CE

KODEN

OPERATION MANUAL

GPS TRACK DISPLAY

GTD-110/150

This product is specifically desingned to be installed on boats and other means of maritime transport. If your country forms part to the EU, please contact your dealer for advice before attempting to install elsewhere.

GTD-110/150.OM.E 0093151542-13

KODEN

Declaration of Conformity

(As required by Article 7 (1) of Directive 89/336/EEC)

Declares under his sole responsibility that the produced GPS Track Display manufactured by

Koden Electronics Co., Ltd.
5278 Uenohara, Uenohara-Machi
Kitatsuru-Gun, Yamanashi-Ken
409-0112, Japan

Telephone +81 554 20 5865 **Telefax +81 554 20 5880**

Identified by the type number GTD-110 to which this declaration refers conforms to the requirements of Directive 89/336/EEC amended by 92/31/EEC and 93/68/EEC and is in conformity with the EMC, Health and Safety standards of

EN60945

Signed .....
Saburo Suzuki,

Dated 10.12.2002.....
Koden Elektronik GmbH.
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CE

N.B. As this product is for Maritime use compliance with Directive 72/23/EEC is not required.

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Amendment History

GTD-110/150 Operation Manual

Doc No: 0093151542

No.	Document No & Rev No.	Date	Amendments
0	93151542-00	03/01/09	First issue
1	93151542-01	03/07/14	Amended cable type names shown in Figure 1.1 (Page 1-3), Para 2.1 and 2.2 (Page 2-1.
2	93151542-02	04/06/02	KODEN:Address
3	93151542-03	05/06/07	Preface;Chapter_6 6.6.11
4	0093151542-04	06/01/27	Cover
5	0093151542-05	06/07/03	Cover
6	0093151542-06	06/07/26	Chapter_5, Chapter_6
7	0093151542-07	06/08/03	**C-MAP MAX:** Chapter_5, Chapter_6
8	0093151542-08	06/10/13	Chapter_6, Annex
9	0093151542-09	08/09/22	Declaration
10	0093151542-10	08/10/20	Chapter_5, Chapter_6, Chapter_10
11	0093151542-11	10/03/08	Chapter_5 Contents, Chapter_5
12	0093151542-12	10/08/03	Chapter_5 Contents, Chapter_5, Chapter_6, Annex
13	0093151542-13	11/05/10	Chapter_1, Chapter_2, Chapter_3, Chapter_4
14			
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Amendment policy

When any change is applied in the document, only the document number of the relevant sheet(s) and cover sheet are modified and the rest of the sheets are not changed. The document number is shown in the footer area, right or left bottom of each sheet.

Safety Precautions

- **Disconnect Main Power**

It is still possible to receive an electric shock caused by unintentionally switching on the power during repair work. To prevent this from happening, make sure to completely disconnect the unit from the ship's main supply before attempting any inspection and repair.

- **Dust**

Dust can accumulate inside the unit after long periods of use. Allergies can result from the inhalation of this dust, therefore during inspection and cleaning it is advisable to use a mask.

- **Static Electricity**

Static sensitive semiconductor devices are used in this unit. Before changing the printed boards be careful not to damage any of these devices due to electrostatic build up from carpet, clothes, seats, etc

- **Display Front Plate**

A glass plate is used in front of the Liquid Crystal Display in the GTD-110 display unit. The glass is vulnerable against mechanical impact. Use the utmost care when handling this unit, not to apply mechanical shock to this part. In the GTD-150 unit, a plastic plate is used for the same purpose, which is stronger than the glass, however, the same caution should be taken.

- **Liquid Crystal Display**

A Liquid Crystal Display contains mercury, which is harmful to the human body when touched. When you attempt to discard this device, follow the proper disposal procedures.

Operational Precautions

Navigational information shown on the GTD-110/150 series Track Display should be used as reference only. KODEN would not assume any responsibility for trouble encountered on board the ship caused by operational failure nor misinterpretation of the chart used.

Symbols used in this manual

The following symbols are used in this manual. You are requested to be fully aware of the meaning of each symbol before carrying out inspection and maintenance of this equipment.

Alarm mark

Alarm

To handle the equipment ignoring this sign may lead to injury to the human body or damage to the equipment.

Caution mark

Caution

To handle the equipment ignoring this sign may lead to a malfunction in the equipment.

Warning High Voltage mark

To handle the equipment ignoring this sign may lead to an electrical shock to the human body.

