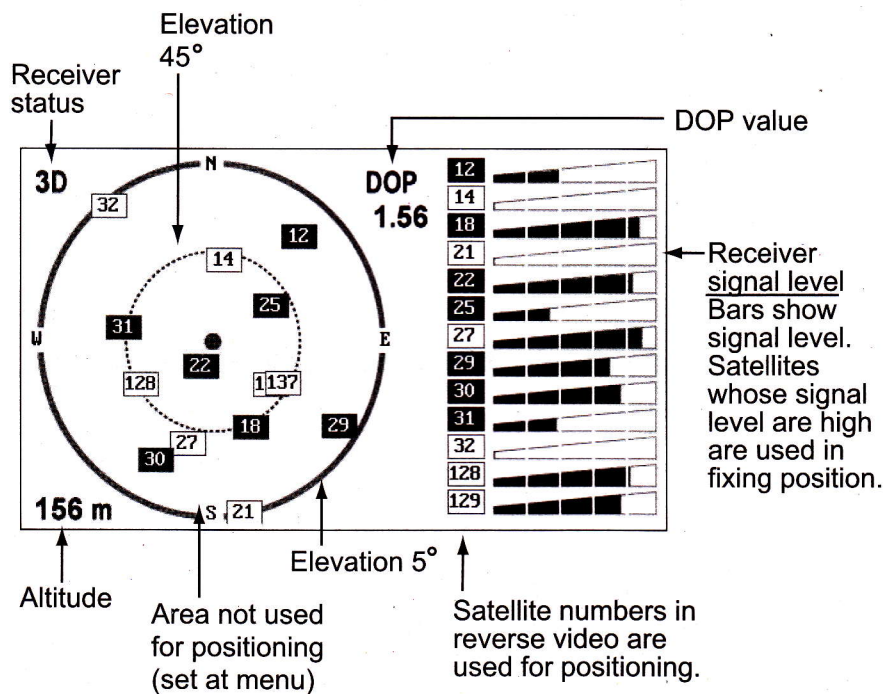
User Display 1, User Display 2

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

- Speedometer display
  The speedometer display provides both digital and analog displays of speed over ground.

- COG display
  The COG display shows both analog course over ground, and digital speed over ground.

Sample digital display (four cells)
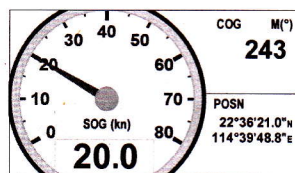
Speedometer display (default: User display 1)
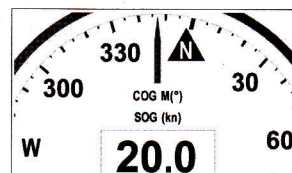
COG display (default: User display 2)

1.5   Menu Overview

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

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

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

```
Menu
─────────────────────────────────────────
Ship To Center *
Tracks
Wayponits
Routes
Plotter Setup
Alarms
Messages
Delete
GPS Setup
WAAS
─────────────────────────────────────────
[MENU/ZOOM]:Cancel/Back   [ENT]:Enter        ▲/▼ :Select
```

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

2.   You can Press ▲ or ▼ to select an item, and press the **ENT** key.

3.   Press **ENT** .
For example, select [Plotter Setup] and press the **ENT** key.

```
Menu >Plotter Setup
─────────────────────────────────────────
Auto Waypoint Entry(COG)  : Off          60 °      10 s
COG Line                  : On
COG/BRG ref.              : Mag
Magnetic Variation        : Auto         W 3 °
WP Name                   : Disp Goto
TTG/ETA SPD               : Auto         60 s
```

4.   Press ▲ or ▼ to select option desired.
For example, select [COG/BRG ref.]

5.   Press the **ENT** key .
A window shows the options for the item selected.

```
Mag
True
```

6.   Press ▲ or ▼ to select option desired.

7.   Press the **ENT** key .

8.   Press the **MENU/ZOOM** key twice to close the menu and return back to main menu.

How to enter alphanumeric data

Some menu operations require you to enter alphanumeric data (A to Z, 0 to 9) and symbols (&, _, #,' , -, > and space). The procedure which follows shows how to enter alphanumeric data. For example, to change the waypoint name "WP0008" to "CNSZ", do the follows:

Cursor → | ▲ ▼ WP0000 |

1) Press ▲ or ▼ to select "C".

2) Press ▶, and press ▲ or ▼ to select "N".

3) Press ▶, and press ▲ or ▼ to select "S".

4) Press ▶, and press ▲ or ▼ to select "Z".

5) Press ▶, and press ▲ or ▼ to select " "(space).

6) Press ▶, and press ▲ or ▼ to select " " (space).

7) Press the **ENT** key.

1.6 How to Enter the MOB Mark

Please be noted, only one MOB mark is displayed.
Each time the MOB mark is entered the previous MOB mark and its position data are overwritten.

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

| Goto MOB ? |
| Yes   No |
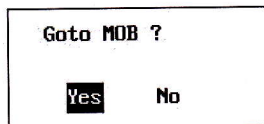
2. To set MOB position as destination, press [Yes] to choose and press the **ENT** key. MOB mark ("M") appears and a blue line is drawn between own boat mark and the MOB mark. This line shows the shortest course to go to the MOB position, and arrows on the line show the direction to the MOB position.

Shortest course from own
boat to MOB position (blue)

MOB mark
(red)

3D
[0.50 nm]

RNG (nm)

0.15

BRG M(°)

203

N 22°36'22.5"

N 22°36'15.0"

N 22°36'07.5"

114°39'00.0"   E 114°39'15.0"   E 114°3

22°36'17.9"N   114°39'16.6"E

Bearing from own boat to MOB position

Range from own boat to MOB position
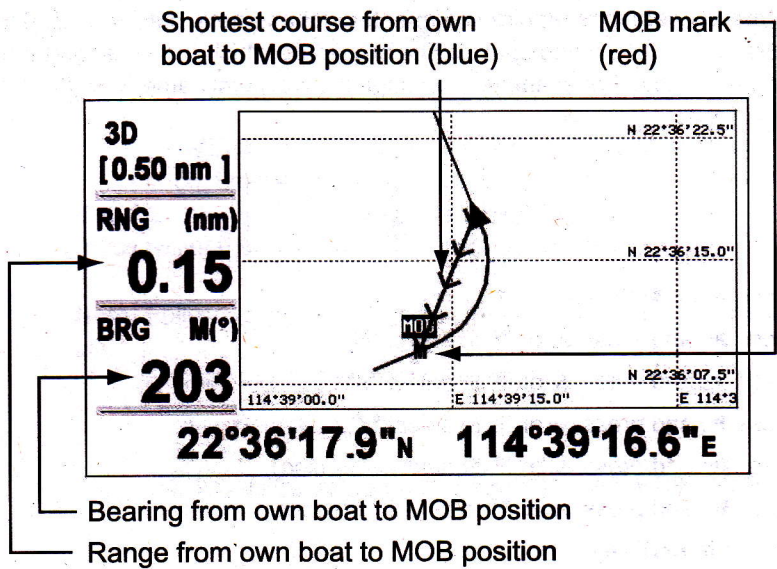
2. PLOTTER DISPLAY OVERVIEW

2.1 How to Select the Display Range

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

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

```
        ▲                    ▲
   0.50  nm             0.2  nm
        ▼                    ▼
  (0.02~320 nm)        (0.2~16 nm)
```

(Plotter display)   (Highway display)

2. Press ▲ or ▼ to select range you want.

3. Press the ENT key to choose and press MENU/ZOOM key to return back main menu display.

2.2 How to Shift the Cursor

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

Cursor state and position indication

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

Cursor at rest

When the cursor is not shown, boat's position of longitude and latitude will appear at the bottom of the display.

