FURUNO

OPERATOR'S MANUAL

GPS PLOTTER

MODEL   GP-1810

·Your Local Agent/Dealer

FIRST EDITION : MAY 1996
       B   : APR. 3, 1997

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⚠ SAFETY INSTRUCTIONS

"**DANGER**", "**WARNING**" and "**CAUTION**" notices appear throughout this manual. It is the responsibility of the operator of the equipment to read, understand and follow these notices. If you have any questions regarding these safety instructions, please contact a FURUNO agent or dealer.

⚠ **DANGER**	This notice indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.

⚠ **WARNING**	This notice indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ **CAUTION**	This notice indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, or property damage.

⚠ WARNING

⚠	**Hazardous voltage. Do not open the equipment.** This equipment uses high voltage electricity which can shock. Only qualified personnel should work inside the equipment.

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.

Turn off the power immediately if water leaks into the equipment, or the equipment is emitting smoke or fire.

Continued use of the equipment can cause fire or electrical shock.

Keep heater away from equipment.

Heat can alter equipment shape and melt the power cord, which can cause fire or electrical shock.
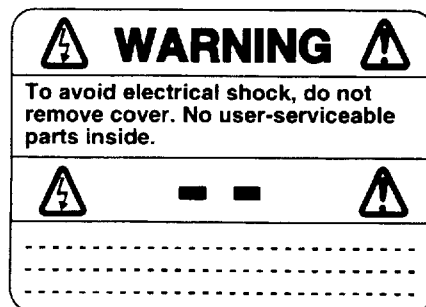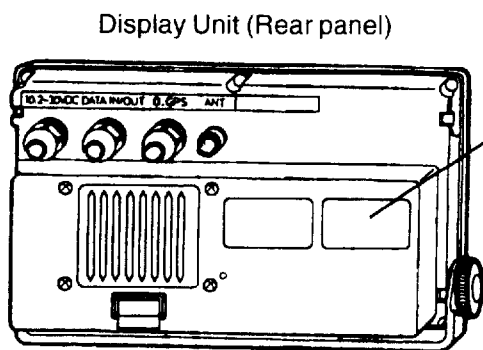
⚠ CAUTION

Use the proper fuse.

Use of a wrong fuse can result in fire or permanent equipment damage.

Power the equipment with the proper power supply.

Powering the equipment with a wrong power supply can cause permanent equipment damage.

GPS position and velocity accuracies are controlled by the U.S. Department of Defense. Position may be degraded up to 100 meters.

WARNING Label attached

Display Unit (Rear panel)

⚠ **WARNING** ⚠

To avoid electrical shock, do not remove cover. No user-serviceable parts inside.

Name : Warning Label (1)
Type : 86-003-1011-0
Code No. : 100-236-230

TABLE OF CONTENTS

MENU TREE

Main menu

FOREWORD

A Word to GP-1810 Owners

Congratulations on your choice of the FURUNO GP-1810 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

- Receives and tracks eight GPS channels simultaneously to ensure accurate position fixing and high speed trackability.
- Menu-driven operation
- Position display in latitude and longitude or Loran LOPs.
- Outputs steering information to FURUNO FAP-50/55/300/330 Autopilots.
- Provision for connection of autopilot, providing automatic steering.
- Improved position fixing accuracy by connection of DGPS Beacon receiver (option).
- FURUNO and NAVIONICS chart cards can be used.
- Memory stores 8000 points of track and marks, 99 points of event marks, 98 waypoints and 10 routes.

SYSTEM INTRODUCTION

Overview

The GP-1810 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 be connected for automatic steering to destination.
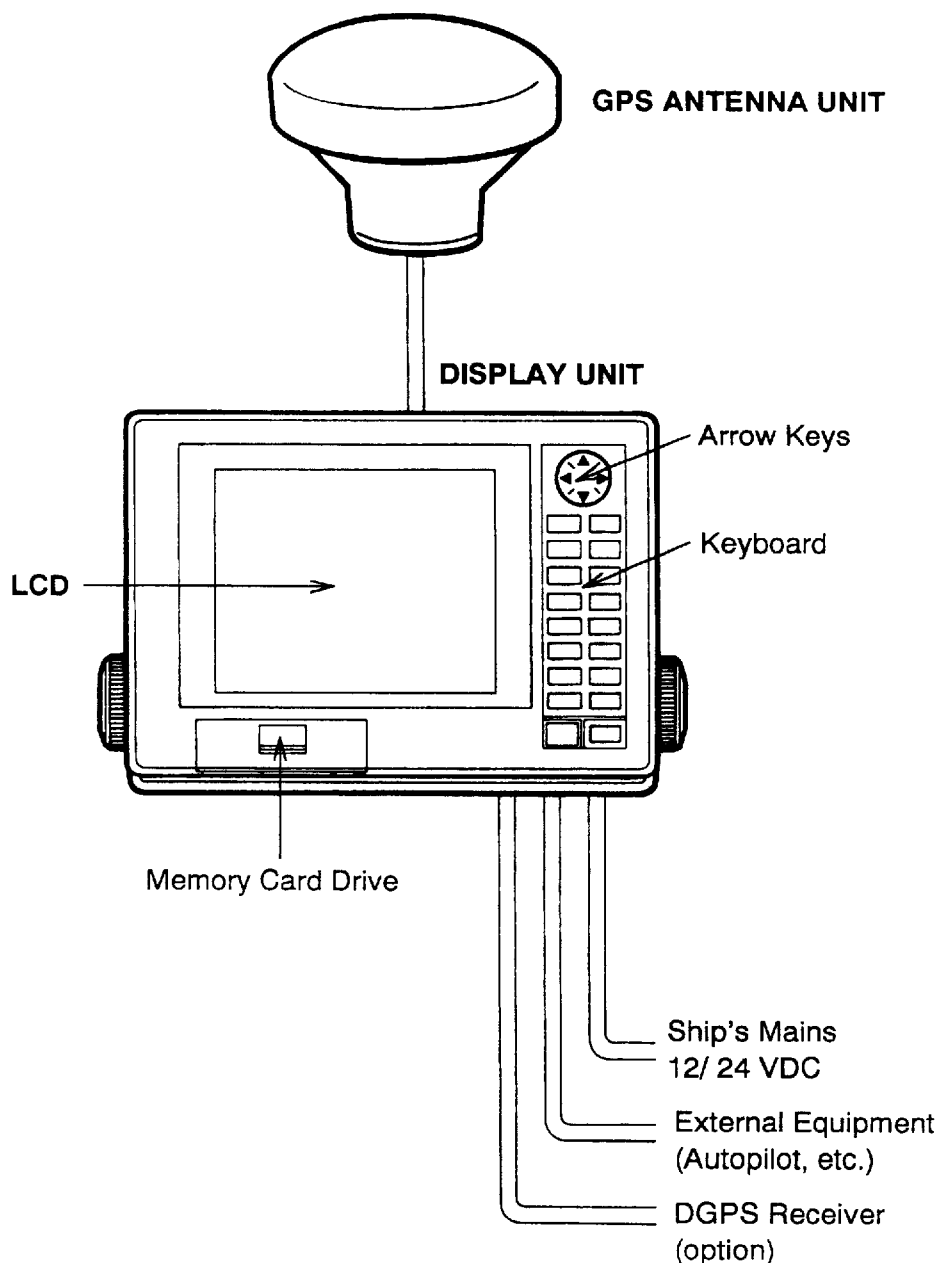
System configuration

Operation Flow Chart

```
                    ( Power  ON )
                         │
                         ├───────►  Within about 20 seconds, own ship's position
                         │          appears.
                    ┌─────────────┐
                    │ Select  display │
                    │ mode          │
                    └─────────────┘
                         │
                         │      • Plotter (own ship's track and data)
                         │      • Data (alphanumeric navigation data)
                         │      • Graphic (analog steering data)
                         │
                         ├───────►  Destination can be set
                         │          temporarily.
                    ┌─────────────┐
                    │ Register     │
                    │ Waypoints    │
                    └─────────────┘
                         │
                         │      • By latitude and logitude
                         │      • By cursor
                         │      • By own position
                         │      • By event position
                         │
                    ┌─────────────┐
                    │ Register     │
                    │ routes       │
                    └─────────────┘
                         │
                         │
                    ┌─────────────┐
                    │ Set  destination │
                    │ (waypoint or route) │
                    └─────────────┘
                         │
                         ├───────────────────►  Display steering data
                         │
                    ┌─────────────┐
                    │ Set  alarms  │
                    └─────────────┘
                         │
                         ▼
```

Perform other operations as required.
(Position correction, geodetic chart to use, enter
smoothing, calculate range and bearing to a point, etc.)

1. CONTROLS

Description of Controls

All operations of the GP-1810 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.)

Shifts cursor, display; selects items on screen. Referred to as Arrow keys in this manual.

Opens/closes menu; escapes current screen.

Selects presentation mode: north-up, course-up or highway display

Registers waypoints.

Enters marks.

Enlarges plot display.

Centers cursor, own ship's position.

Adjusts LCD tone.

Enters event position.

Terminates keyboard input; recalls event positions.

Selects display (plotter or data).

Sets/cancels destination.

Stops/resumes track plotting.

Shrinks plot display.

Turns cursor on/off.

Adjusts LCD brilliance.

Erases marks, waypoints; silences aural alarm.

Turns power on/off.

Figure 1 Front panel controls

2. BASIC OPERATING PROCEDURE

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

Inserting Coastline Data Card

1) Open the memory card drive lid.
2) Insert the card label side up arrow forward (Furuno card) and close the lid.

Coastline Card   EJECT Button
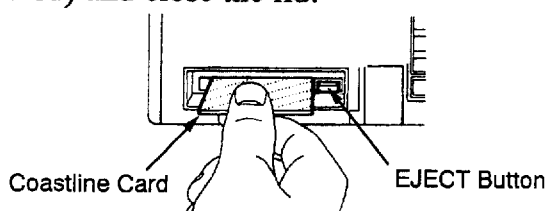
Insert card label side up arrow forward.
The EJECT button pops out when the card is fully inserted.

This side is up.

FURUNO Card   NAVIONICS Card
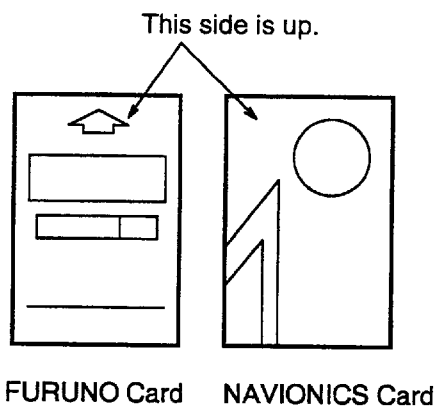
Figure 2 How to insert coastline data card

■ 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 20 seconds after the start-up procedure is completed, the ACQ indication at the upper right-hand corner of the display changes to 2D (or 3D). ACQ means the receiver is acquiring the GPS signal, and 2D (or 3D) means the ship's position is calculated correctly.

ROM OK	— CAUTION —
SRAM OK	
VRAM OK	Data displayed by this unit
	is intended as reference.
	Position should be confirmed
Internal Battery OK	against nautical charts.
	FURUNO ELECTRIC CO., LTD.

⟱
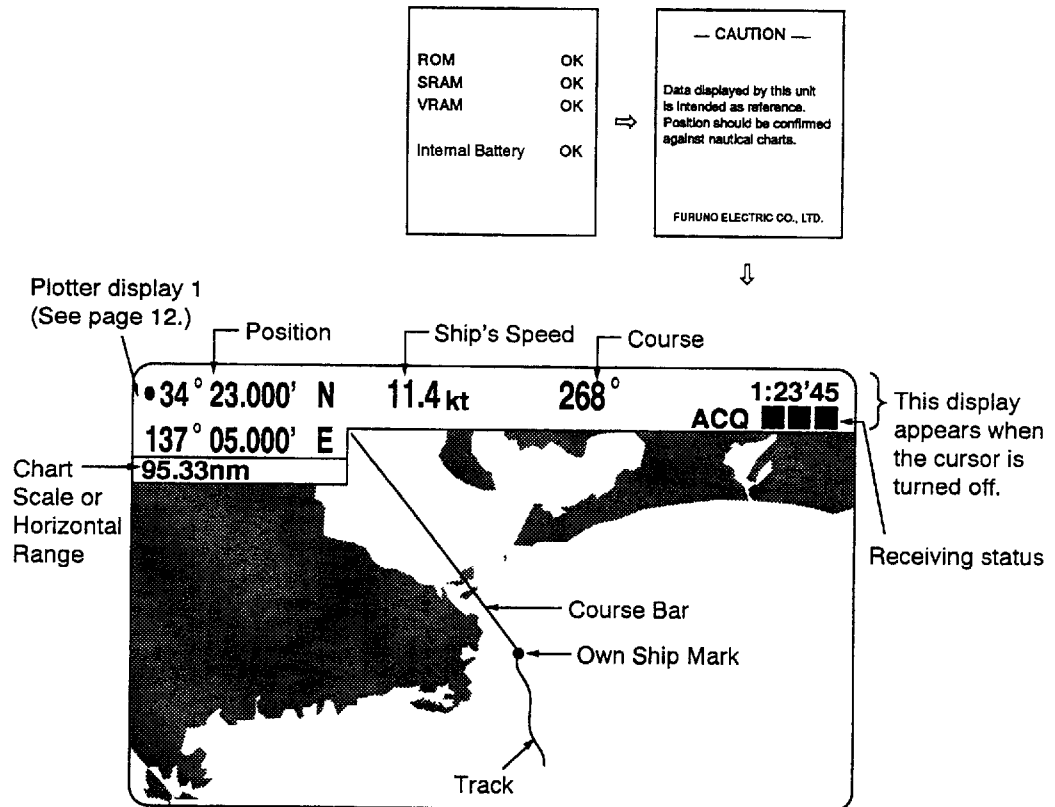
Figure 3 Sequence of start-up procedure

Receiving status is indicated as follows.

