FURUNO

OPERATOR'S MANUAL

GPS PLOTTER

MODEL *GP-1800*

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(TATA) GP-1800

********** IMPORTANT **********
Read This First

- No single navigation aid (including this unit) should ever be relied upon as the exclusive method 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.

- This unit is not a fail-safe record-keeping device. Important data should be recorded in a log or saved to a memory card.

- The GPS satellites are under control of the US Department of Defense. Thus their position-fixing accuracy may be lowered without notice for security reasons.

- If an autopilot is connected with this device, the ship can be automatically steered to a destination. However, always maintain a vigilant watch to prevent collision or grounding.

- If nothing appears on the display when turning on the power, press the **TONE** key several times to raise display brilliance.

- Keep the display unit out of direct sunlight or at least shaded to maintain display tone control by avoiding an excess heat that can build up inside the cabinet.

- The **EVENT MOB** key can function to mark man overboard position, when turned on in the DISPLAY SETUP menu. When the key is pressed, the position at that exact moment is stored in the unit and the event mark appears at that position. The display continuously shows the range and bearing from present position to the man overboard position.

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1. FOREWORD

A Word to GP-1800 Owners

Congratulations on your choice of the FURUNO GP-1800 GPS Plotter. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

For over 40 years 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 unit 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 and the installation instructions contained in the installation manual.

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

Thank you for considering and purchasing FURUNO equipment.

Features

The GP-1800 is a totally integrated GPS Receiver and Video Plotter. It consists of an attractively styled antenna and a compact display unit.

Navigation information is displayed on a bright 8-inch LCD. On-screen information include present position, range and bearing to cursor position, range, bearing and TTG to waypoint, etc.

The main features of the GP-1800 are

- Receives and tracks eight GPS channels simultaneously to ensure high accurate position fixing and high speed trackability.
- Bright 8-inch LCD with temperature compensated tone and brillance control.
- Menu-driven operation
- Automatic coastline chart loading.
- Position display in latitude and longitude or Loran LOPs
- Outputs steering information to FURUNO FAP-50/55/300/330 Autopilots.
- Power consumption is a low 15 W.
- Provision for connection of autopilot, providing automatic steering.
- Improved position fixing accuracy by connection of DGPS receiver (option).

2. ABOUT THIS MANUAL

Manual Layout

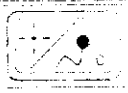
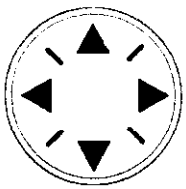
This manual is laid out in as "user-friendly" a manner as possible. It is our intention to guide the user along in the use of the gear as gently and as comfortably as possible in a series of short, easy-to-digest sections that start at a very basic level and proceed forward in complexity.

Typographic Conventions

Before you start reading this manual, please familiarize yourself with the typographic conventions we use throughout this manual.

- Key names appear in a font different from the body text for emphasis. For example, the MENU key appears as **MENU** key.
- Several keys are labelled with a symbol rather than a name. In this instance we substitute a name for the symbol. Below is a list of these keys.

Table 1 Key symbols and names used in text

Key	Referred to in text as;
	**Cursor** keys
	**Scale** keys
	**Arrow** keys

3. SYSTEM INTRODUCTION

Overview

The GP-1800 GPS Plotter mainly consists of a GPS antenna and a display unit, as shown in the figure below. All operations are carried out through the front panel keys. The memory card drive loads digitized charts (option) and provides for storage and replay of RAM memory cards. An autopilot can connected for automatic steering to destination.

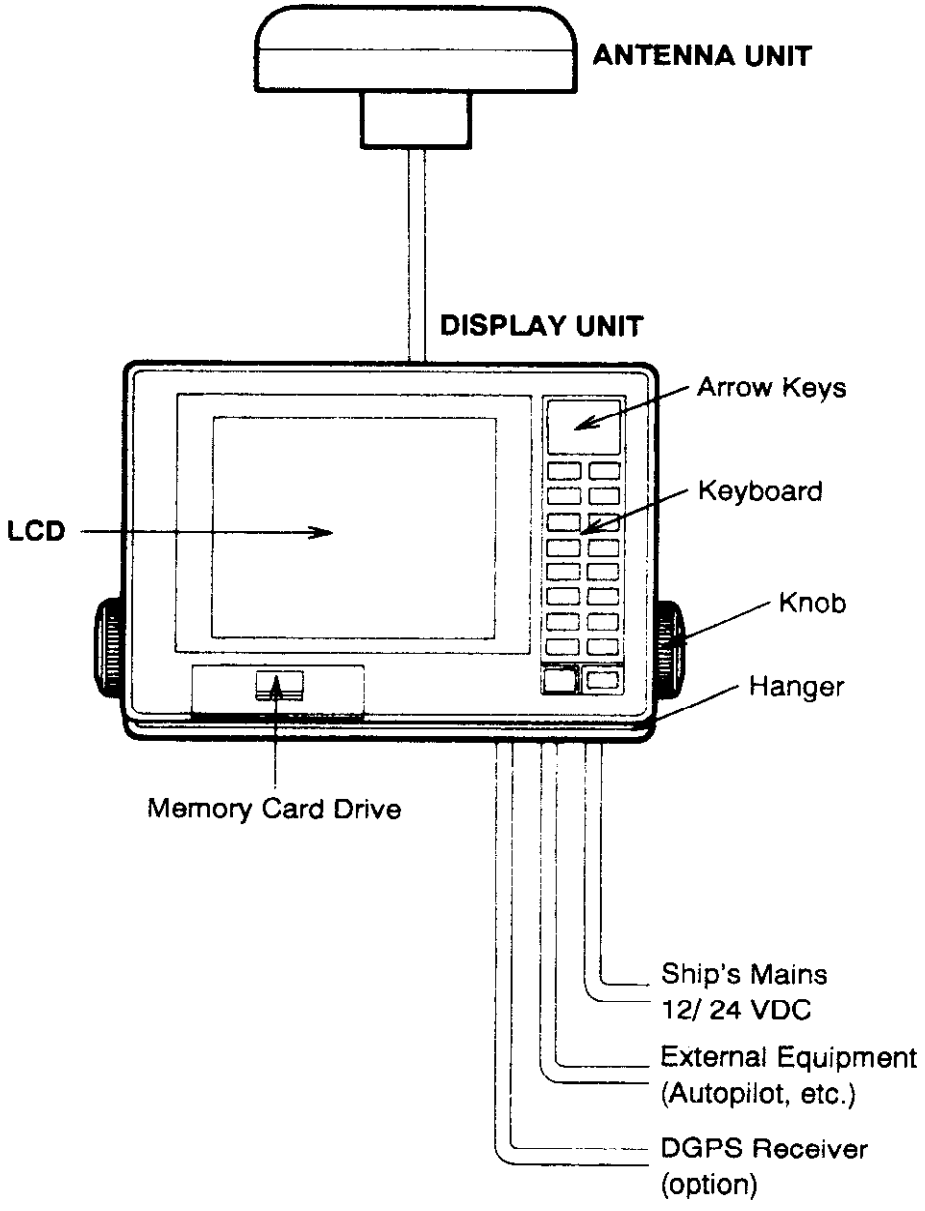


Figure 1 System configuration

4. CONTROLS

Description of Controls

All operations of the GP-1800 are carried out with the controls on the front panel of the display unit. All controls respond immediately to your command and the unit emits a beep to signify it has accepted your command. (Invalid key input emits several beeps.)

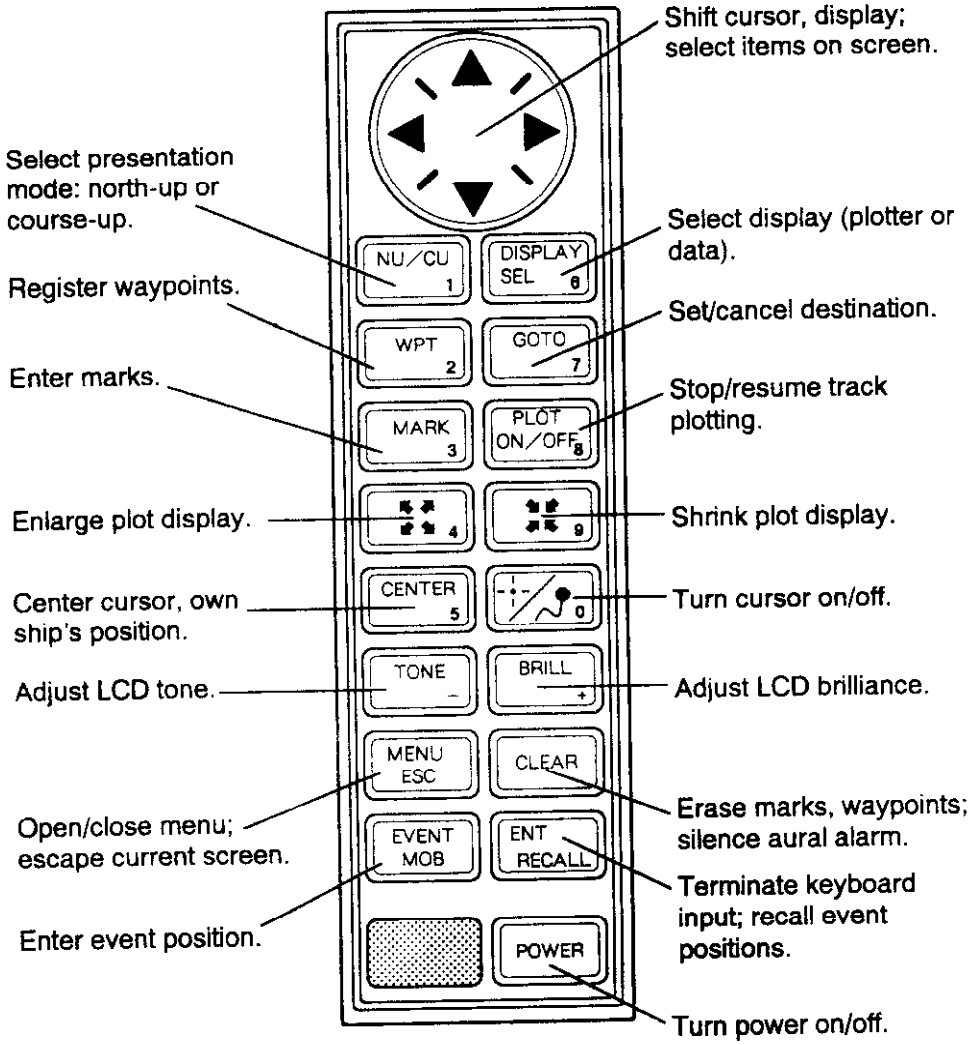


Figure 2 Front panel controls

5. WHAT APPEARS ON THE DISPLAY

Overview

You may display ship's track and chart on the entire display (plotter display), or ship's track and chart on the left half of the display and navigation data on the right half (data display). Below are sample plotter and data displays.

Plotter Displays

North-up presentation

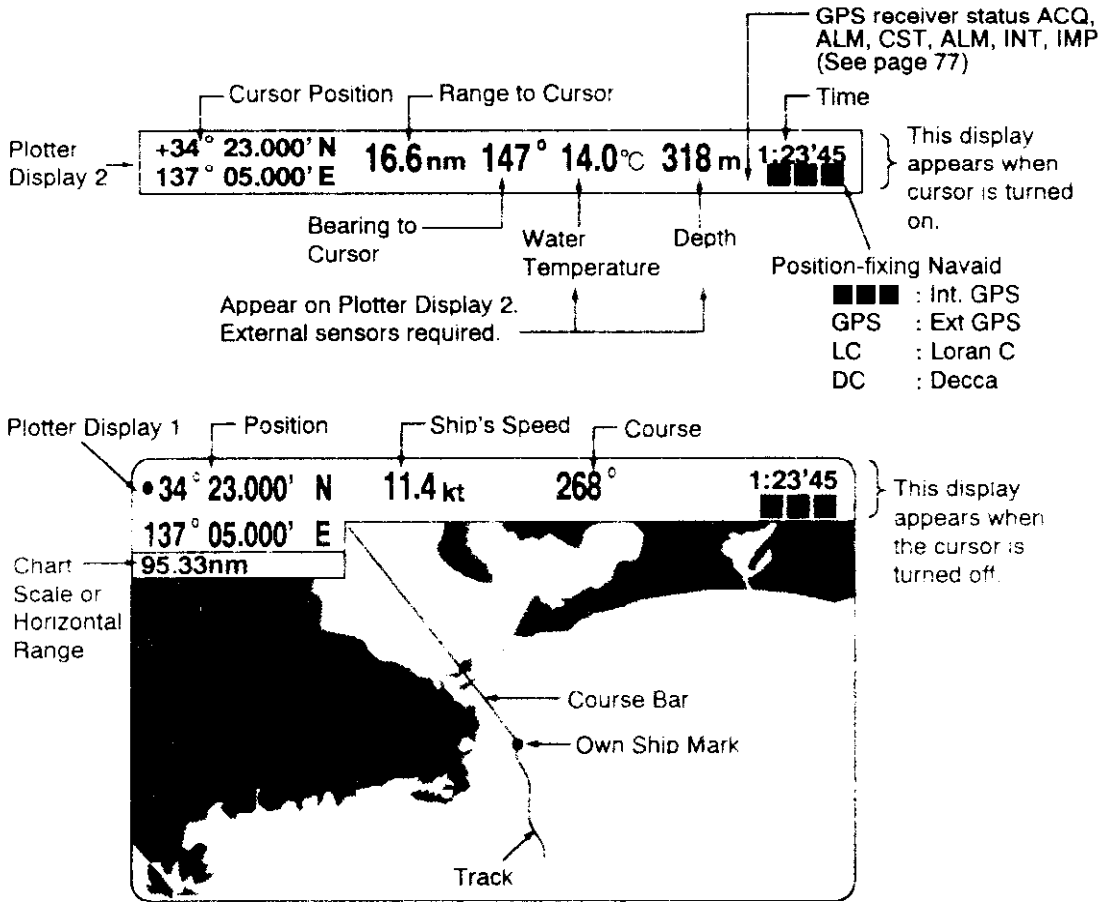


Figure 3 Plotter display, north-up presentation

Course-up presentation

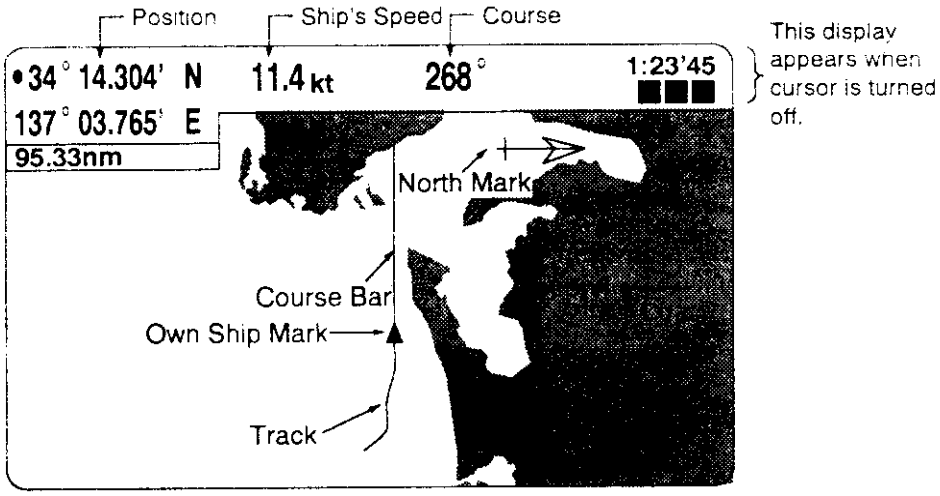


Figure 4 Plotter display, course-up presentation

■ **NOTE:** *Plotter display 1 does not show water temperature or depth and range and bearing from own ship to cursor, and ship's speed and course are enlarged.*