COG (course over ground) • SOG (speed over ground) • COG line • Own boat • Own boat's position latitude and longitude

Cursor state and position indication

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

If there is no operation for about seven seconds, the cursor disappears.
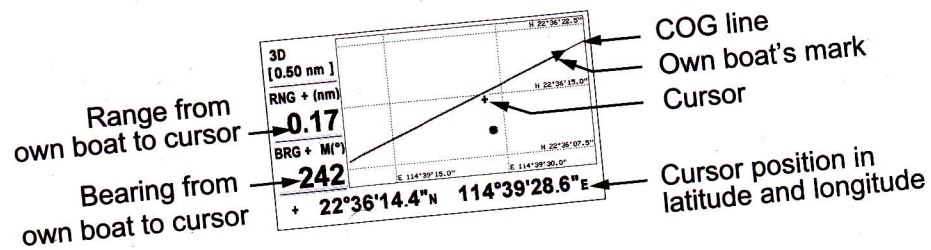
2.3 How to Shift the Display

The display can be shifted on the plotter display.

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

Centering own boat's position

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

2.4 How to Change The Track Plotting Interval, Stop Recording

To trace the boat's track, the boat's position is stored into the memory at an interval of distance or according to display range. For example, a shorter interval provides better reconstruction of the track, but the storage time of the track is shorten. When the track memory becomes full, the oldest track is erased to make space for the latest. You can Choose the [Tracks] on the menu to check the current percent of the memory used.

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

```
Menu >Tracks

Rec            : Distance    0.01 nm
Color          : Purple
Delete         : By Color

Track Memory Used 3%




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

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

```
Off
Distance
Auto
```

4. Select [Off], [Distance] or [Auto], and press the **ENT** key.
   Off: Track is not recorded. This setting is useful when you do not need to record track.
   Distance: Track is recorded and plotted at the distance interval set.
   Auto: Plotting and recording interval changes with display range selected.

5. For [Off] or [Auto], go to step 6. For [Distance], enter the recording interval as follows:

   1) Press ▶.
   2) Press **ENT** key.

```
▲
0.02 km
▼
```

   3) Use the cursorpad to enter the interval, and press the **ENT** key.
      For entering the numeric data, see page 1-9.

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

2.5   How to Change The Track Color

You can select the color for the tracks, there are 7 colors for choose, red, yellow, green, blue, purple, black and brown. It is useful to change the color to distinguish tracks at different times of a day, for example.

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

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

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

```
Red
Yellow
Green
Blue
Purple
Black
Brown
```

4. Select the color to use for the track, and press the **ENT** key.

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

2.6   How to Erase Track

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

2.6.1   How to erase track by color

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

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

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

```
All
By Color
```

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

```
Red
Yellow
Green
Blue
Purple
Black
Brown
```

5. Select the track color to erase, and press the **ENT** key.

```
Delete  all tracks by
color in Blue.

Are you sure ?
Yes        No
```

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

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

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

2.6.2   How to erase all tracks

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

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

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

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

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

5.   Press ◀ to select [Yes], and press the **ENT key to erase all tracks.**
     [Track Memory Used] on the Tracks menu shows "0%".

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

3. WAYPOINTS

3.1 How to Enter Waypoints

In navigation terminology a waypoint is a particular location on a voyage, whether it be a starting, intermediate or destination waypoint. Your unit can store 10,000 way-points. Waypoints can be entered on the plotter display by 4 conditions: at cursor position, at own boat's position, through the waypoints list and at the MOB position. Also, waypoints can be entered automatically when your boat changes course prominently.

3.1.1 How to enter a waypoint with the cursor

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

3.1.2 How to enter a waypoint at own boat position

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

3.1.3 How to enter a waypoint through the list

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

Alpha
Local

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

Menu >Waypoints >Waypoint List				
Name	Symbol	Color	RNG(km)	BRG(°)
[New]				
WP0003	●	Green	1.06	271
WP0002	●	Green	0.13	31
WP0001	●	Green	0.65	152
WP0000	●	Green	0.56	163
KABT00	◆	Purple	0.15	29
DTCR2	⬧	Blue	0.26	349
G BCDR3	▶	Red	0.41	333
ADXUY01	■	Green	0.13	108
[MENU/ZOOM]:Cancel/Back	[ENT]:Enter			▲/▼ :Select

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

```
Menu >Wayponits >Waypoint List >Waypoint Info.

Name          : JP0001
Symbol        : ⚐
Color         : ■ Red
Lat           :  22°35'52.2"N
Lon           : 114°40'05.3"E
Comment       : 08:25 26Dec12
RNG (km)      :  0.65
BRG (°)       : 152


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

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

Name: The update unused waypoint number.

Lat, Lon: Current own boat position

Comment: Current date/time

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

Cursor → ▲ JP0001 ▼
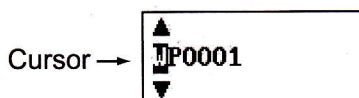
6. Press the cursorpad to change the waypoint name (max. 8 characters).

7. To change the mark shape, select [Symbol] and press the **ENT** key.
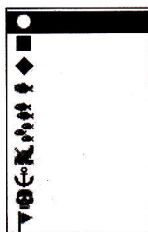
8. Select a mark desired, and press the **ENT** key.

9. To change the mark color, select [Color], and press the **ENT** key.

```
Red
Yellow
Green
Blue
Purple
Black
Brown
```

10. Select a color desired, and press the **ENT** key.

11. To change the position, do as follows:

   1) Select [Lat], and press the **ENT** key.

   2) Enter latitude, and press the **ENT** key.

   3) Press ▼ to select [Lon], and press the **ENT** key.

   4) Enter longitude, and press the **ENT** key.