☐☐☐ : all off : No fix or DOP > 12
■☐☐ : one lit : $6 < \text{DOP} \leq 12$
■■☐ : two lit : $3 < \text{DOP} \leq 6$
■■■ : three lit : $\text{DOP} \leq 3$

(The lower the DOP value, the more accurate the position fix. See page A-6 for details.)

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■ NOTE: It takes 2 to 3 minutes to fix your position when the unit is first installed.
■ NOTE: The "DEMO" icon appears when the display is in the demonstration mode. To return to normal mode, turn off the power and then turn it on while pressing and holding down the ENT key.

Adjusting Brilliance and Tone of the LCD

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

	[−]	[+]	[Current]
Tone :	◀	▶	7
Brilliance :	▼	▲	2

Figure 4 Display for adjustment of tone and brilliance

Turning Off the Power

Press the **POWER** key.

■ NOTE: Wait for a couple of seconds to turn on the unit again.

3. 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. You can shift the cursor by operating the **Arrow** keys. The cursor moves in the direction of the key pressed. When the cursor reaches an edge of the display, the display is scrolled.

Latitude and Longitude of Cursor

Range and Bearing from Current Position to Cursor

+36° 44.257' N   16.7 nm 268°
134° 40.719' E
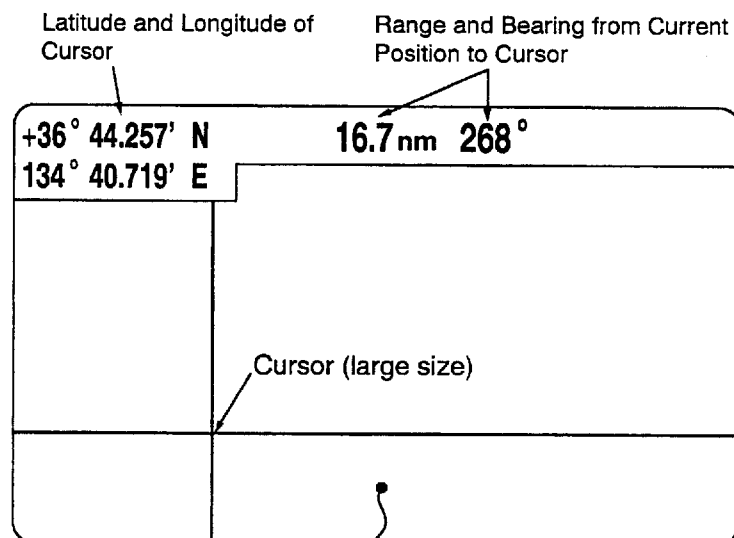
Cursor (large size)

Figure 5 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 "17. CUSTOMIZING YOUR UNIT."

4. DISPLAYING CHARTS

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 **ZOOM IN** or **ZOOM OUT** key to adjust display scale. One of three icons appears at the left side of the display to help you select suitable chart scale.

Table 1 Chart scale icons and their meanings

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

■ NOTE: When you newly insert a coastline data card, the chart does not immediately appear on the display. Press the [ZOOM IN] or [ZOOM OUT] key to reformat the screen and display the chart.

Display Range (FURUNO chart only)

When the **ZOOM OUT** key is pressed, you will see several frames with letters in them. 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.
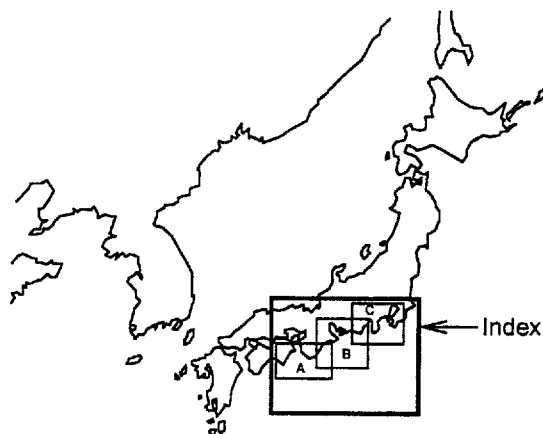
Figure 6 Sample chart (Japan and South Korea)

Symbols on FURUNO Chart

The table below shows chart symbols used on FURUNO digital charts and their meanings.

Table 2 Symbols on FURUNO digital charts

Symbol	Description	Symbol	Description
⚠	Summit	●	Position of Sounding
─┼┼─	Wreck	✕	Obstruction
⊕	Lighthouse	🐟✕	Fishing Reef
🗼	Lighted Buoy	☐	Platform
🔲	Buoy	⚓	Anchorage
⊙	Radio Station	◇ R	*Lighted Buoy
® Ⓦ Ⓖ	*Lighthouse		

*Newly designed chart card only

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Lighthouse and Buoy Data Display

Newly designed FURUNO chart cards show lighthouses and lighted buoys as shown in Figure 7.
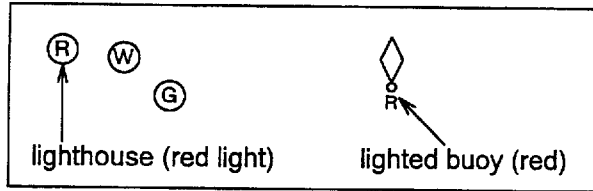
Figure 7 Appearance of lighthouse or buoy mark

Finding buoy or lighthouse data

Place the cursor on a buoy or lighthouse mark. Data appears by the buoy or lighthouse mark selected.
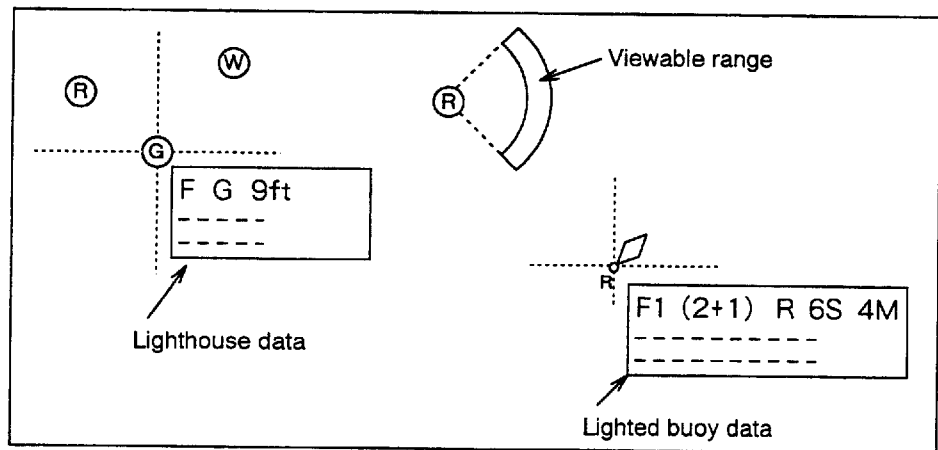
FURUNO Chart
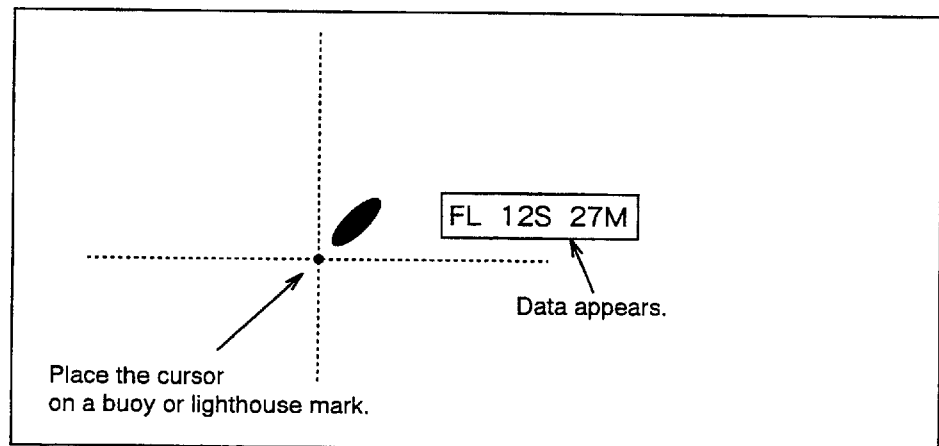
NAVIONIC Chart

Figure 8 Selecting buoy or lighthouse to find its data

Lighthouse or buoy data is abbreviated on the display as follows.

Example

FL (2) R 12S   15M

- Visibility in nautical miles (ex. : red)
- Period (ex. : 12seconds)
- Color (ex. : red)
- Number of flashes per period (ex, : 2)

```
FL   : Flashing
F    : Fixed light
F FL : Fixed and Flashing light
MO   : Morse code light
Oc   : Occulting light
```
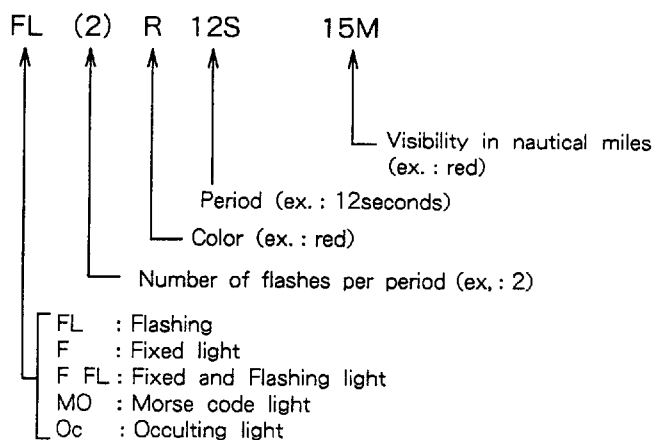
Difference Between FURUNO Chart and NAVIONICS Chart

Table 3 FURUNO chart vs. NAVIONICS chart

Item	FURUNO	NAVIONICS
Dot scrolling capability	YES	YES
Course-up display	YES	NO
Zoom at cursor position	YES	*1
Range at Equator	1, 1.5, 2, 3, 4, 6, 8, 12...8192 nm	0.125, 0.25, 0.5, 1, 2, 4, 8...1024 nm
Chart offset data entry	YES	NO
Centering	YES	*2

*1: The cursor may not be centered.
*2: The own ship position may not be centered perfectly.

5. SHIFTING THE DISPLAY

Centering Ship's Position

1) Press the **CURSOR** key to turn off the cursor.
2) Press the **CENTER** key.

■ **NOTE: Ship's position may not be centered perfectly on a NAVIONICS chart.**

Centering a Location

1) Press the **CURSOR** key to turn on the cursor.
2) Operate the **Arrow** keys to set the cursor on the location you want to center.
3) Press the **CENTER** key.

■ **NOTE: The cursor may not be perfectly centered on a NAVIONICS chart.**

Scrolling the Display

1) Press the **CURSOR** key to turn off the cursor.
2) Operate the **Arrow** keys to scroll the display in direction desired.

■ **NOTE: The NAVIONICS chart may disappear for some time when scrolling the display.**

6. ABOUT THE DISPLAYS

How to Select a Display

There are four types of displays which you can select.