Data Displays

Data display 1

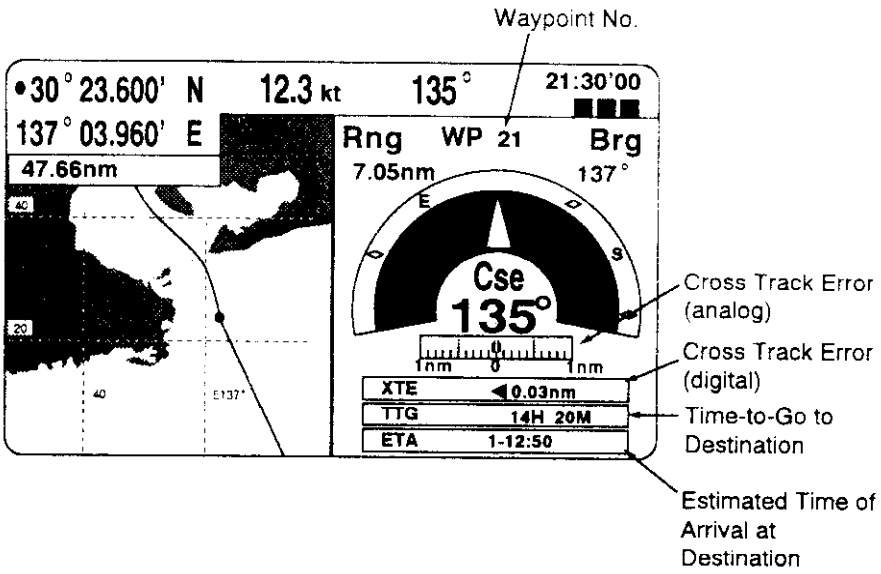
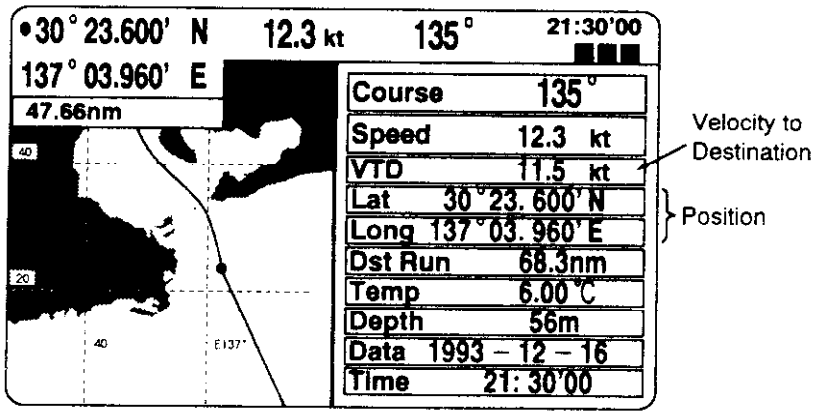


Figure 5 Data display 1

Data display 2



Dst Run (distance run) is reset to zero by pressing the CLEAR key.

Figure 6 Data display 2

Data display, autopilot connection

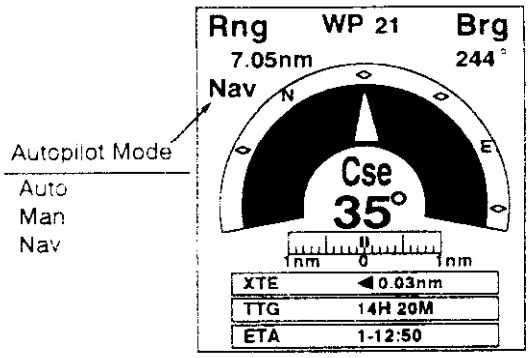


Figure 7 Data display, autopilot FAP-300/330 connection

6. GETTING ACQUAINTED WITH THE GP-1800—A TUTORIAL

Overview

This section introduces the basic functions of your unit. You will learn how to sail from your port to a destination and return to port. For sake of illustration, the procedures which follow explain how to sail between points A and B and vice versa in Figure 8. If your unit is installed and you have time for a short cruise, try operating the unit as you review this section. Don't worry if you don't understand everything which appears on the display. You will learn more about your unit in later sections.

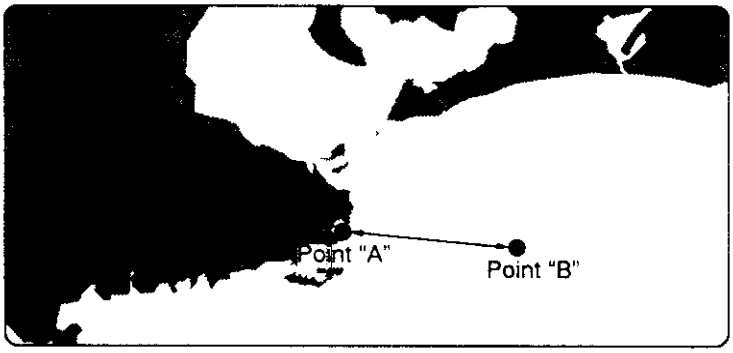


Figure 8

Step 1: Preparation in port

Insert coastline data card

1) Open the memory card drive lid.
2) Insert the coastline data card label side up arrow forward. Close the lid.

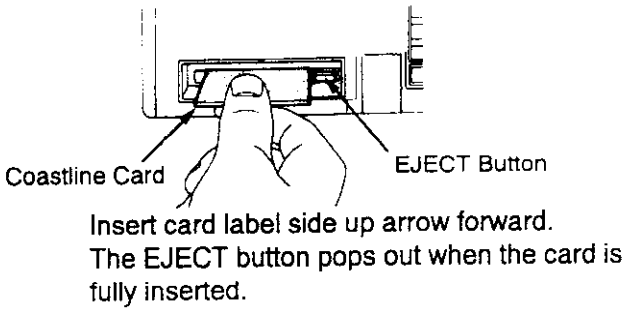


Figure 9

Turn on the power, adjust display brilliance and tone

1) Press the **POWER** key.
2) Press either the **BRILL** or **TONE** key.
3) Operate the **Arrow** keys to adjust display brilliance and tone.

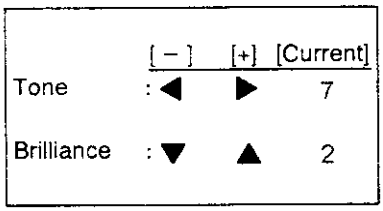


Figure 10

Select plotter display

1) Press the **DISPLAY SEL** key and the up arrow key to select "Plotter Disp 1."

2) Press the **NU/CU** key to select the north-up mode.

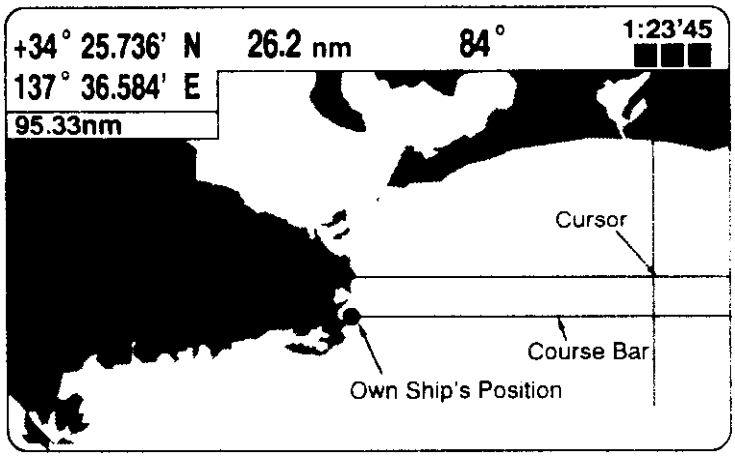


Figure 11

3) Press the **Cursor** key to turn off the cursor.

4) Press the **CENTER** key to center own position.

5) Press the **Scale** keys so the chart can be easily viewed.

Mark own ship's position

This will enable you to use your current position as destination waypoint, when returning to port.

1) Press the **WPT** key. The display shown in Figure 12 appears.

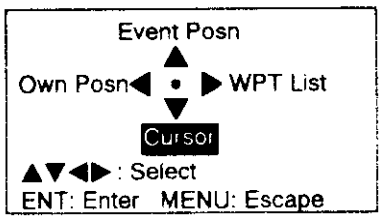


Figure 12

2) Press the left arrow key to select "Own Pos."

3) Press the **ENT** key.

4) Enter waypoint number. As an example, enter "01."

5) Press the **ENT** key.

6) Press the **MENU** key.

Set destination

There are several ways by which you can set destination. Two are presented in this tutorial: by the cursor and by waypoint. First, by the cursor.

1) Press the **GOTO** key. The destination selection display appears.

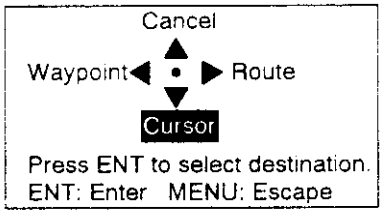


Figure 13

2) Press the down arrow key to select "Cursor," if it is not already selected.

3) Press the **ENT** key.

4) Operate the **Arrow** keys to set cursor on destination.

5) Press the **ENT** key.

Step 2: Sailing to destination

Navigation information

A flag marks destination and a dashed line runs between it and own ship's position, shown on the display as waypoint "00." The dashed line shows the shortest possible course to destination. Range and bearing to the destination appear at the bottom of the display.

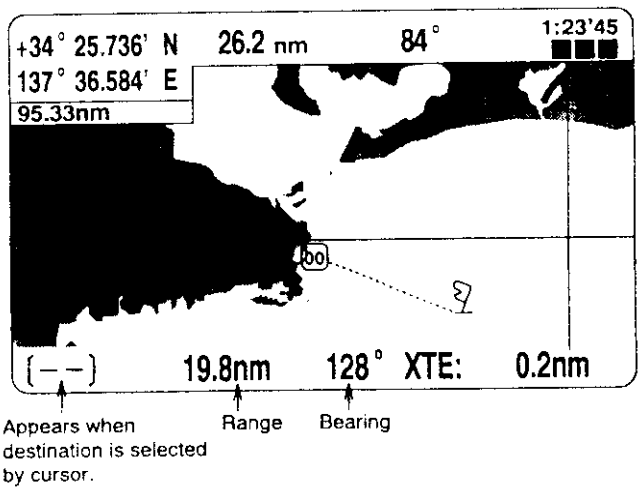


Figure 14

How to steer to destination

Set ship's course to be the same as the bearing of the destination. While sailing, confirm that ship's track on the display traces the dashed line. Watch the "XTE" (cross-track error) indication at the bottom right-hand corner to help stay on course. It shows the direction (by arrows) and amount (in nautical miles) to steer your boat to return to course set.

Step 3: Return to port

Select your port as destination

Set your port as destination, using waypoint 01, which you entered in step 1.

1) Press the **GOTO** key.
2) Press the left arrow key to select "Waypoint."
3) Enter waypoint "01."
4) Press the **ENT** key. The display would now look like Figure 15.

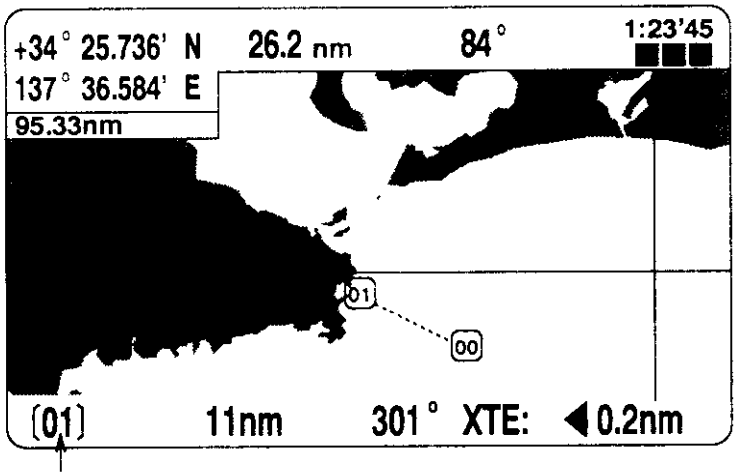


Figure 15

Steer ship's wheel just as in "Step 2: Sailing to destination."

Step 4: Quitting operation

1) Press the **POWER** key to turn off the unit.

7. BASIC OPERATING PROCEDURE

Overview

This section provides the information necessary for everyday start-up of the equipment.

Inserting Coastline Data Card

1) Open the memory card drive lid.

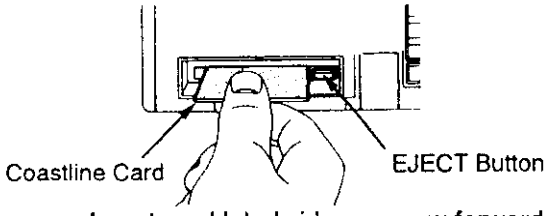


Figure 16 How to insert coastline data card

2) Insert the card label side up arrow forward and close the lid.

■ **NOTE:** *Always keep the lid completely closed. Foreign material or water may damage the drive and void the warranty.*

Turning On the Power

Press the **POWER** key. The unit proceeds in the sequence shown in the following figure. About 45 seconds after the start-up procedure is completed, the three hollow squares (appear when internal GPS feeds position data) at the top right-hand corner of the display will become filled. This means the receiver is receiving the GPS signal.

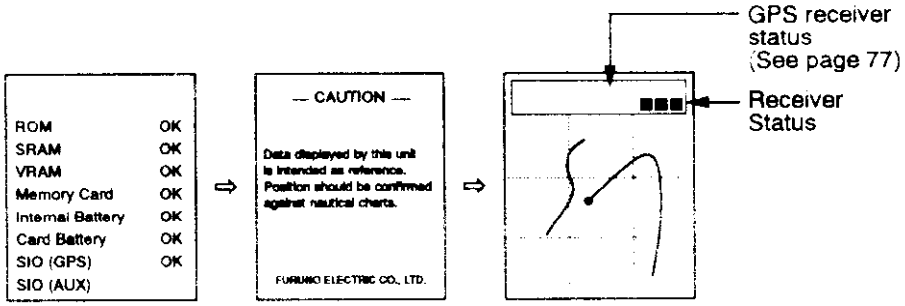


Figure 17 Sequence of start-up procedure

■ **NOTE:** *It takes 3 to 10 minutes to fix your position when the unit is first installed. In this state, a GPS receiver status is indicated CST, ALM, ACQ in sequence until the three hollow squares become filled.*

Adjusting Brilliance and Tone of the LCD

1) Press the **BRILL** or **TONE** key.

2) Operate the **Arrow** keys to adjust brilliance and tone.

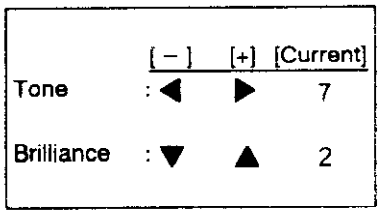


Figure 18 Display for adjustment of tone and brilliance

Turning Off the Power

1) Press the **POWER** key.

8. THE CURSOR

Function

The cursor functions to

- find latitude and longitude of a location
- find range and bearing from your ship to cursor position, and
- enter and erase marks and waypoints.

Operation

The **Cursor** key turns the cursor on/off alternately. You can shift the cursor by operating the **Arrow** keys. The cursor moves in the direction of the key pressed.

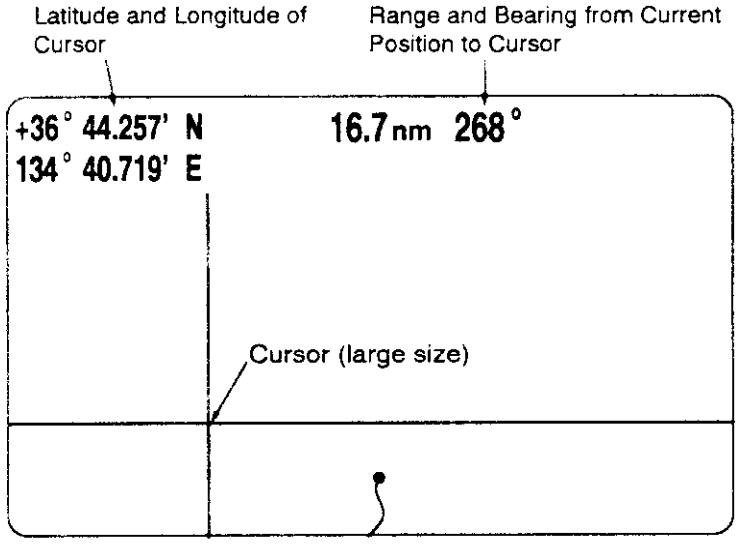


Figure 19 Display, showing cursor indications

■ **NOTE:** *The size of the cursor can be set for large or small on the DISPLAY SETUP menu. For further details see "22. Customizing Your Unit."*

9. DISPLAYING CHARTS

Overview

When a proper coastline data card is inserted into the memory card drive and a suitable chart scale is selected, a land-filled coastline of your area appears. If there is no land near your ship, or a proper display scale is not selected, coastline does not appear.