12. To change the comment, select [Comment] and press the **ENT** key.

13. Enter the comment, and press the **ENT** key.

14. Press the **MENU/ZOOM** key to register the new waypoint into the list.

15. To register other waypoints, repeat steps 4 through 14.

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

3.1.4   How to enter waypoints automatically

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

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

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

```
Menu >Plotter Setup

Auto Waypoint Entry(COG)  : On        60 °    10 s
COG Line                  : On
COG/BRG ref.              : Mag
Magnetic Variation        : Auto      W 3 °
WP Name                   : Disp Goto
TTG/ETA SPD               : Auto      30 s




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

3. Select [Auto Waypoint Entry (COG)], and press the **ENT** key.

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

5. Press ▶ to select the degree setting, and press the **ENT** key.

6. Enter the degree, and press the **ENT** key (setting range: 15 to 150°).

7. Press ▶ to select the seconds setting, and press the **ENT** key.

8. Enter the seconds, and press the **ENT** key (setting range: 1 to 60 seconds).

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

3.2   How to Display Waypoint Name

You can display waypoint names as follows:

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

```
Menu >Plotter Setup

Auto Waypoint Entry(COG)  : Off        60 °    10 s
COG Line                  : On
COG/BRG ref.              : Mag
Magnetic Variation        : Auto       W 3 °
WP Name                   : Disp Goto
TTG/ETA SPD               : Auto       30 s



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

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

```
Disp Goto
Disp All
Disp Route
```

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

3.3   How to Edit Waypoints

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

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

3.3.1   How to edit waypoints on the plotter display

1. Press the cursorpad to place the cursor on the waypoint to edit.
2. Press the **ENT** key to show the below window.
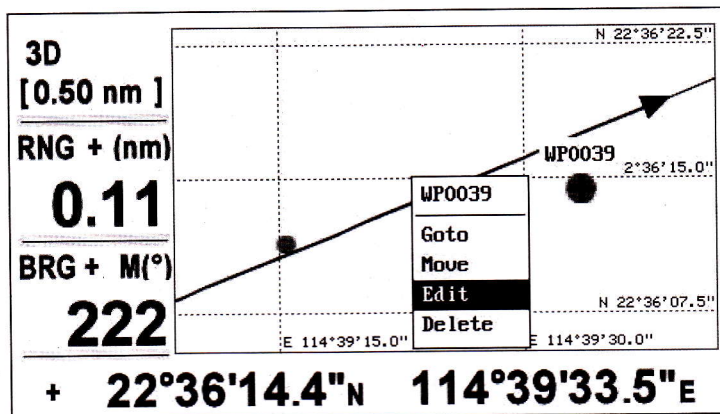
3. Select [Edit], and press the **ENT** key to show the waypoint information.
4. Edit the waypoint (see the paragraph 3.1.3).
5. Press the **MENU/ZOOM** key to return to the plotter display.

3.3.2   How to edit waypoints through the list

1. Press the **MENU/ZOOM** key twice to show the main menu.
2. Select [Waypoints], and press the **ENT** key.
3. Select [Alpha] or [Local], and press the **ENT** key.
    Alpha: The list shows waypoints in alpha order.
    Local: The list shows waypoints order the nearest to the furthest.
4. Select the waypoint to edit, and press the **ENT** key to show the below window.
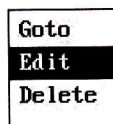
5. Select [Edit], and press the **ENT** key to show the waypoint information.
6. Edit the waypoint data (see the paragraph 3.1.3).
7. Press the **MENU/ZOOM** key several times to close the menu.

3.4 How to Move Waypoints

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

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

```
WP0006
Goto
Move
Edit
Delete
```

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

3.5 How to Erase Waypoints

You can erase each or all waypoint(s).

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

3.5.1 How to erase a waypoint on the plotter display

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

```
WP0004
Goto
Move
Edit
Delete
```
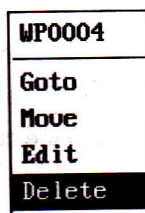
3. Select [Delete], and press the **ENT** key.

3.5.2 How to erase a waypoint through the waypoint list

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

```
Goto
Edit
Delete
```

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

3.5.3 How to erase all waypoints

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

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

```
Menu >Delete

All Waypoints      : Off
All Routes         : Off
```

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

```
Off
Delete
```

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

```
Delete  all waypoints.
Are you sure ?
    Yes       No
```

When no waypoint is set as destination

```
Waypoint is set as a destination.
Are you sure to delete all waypoints ?
    Yes            No
```

When a waypoint is set as destination

5. Select [Yes], and press the **ENT** key to erase all waypoints.
   Note: To cancel, select [No].

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

4. ROUTES

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

4.1 How to Create a New Routes

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

Waypoint
(Intermediate point)

Waypoint
(Arrival point)

Waypoint
(Intermediate point)

Waypoint
(Starting point)

Waypoint
(Intermediate point)

Sample route

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

```
Menu >Routes >Route List

  Name        Comment              TLEG(km)    Number
  [New]



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

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

```
Menu >Routes >Route List >Route Info.

Name : RT0001              Total LEG  0.00 km   0Points
Cmnt :            ->        LEG (km)            BRG (°)
     1 ___                     ___                 ___




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

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

```
▲
RT0001
▼
```

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

7. Press ▼ then **ENT** key.

```
▲
▌            ->
▼
```

8. Operate the cursorpad to enter the comment (maximum: 18 characters).

9. Press ▼ to move the cursor to [1], and press the **ENT** key.

```
Change
Add
Skip
Delete
```

10. Confirm that [Add] is chosen, and press the **ENT** key.

11. Select [Alpha] or [Local], and press the **ENT** key to show the waypoint list.

12. Select the waypoint to add to the route, and press the **ENT** key.
    The chosen waypoint (as the starting point) is registered to [1].

13. Press ▼ to select [2], and press the **ENT** key.

14. Repeat steps 10 through 13 to complete the route.

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

## 4.2 How to Edit Routes

You can edit the route created.

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

4.2.1 How to replace a waypoint in a route

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

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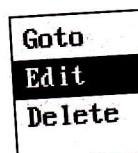
5. Select [Edit], and press the **ENT** key to show the route list.
6. Select the waypoint to replace, and press the **ENT** key.

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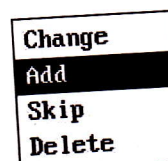
7. Select [Change], and press the **ENT** key.
8. Select [Alpha] or [Local], and press the **ENT** key to show the waypoint list.
9. Select the new waypoint, and press the **ENT** key.
10. Press the **MENU/ZOOM** key several times to close the menu.

4.2.2 How to delete a waypoint from a route

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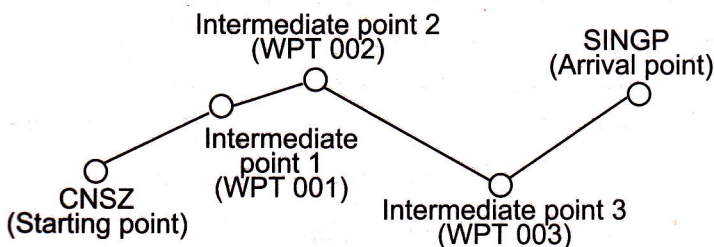8. Press the **MENU/ZOOM** key several times to close the menu.

4.2.3 How to insert a waypoint in a route
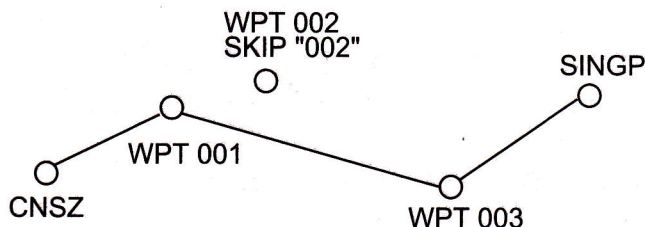
To insert a waypoint in a route, do the following:

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

4.2.4 How to temporarily deselect a waypoint in a route

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

Intermediate point 2
(WPT 002)

SINGP
(Arrival point)

Intermediate
point 1
(WPT 001)

CNSZ
(Starting point)

Intermediate point 3
(WPT 003)

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

WPT 002
SKIP "002"

SINGP

WPT 001

CNSZ

WPT 003

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

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

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

4.3 How to Erase a Route

You can erase routes individually or collectively.