1) Press **DISPLAY SEL** key. The following screen appears.

```
┌─────────────────────────────┐
│         Plotter Disp 1      │
│              ▲              │
│  Data Disp 1 ◄ • ► Data Disp 2 │
│              ▼              │
│         Plotter Disp 2      │
│                             │
│      ▲▼◄►: Select           │
└─────────────────────────────┘
```
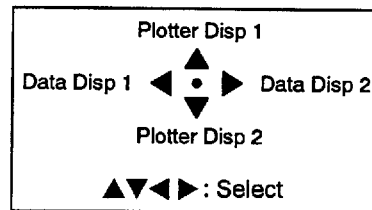
Figure 9 Screen for selection of display

■ **NOTE: If an arrow key is not pressed within 10 seconds, the menu screen disappears.**

2) Press the **Arrow** keys to select display desired.
3) Press the **ENT** key.

Plotter Displays

Plotter 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.

Plotter Display 1
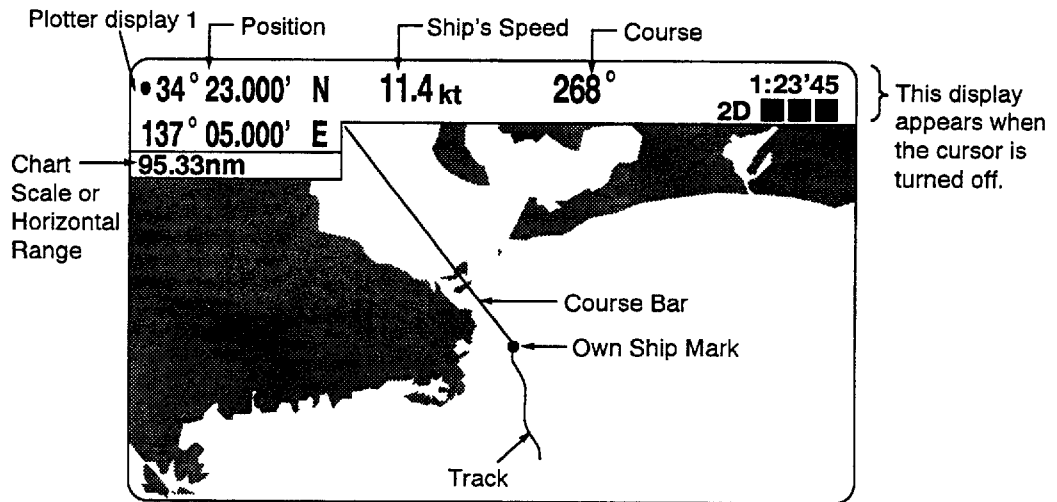
Figure 10 Plotter display 1

Plotter Display 2
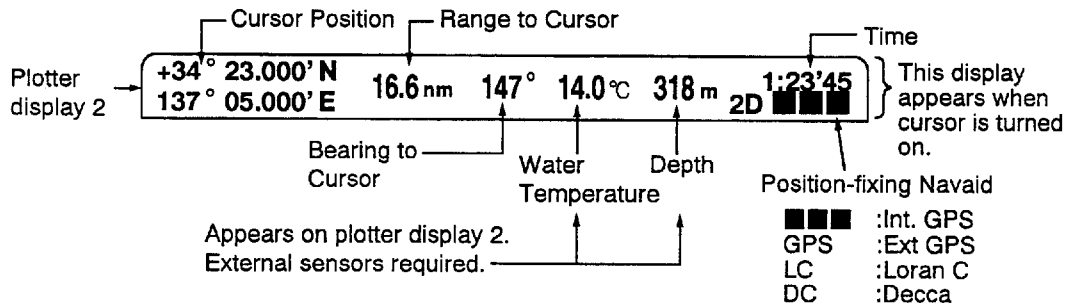
Figure 11 Plotter display 2

Data Displays

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

Data display 1
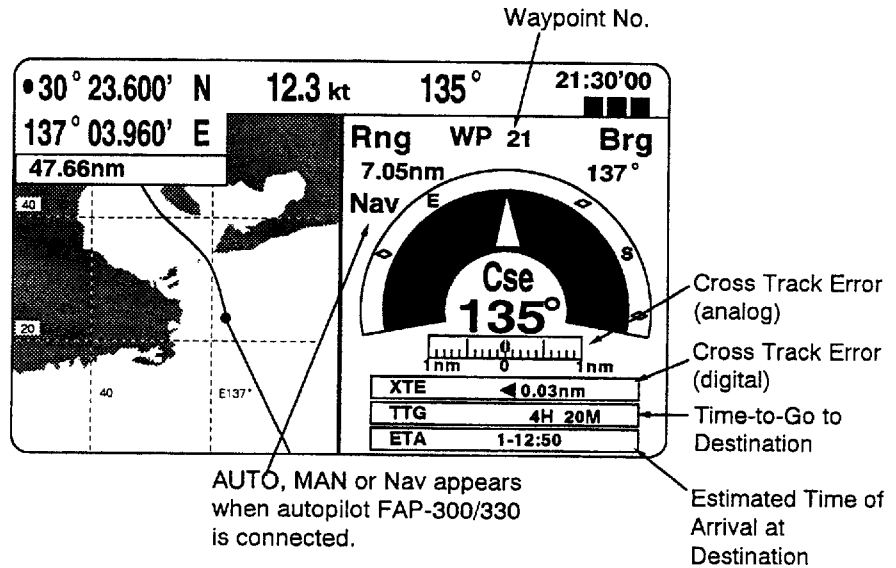
Figure 12 Data display 1

Data display 2
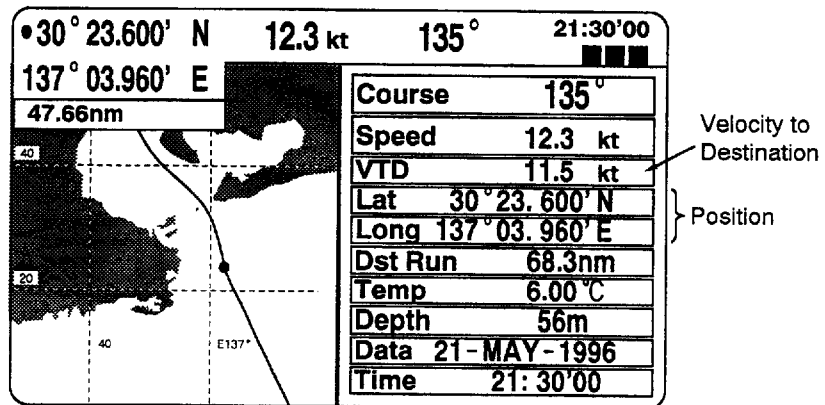
■ **NOTE: To reset DST RUN (Distance Run), press the CLEAR key in this display.**

Figure 13 Data display 2

Presentation Mode

North-up presentation

North is 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.
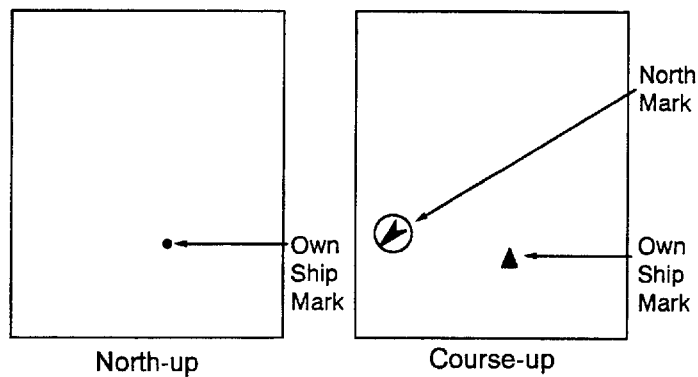
Figure 14 North-up and course-up presentations

How to change presentation mode

1) Press the **NU/CU** key. The presentation mode changes from north-up to course-up or vice-versa.
   When this key is pressed, north-up, course-up or highway display can be selectable. See page 34 for highway display.

Icons

Various icons appear on the display to alert you to equipment status.

🗾	: Chart scale icons are explained on page 6.
⊞	: Chart position offset applied.
L/L	: L/L position offset applied.
H	: Track recording turned off.
⬜	: Alarm is violated.
🔋	: Low voltage of internal battery or memory card battery.
DE MO	: Demonstration display.

7. 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.

```
┌─────────────────────────────────────────────┐
│   MENU                                        │
├─────────────────────────────────────────────┤
│  1.█DISPLAY SETUP████████████████             │
│  2. TRACK/MARK SETUP                          │
│  3. ERASE TRACK/MARK                          │
│  4. ROUTE/ROUTE LIST                          │
│  5. ALARM SETTINGS                            │
│  6. MEMORY CARD OPERATIONS                    │
│  7.                                           │
│  8. SELF-TEST                                 │
│  9. SYSTEM SETUP                              │
│  0. CHART OFFSET                              │
├─────────────────────────────────────────────┤
│  ▲▼ : Cursor      ▶ : Select   MENU: Escape   │
└─────────────────────────────────────────────┘
```
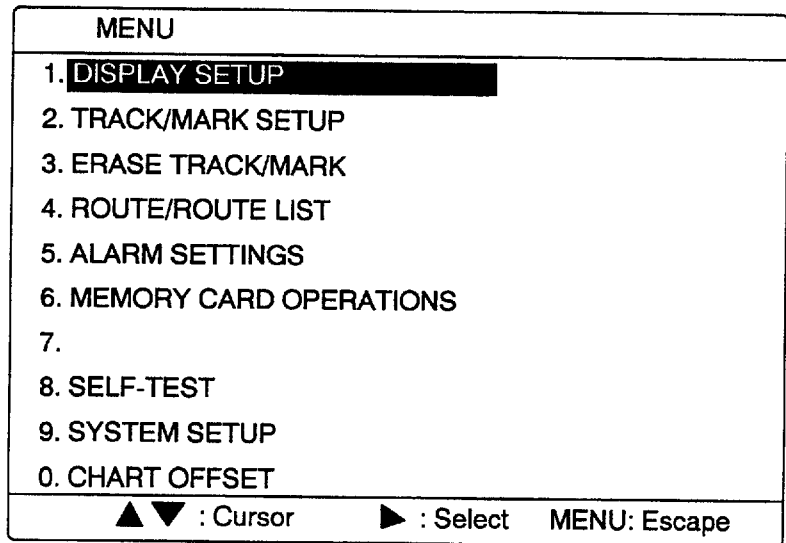
Figure 15 Main menu

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.

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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 16 TRACK/MARK SETUP menu

8. 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 plotting of track." appears momentarily.

Setting Track Recording Interval

In drawing the track, first the ship's position (fed from the internal GPS receiver) is stored into this unit's memory at an interval of time or 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.

Picture shifted ↓   Picture shifted ↓

(a) Long plotting interval   (b) Short plotting interval
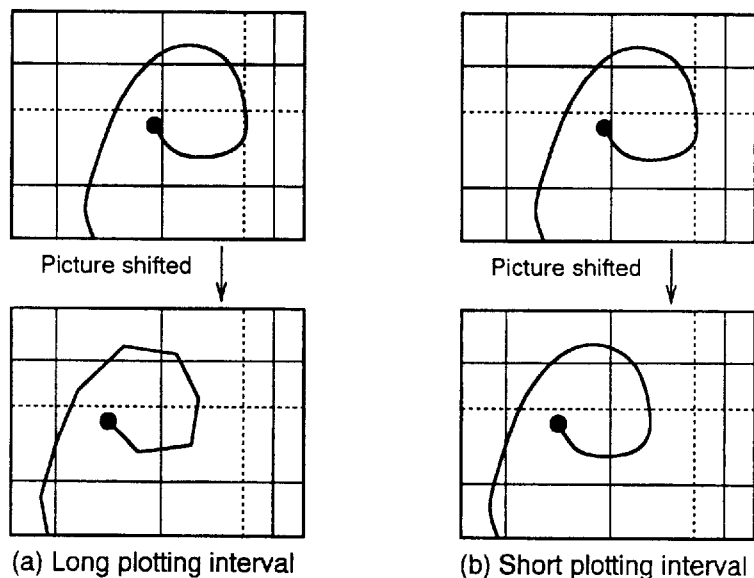
Figure 17 Track reconstruction and plotting interval

Procedure

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

```
┌─────────────────────────────────────────────┐
│  TRACK/MARK SETUP                            │
│ ┌───────────────────────────────────────┐   │
│ │ Track Rec      Auto  Time (00'10) │Dist│(00.10nm) │
│ │                                       │   │
│ │ Mark Shape     ○  □  ◇ │×│ ♋ ♌  •   │   │
│ │                                       │   │
│ │ Mark Tone      │Dark│ Light          │   │
│ │                                       │   │
│ │ Mark Line      │ • │  ──   .....  _._ │   │
│ │                                       │   │
│ │ Event Mark     △  ▽  ◎ │☆│          │   │
│ │                                       │   │
│ │                                       │   │
│ │                                       │   │
│ │                                       │   │
│ │ ▲▼◀▶ : Select   ENT: Enter   MENU: Escape │
│ └───────────────────────────────────────┘   │
└─────────────────────────────────────────────┘
```

Figure 18 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 recording 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.