Adjusting Display Scale

Press the **Scale** keys to adjust display scale. One of three icons appears at the left side of the display to help you select suitable chart scale.

Table 2 Chart scale icons and their meanings

Icon	Meaning
	Proper card is not inserted or chart scale is too small (chart is overenlarged). Press the [ ] key to adjust chart scale.
	Chart scale is too large. Press the [ ] key to adjust chart scale.
	Suitable chart scale is selected.

Display range

When the **Scale** keys are pressed, you will see several frames. These frames are called indices and they show you what parts of the chart can be enlarged in the current chart scale. The areas circumscribed with smaller frames can be enlarged. The area enclosed by the largest frame cannot be enlarged.

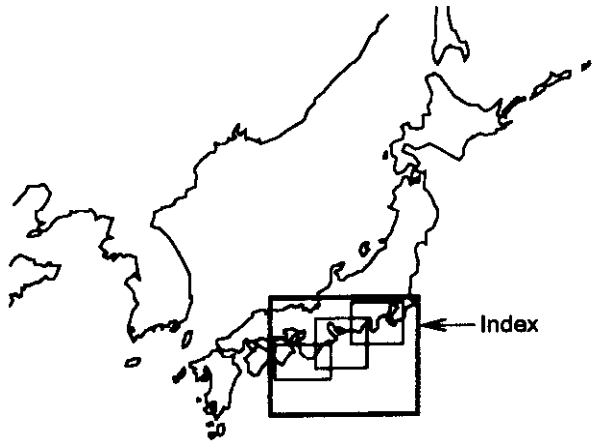


Figure 20 Sample chart (Japan and South Korea)

10. SHIFTING THE DISPLAY

Centering Ship's Position

1) Press the **Cursor** key to turn off the cursor if it is currently displayed.
2) Press the **CENTER** key.

Centering a Location

1) Press the **Cursor** key to turn on the cursor if it is not currently displayed.
2) Operate the **Arrow** keys to set the cursor on the location you want to center.
3) Press the **CENTER** key.

Scrolling the Display

1) Press the **Cursor** key to turn off the cursor if it is currently displayed.
2) Operate the **Arrow** keys to scroll the display in direction desired.

11. SELECTING DISPLAYS

How to Select a Display

There are four types of displays which you can select with the **DISPLAY SEL** key and **Arrow** keys.

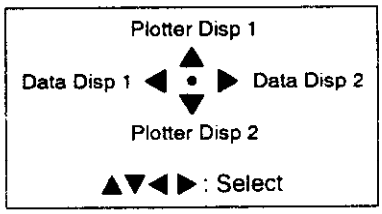


Figure 21 Screen for selection of display

Plotter Displays

These displays show chart (option) and ship's track. Two digital data display modes are available at the upper parts of the graphic display: plotter display 1 and plotter display 2.

Data Displays

The data displays show the plotter display on the left half of the screen and a data display on the right half.

Presentation Mode

How to Change Presentation Mode

Press the **NU/CU** key, and the presentation mode changes from north-up to course-up or vice versa.

North-up presentation

North is at the top of the display. This mode is useful for long-range navigation.

Course-up presentation

Ship's course is at the top of the display. This mode is useful for finding course error and relation between own ship and waypoint.

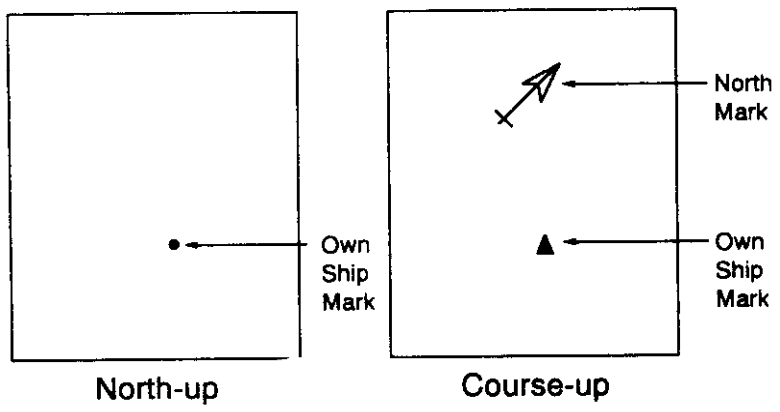


Figure 22 North-up and course-up presentations

12. MENU OPERATION

Overview

Many functions of this unit are carried out through the menu. The main menu consists of nine menus. You may display it by pressing the **MENU** key.

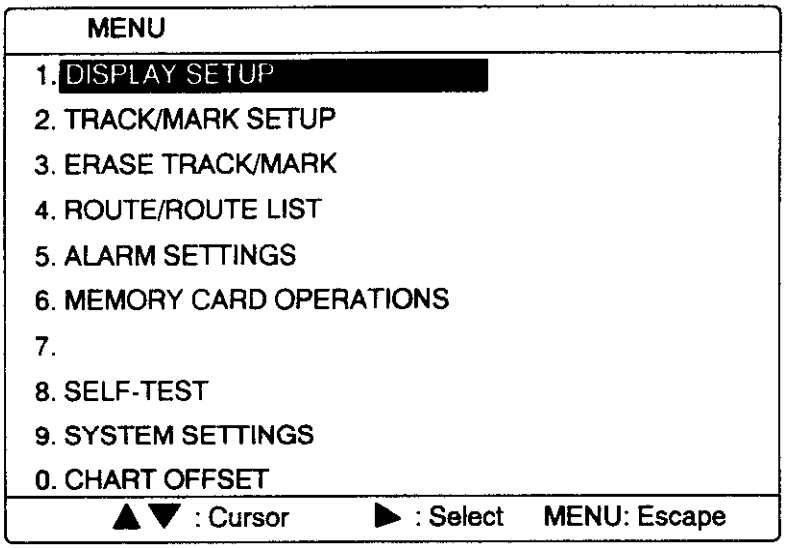


Figure 23 Main menu

Selecting Menus

You may select a menu one of two ways:

- by direct keyboard input of menu number, or
- operating the **Arrow** keys to display menu name in highlight and then pressing the **ENT** key.

For example, if you want to select the TRACK/MARK SETUP menu, you could press the **2** key, or operate the **Arrow** keys to highlight "TRACK/MARK SETUP" and then press the **ENT** key.

Selecting Menu Items, Registering Options

Operate the **Arrow** keys to select both item and option. Press the **ENT** key to register selection and escape. Currently selected options are circumscribed.

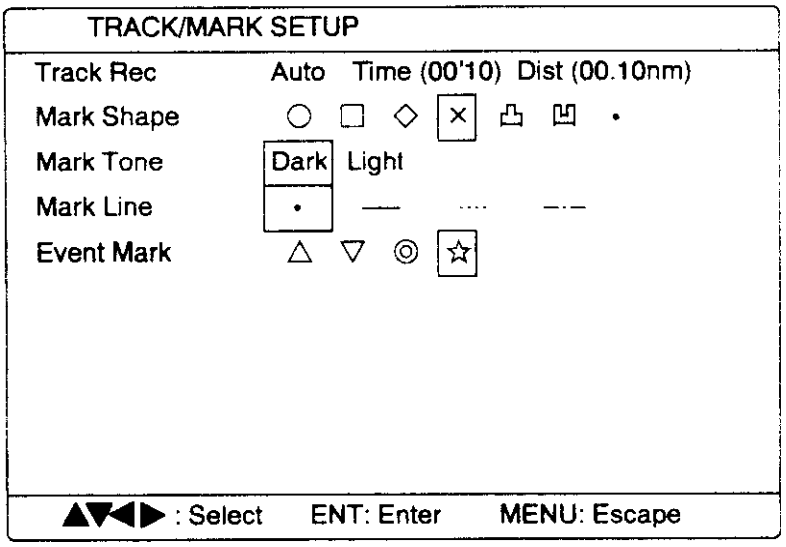


Figure 24 TRACK/MARK SETUP menu

13. TRACK OPERATIONS

Stopping/Resuming Recording of Ship's Track

When your boat is at anchor or returning to port you probably won't need to record its track. You can stop recording the track, to conserve the track memory, by pressing the **PLOT ON/OFF** key. The message "Stopping recording of track." appears momentarily, "H" is displayed at the left-hand side of the display and own ship mark becomes hollow. To resume recording, press the key again. The message "Resuming recording of track." appears momentarily.

Setting Track Recording Interval

In drawing the track, first the ship's position is stored into this unit's memory at an interval of time, distance or automatic recording. 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.

The AUTO position is set to store ship's track every 10 seconds or 0.1 nautical miles.

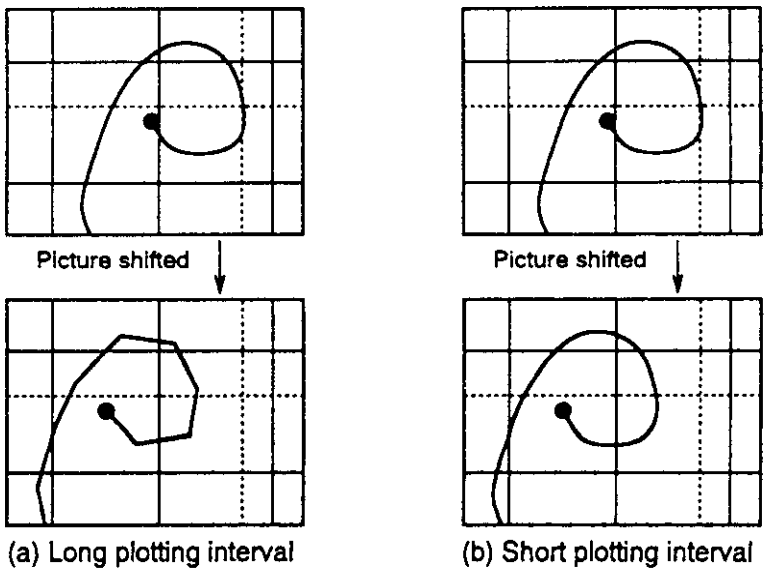


Figure 25 Track reconstruction and plotting interval

Procedure

1) Press the **MENU** key.

2) Press the **2** key to select "TRACK/MARK SETUP."

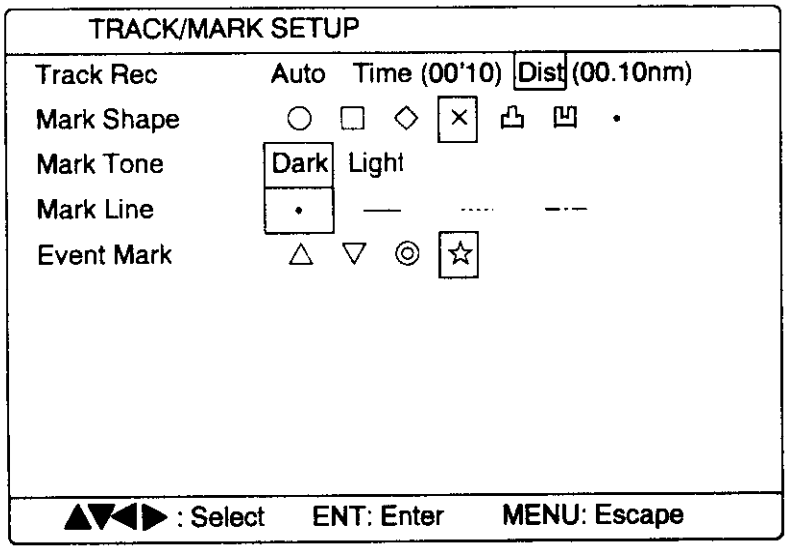


Figure 26 TRACK/MARK SETUP menu

3) Operate the **Arrow** keys to select Auto, Time or Dist on the "Track Rec" line.

4) For time or distance, enter interval. (One advantage of setting the plotting interval by distance is that you won't use the track memory when your boat is dead in water.)

5) Press the **ENT** key.

6) Press the **MENU** key to close the menu.

Erasing Track

When you have been cruising for a long time and retracing the same route many times the display may become full of track. You can erase all track or a section you specify, to clear up the display.

All track

1) Press the **MENU** key.
2) Press the **3** key to select "ERASE TRACK/MARK."
3) Operate the **Arrow** keys to select "Track" on the "Erase" line.
4) Press the **Arrow** keys to select "All" on the "Erasure Rng" line.
5) Press the **ENT** key.
6) If you are sure to erase, press the **ENT** key again.
7) Press the **MENU** key twice to close the menu.

Specific track

1) Do steps 1 through 3 in the above procedure.
2) Press the **Arrow** keys to select "Area" on the "Erasure Rng" line, followed by the **ENT** key.
3) Operate the **Arrow** keys to place the cursor at one of the corners of the area which will enclose the track to erase.
4) Press the **ENT** key.
5) Operate the **Arrow** keys to enclose the track to erase.

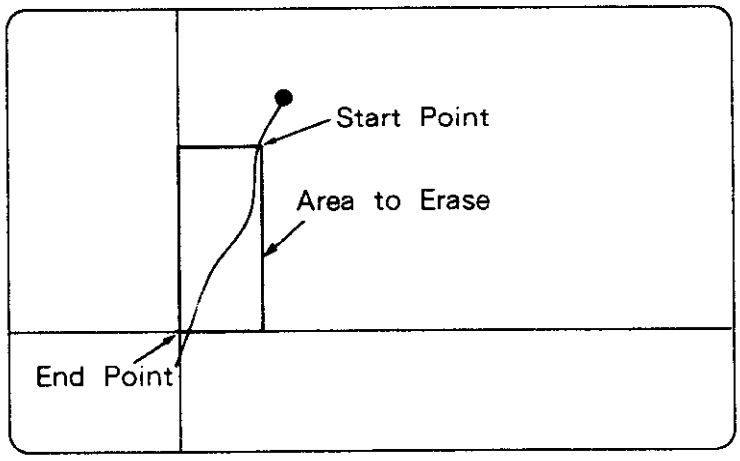


Figure 27 How to erase track using the cursor

6) Press the **ENT** key.

7) If you are sure to erase the track selected, press the **ENT** key.

8) Press any key.

9) Press the **MENU** key to close the menu.

14. WAYPOINT NAVIGATION

Overview

In navigation terminology, a **waypoint** is a particular location on a voyage whether it be a starting, intermediate or destination point. A waypoint is the simplest piece of information the GP-1800 requires to get you to a destination, in the shortest distance possible.

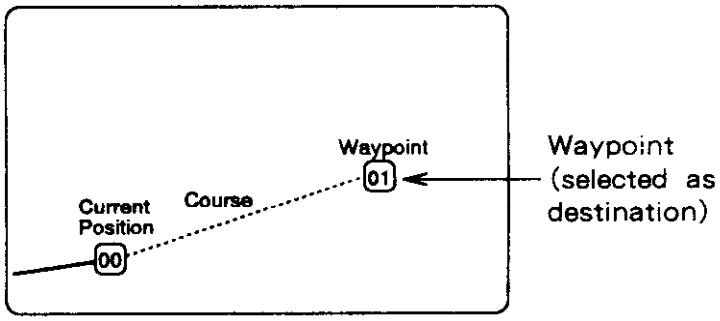


Figure 28 Waypoint 01 selected as destination

Registering Waypoints

About entry of waypoints

This unit has 98 waypoints into which you can enter position information. It numbers them 01 to 98. Waypoints "00" and "99" are special waypoints. Waypoint "00" marks own ship's position when a destination is selected. Waypoint "99" is reserved for event mark position from external navaid.

There are four methods by which you can enter a waypoint:

- By event position
- By the cursor
- Through the waypoint list (manual input of latitude and longitude), or
- By own ship's position.

Entry by event position

1) Press the **WPT** key.

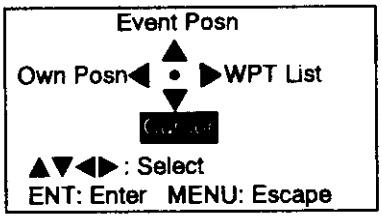


Figure 29 Display for selection of waypoint entry method

2) Press the up arrow key to select "Event Posn."