4.3.1 How to erase a route through the route list

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

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

4.3.2 How to erase all routes

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

```
Delete  all routes,
Are you sure ?
     Yes      No
```
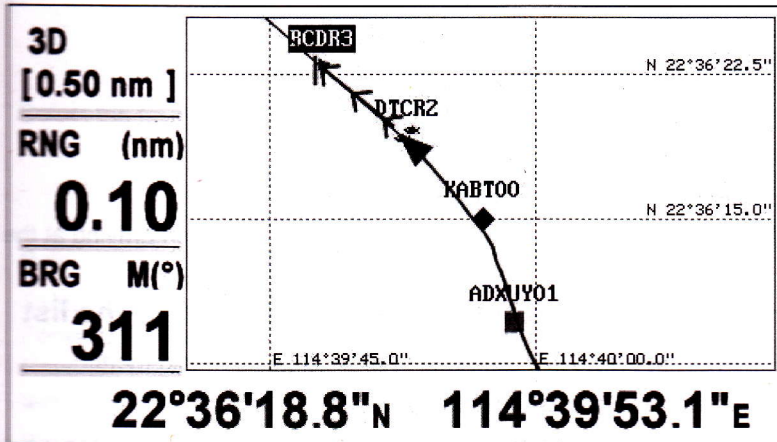*When no route is set as destination*

```
Route is set as destination.
Are you sure to delete all routes ?
     Yes              No
```
When a route is set as destination

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

5. DESTINATION

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

```
3D                    BCDR3
[0.50 nm ]                              N 22°36'22.5"
                        DTCR2
RNG    (nm)
                           KABTOO
0.10                               N 22°36'15.0"

BRG    M(°)                ADXUY01
311
              E 114°39'45.0"    E 114°40'00.0"
      22°36'18.8"N   114°39'53.1"E
```

5.1   How to Set Destination by Cursor Position

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

1. On the plotter display, operate the cursorpad to place the cursor on the location desired for destination.

2. Press the **GO TO** key to enter the waypoint as the quick point.
   The quick waypoint is shown with a green solid circle, and named as "QP". This point is saved in the waypoint list automatically.

3. Cancel the destination, referring to section 5.4, when arriving at the waypoint.

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

5.2　How to Set Destination by Waypoint

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

5.2.1　How to set a destination waypoint with the cursor

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

2. Press the **ENT** key.

```
WP0037
Goto
Move
Edit
Delete
```

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

4. Cancel the destination referring to section 5.4 when arriving at the waypoint.

5.2.2　How to set a destination waypoint through the list

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

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

3. Select [Alpha] or [Local], and press the **ENT** key to show the waypoint list.

```
Menu >Wayponits >Waypoint List
```

Name	Symbol	Color	RNG(km)	BRG(°)
WP0004	●	■Green	0.58	144
WP0003	●	■Green	103.7	270
WP0002	●	■Green	0.26	99
G WP0001	▷	Red	0.88	146
WP0000	●	■Green	0.77	153
KABT00	◆	■Purple	0.26	95
DTCR2	≼	■Blue	0.17	52
BCDR3	■	■Red	0.22	360
ADXUY01	■	■Green	0.36	122

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

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

```
Goto
Edit
Delete
```

5. Select [Goto], and press the **ENT** key to show the plotter display.

6. Cancel the destination referring to section 5.4 when arriving at the waypoint.

5.3　How to Set Route as Destination

You can set a route as destination through the list.

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

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

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

```
Menu >Routes >Route List

  Name        Comment           TLEG(km)    Number
   [New]
G RT0000    :  ADXUY01 ->WP0003     104.2        5




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

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

```
Goto
Edit
Delete
```

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

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

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

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

5.4 How to Cancel Destination

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

5.4.1 How to cancel destination with the cursor

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

2. Press the **ENT** key.

```
WP0027
Move
Cancel Goto
Edit
Delete
```

```
QP
Move
Cancel Goto
Edit
Delete
```

```
WP0030
Move
Skip
Cancel Route
Edit
```

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

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

```
Cancel Goto.
Are you sure ?
Yes   No
```

```
Cancel Route Navigation.
Are you sure ?
Yes   No
```

(for waypoint destination)   (for route navigation)

4. Chose [Yes], and press the **ENT** key.
   To cancel, select [No].

5.4.2 How to cancel destination through the list

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

Menu >Wayponits >Waypoint List				
Name	Symbol	Color	RNG(km)	BRG(°)
R WP0003	●	Green	102.5	270
WP0002	○	Green	1.48	78
WP0001	●	Red	1.72	102
WP0000	●	Green	1.58	102
QP	●	Green	0.21	239
R KABT00	■	Purple	1.48	77
R DTCR2	⚓	Blue	1.40	71
R BCDR3	◆	Red	1.32	64
G ADXUY01	▶	Red	1.51	84

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

```
...el Goto
```

```
Cancel Route
Edit
Delete
```

(for route navigation)
...he **ENT** key.

```
...cel Route Navigation.
...u sure ?
        No
```

...e navigation)

4. ...e current route
   ...oute destination

5. Sele...
6. Canc... list.

5.3 How to S...

You can set a ra...

1. Press the **MEN**...
2. Select [Route]...

...the cursor on the waypoint

...o close the menu.

5-3

6. ALARMS

6.1 Overview

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

When an alarm setting is violated, the buzzer sounds and the name of the offending alarm and the alarm icon appear on the display (alarms other than Speed Based Output).
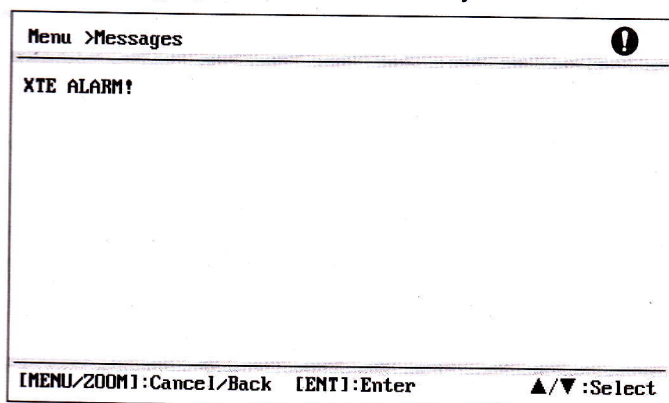
You can silence the buzzer and remove the alarm name indication by pressing any key. The alarm icon remains on the screen until the reason for the alarm is cleared.
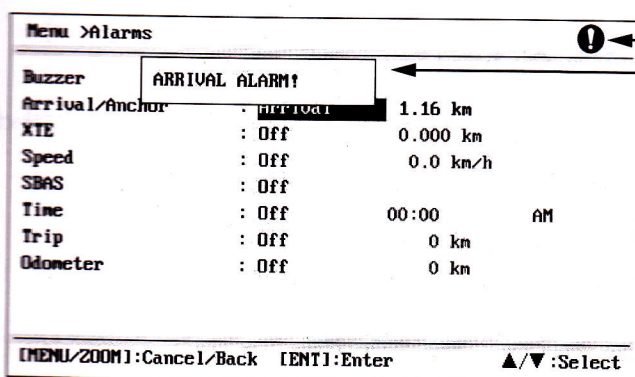
```
Menu >Alarms                                    ❶  ◄───── Alarm icon (flashing)
                                                   ┌──── Alarm message
Buzzer          ┌─ ARRIVAL ALARM!         ◄───────┘
Arrival/Anchor  │       : Arrival      1.16 km
XTE             │       : Off          0.000 km
Speed                   : Off            0.0 km/h
SBAS                    : Off
Time                    : Off         00:00        AM
Trip                    : Off             0 km
Odometer                : Off             0 km