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.

Erasing 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.

Erasing 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, and then press 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 you want to erase.
4) Press the **ENT** key.
5) Operate the **Arrow** keys to enclose the track to erase.
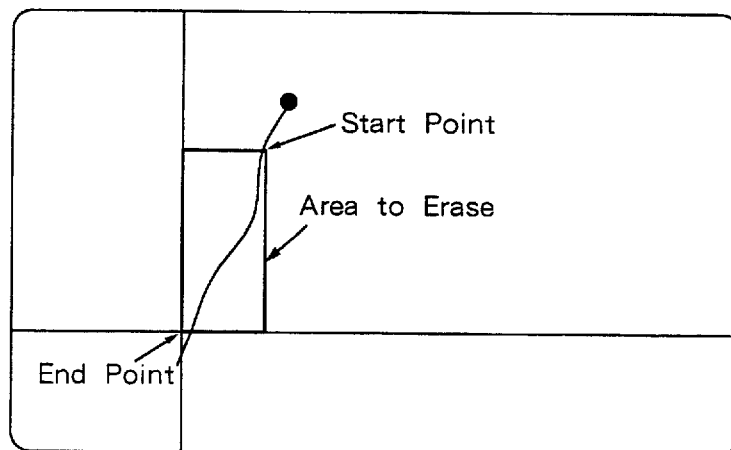
Figure 19 How to erase track using the cursor

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.

9. THE EVENT MOB KEY

Overview

Basic function

The **EVENT MOB** key saves present position. When the key is pressed the GP-1810 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.

Man Overboard

Press [EVENT MOB] when someone falls overboard.

Range and Bearing to MOB Position
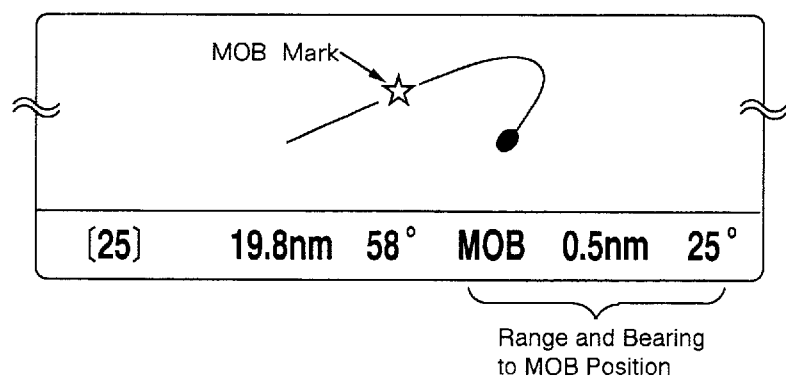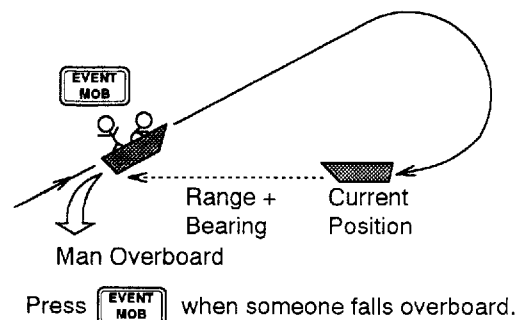
Figure 20 The MOB function

Event/MOB storage capacity

You may enter 99 event/MOB positions. The GP-1810 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 also shown.

Viewing Event /MOB Positions

You can view event mark position information as follows.

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

#01 is the latest ──────▶ [#01] Displaying event data
event mark

```
[#01] Displaying event data
    34° 25.070' N
136° 39.242' E
◀ ▶ : Recall
ENT: Select Dest    MENU: Escape
```
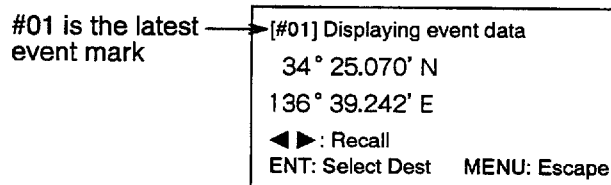
Figure 21 Display for selection of event position

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

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.

10. 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

Entering marks at cursor intersection
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.

Entering marks at own ship position
1) Press the **Cursor** key to turn off the cursor.
2) Press the **MARK** key.

Changing Mark Attributes

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

Mark size

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

DISPLAY SETUP			▼ : Next Page	
Display	Normal		Reverse	
Land Pattern	Dark	Med	Light	OFF
Place-Name	Dark	Light	OFF	
Grid	Dark	Light	OFF	
Course Bar	Dark	Light	OFF	
Time Mark	Dark	Light	OFF	
MOB Data	ON	OFF		
Waypoint Mark Size	Large	Small		
Mark Size	Large	Small		
Cursor Size	Large	Small		
▲▼◄► : Select	ENT: Enter	MENU: Escape		

Figure 22 DISPLAY SETUP menu

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Mark shape, mark tone

3) Operating the **Arrow** keys, select "Mark Size" and "Large" or "Small."
4) Press the **ENT** key.
5) Press the **MENU** key.

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

```
┌─────────────────────────────────────────────────────┐
│ TRACK/MARK SETUP                                     │
│ ┌─────────────────────────────────────────────────┐ │
│ │ Track Rec    Auto   Time (00'10) │Dist│ (00.10nm) │ │
│ │ Mark Shape   ○  □  ◇ │×│ ⌂ ⊔ ·                    │ │
│ │ Mark Tone   │Dark│ Light                          │ │
│ │ Mark Line   │ · │ ──  ····  ─·─                  │ │
│ │ Event Mark   △ ▽ ◎ │☆│                           │ │
│ │                                                   │ │
│ │                                                   │ │
│ ├─────────────────────────────────────────────────┤ │
│ │ ▲▼◀▶ : Select   ENT: Enter   MENU: Escape        │ │
│ └─────────────────────────────────────────────────┘ │
└─────────────────────────────────────────────────────┘
```

Figure 23 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.

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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.
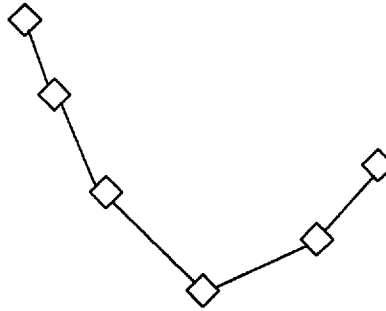
Figure 24 Marks connected with lines

To return to individual entry of marks, set "Mark Line" to "single dot" in step 3 of the above procedure and then press the **ENT** and **MENU** keys.

Erasing Marks

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

Erasing Individual marks

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.

Erasing all marks

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

```
┌─────────────────────────────────────────────────┐
│  ERASE TRACK/MARK                                │
│  ┌──────────────────────────────────────────────│
│  Erase        │Track│ Mark   Track+Mark          │
│  Erasure Rng  │ No  │ All    Area                │
∿                                                 ∿
│                                                  │
│                Track Pts Used  : 1984/4000Pt     │
│                Mark Pts Used  :      5/4000Pt    │
│  ▲▼◄► : Select    ENT: Enter    MENU: Escape     │
└─────────────────────────────────────────────────┘
```

Figure 25 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 or left arrow key 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.

Erasing 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.
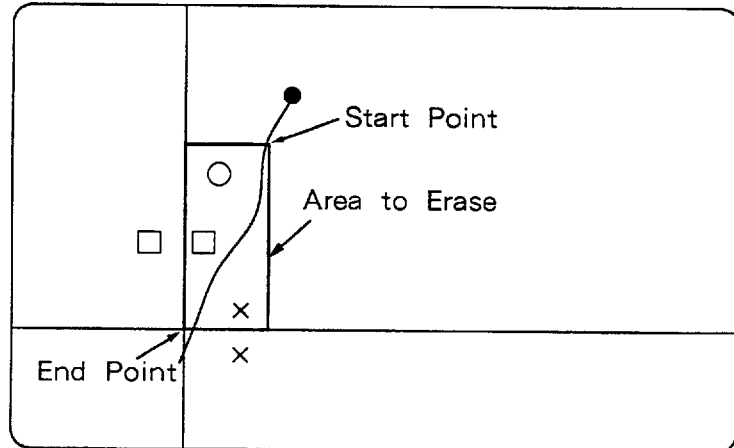
Figure 26 How to erase marks by the cursor

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.

Target Mark

A target mark ⊗ appears on the display when a radar target's L/L data (cursor position data) is fed from the radar connected. The following radars can output target L/L data : FR-1500 MARK-2 series, FR-2805 series, FR-2100 series and others.

To erase the target mark, place the cursor on the mark and press the **CLEAR** key.

11. 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-1810 requires to get you to a destination, in the shortest distance possible.
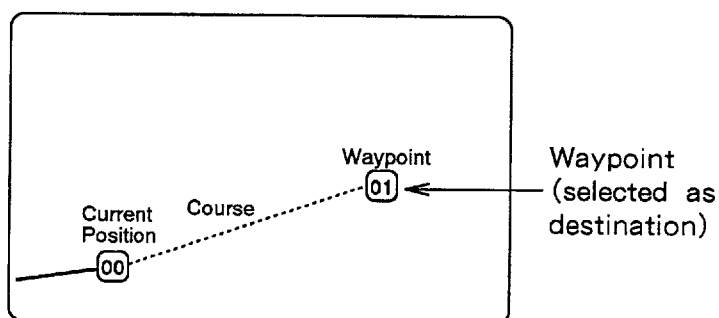
Figure 27 Waypoint 01 selected as destination

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

Entering waypoints by the cursor

1) Press the **WPT** key.
2) Press the down arrow key to select "Cursor."
3) Press the **ENT** key.
4) Set the cursor on position desired.
5) Press the **ENT** key.

```
┌─────────────────────────────────┐
│  Lat  :  34° 25. 070' N          │
│  Long : 136° 39. 242' E          │
│  No.  : █_                       │
│  Cmnt : _____      │
│  ─────────────────────────────   │
│  ENT: Enter    MENU: Escape      │
└─────────────────────────────────┘
```
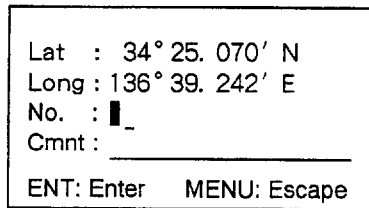
Figure 28 Display for entering waypoint number

6) Enter waypoint number.

■ **NOTE: You can let your unit automatically assign waypoint number if desired. Simply select waypoint and then 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. See next paragraph for how to enter comments.

8) Press the **ENT** key.

In a few moments the waypoint entry display disappears. You should see the waypoint on the display — an octagon with waypoint number inside.

How to enter comments

You may attach a comment to waypoints. This can be done while you are entering them, or after they have been entered. A comment may contain up to 10 characters. All comments are stored in the waypoint list.

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

```
┌──────────────────────────────────────────────┐
│                                                │
│  A B C D E F G H I J K L M N O P Q R S T U V W X Y │
│  Z 、 - ! ? ／ & - #_ 1 2 3 4 5 6 7 8 9         │
│  a b c d e f g h i j k l m n o p q r s t u v w x y │
│  z                                             │
│       ア イ ウ エ オ   ツ ヤ ユ ヨ      ┌─────┐│
│                                        │ENTER││
│                                        └─────┘│
│  ─────────────────────────────────             │
│  ▲▼◄► : Sel Char   ENT: Enter    MENU: Escape  │
└──────────────────────────────────────────────┘
```
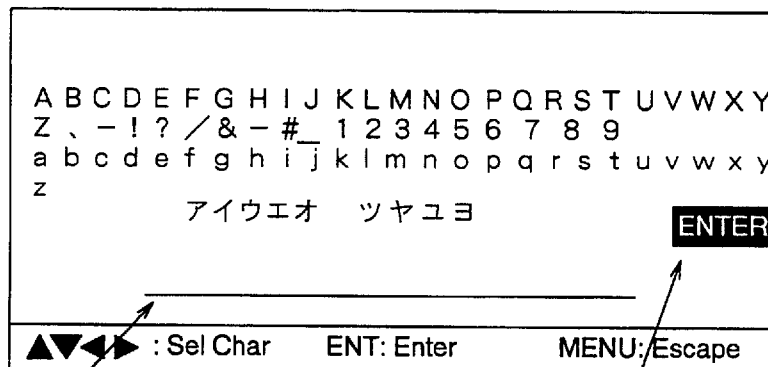
Comment Entry   After entering comment,
                                 select ENTER.