3) Press the **ENT** key. The display shows the event data window.

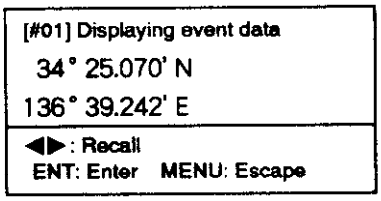


Figure 30 Display for selection of event position

4) Press the left arrow or right arrow key to recall desired event data.

5) Press the **ENT** key. The display shows the event position.

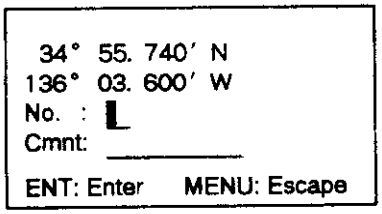


Figure 31 Display for entering waypoint number

6) Enter waypoint number.

- *NOTE: You can let your unit automatically assign waypoint number, if desired. Simply press the* **ENT** *key. The unit saves waypoint position information to the youngest empty waypoint.*

7) Press the down arrow key to enter comments, if desired. The following display appears. (If you do not want to enter a comment, press the **ENT** key after entering waypoint number.)

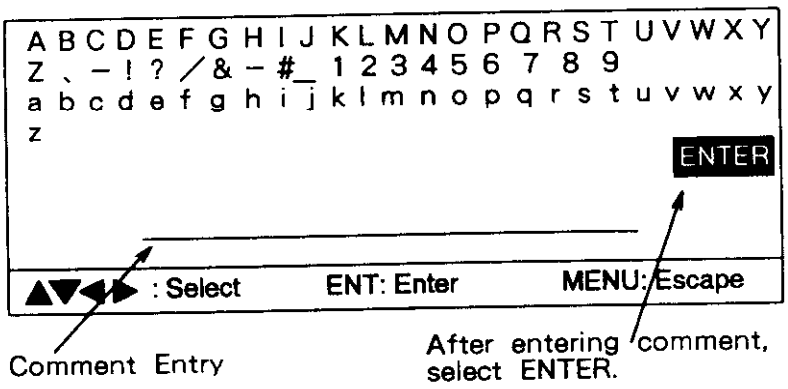


Figure 32 Characters available for waypoint comment

About comments: You may attach a comment to waypoints during or after entry. A comment may contain up to ten characters. All comments are stored in the waypoint list. See page 32.

8) Operate the **Arrow** keys to select character. You can enter figures, + and - by direct keyboard input.

9) Press the **ENT** key.

10) Repeat steps **8** and **9** to complete comment.

11) Operate the **Arrow** keys to select "ENTER."

12) Press the **ENT** key twice.

Entry by the cursor

1) Press the **WPT** key.

2) Press the down arrow key to select "Cursor."

3) Press the **ENT** key.

4) Operate the **Arrow** keys to place the cursor on the position desired. Cursor latitude and longitude appear at the top of the display.

5) Press the **ENT** key.

6) Enter waypoint number and comments as explained above, or enter waypoint number and press the **ENT** key to register waypoint.

7) Press the **MENU** key to escape.

Entry by own ship's position

1) Press the **WPT** key.

2) Press the left arrow key to select "Own Posn."

3) Press the **ENT** key.

4) Enter waypoint number and comments as explained above, or press the **ENT** key to register waypoint.

5) Press the **MENU** key to escape.

Entry through the waypoint list

1) Press the **WPT** key.

2) Press the right arrow key to select "WPT List."

3) Press the **ENT** key. The waypoint list appears.

WAYPOINT LIST

No.	Lat	Long	Display	Comment	
01	34° 44. 567 'N	135° 22. 321 'W	Yes	CRAB	
02	34° 45. 567 'N	135° 23. 321 'W	Yes	LOBSTER	Route
03	-34° 46. 567 'N	135° 24. 321 'W	No	BUOY	
04	3[redacted]° 47. 567 'N	135° 25. 321 'W	Yes	----------	in Use
05	__° __. ___ 'N	___° __. ___ 'W	Yes	----------	
06	__° __. ___ 'N	___° __. ___ 'W	Yes	----------	
07	__° __. ___ 'N	___° __. ___ 'W	Yes	----------	
08	__° __. ___ 'N	___° __. ___ 'W	Yes	----------	
09	__° __. ___ 'N	___° __. ___ 'W	Yes	----------	
10	__° __. ___ 'N	___° __. ___ 'W	Yes	----------	

▲▼◀▶ : Cursor ENT: Enter MENU : Escape

Figure 33 Sample waypoint list

4) Press the up arrow or down arrow key to select waypoint number.

5) Enter latitude and longitude. (For South latitude or East longitude, press the [-] or [+] key.)

6) The cursor should be in the Display column and "Yes" selected. You will learn a little while later what this column means. For now, press the right arrow key once if you want to enter comments as explained above, or press the **ENT** key to register the waypoint.

7) Press the **ENT** key.

8) Press the **MENU** key twice to escape.

Changing Waypoint Data

You may change the position and comments of waypoints you have entered, through the waypoint list.

1) Press the **WPT** key.
2) Press the right arrow key to select "WPT List."
3) Press the **ENT** key. The waypoint list appears.
4) Operate the up and down arrow keys to select waypoint number.
5) Operate the right and left arrow keys to select column in which to edit or add data.
6) Press the **ENT** key.
7) Press the **MENU** key twice to escape.

Deleting Waypoints

The GP-1800 provides two ways by which you can delete waypoints:

- By the cursor, or
- Through the waypoint list.

Waypoints which are part of a route cannot be deleted except through the route list. Note that you can easily delete all waypoints by clearing the Plotter memory. More on this later.

By the cursor

1) Operate the **Arrow** keys to set the cursor on the waypoint you want to delete.
2) Press the **CLEAR** key.

Through the waypoint list

1) Press the **WPT** key.
2) Press the right arrow key to select "WPT List."
3) Press the **ENT** key. The waypoint list appears.
4) Operate the up and down arrow keys to select waypoint number.
5) Press the **CLEAR** key.
6) Press the **ENT** key.

Hiding/Showing Waypoints

You may choose to hide or show waypoints on the display.

1) Press the **WPT** key.
2) Press the right arrow key to select "WPT List."
3) Press the **ENT** key. The waypoint list appears.
4) Operate the up and down arrow keys to select waypoint number.
5) Press the right arrow key several times to set the cursor in the "DISPLAY" column.
6) Press the [–] key to hide the waypoint. "No" replaces "Yes."
7) Press the **ENT** key.

When you want to show the waypoint, press the [+] key in step 6 of the above procedure.

Setting Destination Waypoint

The GP-1800 offers four methods by which you can set destination waypoint:

- By the cursor
- By waypoint number, or
- By route number (discussed in next chapter).
- By event position (discussed in "17. THE EVEN MOB KEY")

When you select a destination waypoint, range and bearing from own ship to that point appear at the bottom of the display.

By the cursor

Setting a destination by the cursor allows you to enter multiple points leading to the ultimate destination. In the next section you will learn how to set multiple points, and store them as a route. The procedure which follows shows you how to set ultimate destination (single point).

1) Press the **GOTO** key.

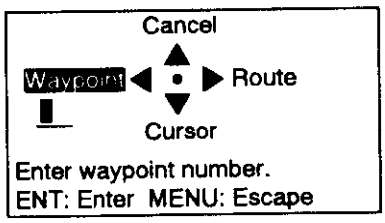


Figure 34 Display for setting destination

2) Press the down arrow key to select "Cursor," if it is not already selected.

3) Press the **ENT** key.

4) Operate the **Arrow** keys to set the cursor on destination.

5) Press the **ENT** key to set destination.

When a single destination point is selected by cursor;

- A flag marks destination and a dashed line runs between it and own ship's position.
- The range and bearing to the destination appear at the bottom of the display.

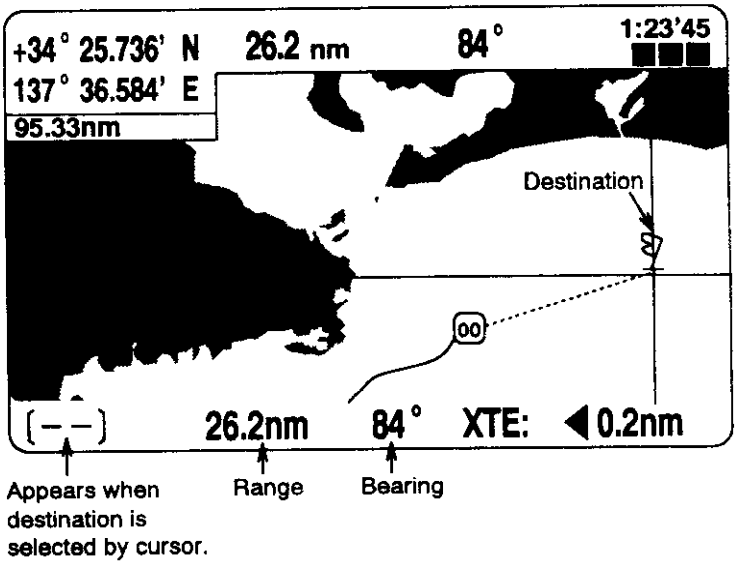


Figure 35 Sample destination waypoint data

By waypoint number

1) Press the **GOTO** key and the left arrow key to select "Waypoint."

2) Enter waypoint number.

3) Press the **ENT** key.

When destination is selected by waypoint number;

- A dashed line runs between waypoint selected and own ship's position.
- The range and bearing to the destination appear at the bottom of the display.

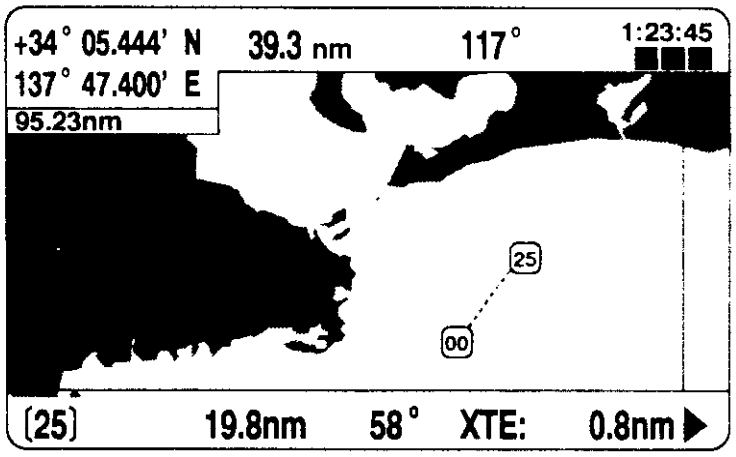


Figure 36 Sample destination waypoint data

Cancelling Destination Waypoint

1) Press the **GOTO** key.
2) Press the up arrow key to select "Cancel."
3) Press the **ENT** key.

15. ROUTE NAVIGATION

Overview

Often a trip from one place to another involves several course changes, requiring a series of route points (waypoints) which you navigate to, one after another. The sequence of waypoints leading to the ultimate destination is called a **route**. The GP-1800 can automatically advance to the next waypoint on a route, so you do not have to change the destination waypoint repeatedly.

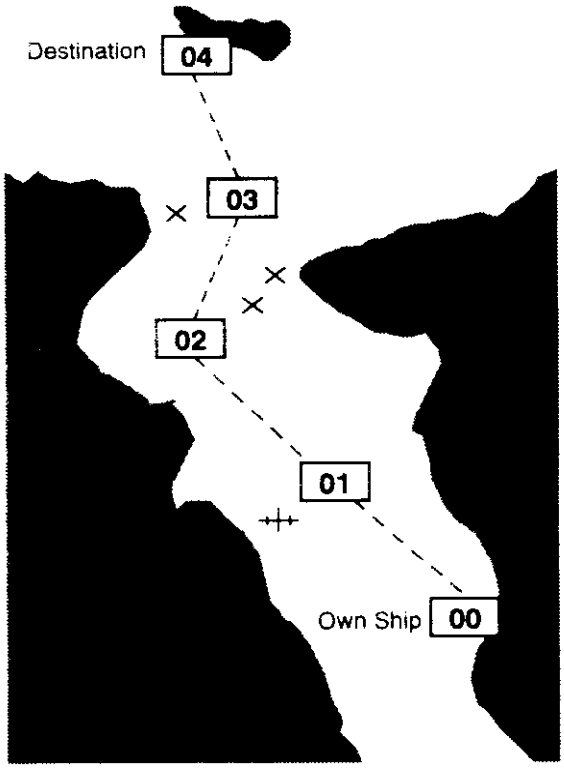


Figure 37 Sample route

Registering Routes

You can store up to 10 routes. They are numbered from 01 to 10 on the route list. A route may consists of 30 points.

A route can be registered two ways: through the route list or by using the cursor (see "Following a Route").

Through the route list

One advantage of this method is you can use waypoints you have already entered.

1) Press the **MENU** key.

2) Press the **4** key to select "ROUTE/ROUTE LIST."

ROUTE/ROUTE LIST

No.	Pts.	Total Dist	TTG(H:M)	Status
01	5	1234. 56nm	62 : 69	
02	10	2345. 67nm	51 : 78	In Use
03	15	3456. 78nm	21 : 89	
04	0	0. 00nm		
05	0	0. 00nm		
06	0	0. 00nm		
07	0	0. 00nm		
08	0	0. 00nm		
09	0	0. 00nm		
10	0	0. 00nm		

▲▼ : Cursor ▶ : Select MENU : Escape

Figure 38 ROUTE/ROUTE LIST

3) Press the up and down arrow keys to select route number.

4) Press the **ENT** key.

Minus sign means waypoint is skipped.

ROUTE/ROUTE LIST Route: 04

WPT		LAT	LONG	LEG	TTG (H:M)
01	20	34° 44. 567'N	131° 22. 320'E	0. 00nm	0:00
02	21	35° 43. 568'N	132° 23. 321'E	78. 96nm	6:14
03	-22	36° 42. 569'N	133° 24. 322'E	89. 95nm	7:35
04	23	37° 41. 560'N	134° 25. 323'E	98. 94nm	3:68

▲▼◀ ▶ : Cursor MENU : Escape ENT: Enter
+ : N, E, Restore − : S, W, Skip

Figure 39 ROUTE/ROUTE LIST, waypoint entry display

5) Enter waypoint numbers in the order in which you will traverse them. (If a waypoint is already registered its position appears. Any waypoints you newly register here are also registered on the waypoint list.)

■ **NOTE:** *If you enter the waypoint number to be already registered, its position data appears. If you want to change it, enter new latitude and longitude position.*

6) Press the down arrow key.

■ **NOTE:** *The Time-To-Go between legs on the route is calculated based on the trial speed entered on page 2 of the route. To go to page 2, select route point 01 (or 16) and press the up arrow key (down arrow key). The default speed is 10 knots.*

7) Press the **ENT** key.

8) Press the **MENU** key twice.

Changing Route Contents

Skipping route waypoints

To skip a route waypoint;

1) Press the **MENU** key.

2) Press the **4** key.

3) Press the up and down arrow keys to select route number.

4) Press the **ENT** key.

5) Press the **Arrow** keys to select the route waypoint you want to skip.

6) Press the [–] key to skip that point temporarily. A minus sign appears to the left of route waypoint.

7) Press the **ENT** key.

8) Press the **MENU** key twice to close the menu.

Restoring route waypoints

When you want to restore a route waypoint, press the [+] key in step 6 in the above procedure to erase the minus sign.

Changing L/L position of route waypoints

1) Press the **MENU** key.
2) Press the **4** key.
3) Press the up and down arrow keys to select route number.
4) Press the **ENT** key.
5) Press the **Arrow** keys to set the cursor in the LAT (or LONG) column of the route point you want to change position.
6) Enter new latitude/longitude position.
7) Press the **ENT** key.
8) Press the **MENU** key twice to close the menu.

Deleting Route Waypoints

1) Press the **MENU** key.
2) Press the **4** key.
3) Press the up and down arrow keys to select route number.
4) Press the **ENT** key.
5) Press the up and down arrow keys to select route waypoint which you want to delete.
6) Press the **CLEAR** key.
7) Press the **ENT** key.
8) Press the **MENU** key twice to close the menu.