Prohibition mark

This sign indicates that a specified action is prohibited. The prohibited action will be shown in the vicinity of the mark.

How to use this manual

Scope of this manual

This manual contains information about installation, operation and maintenance of the GTD-110/150 series Track Display.

Structure of this manual

This manual is divided into sections according to the contents as described below. This arrangement will help you overview the whole contents as well as refer to detailed information for your specific requirement.

Chapter 1: General Information

- About GPS
- Outline of the equipment
- Applicable standards
- Equipment composition
- Software type name

Chapter 2: Equipment Composition

- Standard Equipment list
- Optional items list

Chapter 3: Specification

- Specification
- Serial data
- Power requirements
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- Unpacking of the goods
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- Sitting the units
- Cable routing and connections

- Display Installation
- Cable connections
- Inspections after installation

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- Getting started
- Displaying the current position
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- Setting the KODEN GPS/DGPS sensor
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- Track color settings
- Other ships plot settings
- User C-CARD
- Nearest port info
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- Routes
- Texts for marks

Chapter 8: Trouble Shooting

- Information required for service
- First line fault location

Chapter 9: Maintenance

- Periodic inspection and cleaning

Chapter 10: Technical References

- Details of input serial data
- Details of output serial data
- Data input/output serial line
- Connector pinouts

Annex:

- Menu tree
- Color palette list

Chapter 1

General Information

Contents

Chapter 1 General Information

1.1 About GPS

1.1.1 General

GPS is a navigation system using 24 satellites (21 plus 3 in service) orbiting 20,183 km high from the earth every 11 hours 58 minutes.

1.1.2 Positioning by GPS

Your position is determined by calculating the distance from two satellites (in 2-dimensional positioning) or three satellites (in 3-dimensional positioning) to your position. The distance is determined by the time taken for a message to be sent from the satellites to the receiver. In 2-dimensional positioning, your position (latitude and longitude; height is preset) is determined at the intersection point of three spheres formed by three satellites. In 3-dimensional positioning, your position (latitude, longitude and height) is determined at the intersection point of four spheres formed by four satellites.

NOTE

The GPS system is based on a geodetic system called WGS-84. In conventional world maps, one coordinate system differs from others by region, and this causes the position fix made on the map and GPS measurement to differ to a certain extent.

1.1.3 Time required for position fix

In the following circumstances, your GPS receiver takes more time to fix position:

(1) When you turn the GPS receiver on for the first time.

(2) The stored orbital data is not suitable for the available satellite, or purged due to lengthy storage.

(3) When you use it after moving a long distance

When the GPS receiver is first turned on it starts to store orbital data sent from the satellite. It takes about 15 minutes before the first fix is available. After this, the receiver can fix your position within a minute by using the previously stored data.

1.2 Outline of the equipment

The GTD-110/150 series of Track Display system is a GPS based color electronic chart, designed for navigational aids for small and medium size vessel. The GTD-110/150 Track Display system is composed of a Display unit and a GPS antenna unit. General features of each unit are as follows:

Display unit: This unit uses a high brightness, TFT (Thin Film Transistor) Liquid Crystal Display (LCD) to allow easy viewing in daytime and nighttime operations. Thanks to its wide viewing angle display, you can observe the display from all possible positions in the wheelhouse. The screen size of the display unit varies according to the type, i.e. 10.4 inch (Diagonal) for GTD-110 and 15 inch for GTD-150. The panning and scrolling speed is greatly improved by using the latest digital technology. The operation is simple and straightforward, using dedicated rotary controls and tactile key pads with user-friendly menus. The display unit is a splash proof design, meeting IPX5 technical standard.

GPS antenna unit (Option): This unit includes the GPS antenna and its receiver section in a water -sealed high grade plastic case.

1.3 Applicable standards

The GTD-110/150 series of Track Display complies with the requirements of the technical standards of IEC-60945 (3rd edition).

1.4 Equipment composition

The equipment composition of GTD-110/150 is shown in Figure 1.1.

1.5 Software type name

The following software type is used in the GTD-110/150 Track Display system.