Figure 29 Display for entering waypoint comments

2) Press the **ENT** key.
3) Repeat steps 1 and 2 to complete comment.
4) Operate the **Arrow** keys to select "ENTER."
5) Press the **ENT** key twice.

Entering waypoints by own ship's position

1) Press the **WPT** key.
2) Press the left arrow key to select "Own Pos."
3) Press the **ENT** key.

```
┌─────────────────────────────┐
│ Lat  :  34° 25. 070'  N     │
│ Long : 136° 39. 242'  E     │
│ No.  : █ _                   │
│ Cmnt : _____      │
│                             │
│ ENT: Enter    MENU: Escape  │
└─────────────────────────────┘
```

Figure 30 Display for entering waypoint number

4) Enter waypoint number.
5) Press the down arrow key to enter comments, or press the **ENT** key to register waypoint and escape.

Entering waypoints through the waypoint list

1) Press the **WPT** key.
2) Press the right arrow key to select "WPT List."
3) Press the **ENT** key.

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 01
03	34° 46. 567'N	135° 24. 321'W	No	BUOY	
04	34° 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	_____	

WAYPOINT LIST

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

Figure 31 Sample waypoint list

4) Operate the up and down arrow keys to select way-point number.
5) Enter latitude and longitude position of the waypoint. (The [-] key serves to switch to South latitude and East longitude.)
6) The cursor should be in the "DISPLAY" column and selected to "Yes." 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, or press the **ENT** key to register the waypoint and escape.

Entering waypoints by event position

1) Press the **WPT** key.
2) Press the up arrow key to select "Event Posn".
3) Press the **ENT** key.
4) Press the left or right arrow keys to select event data.
5) Press the **ENT** key.
6) Enter waypoint number.
7) Press the down arrow key to enter comments, or press the **ENT** key to register waypoint and 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) Operate the up and down arrow keys to select waypoint number.
4) Operate the right and left arrow keys to select column in which to edit or add data.
5) Press the **ENT** key.

Deleting Waypoints

The GP-1810 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.

Deleting waypoints by the cursor

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

Deleting waypoints through the waypoint list

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

When you want to show the waypoint, press the [+] key in step 5 of the above procedure.

Setting Destination Waypoint

The GP-1810 offers four methods by which you can set destination waypoint:

- By the cursor
- By event position
- By waypoint number, or
- By route number (discussed in next chapter).

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

Setting destination waypoint 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 ultimate destination (single waypoints).

1) Press the **GOTO** key.

```
          Cancel
            ▲
 Waypoint◀  •  ▶ Route
 ▬          ▼
          Cursor
 Enter waypoint number.
 ENT: Enter  MENU: Escape
```
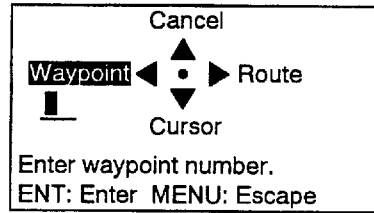
Figure 32 Display for setting destination

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 (waypoint 00).
- The range and bearing to the destination appear at the bottom of the display.
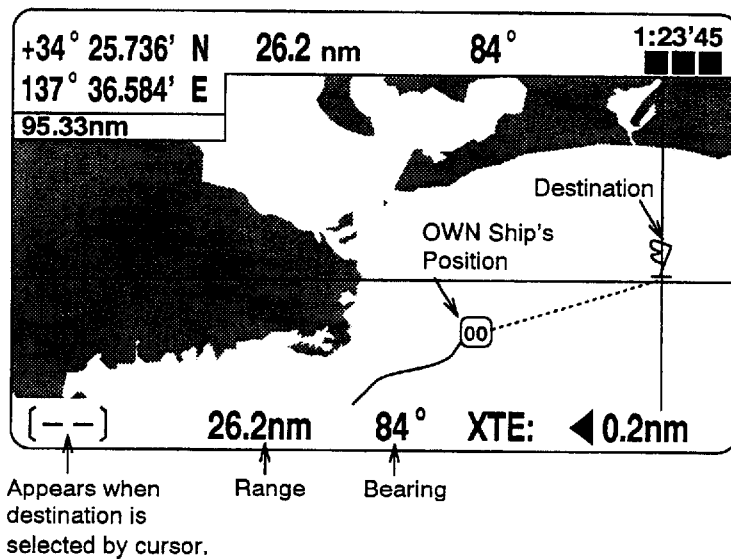
Figure 33 Sample destination waypoint data

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.

Setting destination 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.

| +34° 05.444' N | 39.3 nm | 117° | 1:23'45 |
| 137° 47.400' E | | | |

95.23nm

[25]   19.8nm   58°   XTE: 0.8nm ▶
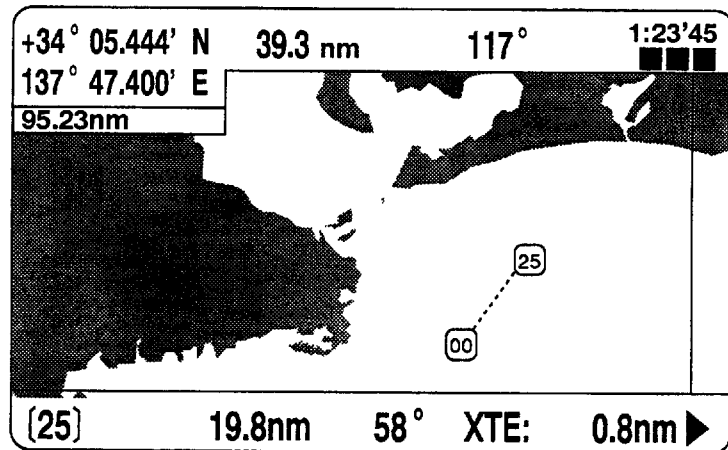
Figure 34 Sample destination waypoint data

Selecting Highway Display

The highway shows graphic presentation of ship's course to the destination. The scale can be changed by the **ZOOM IN** or **ZOOM OUT** key. The width of the "highway" is changed by the setting of the XTE alarm (page 43).

1) Press **NU/CU** key once or twice. The following highway display appears.

●34°43.311' N   10.5kt 214°   5.0°C   110ft 3D 2:16'32

135° 23.304' E

6.597nm

— Destination
— Course to destination
— Own ship
— Cross track error

3 2.5 2 1.5 1 0.5   0.5 1 1.5 2 2.5 3

[01]   0.95nm   215° XTE: ◀0.17nm

Destination waypoint number
Range to destination
Course to destination
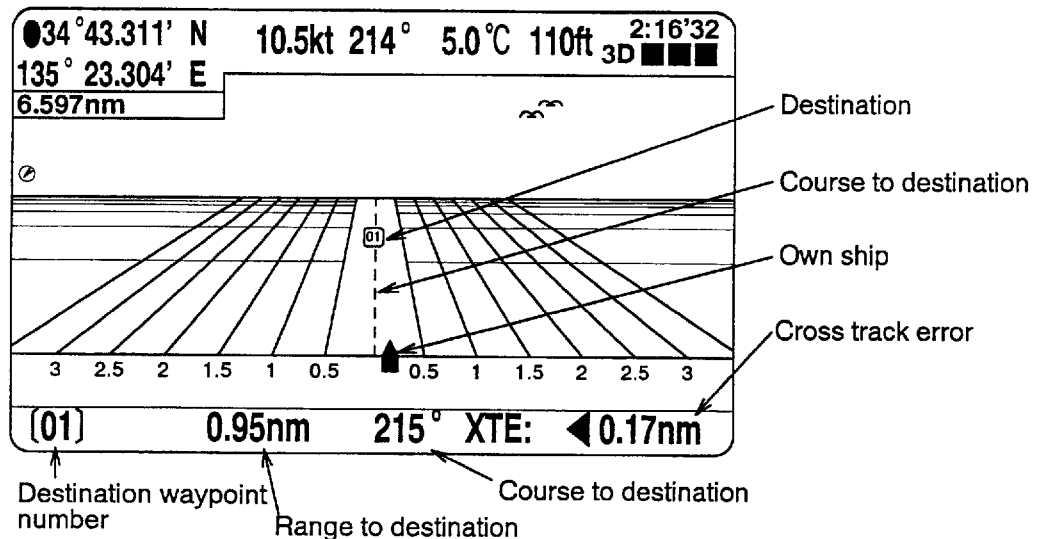
Cancelling Destination Waypoint

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

12. 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-1810 can automatically advance to the next waypoint on a route, so you do not have to change the destination waypoint repeatedly.
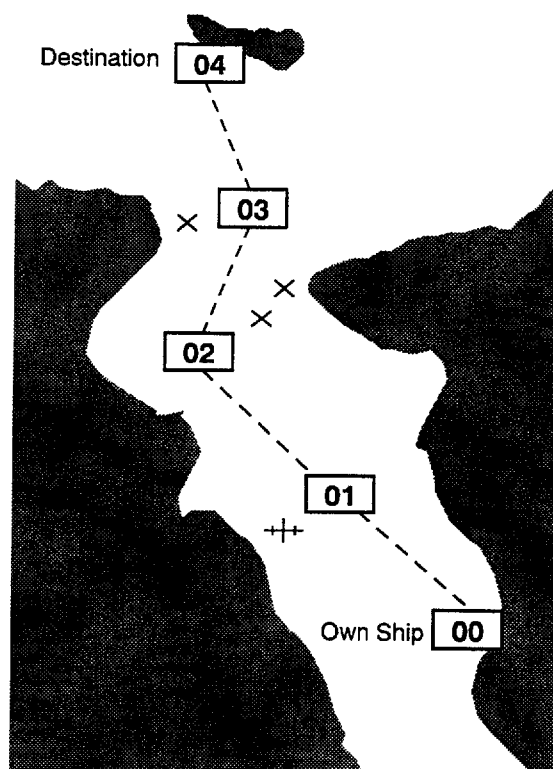
Figure 35 Sample route

Entering Routes

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

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

Entering routes through the route list

One advantage of this method is you can use waypoints which 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 36 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 37 ROUTE/ROUTE LIST, waypoint entry display

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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 position data followed by waypoint number and the waypoint already exists, the message "Waypoint already exists." Press the [ENT] key to use position data of <u>existing</u> waypoint, or press the [CLEAR] key to clear waypoint number.**

6) Press the **ENT** key.

■ **NOTE:** **The TTG 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 **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 set the cursor in the WPT column of 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.

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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 Routes

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 is automatically switches from one waypoint to another in sequence.

Following a 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 twice at step 7 to escape.

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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.
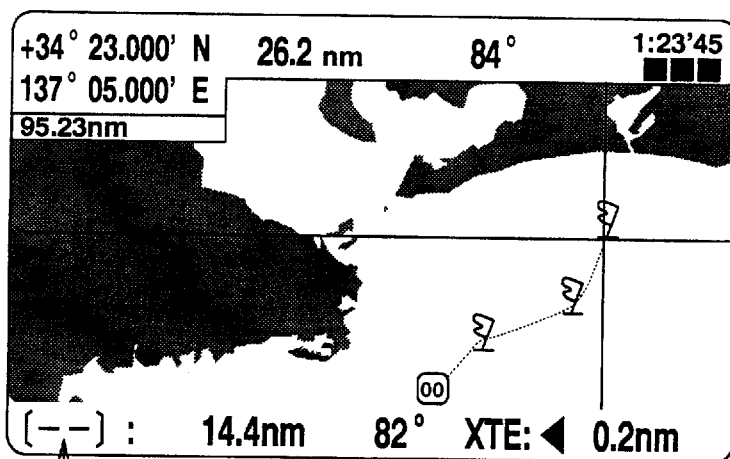
Appears when following cursor-created route.

Figure 38 Appearance of cursor-created route selected for navigation

Following a route registered

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 order reverse of 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.
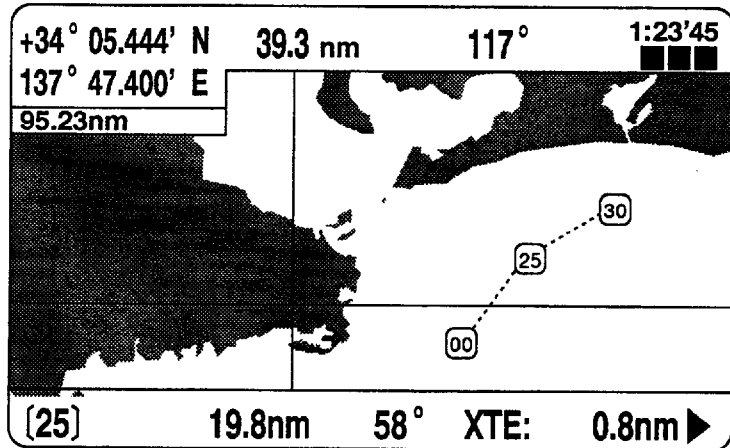
Figure 39 Appearance of waypoint-created route selected for navigation

Cancelling 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, way-point "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.