Following a Route

Following a route is the process by which you use a registered route for navigation. This unit displays navigation information to guide you from one waypoint to the next, as it automatically switches from one waypoint to another in sequence.

By cursor-created route

1) Press the **GOTO** key.
2) Press the down arrow key to select "Cursor," if it is not already selected.
3) Press the **ENT** key.
4) Press the **Arrow** keys to set the cursor on waypoint.

5) Press the [+] key to enter the first waypoint. (You can clear a waypoint by pressing the [–] key.)

6) Repeat steps 4 and 5 to complete the route.

7) Press the **ENT** key.

8) Enter route number.

   ■ **NOTE:** *If you do not want to store the route permanently, press the* **ENT** *key to escape.)*

9) Press the **ENT** key.

Flags mark route waypoints and a dashed line connects all route waypoints including own ship's position. The range and bearing to the first waypoint appear at the bottom of the display.

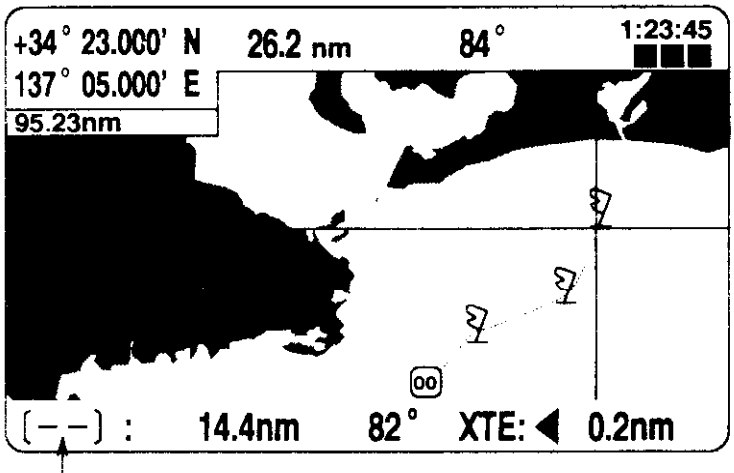


Figure 40 Appearance of cursor-created route selected for navigation

By preregistered route

1) Press the **GOTO** key.

2) Press the right arrow key to select "Route."

3) Enter route number.

4) If you want to navigate the waypoints of the route in the reverse order in which they were entered, press the [–] key.

5) Press the **ENT** key.

A dashed line connects all waypoints including own ship's position. Range and the bearing to the first waypoint appear at the bottom of the display.

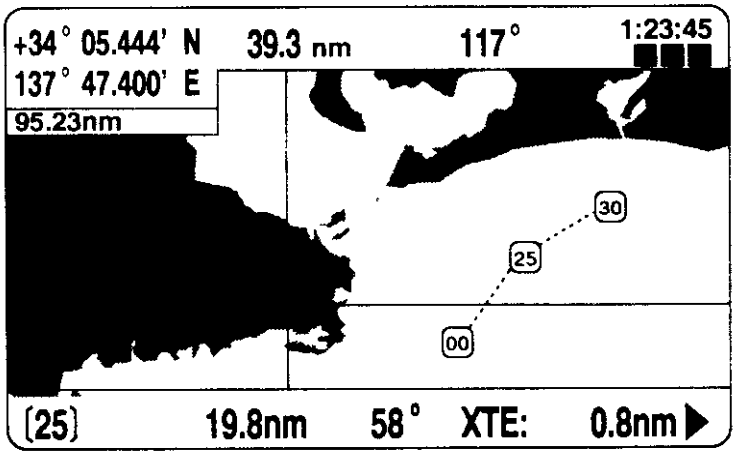


Figure 41 Appearance of waypoint-created route selected for navigation

Cancelling a Route Navigation

1) Press the **GOTO** key.

2) Press the up arrow key to select "Cancel."

3) Press the **ENT** key.

■ **NOTE:** *For cursor-created registered routes, waypoint "flags" remain on the screen after cancelling route navigation. If you do not require the route and want to erase the flags, delete all route waypoints of the route through the route list.*

16. MARK OPERATIONS

Overview

You can inscribe marks on the display to denote important locations; for example, buoy, fishing point, wreck. Further, marks can be connected with lines to mark important areas such as a hot fishing spot or danger area.

Entering Marks

1) Press the **Cursor** key to turn on the cursor.
2) Press the **Arrow** keys to set the cursor on location desired.
3) Press the **MARK** key.

Changing Mark Attributes

You may change the size, shape and tone of the mark.

Mark size

1) Press the **MENU** key.
2) Press the **1** key to select "DISPLAY SETUP."

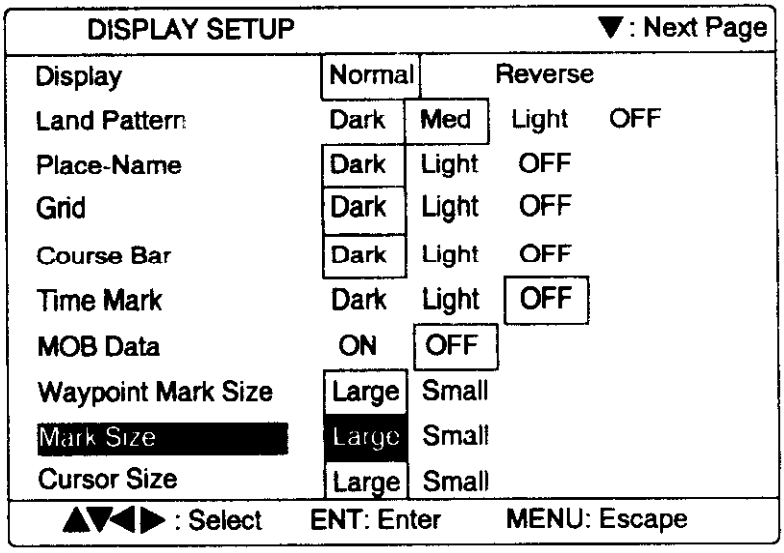


Figure 42 DISPLAY SETUP menu

3) Operating the **Arrow** keys, select "Mark Size" and "Large" or "Small."

4) Press the **ENT** key.

5) Press the **MENU** key.

Mark shape, mark tone

1) Press the **MENU** key.

2) Press the **2** key to select "TRACK/MARK SETUP."

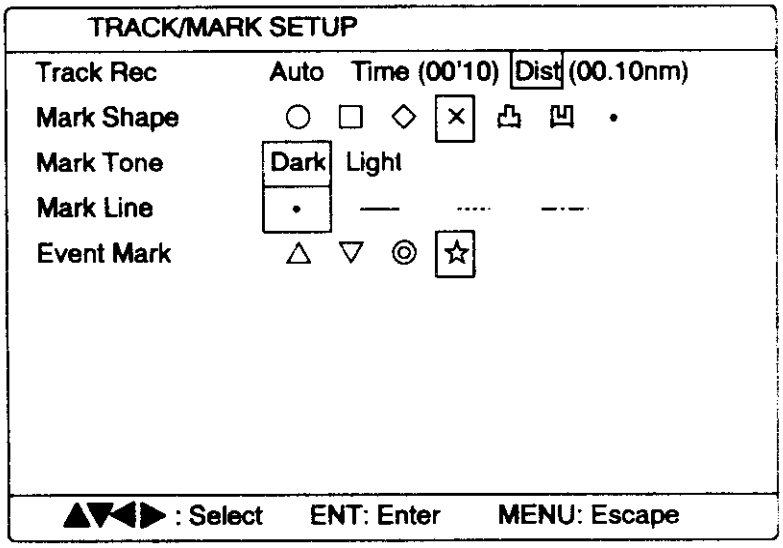


Figure 43 TRACK/MARK SETUP menu

3) Operating the **Arrow** keys, select "Mark Shape" and shape desired.

4) Operate the **Arrow** keys to select "Mark Tone" and tone desired.

5) Press the **ENT** key.

6) Press the **MENU** key.

Connecting Marks

Marks can be connected with solid or dashed lines. This feature is useful for denoting important areas. You can even construct your own charts, and save to them to a memory card for future replay.

1) Press the **MENU** key.
2) Press the **2** key to select "TRACK/MARK SETUP."
3) Operate the **Arrow** keys to select "Mark Line" to other than "single dot."
4) Press the **ENT** key.
5) Press the **MENU** key to close the menu.
6) Press the **Arrow** keys to place the cursor on location desired for mark.
7) Press the **MARK** key.
8) Repeat steps 6 and 7 to continue entering marks.

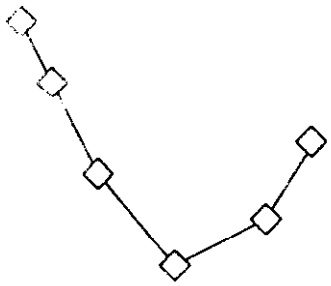


Figure 44 Marks connected with lines

To return to individual entry of marks, set "Mark Line" to "single dot" in step 3 of the above procedure.

Erasing Marks

Marks can be erased individually, collectively, or within an area you specify.

Individual

1) Press the **Cursor** key to turn on the cursor.
2) Press the **Arrow** keys to place the cursor on the mark to erase.
3) Press the **CLEAR** key.

All marks

1) Press the **MENU** key.
2) Press the **3** key to select "ERASE TRACK/MARK."

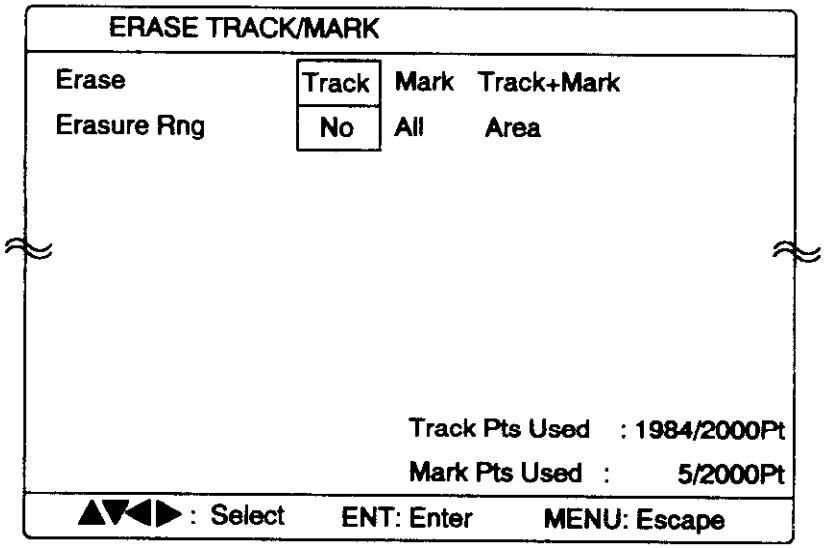


Figure 45 ERASE TRACK/MARK menu

3) Operate the **Arrow** keys to select "Mark" on the "Erase" line.
4) Press the down arrow key once.
5) Press the right and left arrow keys to select "All."
6) Press the **ENT** key.
7) If you are sure to erase, press the **ENT** key again.
8) Press the **MENU** key twice to close the menu.

Marks in a specific area

1) Do steps 1 through 3 in the previous procedure.
2) Press the **Arrow** keys to select "Area" on the "Erasure Rng" line.
3) Operate the **Arrow** keys to place the cursor at one of the corners of the area which will enclose the marks to erase.
4) Press the **ENT** key.
5) Operate the **Arrow** keys to enclose the marks to erase.

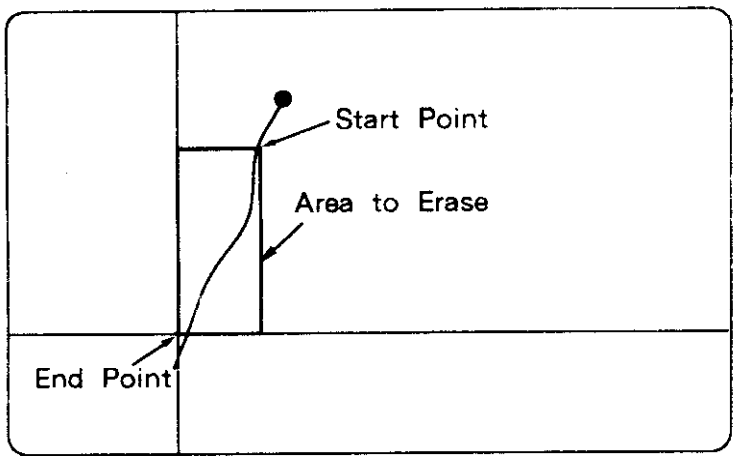


Figure 46 How to erase marks using the cursor

6) Press the **ENT** key.
7) If you are sure to erase the marks selected, press the **ENT** key.
8) Press any key.
9) Press the **MENU** key to close the menu.

17. THE EVENT MOB KEY

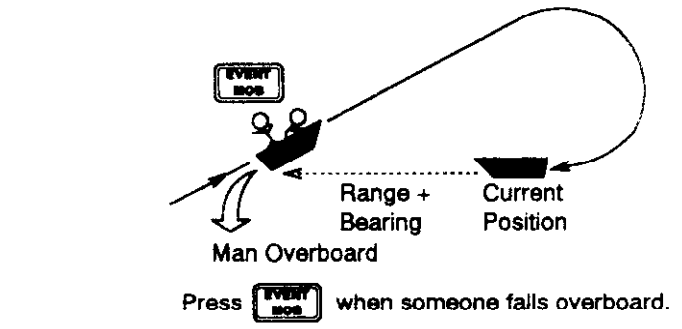
Overview

Basic function

The **EVENT MOB** key saves present position. When the key is pressed the GP-1800 saves present position at that moment and displays the event mark at that position. This key can function to save present position as either an "event position" or MOB (Man Over Board) position.

MOB function

The MOB function can be enabled on the DISPLAY SETUP menu. When enabled, the range and bearing to the MOB position are continuously updated on the display, to help you navigate to the MOB position.



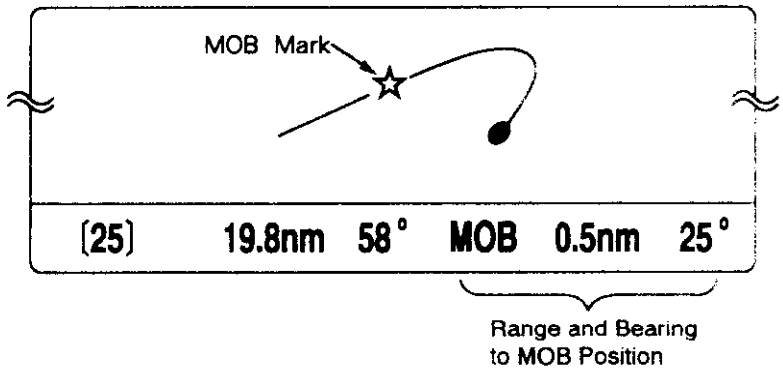


Figure 47 The MOB function

Event/MOB storage capacity

You may enter 99 event/MOB positions. The GP-1800 saves and numbers them from 01-99, 01 being the latest event/MOB position. When the event position memory is full the oldest event/MOB position is erased to make room for the latest.

Enabling the MOB Function

1) Press the **MENU** key.
2) Press the **1** key to display the DISPLAY SETUP menu.
3) Press the **Arrow** keys to display "MOB DATA ON."
4) Press the **ENT** key.
5) Press the **MENU** key.

Entering Event/MOB Position

Press the **EVENT MOB** key when you want to enter an event position/MOB position. The indication "Memorized event position" and position appear at the bottom left-hand corner of the screen and the position is marked on the display in current event mark type. For MOB position, range and bearing to it are shown.

Viewing Past Event/MOB Positions

You can view past event mark position information as follows.

1) Press the **ENT RECALL** key.

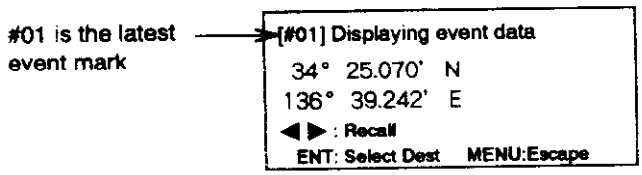


Figure 48 Event/MOB position display

2) Press the right and left arrow keys to display position number desired. You can press and hold down those keys to change the display faster.
3) Press the **MENU** key to escape.