Software type	Application
KMC-100	System control

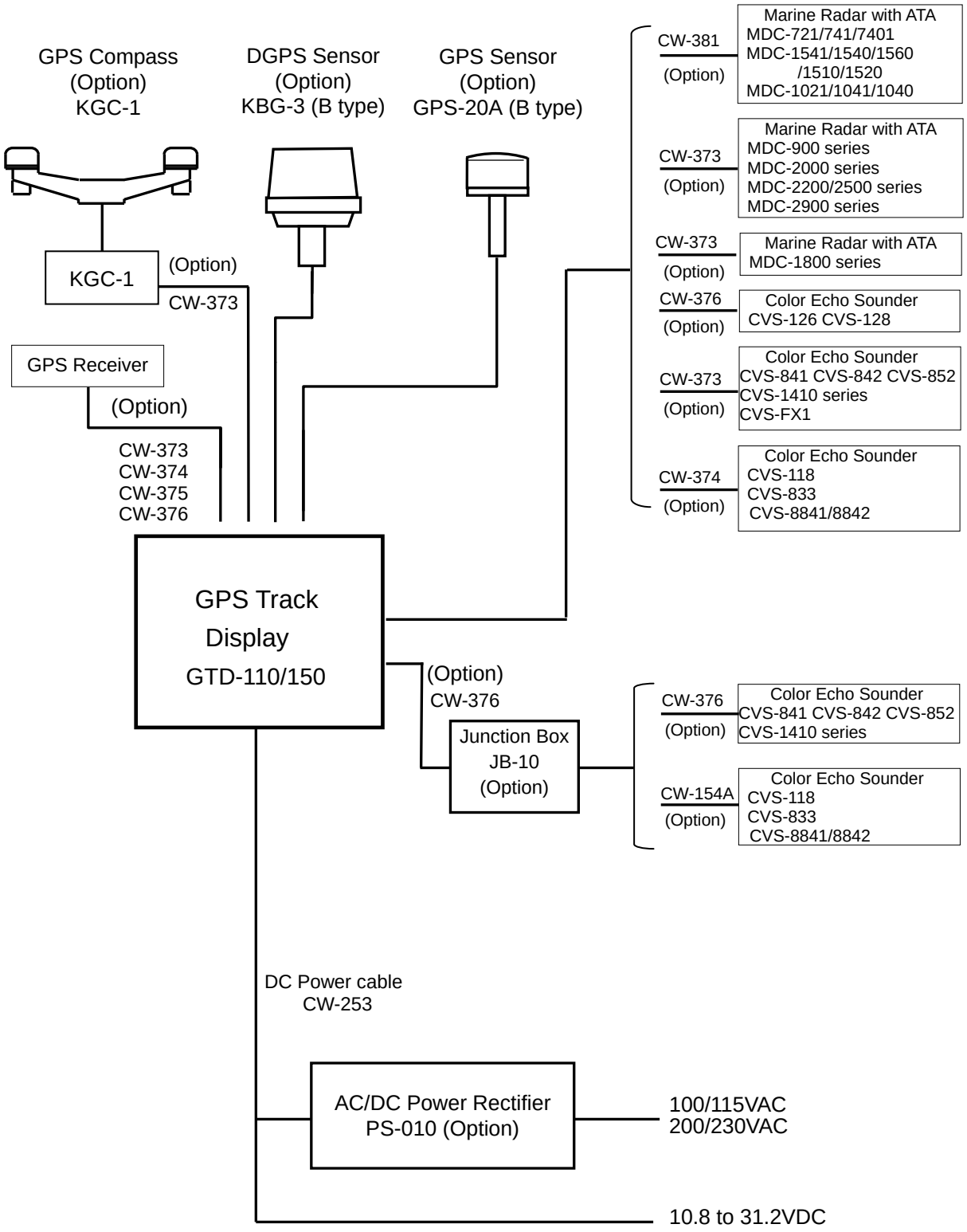

Figure 1.1 Configuration of GTD-110/150

Chapter 2

Equipment Composition

Contents

Chapter 2 Equipment composition

2.1 Standard equipment list

No	Item name	Type name	Remarks	Weight/Length	Q'ty
1	Display unit	GTD-110/150	With base mount and PVC cover	6.5 kg/10 kg	1
2	DC power cable	CW-253-2M	5 pin waterproof connector/fly leads with 10 A fuse	2 m	1
3	Fuse	F-7161	10 Amp		1
4	Operation manual	93151542-00	English		1