13. 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 boat is moving when it should be at rest.

■ Arrival Alarm   ■ Anchor Watch Alarm
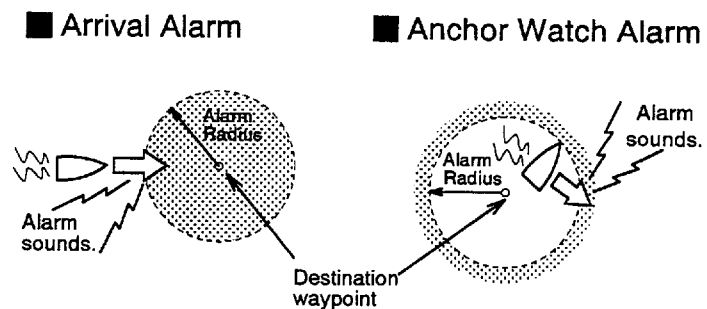
Figure 40 How the arrival and anchor watch alarms work

Cross track error (XTE) alarm, border alarm

<u>XTE alarm</u>

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

<u>Border alarm</u>

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.

■ XTE Alarm   ■ Border Alarm
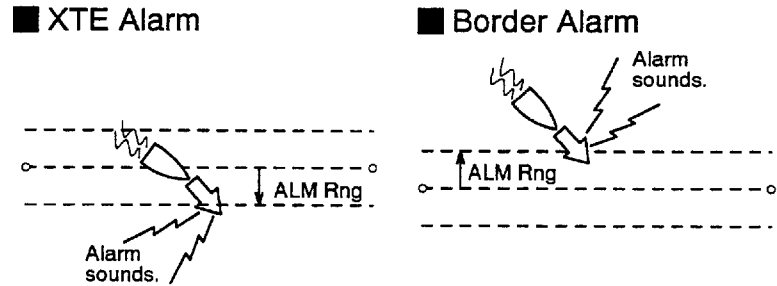
Figure 41 How the XTE and border alarms work

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 of fish, has its own habitable water temperature. (This alarm requires connection of a water temperature indicator.)

Enabling the Alarms

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

```
┌─────────────────────────────────────────────┐
│  ALARM SETTINGS                             │
│ ┌─────────────────────────────────────────┐ │
│ │ Arrival/Anchor      Arrival  Anchor  OFF│ │
│ │    Alarm Range    00. 500nm             │ │
│ │ XTE/Border         XTE        Border  OFF│ │
│ │    Alarm Range    00. 250nm             │ │
│ │ Ship Speed        Within   Over   OFF   │ │
│ │    Speed Range    10. 0kt~12.0kt        │ │
│ │ Water Temperature  Within   Over    OFF │ │
│ │    Temp. Range    +11.0~+15.0℃          │ │
│ │                                         │ │
│ │                                         │ │
│ │                                         │ │
│ ├─────────────────────────────────────────┤ │
│ │ ▲▼◄►: Select   ENT: Enter   MENU: Escape│ │
│ └─────────────────────────────────────────┘ │
```

Figure 42 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 (speaker mark) are released. You can silence the aural alarm by pressing the **CLEAR** key. 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.

14. 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."

```
┌─────────────────────────────────────────┐
│        MEMORY CARD OPERATIONS            │
│ ┌─────────────────────────────────────┐ │
│ │ 1. RECORD                           │ │
│ │ 2.▐REPLAY▌▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬    │ │
│ │ 3. DELETE                           │ │
│ │ 4. FORMAT                           │ │
│ │                                     │ │
│ │                                     │ │
│ │                                     │ │
│ │                                     │ │
│ │ ▲▼ : Cursor    ► : Select   MENU: Escape │
│ └─────────────────────────────────────┘ │
└─────────────────────────────────────────┘
```
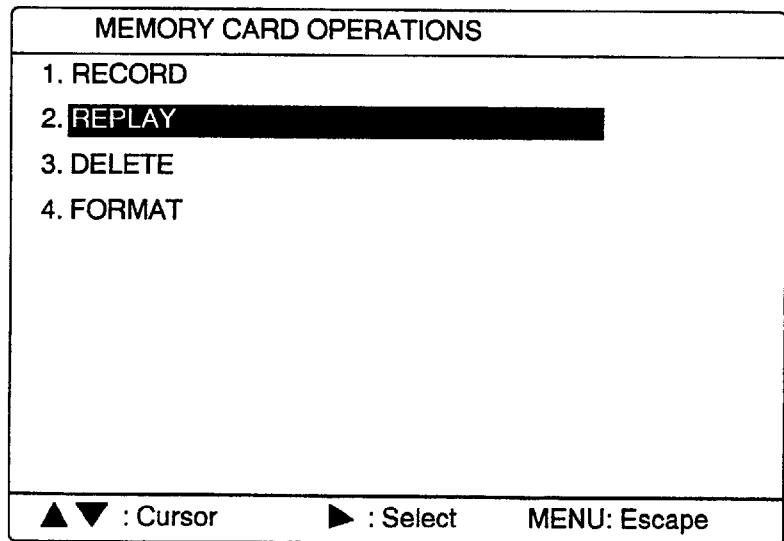
Figure 43 MEMORY CARD OPERATIONS menu

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 OPERA-TIONS."
3) Press the **1** key to select "RECORD."

```
┌─────────────────────────────────────────────┐
│  RECORD                                       │
│ ┌─────────────────────────────────────────┐ │
│ │ Track             [YES]   NO             │ │
│ │ Mark/ Line        [YES]   NO             │ │
│ │ Waypoint/ Route   [YES]   NO             │ │
│ │ Initial Data      [YES]   NO             │ │
│ │                                          │ │
│ │                                          │ │
│ │                                          │ │
│ │                                          │ │
│ ├─────────────────────────────────────────┤ │
│ │ ▲▼◀▶ : Cursor   ENT: Enter   MENU : Escape│ │
│ └─────────────────────────────────────────┘ │
└─────────────────────────────────────────────┘
```

Figure 44 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.

46

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.

Set tab rightward to write protect card.
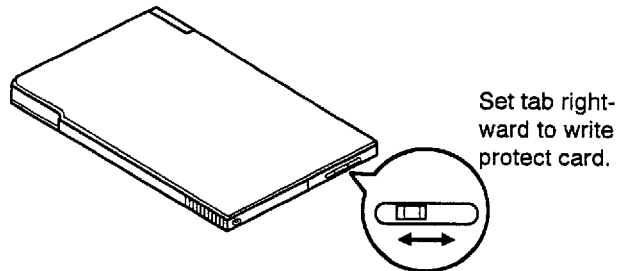
Figure 45 Location of writing enable/disable switch on memory card

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 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 OPERA-TIONS."
3) Press the **3** 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.

15. 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."

```
┌─────────────────────────────────────────────┐
│  CHART OFFSET                                 │
├─────────────────────────────────────────────┤
│  Chart Offset      Off  Cursor (00.000'N 00.000'E)  │
│  Geodetic: TOKYO                              │
├─────────────────────────────────────────────┤
│  ▲▼ : Select   ENT: Enter   MENU: Escape      │
└─────────────────────────────────────────────┘
```

Datum of FURUNO chart card inserted. Does not appear when using NAVIONICS chart card.

Figure 46 CHART OFFSET display

Own Ship

Chart is deviated.

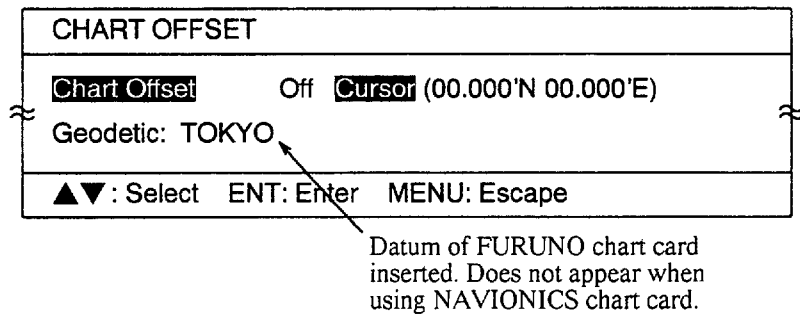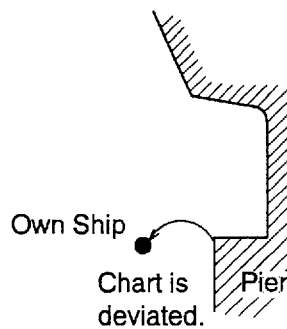Pier

Figure 47

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 accuracy.

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

```
┌─────────────────────────────────────────────┐
│ Position Offset    00.000'N  00.000'E         │
│                                               │
├─────────────────────────────────────────────┤
│ ▲▼◄► : Select  ENT: Enter  MENU: Escape       │
└─────────────────────────────────────────────┘
```

Figure 48 Display for entry of position offset
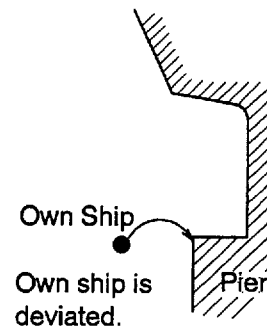

Own Ship

Own ship is deviated.

Pier

Figure 49

4) Enter correction value 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 procedure and press the **ENT** and **MENU** keys.

16. 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."
3) Operating the **Arrow** keys, select "Pos Display" to "LOP."

```
┌─────────────────────────────────────────────────────────┐
│    SYSYTEM SETTINGS   1/2   ▲▼:Next, previous page       │
│  ┌──────────────────────────────────────────────────┐   │
│  │ Memory Apportion   Trk=4000Pt/8000Pt             │   │
│  │ Unit of Distance   [nm]    km    sm              │   │
│  │ Unit of Depth      [m]     ft    Fa   ㅏㅁ   PB  │   │
│  │ Unit of Temp       [°C]    °F                    │   │
│  │ Navaid             [Int. GPS]  Ext. GPS  LC  DC  All │
│  │ Scale/ Range       [Scale]  Range                │   │
│  │ Rec Resolution     2                             │   │
│  │ ▐Posn Display▌     Lat/Long  [ LOP ]             │   │
│  │ LOP Display        [ LA ]   LC    No             │   │
│  │    LA Chain        00-01 △+000.0 μ s △+000.0 μ s │   │
│  │    LC Chain        00:11-26 △+000.0 μ s △+000.0 μ s │ │
│  │ ≋                                              ≋ │   │
│  └──────────────────────────────────────────────────┘   │
└─────────────────────────────────────────────────────────┘
```

Figure 50 SYSTEM SETTINGS menu

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 51 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

CHAN	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 52 Loran C codes

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

17. 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."

DISPLAY SETUP				
Display	Normal	Reverse		
Land Pattern	Dark	Med	Light	OFF
Place-Name	Dark	Light	OFF	
Grid	Dark	Light	OFF	
Course Bar	Dark	Light	OFF	
Time Mark	Dark	Light	OFF	
MOB Data	ON	OFF		
Waypoint Mark Size	Large	Small		
Mark Size	Large	Small		
Cursor Size	Large	Small		
▲▼◀▶ : Select ENT: Enter MENU : Escape				

Figure 53 DISPLAY SETUP menu

3) Press the **Arrow** keys to 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.

Land Pattern

Select land pattern; hollow (OFF) or filled (choose tone to light, medium or dark).

Place-Name

Select tone of place-name shown on chart.

Grid

Select tone of grid.

Course Bar

Select tone of ship's course bar.
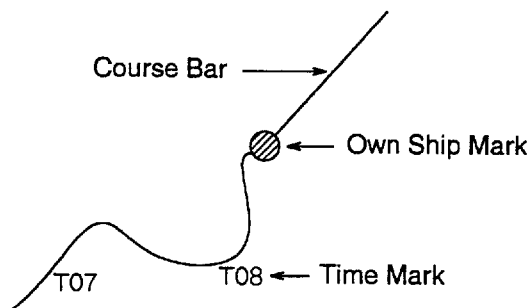
Time Mark

Turn time mark on or off.

Figure 54 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.