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

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

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

```
Menu >Messages                                    ❶

XTE ALARM!








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

Example alarm message

The display shows the names of offending alarms.

Message and meanings

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

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

6.2   Buzzer Type Selection

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

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

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

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

```
Short
Long
Continuous
```
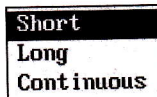
4.   Select buzzer type, and press the **ENT** key.
      Short: A short beep sounds.
      Long: Three long beeps sound.
      Continuous: Continuous long beeps sound until a key is pressed.

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

6.3   How to Set an Alarm

Set alarms as below:

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

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

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

```
Menu >Alarms

Buzzer           : Long
Arrival/Anchor   : Arrival      0.50 km
XTE              : On           0.010 km
Speed            : Off          0.0 km/h
SBAS             : Off
Time             : Off        00:00        AM
Trip             : Off            0 km
Odometer         : Off            0 km


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

3. Select an alarm item, and press the **ENT** key.

4. Do one of the following:

   (Arrival/Anchor)

   1) Select [Arrival] or [Anchor], and press the **ENT** key.

   2) Press ▶ and **ENT** key.

   3) Enter the alarm area, and press the **ENT** key.

   (XTE, Speed, Trip and Odometer)

   1) Select [On], and press the **ENT** key.

   2) Press ▶ and **ENT** key.

   3) Enter the value, and press the **ENT** key.

   (WAAS)
   Select [On], and press the **ENT** key.
   (Time)

   1) Select [On], and press the **ENT** key.

   2) Press ▶ and **ENT** key in order.

   3) Enter the time, and press the **ENT** key.

   4) For 12-hour clock, press ▶ and **ENT** key.

   5) Select [AM] or [PM], and press the **ENT** key.

   (Speed Based Output)

   1) Select [On], and press the **ENT** key.

   2) Press ▶ and **ENT** key.

   3) Enter the speed at which to close the contact signal, and press the **ENT** key.

   4) Press ▼ and **ENT** key.

   5) Enter the speed to open the contact signal, and press the **ENT** key.

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

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

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

6.4   Alarm Descriptions

Arrival alarm

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

Alarm setting

Destination waypoint

Own boat's position

: Alarm released
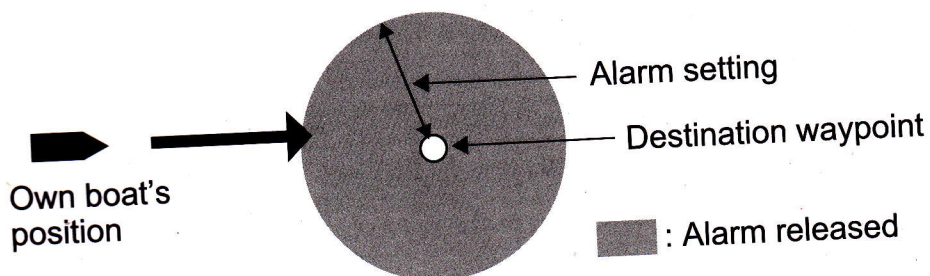
How the arrival alarm works

Anchor watch alarm

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

Alarm setting

Own boat's position

Destination waypoint

: Alarm released
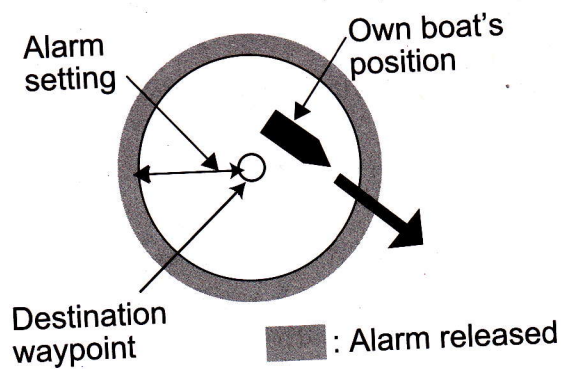
How the anchor watch alarm works

XTE (Cross-Track Error) alarm

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

How the XTE alarm works
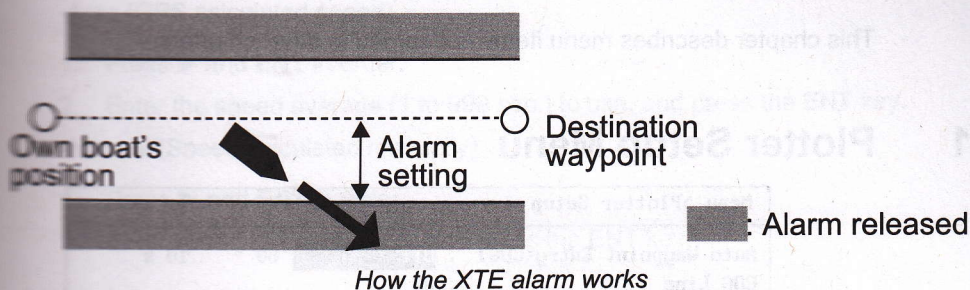
Speed alarm

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

WAAS alarm

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

Time alarm

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

Trip alarm

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

Odometer alarm

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

7. OTHER FUNCTIONS

This chapter describes menu items not carried in other chapters.

7.1 Plotter Setup Menu

```
Menu >Plotter Setup

Auto Waypoint Entry(COG)  : Off        60 °    10 s
COG Line                  : On
COG/BRG ref.              : Mag
Magnetic Variation        : Auto       W 3 °
WP Name                   : Disp Goto
TTG/ETA SPD               : Auto        30 s




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

COG Line

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

COG/BRG ref.

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

Magnetic Variation

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

To enter magnetic variation manually, do the following:

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

TTG/ETA SPD

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

Auto (GPS calculated speed)

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

Manual (Speed calculated manually)

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

7.2 GPS Setup Menu

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

```
Menu >GPS Setup

Datum             : WGS84
Navigation        : Great Circle
Smooth Position   :   0 s
Smooth S/C        :   5 s
Lat Offset        : 0.000'N
Lon Offset        : 0.000'E
SV ELV            :   5 °


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

Datum

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

Navigation

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

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

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

Smooth Position

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

Smooth S/C (speed/course)

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

Lat Offset, Lon Offset

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

SV ELV (satellite elevation)

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

7.3 SBAS Menu

```
Menu >SBAS

Mode              : SBAS
SBAS Search       : Auto              120




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

*Use "0" (as default setting).

Mode

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

SBAS Search

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

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

Manual: Enter a GEO satellite number manually.

7.4 Position Display Format

Position can be shown in latitude and longitude.