Setting Past Event/MOB Position as Destination

1) Press the **ENT RECALL** key.
2) Press the right and left arrow keys to display position number desired.
3) Press the **ENT** key.

Erasing Event/MOB Marks

1) Press the **Cursor** key to turn on the cursor, if it is not currently displayed.
2) Press the **Arrow** keys to place the cursor on the event/MOB mark you want to erase.
3) Press the **CLEAR** key.

Changing Event/MOB Mark Shape

1) Press the **MENU** key.
2) Press the **2** key to select "TRACK/MARK SETUP."
3) Press the **Arrow** keys to select "Event Mark Shape" and shape desired.
4) Press the **ENT** key.
5) Press the **MENU** key to close the menu.

18. ALARMS

Description of Alarms

There are eight conditions which generate both aural and visual alarms in this unit.

Arrival alarm, anchor watch alarm

Arrival alarm

The arrival alarm informs you that your 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 be released if your boat enters the circle.

Anchor watch alarm

The anchor watch alarm sounds to warn you that your ship is moving when it should be at rest.

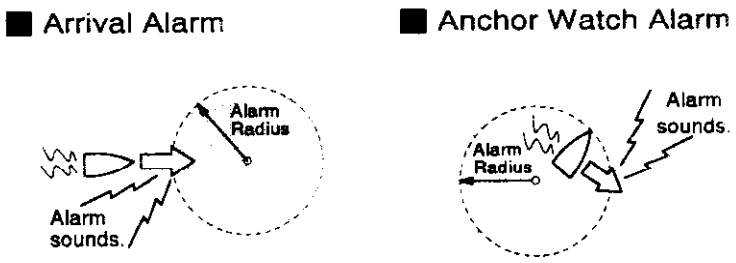


Figure 49 How the arrival and anchor watch alarms work

Cross track error (XTE) alarm, border alarm

XTE alarm

The XTE alarm warns you when your ship is off its intended course.

Border alarm

The border defines an area, comprised of a starting and destination waypoint, which you do not want your boat to cross. The alarm sounds when the boat crosses the area defined by the two waypoints.

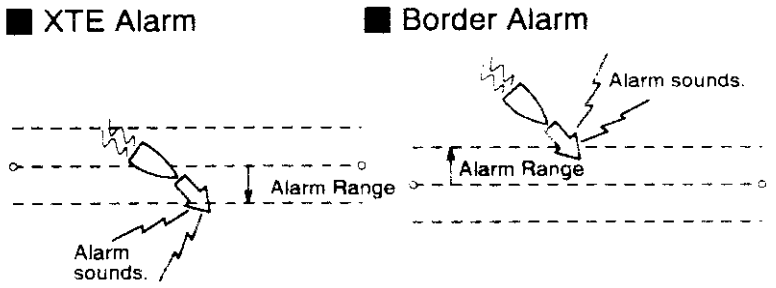


Figure 50 How the XTE and border alarms work

Ship's speed alarm

The ship's speed alarm sounds when your ship's speed is within (or over) the alarm range set.

Water temperature alarm

The water temperature alarm sounds when the water temperature is within (or over) the preset temperature range. This alarm is useful for searching for specific species of fish, since each species of fish has its own habitable water temperature. (This alarm requires connection of a water temperature sensor.)

Enabling the Alarms

1) Press the **MENU** key.

2) Press the **5** key to select "ALARM SETTINGS."

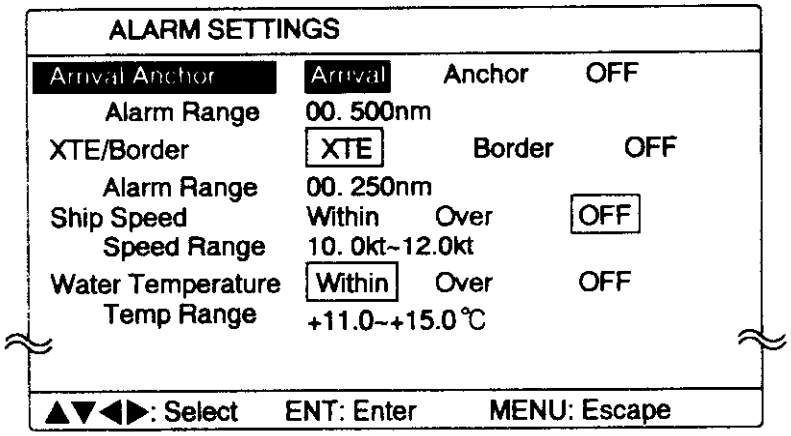


Figure 51 ALARM SETTINGS menu

3) Operate the **Arrow** keys to select alarm desired.

4) Press the down arrow key once.

5) Enter alarm range.

6) Press the **ENT** key.

7) Press the **MENU** key to close the menu.

Deleting Aural and Visual Alarms

When an alarm setting is exceeded, both aural and visual alarms are released. You can silence the aural alarm by pressing the **CLEAR** key. To erase the visual alarm, press the **CLEAR** key again. The speaker mark remains on the display until the alarm setting is no longer violated.

Disabling Alarms

Select "Off" in step 3 in "Enabling the Alarms" and then press the **ENT** and **MENU** keys.

19. MEMORY CARD OPERATIONS

Overview

This chapter shows you how to use the optional RAM memory cards.

Formatting Memory Cards

Before you can use a memory card it must be formatted. Formatting prepares the card for use with the system.

1) Insert a new memory card into the memory card drive label side up arrow pointing forward.

2) Press the **MENU** key.

3) Press the **6** key to select "MEMORY CARD OPERATIONS."

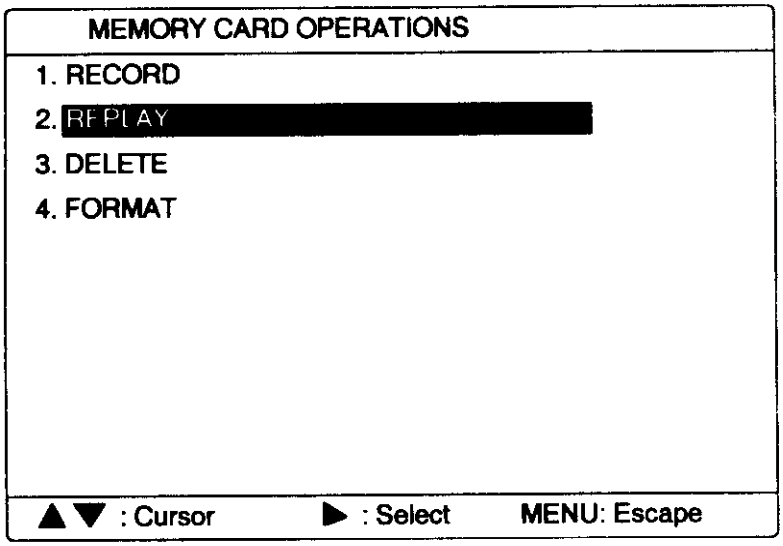


Figure 52 MEMORY CARD OPERATIONS menu

4) Press **4** to select "Format."

5) Press the **ENT** key to format the card.

6) Press the **MENU** key twice to close the menu.

Recording Data

1) Press the **MENU** key.

2) Press the **6** key to select "MEMORY CARD OPERATIONS."

3) Press the **1** key to select "Record."

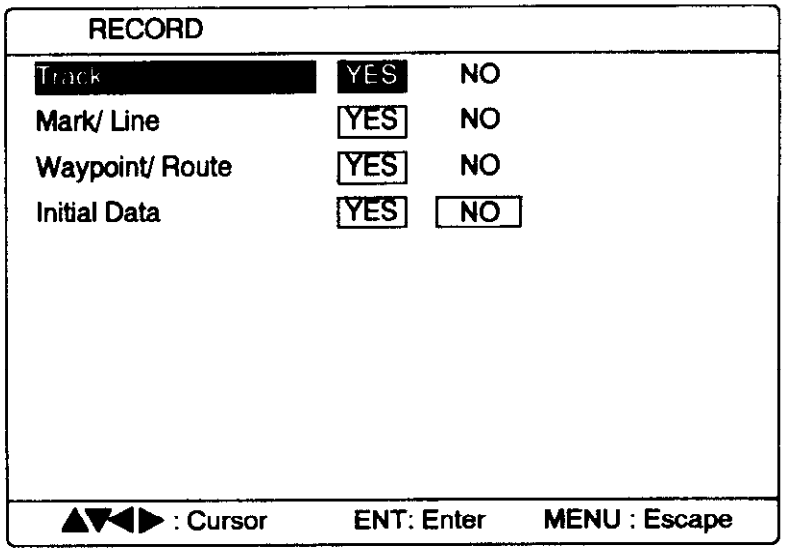


Figure 53 RECORD menu

4) Operate the **Arrow** keys to choose items to record.

5) Press the **ENT** key.

6) Press the **ENT** key again to make a new file. (You may write over an existing file if you wish; press the up and down arrow keys to select file and press the **ENT** key twice.)

7) Enter file name, using up to 16 characters. Press **Arrow** keys to select character and then press the **ENT** key. Repeat to complete file name. (Figures, + and - may be entered by direct keyboard input.)

8) Select "ENTER" and press the **ENT** key.

Write Protecting Data

The memory card contains a switch which can prevent writing of information to the card. This prevents accidental erasure of important information. To write protect a memory card, set the switch at the base of the card rightward as shown in figure below.

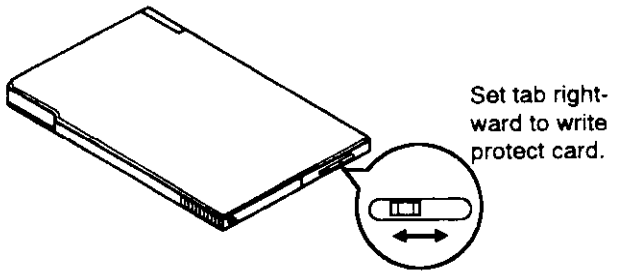


Figure 54 Location of writing enable/disable switch on memory card

Replaying Data

Data stored on a memory card can be replayed on the display. This feature is useful for analyzing past track, restoring menu settings, displaying user-constructed charts, etc.

1) Press the **MENU** key.
2) Press the **6** key to select "MEMORY CARD OPERATIONS."
3) Press the **2** key to select "Replay."
4) Operate the up and down arrow keys to choose items to replay.
5) Press the **ENT** key.
6) Press the up and down arrow keys to select file.
7) Press the **ENT** key.

Deleting Recorded Data

Unwanted data on memory card files can easily be deleted.

1) Press the **MENU** key.
2) Press the **6** key to select "MEMORY CARD OPERATIONS."
3) Press the **2** key to select "DELETE."
4) Operate the up and down arrow keys to choose items to delete.
5) Press the **ENT** key.
6) Press the up and down arrow keys to select file.
7) Press the **ENT** key.

20. CHART/POSITION OFFSET

Chart Offset

In some instances chart position may be off by a few minutes. For example, the position of the ship is shown to be at sea while it is in fact moored at a pier. You can compensate for this error by offsetting chart position.

1) Press the **MENU** key.
2) Press the **0** key to select "CHART OFFSET."
3) Press the right arrow key to select "Cursor."

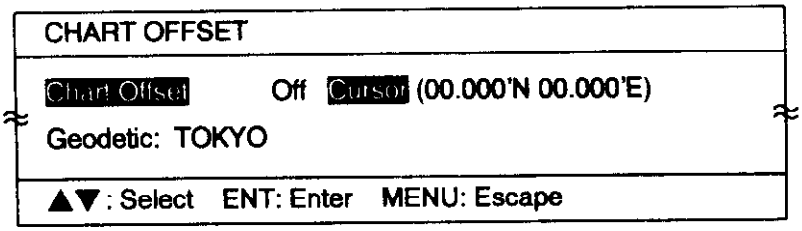


Figure 55 CHART OFFSET menu

4) Press the **ENT** key.
5) Set the cursor on correct position.
6) Press the **ENT** key. The chart offset icon ( ) appears on the display.
7) Press the **MENU** key.

To remove the offset, select "Off" in step 3 of the above procedure and press the **ENT** and **MENU** keys.

Position Offset

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

1) Press the **MENU** key.
2) Press the **9** key to select "SYSTEM SETUP."
3) Operate the **Arrow** keys to select SYSTEM SETUP menu 2/2, "Position Offset."

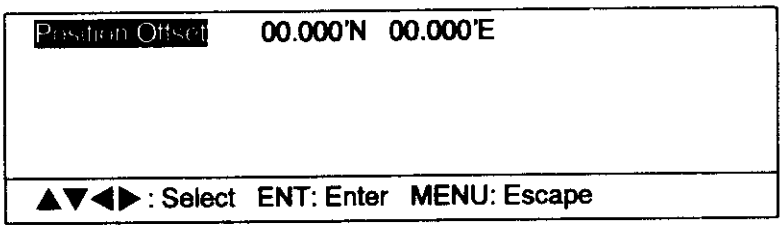


Figure 56 Display for entry of position offset

4) Enter offset with numeral keys.
5) Press the **ENT** key.
6) Press the **MENU** key.

"L/L" appears on the display to show that an offset is applied to position. To remove the offset, enter zeroes at step 4 in the above the procedure and press the **ENT** and **MENU** keys.

21. DISPLAYING LORAN LOPs

Overview

Ship's position can be displayed in either latitude and longitude or Loran A or C LOPs. To display position by Loran A or C LOPs, do the following.

1) Press the **MENU** key.

2) Press the **9** key to select "SYSTEM SETUP."

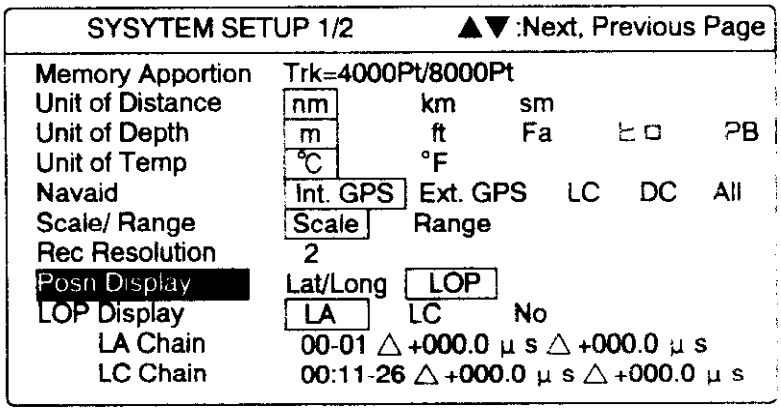


Figure 57 SYSTEM SETTINGS menu

3) Operating the **Arrow** keys, select "Pos Display" to "LOP."

4) Operating the **Arrow** keys, select "LOP Display" to "LA" (or "LC").

5) Enter Loran A (or Loran C) data with the numeral keys.

for Loran A, enter station code

(Station Code)				
00 : 1L0,	01 : 1L1,	02 : 1L4,	03 : 1L5,	04 : 1L6,
05 : 1L7,	06 : 1S1,	07 : 1S2,	08 : 1S3,	09 : 1S4,
10 : 1S6,	11 : 2HS,	12 : 2H4,	13 : 2H5,	14 : 2H6,
15 : 2S0,	16 : 2S1,	17 : 2S2,	18 : 2S3,	19 : 2S4,
20 : 2S5,	21 : 2S6,	22 : 2S7		

Figure 58 Loran A codes

For example, if you are somewhere between Japan Loran A stations 2S3 and 2S4, enter 18-19.

for Loran C, enter GRI and secondary codes

CHAIN	GRI	S1	S2	S3	S4	S5
CENTRAL PACIFIC	08 : 4990	11	29	– –	– –	– –
CANADIAN EAST COAST	11 : 5930	11	25	38	– –	– –
COMMANDO LION (Korea)	12 : 5970	11	31	42	– –	– –
CANADIAN WEST COAST	05 : 5990	11	27	41	– –	– –
SOUTH SAUDI ARABIA	16 : 7170	11	26	36	52	– –
LABRADOR SEA	13 : 7930	11	26	– –	– –	– –
EASTERN U.S.S.R.	15 : 7950	11	30	46	61	– –
GULF OF ALASKA	06 : 7960	11	26	– –	– –	– –
NORWEGIAN SEA	00 : 7970	11	26	46	60	– –
SOUTHEAST U.S.	02 : 7980	11	23	43	59	– –
MEDITERRANEAN SEA	10 : 7990	11	29	47	– –	– –
WESTERN U.S.S.R	18 : 8000	10	25	50	65	– –
NORTH CENTRAL U.S.	20 : 8290	11	27	42	– –	– –
NORTH SAUDI ARABIA	17 : 8990	11	25	40	56	69
GREAT LAKES	03 : 8970	11	28	44	– –	– –
SOUTH CENTRAL U.S.	19 : 9610	11	25	40	52	65
U.S. WEST COAST	04 : 9940	11	27	40	– –	– –
NORTHEAST U.S.	01 : 9960	11	25	39	54	– –
NORTHEAST PACIFIC	09 : 9970	11	30	55	81	– –
ICELANDIC	14 : 9980	11	30	– –	– –	– –
NORTH PACIFIC	07 : 9990	11	29	43	– –	– –

Figure 59 Loran C codes

For example, if you are currently in Osaka Bay, Japan, enter 09 (GRI 9970) and 30 and 55.