Sector Info

Turn on/off graphic which shows viewable range for lighthouses.
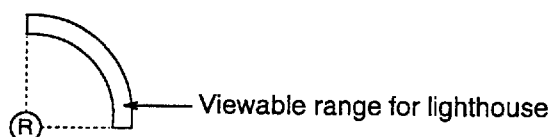
18. SYSTEM SETTINGS

Overview

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

```
┌─────────────────────────────────────────────────────────────┐
│  SYSYTEM SETUP    1/2        ▲▼:Next, Previous Page          │
├─────────────────────────────────────────────────────────────┤
│  Memory Apportion  Trk=4000Pt/8000Pt                        │
│  Unit of Distance  [nm]     km    sm                        │
│  Unit of Depth     [m]      ft    Fa    ┣□    PB            │
│  Unit of Temp      [°C]     °F                              │
│  Navaid            [Int. GPS] Ext. GPS  LC   DC   All       │
│  Scale/ Range      [Scale]  Range                          │
│  Rec Resolution    2                                        │
│  Pos Display       Lat/Long [LOP]                          │
│  LOP Display       [LA]     LC    No                        │
│     LA Chain       00-01 △+000.0 μ s △+000.0 μ s          │
│     LC Chain       00:11-26 △+000.0 μ s △+000.0 μ s       │
│  Smoothing Factor  00(0 – 15)                              │
│  Spd Average Time  01 minute                               │
│  Bearing Ref.      True Brg [Mag Brg]                       │
│  Mag. Variation    [Auto](07° W)      Man  (00° E)         │
│  Output Data Fmt   NMEA180 [NMEA183V1. 5]   NMEA183V2. 0   │
│  External Device   [Autopilot]  AP + RADAR   Navaid        │
├─────────────────────────────────────────────────────────────┤
│     ▲▼◀▶ :Select     ENT:End      MENU:Escape              │
└─────────────────────────────────────────────────────────────┘
```

```
┌─────────────────────────────────────────────────────────────┐
│  SYSYTEM SETUP    1/2        ▲▼:Next, Previous Page          │
├─────────────────────────────────────────────────────────────┤
│  Time Difference    +00:00                                  │
│  GPS Posn Smooth    00 (00-99)                              │
│  GPS Speed Smooth   05 (00-99)                              │
│  Antenna Height     +005m                                   │
│  DOP Threshold      20 (2-99)                               │
│  Fix Mode           2D      [2/3D]                          │
│  Geodetic Datum     Tokyo [WGS-84] WGS-72  Other (_ _ _)   │
│  Position Offset    00.000'N   00.000'E                     │
│  Disabled Satellite [Rstr]      Disable (_ _)              │
│  DGPS Mode          On        [Off]                        │
│  RTCM Version       1.0       [2.0]                        │
│  Byte Format        [8-6]      8-8                         │
│  First Bit          MSB       [LSB]                        │
│  Parity Bit         Even       Odd      [None]            │
│  Stop Bit           [1]        2                           │
│  Bit Rate           7         [8]                          │
│  Baud Rate          9600(300 ◀▶ 9600)                     │
│  Clear Memory       [No]      PLT      GPS   All          │
│  Position           38° 00.000' N  123° 00.000' W         │
│  D.GPS Level        RS-422    [RS-232]                     │
├─────────────────────────────────────────────────────────────┤
│     ▲▼◀▶ : Select     ENT: End    MENU: Escape            │
└─────────────────────────────────────────────────────────────┘
```

Figure 55 SYSTEM SETTING menu

Description of SYSTEM SETTINGS Menu

Memory Apportion

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

■ NOTE: When you change memory apportion, track and mark data are erased.

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 the number of dots to record when the plotting interval is set to automatic. (Automatic plotting stores ship's track every 10 seconds or 0.1 nautical miles.) The equation for determining number of dots to record is 5×2^k. For example, if k is "2", the number of dots to record per plotting interval would be twenty; $5 \times 2^2 = 20$ dots.

Pos Display

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

LOP Display

If Pos Display is selected to LOP, enter Loran chain here. For further details, see "16. Displaying Loran LOPs."
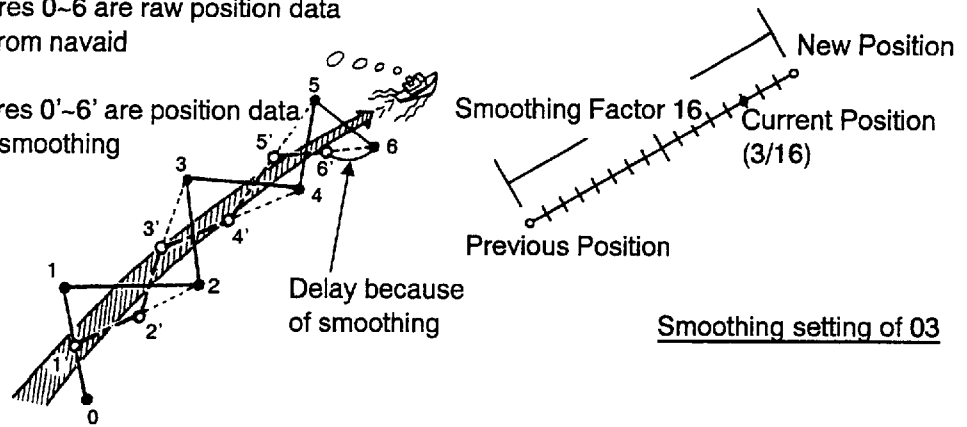
Smoothing Factor

Event 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 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 56 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.
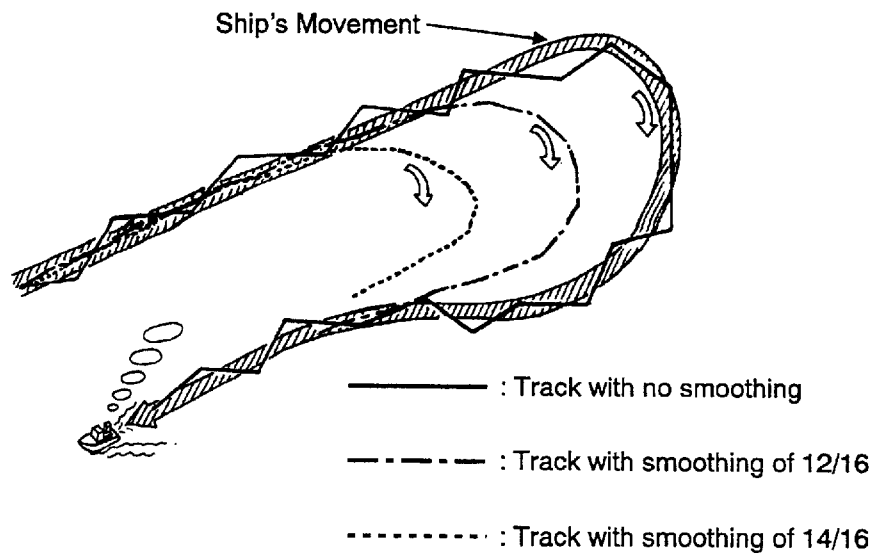
Figure 57 Comparing track and different smoothing factors

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 your 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-1810.

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 [+] or [-] key for times later or earlier than UTC, respectively.

Pos Smooth Factor

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.
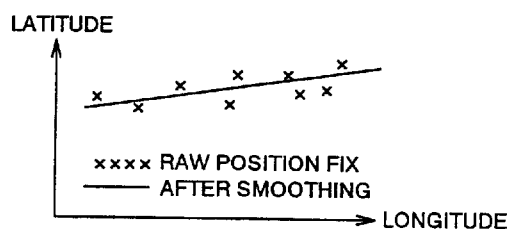
LATITUDE

xxxx RAW POSITION FIX
——— AFTER SMOOTHING

LONGITUDE

Figure 58 GPS position smoothing

58

Speed Smooth Factor

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.
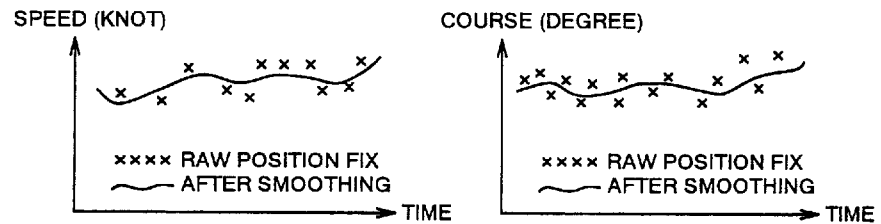
SPEED (KNOT)   COURSE (DEGREE)

xxxx RAW POSITION FIX   xxxx RAW POSITION FIX
~~~ AFTER SMOOTHING   ~~~ AFTER SMOOTHING
                        TIME   TIME

Figure 59 GPS speed smoothing

Antenna Height

Enter antenna height above the waterline, for accurate 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 for further details see HDOP in the glossary.

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 "Geodetic Chart List" in the Appendix. For sake of accuracy, the chart system selected here should be the same as that of the chart card used.

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 on-line status it is automatically restored to the satellite schedule when the Almanac is received. In some instances however the Almanac may not contain

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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-1810 is connected to a differential GPS beacon receiver.

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

When DGPS mode is ON, these items should be set by referring to the manual of the DGPS beacon receiver.

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.

Position

Enter estimated position if necessary.

D.GPS Level

Select output level of the DGPS beacon receiver connected.

19. MAINTENANCE AND TROUBLESHOOTING

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.

⚠️**WARNING**

Hazardous voltage can shock. Do not open the equipment.

This equipment uses high voltage electricity which can shock.
Only qualified personnel should work inside the equipment.

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.

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 4 Recommended maintenance program

Item	Check Point	Remedy
Antenna	Check for loosened and corroded bolts.	Tighten loosened bolts. Replace heavily corroded bolts.
Antenna cable	Check connection point for watertightness. Check connector for tightness and corrosion. Check cables for damage.	Replace damaged parts.
Display unit connectors	Check for tight connection.	Tighten loosened connectors.
Ground terminal	Check for tight connection and corrosion.	Clean and replace as necessary.
Display unit	Dust and foreign material on the display unit and screen.	Dust on the display dims the picture. Dust may be removed with a soft cloth. If necessary anti-static cleaner may be used. Never use chemical solvents to clean the display; they can 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.

> ⚠ **CAUTION**
>
> **Use only a 5A fuse.**
>
> Use of a wrong fuse can damage the equipment 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 a new battery plus side facing up. Refasten cover. Record date of replacement on card.
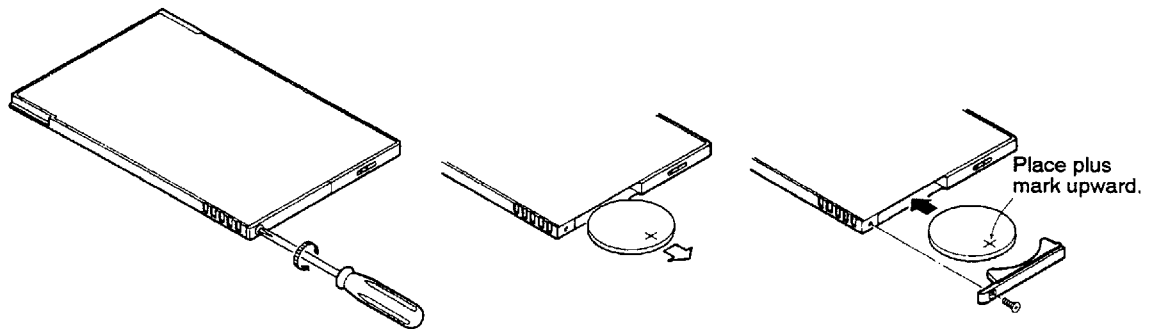
Battery: Type BR-2325, Code No. 000-126-680

Figure 60 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 5 Troubleshooting table

IF...	THEN...
you cannot turn on the power	• check for blown fuse 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** key and then the right or left arrow key to adjust tone.
position is not fixed within 3 minutes after power is applied	• check for frequency deviation on the "GPS Monitor Display" 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 selected on the SYSTEM SETUP menu is correct. • check that the antenna height entered on the SYSTEM SETUP menu is correct.
position fixing available period is shorter in comparison with other ship's GPS receiver	• DOP value is larger than that set on other ship.that correct antenna height is entered.lower DOP value. The normal setting
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 setting menu is correct.
no Loran LOPs appear	• check that proper Loran chains are entered.

(Continued on next page)

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IF...	THEN...
wrong Loran LOPs are 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.

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**.

```
┌──────────────────────────────────────────┐
│            SELF – TEST                     │
├──────────────────────────────────────────┤
│  1. GPS Monitor Display                    │
│                                            │
│  2. Memory, I/ O Port Test                 │
│                                            │
│  3. Keyboard Test                          │
│                                            │
│  4. Test Pattern                           │
│                                            │
│  5. Automatic Testing                      │
│                                            │
│                                            │
│                                            │
│                                            │
│       GPS Program No. : 48501030xx         │
│       GDC Program No. : 14506651xx         │
├──────────────────────────────────────────┤
│   ▲▼ : Cursor    ▶ : Select   MENU: Escape │
└──────────────────────────────────────────┘
```
← Version No.

Figure 61 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 and SIO DGPS without test connector.