```
Menu >Pos Setup

Display     : xx'xx.x''






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

Display

Select the position format.

- xx.xxx': Shows L/L position with no seconds.
- xx'xx.x": Displays L/L position with seconds.

7.5   System Menu

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

```
Menu >System

Key Beep             : On
Language             : English
Units                : km,km/h
Time Offset          : + 8:00
Daylight Saving Time : Off
Time Display         : 12Hour
Date Display         : DD/MM/YY
Demo
Self Test
Reset

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

Key Beep

This item turns the key beep on or off.

Units

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

```
nm,kn
km,km/h
sm,mph
```

Time Offset

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

Daylight Saving Time

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

Time Display

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

Date Display

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

Demo

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

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

Reset (Trip)

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

```
Menu >System >Reset

Trip(2 nm)        : Off
GPS *             : Off
Menu Settings*    : Off
Factory Reset*    : Off




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

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

7.6 User Display Menu

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

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

```
Menu >User Display

Display 1   : Speedmeter      0-80
Display 2   : COG




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

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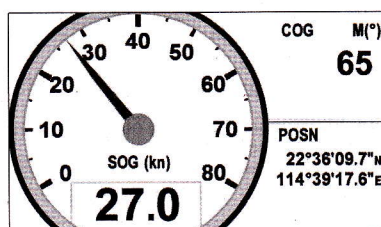
Speedometer display
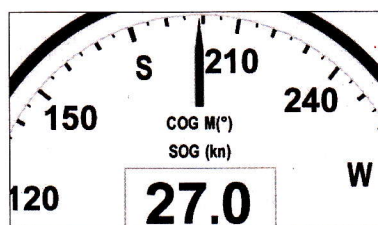
COG

Display 1, Display 2

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

```
Digital
Speedmeter
COG
Off
```

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

1. Press ▶ and **ENT** key in order to show the following window.
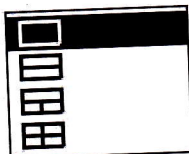
2. Select the screen division, which is the number of data to display, and press the **ENT** key.
   The display now looks something like the one shown below, showing data choices and screen division selected.

```
Menu >User Display >Display 1 >Data Select

A     : COG                        A    B     *
B     : SOG
C     : BRG                        C    D
D     : XTE




[MENU/ZOOM]:Cancel/Back   [ENT]:Enter        ▲/▼ :Select
```
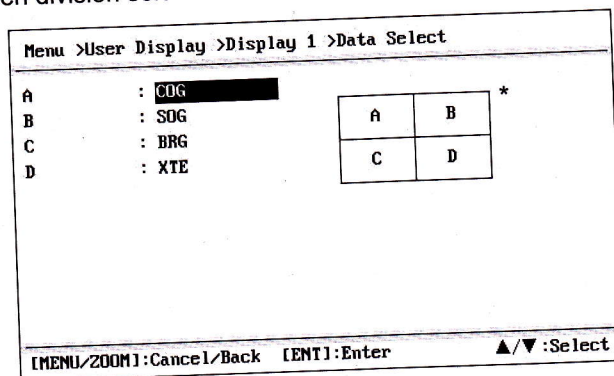
*: Depending on the selection at step 2.   ┌─┐ ┌─┐ ┌─┐
│A│ │A│ │ A │
└─┘ │B│ │B│C│
    └─┘ └───┘
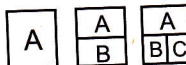
3. Select [A], [B], [C] or [D], and press the **ENT** key.
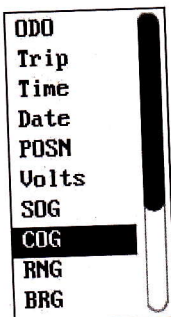
```
ODO
Trip
Time
Date
POSN
Volts
SOG
COG
RNG
BRG
```

ODO: Odometer distance
Trip: Trip distance
Time: Time
Date: Date
POSN: Position
Volts: Power voltage
SOG: Speed over ground
COG: Course over ground
RNG: Range
BRG: Bearing

XTE: Cross-track error
TTG: Time to go
    (to destination)
ETA: Estimated time to
    arrival (to destination)
WPT: Range and bearing
    to waypoint
None: No display

4. Select data desired, and press the **ENT** key.

5. Repeat steps 3 and 4 to set other data.

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

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

Cursor (displayed approx. seven seconds)
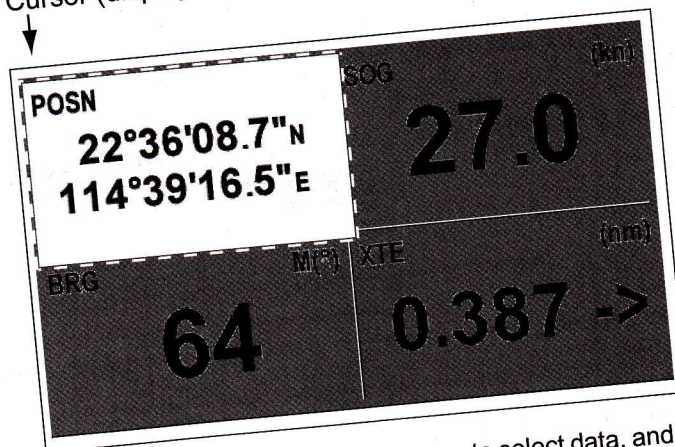
2. Operate the cursorpad to select the column to select data, and press the **ENT** key.
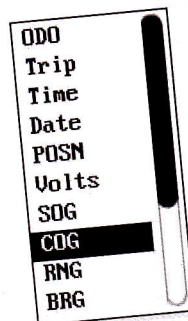
ODO: Odometer distance
Trip: Trip distance
Time: Time
Date: Date
POSN: Position
Volts: Power voltage
SOG: Speed over ground
COG: Course over ground
RNG: Range
BRG: Bearing

XTE: Cross-track error
TTG: Time to go
    (to destination)
ETA: Estimated time to
    arrival (to destination)
WPT: Range and bearing
    to waypoint
None: No display

3. Select the item to show, and press the **ENT** key.

4. Repeat steps 2 and 3 for other displays if necessary.

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

(kn, mph) (km/h)
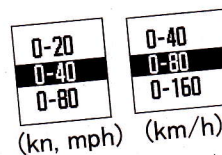
I/O Setup Menu

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

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