6) Press the **ENT** key.

7) Press the **MENU** key.

Entering LOP Offset

You may wish to offset Loran LOPs shown on the display to further refine position accuracy. After entering Loran chain information, enter offset.

22. CUSTOMIZING YOUR UNIT

Overview

This chapter shows you how to customize your unit to suit your needs. All customizing is done on the DISPLAY SETUP menu.

Procedure

1) Press the **MENU** key.

2) Press the **1** key to select "DISPLAY SETUP."

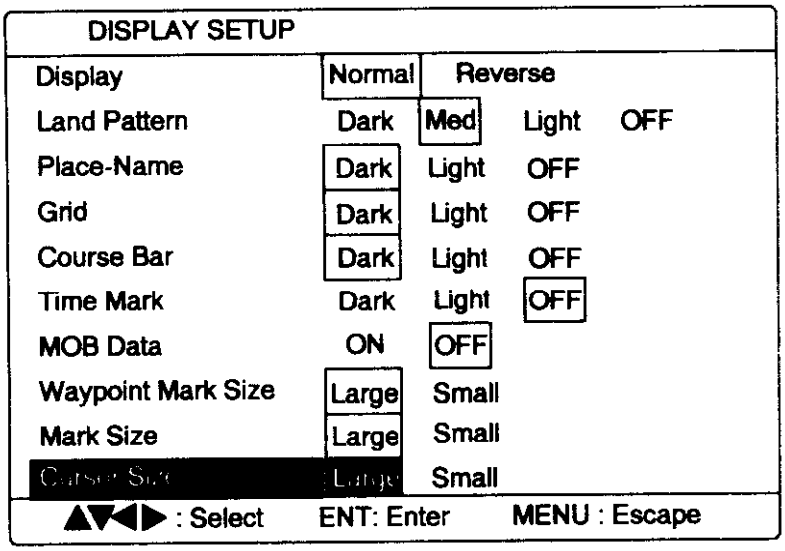


Figure 60 DISPLAY SETUP menu

3) Press the **Arrow** keys to both select item and set option.

4) Press the **ENT** key.

5) Press the **MENU** key to close the menu.

Description of DISPLAY SETUP Menu

Display Select normal (black characters on white background) or reverse tone.

Land Pattern Select land pattern; hollow or filled (choose tone).

Place-Name Select tone of place-name shown on chart.

Grid Select tone of grid.

Course Bar Select tone of ship's course bar.

Time Mark Turn time mark on or off.

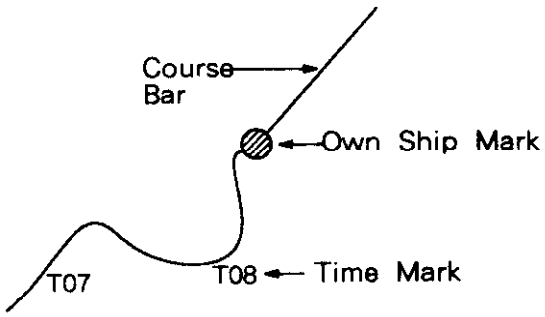


Figure 61 Time mark

MOB Data Select function of the **EVENT MOB** key to event mark (OFF) or MOB (ON).

Waypoint Mark Size Select size of waypoint mark to large or small.

Mark Size Select size of mark to large or small.

Cursor Size Select size of cursor to large or small.

Depth Contours Select tone of depth contours.

Contours Data Select tone of depth contour's depth figure.

Other Features Select tone of other chart features; for example, lighthouses, buoys, etc.

23. SYSTEM SETTINGS

Overview

The SYSTEM SETUP menu, menu 9, contains items which do not require frequent adjustment once set.

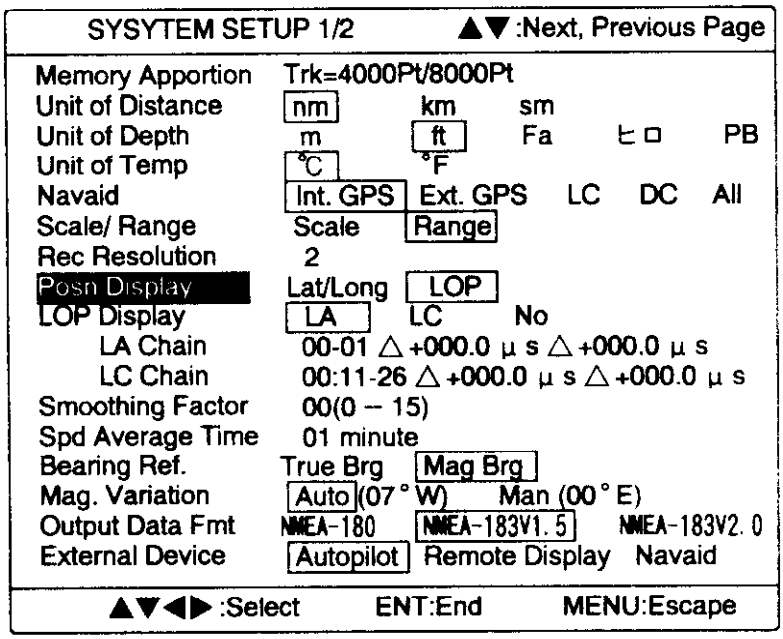


Figure 62 SYSTEM SETUP menu

Description of SYSTEM SETUP Menu

Memory Apportion

This unit can store up to 8,000 points of track and marks. The default track storage capacity is 4,000 points. If you want to change track storage capacity to 5,000, for example, enter **5**, **0**, **0**, **0** here.

Unit of Distance

You may set the unit of distance measurement to nautical miles, kilometers, or statute miles.

Unit of Depth

The unit of depth measurement can be set to meters, feet, fathoms, hiro, or passi/braza.

Unit of Temperature

Select Centigrade or Fahrenheit.

Navaid

Select navaid which is to feed position data; internal GPS, external GPS, Loran C, Decca, or All. Select "All" for multiple navaid connection. In this case position data is read in the order of GPS, Loran C, Decca, etc.

Scale/Range

Select chart scale display to scale or range.

Rec Resolution

Set recording interval for automatic plotting.

Posn Display

Select position display method; latitude and longitude or Loran LOPs.

LOP Display

If Posn Display is selected to LOP, enter Loran chain here. For further details, see "21. Displaying Loran LOPs."

Smoothing Factor

Even when the vessel is sailing in a straight line the track shown on the display looks irregular. This is due to signal variation of the external navaid. To smooth out this irregularity, change the smoothing factor here.

In the following figure, the actual ship's track is shown by a wide hatched arrow and the position being fed from the navaid is shown by black dots. If no smoothing is applied, the track shown on the display will look irregular due to signal variations.

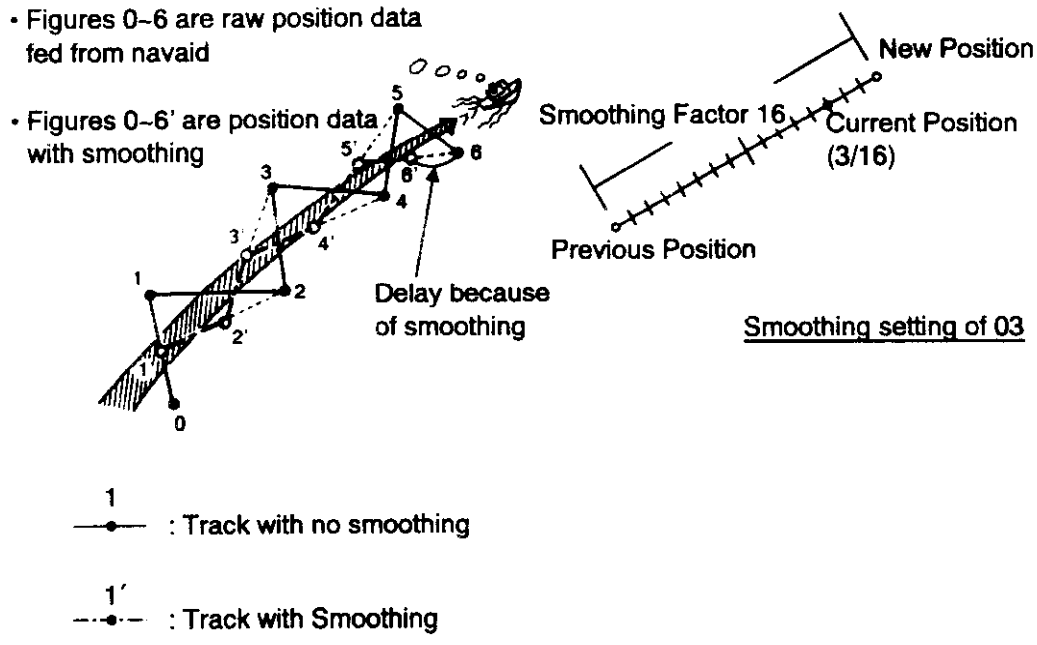


Figure 63 Comparing track with smoothing and no smoothing

For instance, number 03 provides a weighting factor of 13/16 for new data and 3/16 for previous data. The higher the smoothing number, the slower the position update becomes. In the following figure, the track shown by the broken line has a time delay more than the one shown by the dot-dash line, because of higher smoothing factor.

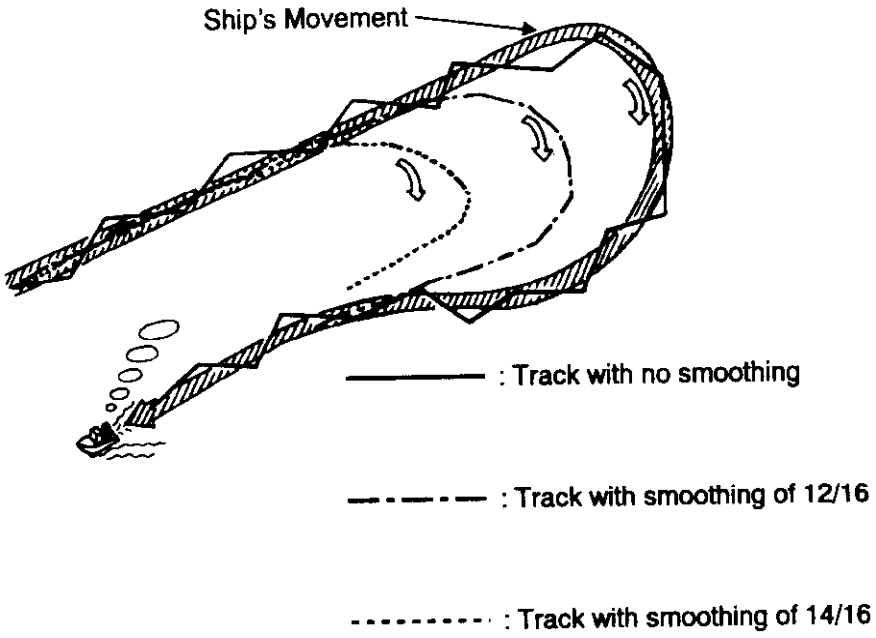


Figure 64 Comparing track and different smoothing factors

Spd Average Time

Calculation of ETA and TTG, etc. is based on an average ship's speed over a given period. If the period is too long and the ship's speed is changed suddenly, calculation error will result. The default setting is "01." Increase the setting if time calculations are in error.

Bearing Ref.

You may display bearing data in true bearing (relative to True North) or magnetic bearing (relative to magnetic North).

Mag. Variation

The location of the magnetic pole is different from the geographical North pole. This causes a difference between the true and magnetic North directions. The difference is called magnetic variation, and varies by the observation point on the earth.

This unit is programmed with the earth's magnetic variations. However, you may wish to further refine variation for a particular area. If you enter variation manually, be sure to change it when ship moves to a different area.

Output Data Format

Select the format of data output to external equipment.

External Device

Select external device connected to the GP-1800.

Time Difference

The GPS uses UTC time. If you would rather use local time, enter the difference in hours between local time and UTC. Use the [+] and [–] keys for times later or earlier than UTC.

GPS Posn Smooth

When the DOP or receiving condition is unfavorable, the GPS fix may change greatly, even if the vessel is dead in water. This change can be reduced by smoothing the raw GPS fixes. A setting between 0 and 9 is available. The higher the setting the more smoothed the raw data. Note however that too high a setting slows response time to change in latitude and longitude. This is especially noticeable at high ship's speeds. "0" is the normal setting; increase the setting if the GPS fix changes greatly.

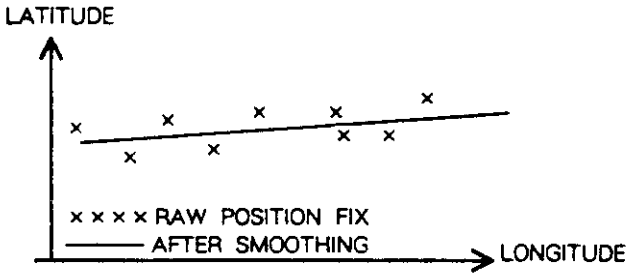


Figure 65 GPS position smoothing

GPS Speed Smooth

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. For no smoothing, enter "0." "5" is suitable for most conditions.

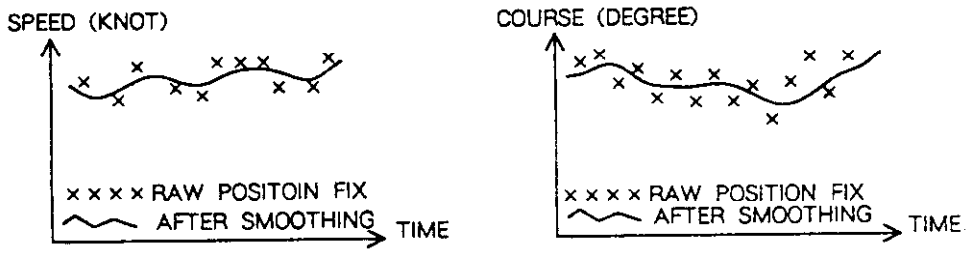


Figure 66 GPS speed smoothing

Antenna Height Enter antenna height above the waterline, for accurate determination of GPS position.

DOP Threshold This is the index for position-fixing accuracy. When the HDOP threshold is lower than the preset HDOP, position reliability worsens. The default setting is 20, which is suitable for most all conditions.

Fix Mode Select position-fixing mode. 2D, marine vessels; 3D, land mobile vehicles.

Geodetic Datum Select the geodetic chart system you are using. WGS-84 (standard GPS chart system), WGS-72 or Tokyo can be directly selected. For other charts, select "Other" and enter chart number referring to "26. Geodetic Chart List."

Position Offset You may apply an offset to position generated by the internal GPS receiver, to further refine position accuracy.

Disabled Satellite Every GPS satellite is broadcasting abnormal satellite number(s) in the Almanac. Using this information, the GPS receiver eliminates any malfunctioning satellite from the GPS satellite schedule. Once the malfunctioning satellite is returned to online status it is automatically restored to the satellite schedule when the Almanac is received. In some instances however the Almanac may not contain information which announces that a satellite is now back on line. If you hear of this through another source, you can manually restore the satellite to the satellite schedule. This is called "enable." Conversely, you can manually "disable" a healthy satellite if you hear it is "unhealthy."

DGPS Mode Select to ON if the GP-1800 is connected to a Differential GPS Receiver.