2.2 Optional items list

No	Item name	Type name	Remarks	Weight/ Length
1	GPS sensor	GPS-20A	For GPS position fixing with power & signal cable connector	0.6 kg 10 m
2	DGPS sensor	KBG-3	For DGPS positioning, power & signal cable connector	0.76 kg 15 m
3	GPS compass	KGC-1	For GPS positioning and Velocity Antenna cable connector Processor unit Power & signal cable connector	1.2kg 15m 1.4kg 2m
4	Connector	LTWD-06BFFA-L180	For NMEA-0183	-
5	GPS antenna holder	RAH- 29	Ratchet mount	-
6	Junction box	JB-10	1 input 3 outputs X 2 circuits	0.4 kg
7	Connecting cable	CW-373-5M	6 pin waterproof connectors (LTW) both ends	5 m
8	Connecting cable	CW-374-5M	6 pin connector / 6 pin waterproof connector (LTW)	5 m
9	Connecting cable	CW-375-5M	6 pin waterproof connector (Conxal)/ 6 pin waterproof connector (LTW)	5 m
10	Connecting cable	CW-376-5M	Fly leads / 6 pin waterproof connector (LTW)	5 m
11	Connecting cable	CW-381-5M	Half-pitched / 6 pin waterproof connector (LTW)	5 m
12	Connecting cable	CW-60-10M	For navigator unit junction box, BNC / fly leads with crimping terminals	10 m
13	Connecting cable	CW-154A-5M	For navigator unit junction box, 6 pin connector / fly leads with crimping terminals	5 m
14	Connecting cable	CW-352-5M	For navigator unit junction box, 6 pin waterproof connector (Conxall) / fly leads with crimping terminals	5 m
15	Connecting cable	CW-328-5M	For navigator unit junction box, 6 pin waterproof connector (Conxall) / fly leads with crimping terminals with ferrite core	5 m
16	AC / DC power rectifier	PS-010	With 5A fuse (2 pcs)	3.5 kg
17	AC power cable	VV-2D8-3M	Fly leads both ends	3 m

Chapter 3

Specification

Contents

Chapter 3 Specification

3.1 Specification

Specification is subject to change without notice.

Type name			GTD-110/150
Display			10.4 inch (GTD-110) / 15 inch (GTD-150) High Brightness Color TFT LCD
Map mode			Mercator projection
Display mode			North-up, East-up, South-up, West-up, Course-up (Waypoint), Own ship centered fix mode and Head up
Track	Zooming range		0.01 to 3,600 nm (0.02 to 6,600 km)
Display	Effective map creation area		Below the latitude 80 degree
	Plotting interval	Time	1, 2, 5, 10, 20, 30, 60, 120, 300, 600 sec
		Distance	0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1.0, 2.0, 5.0, 10.0 nm (km)
	No. of plots		2,000, 4,000, 7,000 (maximum plot) x 7 blocks
	Track color		7 colors
Position data display			Lat/lon, Loran C LOP
Navigation data display			Own ship's position, Own ship's course, Own ship's speed, Waypoint position, Waypoint bearing, Waypoint distance, POB position, POB bearing, POB distance, Cursor position, Cursor bearing, Cursor distance
Position registration			8,300 points (All points can be registered as waypoint)
Mark color			7 colors
Mark shape			○ □ ▽ × ☆ ◇ △ (The marks ☆ ◇ △ are only useable in Mark Editing mode)
Chart used			C-Map NT MAX
Graphics	Drawing nodes		500 points x 7 blocks
	Display color		7 colors
Route			50 points x 50 routes
Alarm			Arrival, POB, Cross track error
Positional correction			By cursor or by lat/long or LOP data
Magnetic compass correction			Manual
Memory backup			By Lithium battery (for SRAM backup) and Non-volatile ROM
Other functions			Name, Loran C LOP, Ring markers

3.2 Serial data

[Input data]

Type: NMEA-0183 Ver. 2.0/1.5

Sentence: GGA, GLL, VTG, ZDA, RMC, MSS, MTW, TTM

[Output data]

Type: NMEA-0183 Ver. 2.0

Sentence: APB, GGA, GLL, VTG, XTE, ZDA, GTD

3.3 Power requirements

Input voltage:	10.8 to 31.2 VDC
Power consumption:	GTD-110: Less than 30 W (at 24VDC)
	GTD-150: Less than 40 W (at 24VDC)
AC Operation:	AC/DC rectifier PS-010 is required.
	Input voltage range: 115 VAC or 230 VAC

3.4 Environmental conditions

(1) Temperature and humidity

Operating temperature:	-15°C - +55°C
Storage temperature:	+70°C
Humidity:	93 ±3 % (at +40°C)

(2) Vibration

The equipment operates normally under the following vibrating conditions.