```
┌─────────────────────────────────────────────────────────┐
│ Menu >I/O Setup                                         │
│                                                         │
│ Data(RS232)*                  : [REM1        ]          │
│ Data(RS422)*                  : GPS                     │
│ NMEA 0183 Version*            : 2.3                     │
│ Save WPT/RTE -> PC                                      │
│ Load WPT/RTE <- PC                                      │
│ Wiring Info. NMEA 0183 *                                │
│                                                         │
│                                                         │
│                                                         │
│                                                         │
│ [MENU/ZOOM]:Cancel/Back  [ENT]:Enter      ▲/▼:Select   │
└─────────────────────────────────────────────────────────┘
```

*: See chapter 9.

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

Setting for communication software on PC

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

Waypoint data format

$PFEC, GPwpl, $\underline{\text{llll.ll}}$, $\underline{\text{a}}$, $\underline{\text{yyyyy.yy}}$, $\underline{\text{a}}$, $\underline{\text{c—c}}$, $\underline{\text{c}}$, $\underline{\text{c—c}}$, $\underline{\text{a}}$, $\underline{\text{hhmmss}}$, $\underline{\text{xx}}$, $\underline{\text{xx}}$, $\underline{\text{xxxx}}$ <CR><LF>
$\quad\quad\quad\quad\;\;$ 1 $\;\;$ 2 $\quad\;$ 3 $\quad\quad$ 4 $\;\;$ 5 $\;$ 6 $\;$ 7 $\;\;$ 8 $\quad$ 9 $\quad$ 10 $\;$ 11 $\;$ 12

1: Waypoint latitude

2: N/S

3: Waypoint longitude

4: E/W

5: Waypoint name (1 to 8 characters)

6: Waypoint color

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

7: Waypoint comment ("@_ (see below.)" + 0 to 13 characters)
-Internal mark code is 0x10 through 0x19. 0x71 through 0x7A are always place at 2nd byte of mark code.
-Following characters can be used for comments:

_ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789&()+-/=?> (space)
0x10: ● @q, 0x11: ■ @r, 0x12: ◆ @s:, 0x13: ◆◀ @t, 0x14: ⬢ @u,

0x15: ⚡ @v, 0x16: ⚓ @w, 0x17: ⚓ @x, 0x18: ♣ @y, 0x19: ⚑ @z

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

9: UTC (Always NULL)

10: Day (Always NULL)

11: Month (Always NULL)

12: Year (Always NULL)

Route data format

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

1: **Number of sentences required for one complete route data (1 to 6) See note.**
2: **Number of sentences currently used (1 to 6)**
3: **Message mode (Always set to "C".)**
4: **Route No. (1 to 100)**

5 to 12: Waypoint name (1 to 8 characters, length of each waypoint name is fixed to 7 byte)
1st byte: "-" (hyphen)= skip ON,
" " (space)= skip OFF
After 2nd byte: Waypoint name
(1 to 8 characters)

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

Route comment data format

$PFEC, GPrtc, x, c--c, c--c <CR><LF>
             1   2   3

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

End of sentence

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

7.7.1 Uploading data to a PC

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

```
Menu >I/O Setup >Save WPT/RTE -> PC


        All WPT/RTE will be saved to PC.

    Set PC port to 38400bps, 8bit, p-n, s1.

            Saving Start ?


            Yes         No

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

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

7.7.2 Downloading data from PC

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

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

```
Menu >I/O Setup >Load WPT/RTE <- PC


   Current WPT/RTE will be erased and load PC data.

   Set PC port to 38400bps, 8bit, p-n, s1.

            Loading Start ?


            Yes         No

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

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

8. MAINTENANCE, TROUBLE-SHOOTING

8.1 Maintenance

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

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

Life of LCD

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

8.2 Troubleshooting

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

Symptom	Remedy
You cannot turn on the power.	Check that power cable is firmly fastened.
	Check for damaged power cable and connector.
	Check whether the volt output is over 9V. less 9 V, can not power on.
No picture appears.	Press the ⏻ /BRILL key several times to adjust the brilliance.
There is no response when a key is pressed.	Turn off and on the power. If no change, ask your dealer.
Position is not fixed within 90 seconds.	Check that antenna connector is firmly fastened.
	Check the number of satellites on Satellite Monitor display. If there are two or less, check for obstructions between antenna unit and satellites.
Position is wrong.	Check that the correct geodetic chart system is selected on the GPS Setting screen.
	Enter position offset on the GPS Setting screen.
Bearing is wrong.	Check Magnetic Variation on the Plotter Setup screen.

Displaying the Message Board

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

Messages and meanings

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

8.4 Diagnostics

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

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

```
System Test
LCD Test
```

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

```
Menu >System >Self Test >System Test
                                      CNT : 12  ◄──── 5
1 ──► ROM      : ok
2 ──► RAM      : ok
3 ──► GPS      : ok
      CPU Main : HP33 Main VXXX (XXXXXXXX)
4 ──► CPU Boot : HP33 Boot VXXX (XXXXXXXX)

                                              ◄── Key test field

Push [MENU] 3 times to exit.
```
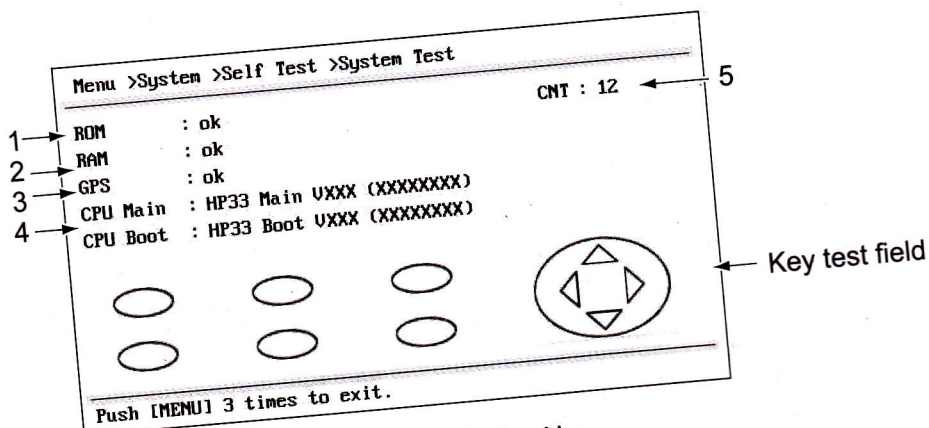
XX: Program version No.

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

5. Press each key one by one.
   The corresponded mark on the display turns red if the key is functioning properly.

6. Press the **MENU/ZOOM** key three times to close the test screen.

7. Select [LCD Test], and press the **ENT** key.
   Each press of this key changes the LCD pattern in the sequence shown below.
   Red→Red (gradation) → Green → Green (gradation)→Blue→Blue (gradation)→ White →White/Black (gradation)→Black→ return to System screen.
   Note: To cancel the test, press the **MENU/ZOOM** key.

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

8.5 Clearing Data

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

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

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

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

```
Menu >System >Reset

Trip(2 nm)        : Off
GPS               : Off
Menu Settings     : Off
Factory Reset     : Off




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

4. Select [GPS], [Menu Settings] or [Factory Reset], and press the **ENT** key.

5. Select [On], and press the **ENT** key.

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

9. INSTALLATION

9.1 Equipment Lists

Standard Supply

Name	Type	Code No.	Qty	Remarks
Main unit	HP-33	-	1	
Antenna Unit	HA-017	-	1	w/10 m cable
Installation Materials		-	1 set	
Accessories		-	1 set	

9.2 Installation of Receiver Unit

9.2.1 Installation consideration

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

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

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

9.2.2   Desktop and underside of table mount

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

3   Installation of Antenna Unit

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

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

Note 1: Do not shorten the antenna cable.