RTCM Version, Byte Format, First Bit, Parity Bit, Stop Bit, Bit Rate, Baud Rate

These are for use by service technicians. Do not change the settings.

Clear Memory

There are times you may wish to clear the Plotter memory or GPS memory (or both) to start afresh. The Plotter memory stores marks, lines, waypoints, routes and settings of the DISPLAY SETUP and SYSTEM SETUP menu. If you wish to restart operation with the items stored in the Plotter memory and your settings on the menus mentioned above, save them to a memory card before clearing the Plotter memory.

Procedure

1) Press the **Arrow** keys to select PLT, GPS, or All.
2) Press the **ENT** key.
3) Press the **ENT** key again to clear.
4) Turn off and on the power.

24. MAINTENANCE AND TROUBLE-SHOOTING

Overview

No machine can perform to the utmost of its ability unless properly maintained. This section provides maintenance and troubleshooting procedures for keeping your unit in good working order.

Maintenance Program

Regular maintenance is essential for good performance. A maintenance program should be established and should at least include the items listed in the following table.

Table 3 Recommended maintenance program

Item	Check Point	Remedy
Antenna	Check for loosened and corroded mounting bolts.	Tighten loosened bolts. Replace heavily corroded bolts.
Antenna cable	Check connection point for watertightness. Check connector for tightness and corrosion. Check cable for damage.	Replace damaged parts.
Display unit connectors	Check for tight connection.	Tighten loosened connectors.
Ground terminal	Check for tight connection and corrosion.	Clean if necessary.
Display unit	Dust and foreign material on the display unit and display screen	Dust on the display screen dims the picture. Remove dust with a soft cloth. The only recommended cleaning agent is anti-static spray. Never use chemical solvents to clean the display unit. They may remove paint and markings.

Replacement of Fuse

The fuse on the power cable protects the system from reverse polarity of the ship's mains and equipment fault. If the fuse blows, find the cause before replacing the fuse. Be sure to use a 5A fuse. Using the wrong fuse will damage the unit and void the warranty.

Replacement of Memory Card Battery

The life of a memory card battery is about three years. The first time you use a memory card record the date on the card. You should replace the battery well before its expected expiration date, so important information stored on the card will not be lost.

The battery must be replaced within 10 minutes after its removal to prevent erasure of data.

1) Using a jeweler's phillips head screwdriver, unfasten the screw at the base of the card. Remove battery.
2) Insert new battery plus side facing up. Refasten cover. Record date of battery replacement on card.

   Battery: Type BR-2325, Code No. 000-126-680

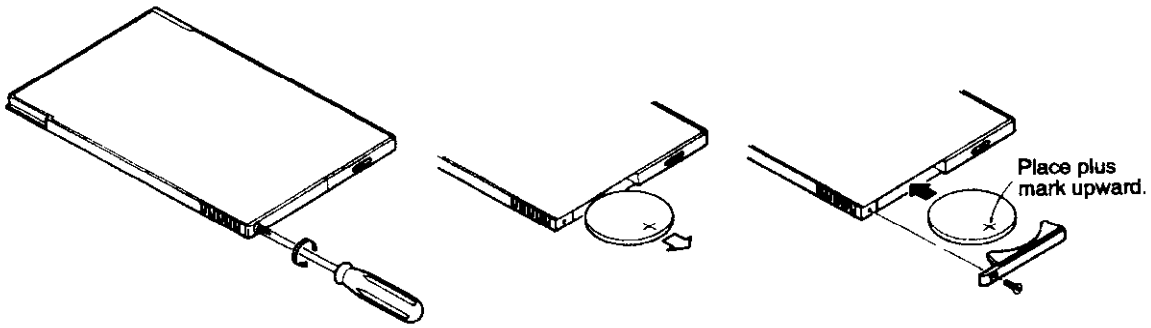


Figure 67 Replacement of memory card battery

Troubleshooting Table

The table which follows provides common operating problems and the means with which to restore normal operation. If you cannot restore normal operation by following the recommended procedures, do not attempt to check inside the unit. There are no user-serviceable parts inside. Any repair work is best left to a qualified technician.

Table 4 Troubleshooting table

IF...	THEN...
you cannot turn on the power	• check for blown fuse (5A) on power cable. • check that the power connector is firmly tightened. • check for corrosion on power cable connector. • check for damaged power cable.
power is on but nothing appears	• press the **TONE** and then the right and left arrow keys to adjust tone. • several beeps are emitted, turn the power off and on, and press the **TONE** key several times.
position is not fixed more than 15 minutes after power is applied	• check that the GPS antenna is connected. • check for frequency deviation on the "GPS Monitor" display. (See "GPS Receiver Check.") • check that three GPS satellites are being received; three filled squares should appear at the top right-hand corner of the display.
the display is showing wrong position	• check that the geodetic chart system is properly set on the SYSTEM SETUP menu. • check that the antenna height is properly entered on the SYSTEM SETUP menu.
position fixing available period is shorter in comparison with other ship's GPS receiver	• DOP value is larger than that set on other ship.
ship's track is not plotted	• plotting of track is stopped. Press the **PLOT ON/OFF** key to resume plotting, if "H" appears at the left-hand side of the display.
wrong bearing appears	• check that magnetic variation entered on the SYSTEM SETUP menu is correct.
no Loran LOPs appear	• check that proper Loran chains are entered.

(Continued on next page)

IF...	THEN...
wrong Loran LOPs indicated	• check that proper correction value is entered.
ship's speed display is not zero after ship is stopped	• try to decrease ship speed smoothing factor.
nothing happens when keys are pressed	• turn off and on the power.
you cannot save data to a memory card	• the card may be write protected. • the card may be defective.

Self-Tests

This unit contains various self-tests which check the display unit and antenna unit for proper operation. Self-tests may be selected on the SELF-TEST menu. You can display the SELF-TEST menu by pressing **MENU** and **8**.

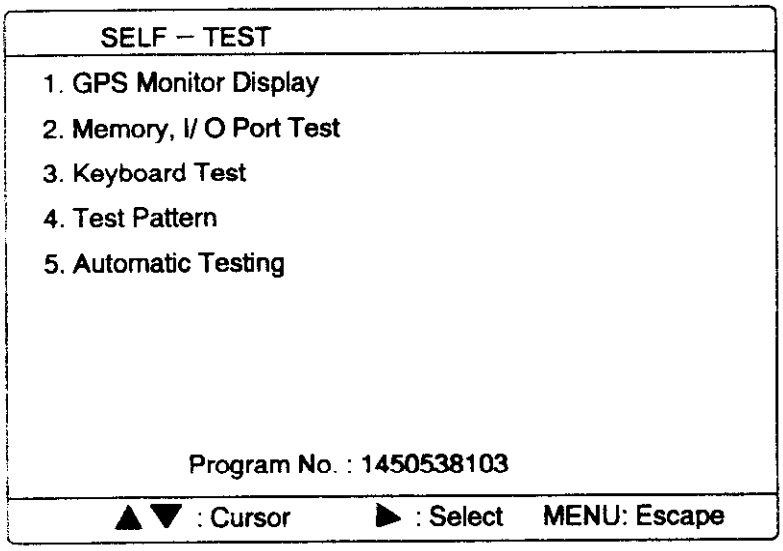


Figure 68 SELF-TEST menu

Memory, I/O port test

This test conducts a general check of the display unit and the antenna unit. Press the **2** key at the SELF-TEST menu to start the test. The unit displays the check results for each device or component as either "OK" or "NG" (No Good). The following figure shows sample memory, I/O port test results. Note that nothing appears for SIO AUX.

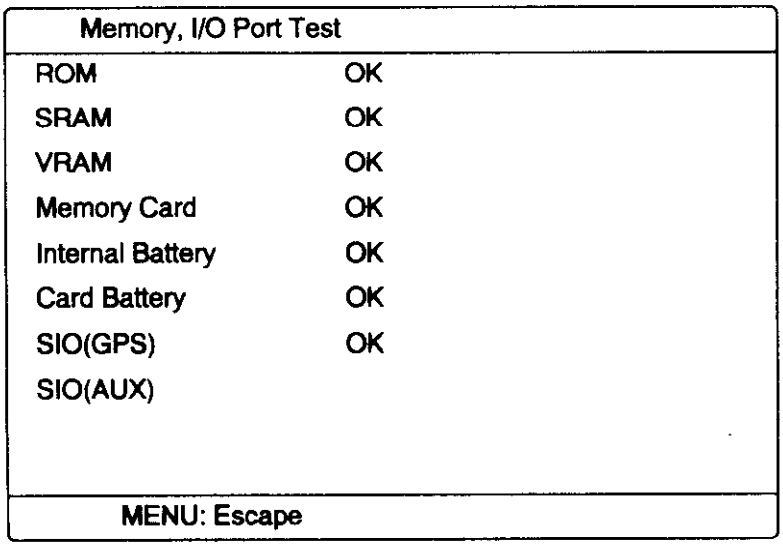


Figure 69 Sample memory, I/O port test results

Keyboard test

This test checks each front panel key for proper operation.

1) Press the **3** key at the SELF-TEST menu to start the test.

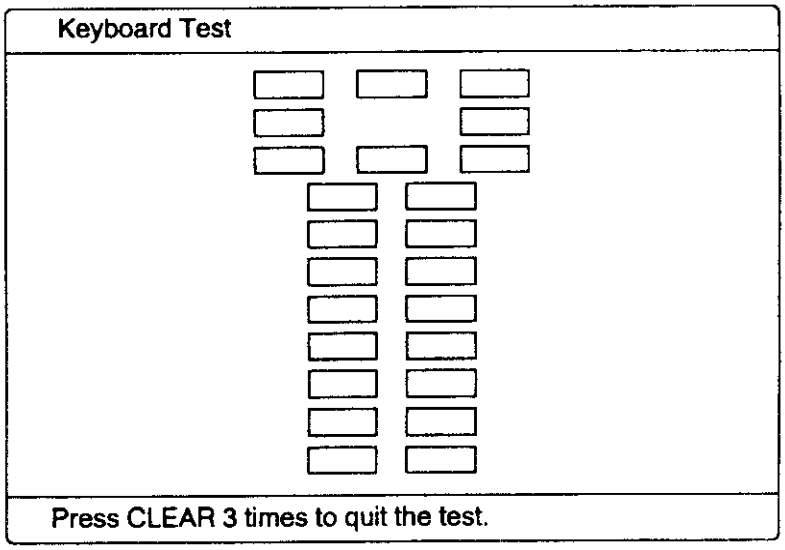


Figure 70 Keyboard test

2) Press a key. The key's location on the display "lights" in dark tone if the key is functioning normally.

3) To escape, press the **CLEAR** key three times.

Test pattern

The test patterns check whether the display circuit is working properly or not. Press the **4** key at the SELF-TEST menu to start the test. Press the **ENT** key to display other test patterns.

Automatic testing

This test continuously executes the memory, I/O test, keyboard test and test pattern self-tests. Press the **5** key at the SELF-TEST menu to start the test. You may escape at anytime by pressing the **MENU** key. Note that several seconds elapse between tests.

GPS Receiver Check

1) Press the **MENU** key.

2) Press the **8** to select "SELF-TEST."

3) Press the **1** key to select "GPS Monitor Display"

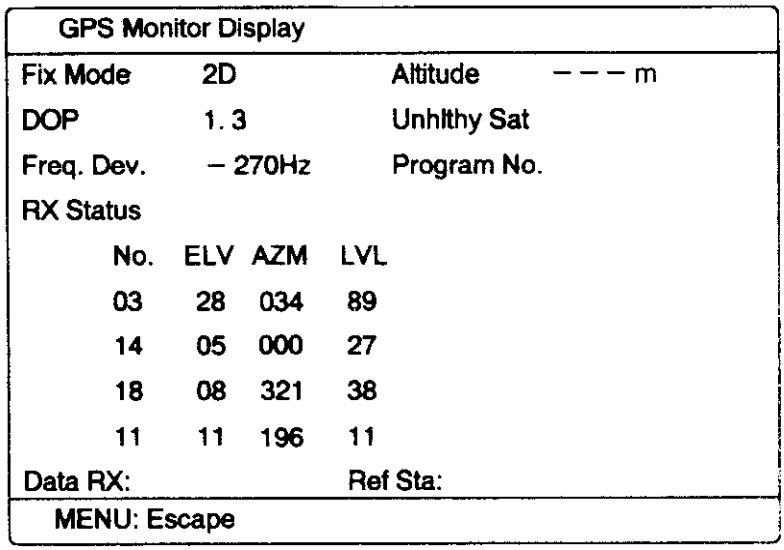


Figure 71 Sample GPS monitor display

Description of receiving status display

The following tables explains the meaning of the indications on the receiving status display.

Table 5 Description of GPS monitor display

Indication	Description
Fix Mode	This shows current position-fixing mode; 2D, 3D, and D2D, D3D (DGPS mode turned on).
Altitude	Shows present altitude of GPS receiver when position fixing mode is set to 3D.
DOP (Dilution of Precision)	This is the index for position-fixing accuracy. The lower the value the higher the accuracy. If the index exceeds 20, position fixing may not be possible.
Unhlthy Sat.	Unhealthy satellite numbers appear here.
Freq. Dev.	If this figure exceeds ±3000 Hz, it may take a long time to fix position.
Rx Status	This section shows elevation angle, azimuth and signal levels.
Data Rx	Shows extenal Nav device normal or abnomal.
Ref Sta	Shows status of DGPS transmitting station.

GPS Receiver Status Indicator

The GPS receiver status is shown on the top right-hand corner on the display. In the normal state, three squares filled appears and reliable position fixing is performed. The table below explains about the GPS receiver status indicated by three characters.

Table 6 GPS receiver status indicator

GPS Receiver Status Indicator	Descriptions
ACQ:	indicates that the GPS receiver is acquiring the GPS satellites referring to the Almanac. If it remains unchanged for a long period of time, the GPS satellite signals may be not received.
ALM:	indicates that the GPS receiver is collecting the Almanac of the GPS satellites being broadcast from each satellite. The Almanac contains estimated arrival time of all GPS satellites. If the unit is not operated for a while and the Almanac becomes too old, the GPS receiver cannot pick up the GPS satellite for a long period of time with "ACQ" indicated. In this state, cold start the GPS receiver to collect the latest Almanac using the SYSTEM SETUP menu, Memory Clear.
CST:	indicates the GPS receiver is cold staring to collect the latest Almanac. This is performed on the first power application or after clearing memory contents using the SYSTEM SETUP menu, Memory Clear.
IMP:	Impossible to receive satellite signals. Check the antenna unit is not blocked by any obstacles within line-of-sight.
INT:	Position fixing is interrupted with a loss of necessary satellite signals. Position fixing is resumed when lost sattelite signal reappears.

25. SPECIFICATIONS

DISPLAY UNIT

Display Type	8-inch monochrome LCD, 640 × 480 dot
Display Tone	Three levels

GPS RECEIVER

Receiver Format	8 channels, all in view
Tracking System	Parallel
Accuracy	Horizontal: 15 m RMS(2D, HDOP ≤3 SA OFF) Velocity: 0.1 kt RMS(2D, HDOP ≤3 SA OFF) *GPS accuracy controlled by U.S. Department of Defense.*

PLOTTER SECTION

Chart Projection	Mercator (85° latitude or below)
Track + Mark Storage Capacity	8,000 pts.
Waypoint Storage Capacity	198 pts. + external waypoint + starting waypoint
Route Storage Capacity	10 routes, 30 points per route
Alarms	Arrival, anchor watch, border, XTE (cross track error), ship's speed, water temperature

EXT. NAVAID I/O DATA FORMAT

Input Format	NMEA 0183, Ver. 1.5 or 2.0
Output Format	NMEA 0180, NMEA 0183, Ver. 1.5 or 2.0

DIMENSIONS (mm) AND WEIGHT

Display Unit: 308(W) × 198(H) × 120(D), 2.4 kg
Antenna Unit: ø90 × 50(H), 300 g

POWER SUPPLY AND POWER CONSUMPTION

10.2 – 30 VDC, 15 W

USABLE TEMPERATURE

Display Unit: 0°C – 50°C
Antenna Unit: -30°C – 70°C

WATERPROOFING SPECIFICATIONS

IEC529 IPX5 (display unit), IPX6 (antenna unit)

26. GEODETIC CHART LIST

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

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