```
┌─────────────────────────────────────────────┐
│ Memory, I/O Port Test                         │
├─────────────────────────────────────────────┤
│ ROM               OK                          │
│ SRAM              OK                          │
│ VRAM              OK                          │
│ Memory Card       OK                          │
│ Internal Battery  OK                          │
│ Card Battery      OK                          │
│ SIO(GPS)          OK                          │
│ SIO(AUX)                                      │
│ SIO(DGPS)                                     │
│                                               │
├─────────────────────────────────────────────┤
│         MENU: Escape                          │
└─────────────────────────────────────────────┘
```

Figure 62 Sample memory, I/O port test results

Keyboard test

This test checks the keys of the display unit for proper operation.

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

```
┌─────────────────────────────────────────────┐
│ Keyboard Test                                 │
├─────────────────────────────────────────────┤
│                                               │
│          ☐   ☐   ☐                            │
│          ☐       ☐                            │
│          ☐   ☐   ☐                            │
│             ☐   ☐                             │
│             ☐   ☐                             │
│             ☐   ☐                             │
│             ☐   ☐                             │
│             ☐   ☐                             │
│             ☐   ☐                             │
│             ☐   ☐                             │
│             ☐   ☐                             │
│             ☐   ☐                             │
├─────────────────────────────────────────────┤
│   Press CLEAR 3 times to quit the test.       │
└─────────────────────────────────────────────┘
```
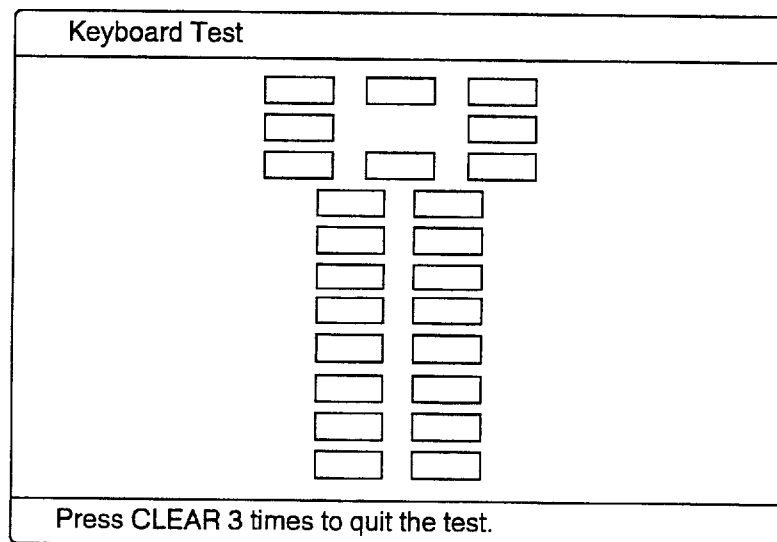
Figure 63 Keyboard test

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** key to select "SELF-TEST."
3) Press the **1** key to select "GPS Monitor Display."

GPS Monitor Display				
Fix Mode	2D		Altitude	− − − m
DOP	1. 3			
RX Status			Program No. 48501030xx	
No.	ELV	AZM	SNR	
03	28	034	89	
02	55	123	56	
14	05	000	27	
15	20	210	22	
18	08	321	38	
20	60	215	80	
11	11	196	11	
30	42	321	77	
Data RX:		Ref Sta:		
MENU: Escape				

Version No.

Figure 64 Sample GPS monitor display

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Description of GPS monitor display

The following tables explains the meaning of the indications on the GPS monitor display.

Table 6 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 "3D".
DOP (Dilution of Precision)	This is the index for position-fixing accuracy. The lower the value the higher the acuuracy. If the index exceeds 20, position fixing may not be possible.
Rx Status	This section shows elevation angle, azimuth and SNR.
Data Rx	Shows normal or abnormal.
Ref Sta	Shows status of DGPS transmitting station.

Installation of New Program

1) Turn off the power.
2) Insert new program card supplied by FURUNO.
3) Turn on the power. Beeps sound three times.
4) Wait about minutes to complete the program loading. When it is completed, the new program automatically starts up.
5) Replace the program card with a chart card.

20. DEMONSTRATION DISPLAY

The demonstration display provides simulated operation of this unit. Own ship tracks, at the speed selected, a figure eight course, starting from position entered. All controls are operative; you may enter destination waypoint, enter marks, etc.

1) While pressing and holding down the **ENT** key, turn on the power.

```
┌─────────────────────────────────────────────────┐
│  DEMO SETTING                                    │
├─────────────────────────────────────────────────┤
│  BASE POSITION :     __°__.___'N ___°__.___'W    │
│  SPEED :             00.0kt                       │
│                                                  │
│                                                  │
│                                                  │
│                                                  │
│                                                  │
├─────────────────────────────────────────────────┤
│  ◀▶ : Cursor              ▼ : Colamn             │
│  ENT: Enter               + : N/S  - : E/W        │
└─────────────────────────────────────────────────┘
```

Figure 65 DEMO SETTING display

2) Key in latitude and longitude for base position. If necessary, press [-] or [+] to switch from north latitude to south or vice versa, or from west longitude to east or vice versa.
3) Press the down arrow key.
4) Enter ship's speed.
5) Press **ENT** key to start the simulation mode. The icon [DE/MO] appears.

■ **NOTE: To return to the normal mode, turn off the power and then turn it on while pressing and holding down ENT key.**

■ **NOTE: When the memory is cleared while in the demonstration mode, the equipment starts up in the normal mode.**

SPECIFICATIONS

DISPLAY UNIT

Display Type   8-inch (20 cm) monochrome LCD.

Display Tone   Three levels

GPS RECEIVER

Receiver Format   8 channels, all-in-view

Tracking System   Parallel

Position Accuracy   Approx. 50 m, 95% of the time, Horizontal dilution of position (HDOP) $\leq$ 4
(Approx. 15 m if SA is not on)

■ **Note: All GPS receiver are subject to degradation of position and velocity accuracies under the U.S. Department of Defense. Position may be degraded up to 100 meters.**

DGPS: 5 to 10 m, 95% of the time 〔Option〕

PLOTTER SECTION

Chart Projection   Mercator (85° latitude or below)

Display Range   0.048 to 8192 nm (above equator)

Track+Mark* Storage Capacity   8,000 pts.
*Enterd marks can also be selected as a destination.

Waypoint Storage Capacity   98 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: 300(W) $\times$ 212(H) $\times$ 124(D), 3kg
Antenna Unit: ϕ 62 $\times$ 57(H), 100g

POWER SUPPLY AND POWER CONSUMPTION

10.2-31.2 VDC, 10W

USABLE TEMPERATURE

Display Unit: -15 °C to 55 °C
Antenna Unit: -25 °C to 70 °C

WATERPROOFING SPECIFICATIONS

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

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 : JOHNSTON ISLAND 1961	: Johnston 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 :	: Cenral 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	: Falal, 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
171 : RT-90	: Sweden

WORLD TIME STANDARDS

GLOSSARY

Almanac

Each GPS satellite broadcasts its own orbital data as well as general orbital data of all other GPS satellites. This general orbital data is called the Almanac. The GPS receiver receives the Almanac and decodes it to calculate the quantity and elevation angle of satellite in view, to know when it can receive the GPS signal. If there is no Almanac in the receiver it cannot fix its position. The receiver is shipped with no Almanac, thus when it is turned on for the first time it starts receiving the Almanac. Each time the unit is turned on the previous Almanac is erased and the latest received.

Cold start

When the GPS receiver is turned on for the very first time, it starts receiving the Almanac. This condition is called cold start. In this condition it takes about two minutes to find position. Once the Almanac is stored in the GPS navigator, it takes only about 20 seconds to find position. (The normal start-up condition is called warm start.)

Destination

A destination can be either a single destination waypoint or a series of waypoints leading to the ultimate destination. When you set a destination, your unit provides range and bearing data to the destination, to help you steer to the destination along the shortest path possible.

DGPS beacon receiver

The DGPS (Differential GPS) station transmits a beacon signal which contains information about GPS error. The device which receives the beacon signal is called a beacon receiver.

Differential GPS (DGPS)

The differential GPS system, consisting of DGPS land stations and DGPS beacon receiver-equipped marine vessels, further refines the accuracy of the GPS measured position.

A DGPS land station knows its exact position. If there is a difference between GPS position and DGPS land station's position this is called GPS error. The DGPS station transmits GPS error data to a beacon receiver which relays the data to the GPS receiver. The GPS receiver uses this data to refine the accuracy of the GPS position (within about 10 meters under ideal conditions).

DGPS stations are strategically located throughout America (including Hawaii and Alaska), Europe, Canada, Bermuda and Brazil.

Estimated time of arrival (ETA)

The time at which you arrive at the ultimate destination. This is calculated by speed entered.

Geodetic chart

A nautical chart is usually made by either trigonometrical survey or astronomical survey and according to the geodetic chart standards of the country where it is used. The GPS standard chart system is WGS-84.

Thus if you are using a chart different from WGS-84, there will be error between GPS position and nautical chart position. To get correct position, the GPS receiver must know what chart system you are using, to apply an offset to GPS position.

GPS measured position

GPS measured latitude and longitude position.

Intermediate waypoint

A waypoint in a route.

HDOP (referred to as DOP in this manual.)

In radar position-fixing, most accurate position fixes are obtained when the targets used are spaced nearly 90 degrees from each other. Similar, GPS position fixing accuracy is subject to satellite location. Generally, the further apart the satellites are from one another, the greater the position-fixing accuracy.

For example, take a look at the figure at the top of the next page. In both situations a fix is obtainable in the Northern Pacific region because three satellites are in line of sight. However, accuracy will be higher in the right-hand figure

since the satellites are spread farther apart than the satellites in the left-hand figure.

LOW ACCURACY   HIGH ACCURACY

Satellite positions and accuracy of position fix

The index for position-fixing accuracy is known as HDOP(Horizontal Dilution of Precision). In simpler terms it is the geometrical relationship among 3 (or 4) satellites. The higher the HDOP value the less accurate the position fix. The error in distance is proportional to the HDOP value as shown in the figure below.

[NOTE]
GPS accuracy is controlled by the US Government. The error shown is subject to change.

HDOP rate and position error

Magnetic bearing
Bearing relative to magnetic north, with the compass bearing corrected for deviation.

Magnetic variation offset
The location of the magnetic north pole is different from the geographical north pole. This causes a difference

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between the true and magnetic north direction. This difference is called magnetic variation, and varies with respect to the observation point on the earth. This variation may be entered automatically or manually.

Navigation calculation

The GPS receiver calculates the range, bearing and cross track error to next waypoint when you select a destination. The calculation of that data is called navigation calculation. The calculation itself is done using one of two methods (selectable): Great circle (straight line between two points) or Rhumb line (straight line between two points on nautical chart).

NMEA 0183

The National Marine Electronics Association's (USA) signal I/O format.

Plotting interval

The plotting interval determines both how the track will be reconstructed on the display and track storage time. The shorter the interval the more accurate the reconstruction of track line, however total storage time is reduced. The plotting interval can be selected to time or distance. Plotting by distance offers the advantage that the track is not stored when the vessel is anchored.

Route

A series of waypoints leading to the ultimate destination.

Route navigation

Following a stored route.

S/A

GPS was developed by the US Department of Defense mainly for use by its marine vessels and aircraft. For civil users the accuracy of the system is purposely downgraded for national security reasons. This intentional accuracy reduction is called S/A. Because GPS position error may be greater than 100 meters any GPS position should be double checked against other sources to confirm position.

Skip

This means to bypass a waypoint in a route.

Storage capacity
Storage capacity defines how many points of track and marks a memory can hold. The GP-1810 storage capacity is 8,000 points.

Time-to-go (TTG)
The amount of time necessary to get to a destination, maintaining current speed and course.

Time differences
Time differences (or TDs) are the position information generated by the Loran C position-fixing systems. TDs are the time in microseconds between the transmission of pulsed signals in the Loran C.

Total distance
Total distance is the number of miles from starting point to end point in a route.

Trip distance
The distance run from starting position.

Trip elapsed time
The amount of time passed since departing a starting point.

True bearing
Bearing relative to North; compass bearing corrected for magnetic deviation. The GPS receiver can display true or magnetic bearing.

Velocity to destination
The amount of speed in the direction (course) of the desired destination.

Waypoint
A waypoint is a particular location on a voyage whether it be a starting, intermediate or destination waypoint.

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