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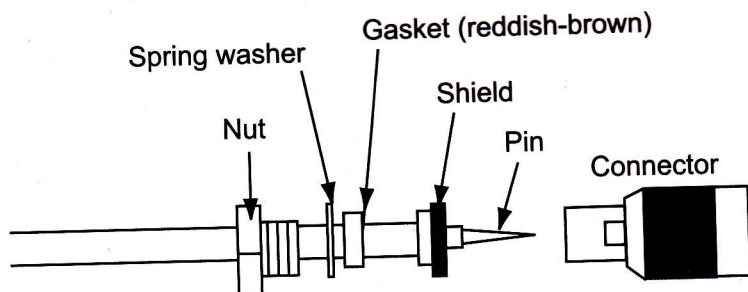
9.4 Wiring

```
Menu >I/O Setup >Wiring Info. NMEA 0183

 Pin                              Interface
 1 : TD-H ─────────────────── Y ┐
 2 : TD-C ─────────────────── Z ┘ RS422
 3 : SD  ─────────────────── RXD ┐
 4 : RD  ─────────────────── TXD │ RS232
 5 : SG  ─────────────────── GND ┘

[MENU/ZOOM]:Cancel/Back  [ENT]:Enter      ▲/▼:Select
```
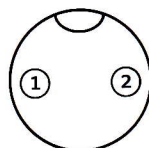
Power
DC12V-24V

① WHITE(+)
② BLACK(-)
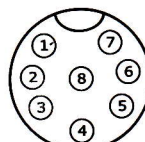
NMEA
DATA PORT
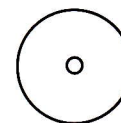
GPS ANT

Data 2/Data 3: NMEA Output Sentence

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

REM1/REM2: Radar, echo sounder, etc.

AP: Autopilot

*: Not output when no waypoint is set.
**: Talker; GP

Output setting

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

REM1
REM2
AP
GPS
None

2.1
2.3

"Data2/Data3"   "NMEA0183 Version"

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

APPENDIX 1 MENU TREE

MENU ZOOM — Ship To Center (only when the plotter display is shown)

- **Tracks**
  - Rec (Off, *Distance*, Auto; 0.00 to 9.99, *0.1 nm*)
  - Color (Red, Yellow, Green, Blue, Purple, Black, *Brown*)
  - Delete (*All*, By Color)
  - Track Memory Used (**%)

- **Waypoints**
  - *Alpha*
  - Local

- **Routes**
  - *Alpha*
  - Local

- **Plotter Setup**
  - Auto Waypoint Entry (COG) (*Off*, On: 15 to 150°, 1 to 60 s)
  - COG Line (Off, *On*)
  - COG/BRG ref. (True, *Mag*)
  - Magnetic Variation (*Auto*, Manual)
  - WP Name (*Disp Goto*, Disp All, Disp Route)
  - TTG/ETA SPD (*Auto; 60s*, Manual; 20 kn)

- **Alarms**
  - Buzzer (Short, *Long*, Continuous)
  - Arrival/Anchor (*Off*, Arrival, Anchor, 0.00 to 99.99 nm)
  - XTE (*Off*, On, 0.000 to 99.999 nm)
  - (*Off*, On, 0.0 to 999.9 kn)
  - Speed (*Off*, On; 0.0 to 999.9 kn)
  - SBAS (*Off*, On)
  - Time (*Off*, On; 00:00 to 23:59)
  - Trip (*Off*, On; 0 to 99999 nm)
  - Odometer (*Off*, On; 0 to 99999 nm)

- **Messages** (Alarm and error messages are shown when occurred.)

- **Delete**
  - All Waypoints (*Off*, Delete)
  - All Routes (*Off*, Delete)

Bold: Default setting

①

AP-1

①

GPS Setup
— Datum (*WGS84*)
— Navigation (*Rhumb Line*, Great Circle)
— Smooth Position (0 to 999 s, *0 s*)
— Smooth S/C (0 to 9999 s, *5 s*)
— Lat Offset (0.000 N/S to 9.999 N/S, *0.000' N*)
— Lon Offset (0.000 E/W to 9.999 E/W, *0.000'E*)
— SV ELV (5 to 90°, *5°*)

SBAS
— Mode (*WAAS*, GPS)
— SBAS Search (*Auto*, Manual; 120 to 138)

I/O Setup
— Data 2 (*REM1*, REM2, AP, GPS)
— Data 3 (*REM1*, REM2, AP, GPS)
— NMEA0183 Version (2.0, *3.0*)
— Save WPT/RTE -> PC
— Load WPT/RTE <- PC
— Wiring Info. NMEA 0183

User Display
— Display 1 (Digital, *Speedometer*, COG, Off; 0-20, *0-40*, 0-80)
— Display 2 (Digital, Speedometer, *COG*, Off)

Pos Setup
— Display (*xx.xxx'*, xx'xx.x")

System
— Key Beep (Off, *On*)
— Language (*English*, others)
— Units (*nm-kn*, km-km/h, sm-mph)
— Time Offset (-14:00 to +14:00; *-8:00*)
— Daylight Saving Time (*Off*, On)
— Time Display (12Hours, *24Hours*)
— Date Display (DD/MMM/YY, *MM/DD/YY*)
— Demo
    — Mode (*Off*, On)
    — Speed (0 to 99 kn; *20 kn*)
    — Course (*Auto*, Manual; 0 to 359°)
    — Lat (*N*/S; *38 00'N*)
    — Lon (E/*W*; *123°00'W*)
— Self Test (*System Test*, LCD Test)
— Reset
    — Trip (0.00 nm) (*Off*, On)
    — GPS (*Off*, On)
    — Menu Settings (*Off*, On)
    — Factory Reset (*Off*, On)

APPENDIX 2 LIST OF TERMS

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

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

Matsutec®

SPECIFICATIONS OF GPS NAVIGATOR
HP-33

1   GENERAL

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

2   GPS RECEIVER

2.1	Receiving channels	
	GPS	50 channels
	SBAS	3 channel
2.2	Rx frequency	1575.42 MHz
2.3	Rx code	C/A code, SBAS
2.4	Position fixing system	All in view, 8-state Kalman filter
2.5	Position accuracy	
	GPS	2.5 m (95% of the time, 2drms)
	SBAS	2 m (95% of the time, 2drms)
2.6	Tracking velocity	500 m/s
2.7	Position fixing time	Within 32 s (cold start)
2.8	Position update interval	1 s

3   INTERFACE

3.1	Number of port	NMEA0183: 2 ports
3.2	Serial output	NMEA0183 Ver2.0 and RS-232C
	Data sentences	AAM,APB,BOD,BWC,BWR,DTM,GGA,GLL,GSV,RMB,RMC,RTE, VTG,XTE,ZDA

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4   POWER SUPPLY   12-24 VDC: 0.24-0.12 A

5   ENVIRONMENTAL CONDITION

5.1   Ambient temperature

Antenna unit   -25°C to +70°C

Receiver unit   -15°C to +55°C

5.2   Relative humidity   93% at 40°C

5.3   Degree of protection IP56

6   UNIT COLOR

6.1   Antenna unit   N9.5

6.2   Receiver unit   N2.5

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