2 - 5 Hz - 13.2 Hz: Amplitude ±1mm ±10 % (Maximum acceleration of 7 m/s2 at 13.2 Hz)

13.2 Hz - 60 Hz: Maximum acceleration of 7 m/s2 being applied

(3) Water proof

Resistive against driven water, in compliance with IPX5

3.5 External dimensions and weight

External dimensions: Width x Height x Depth

	GTD-110	GTD-150	
Dimensions (WxHxD):	320 x 340 x 138	390 x 430 x 173	(mm)
Weight:	6.5 kg	10 kg	

Refer to Figure 3.1 and Figure 3.3 for the exterior with dimensions.

Unit: mm (inch)

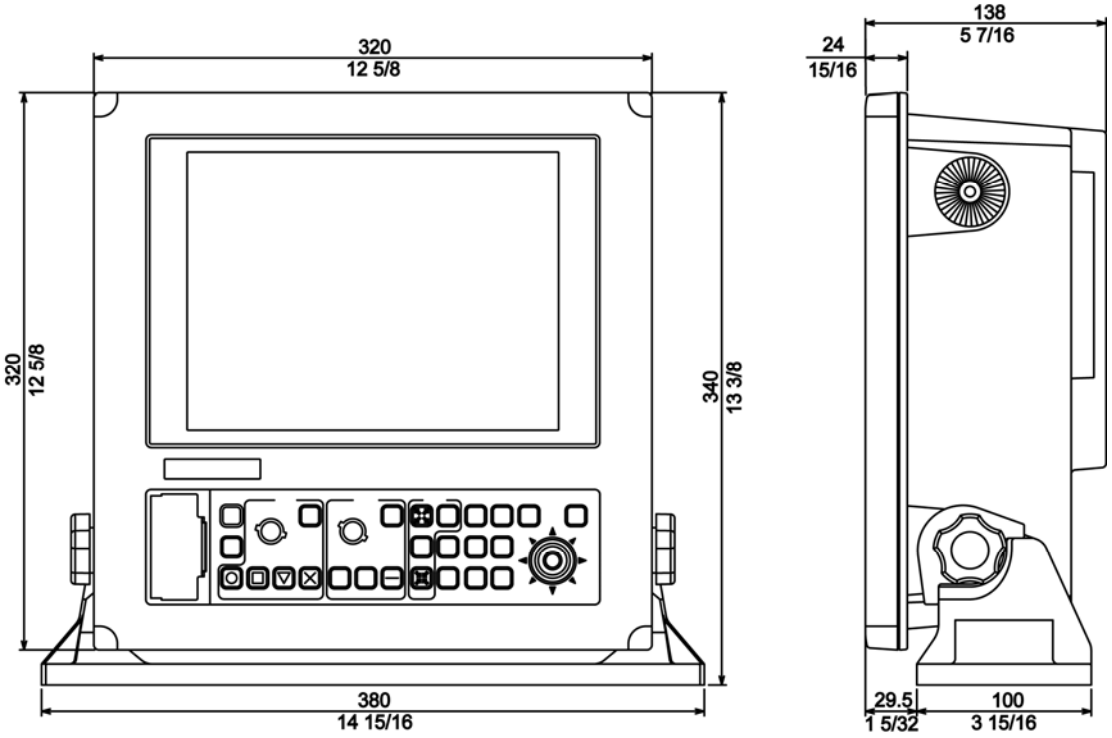

Figure 3.1 The Exterior of GTD-110 with dimensions

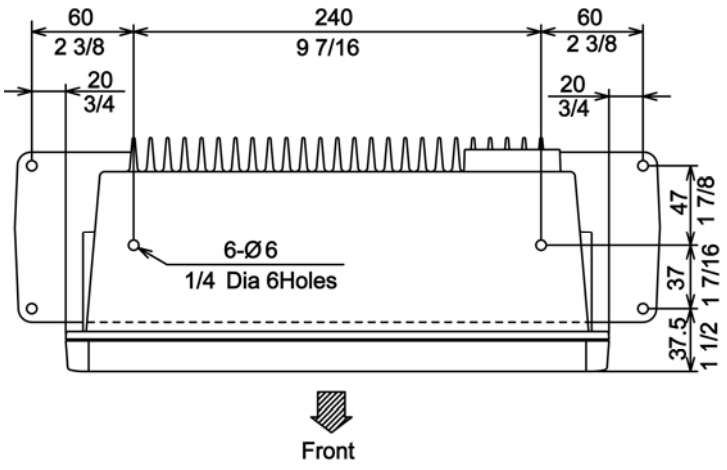

Figure 3.2 Service space required for GTD-110

Unit: mm (inch)

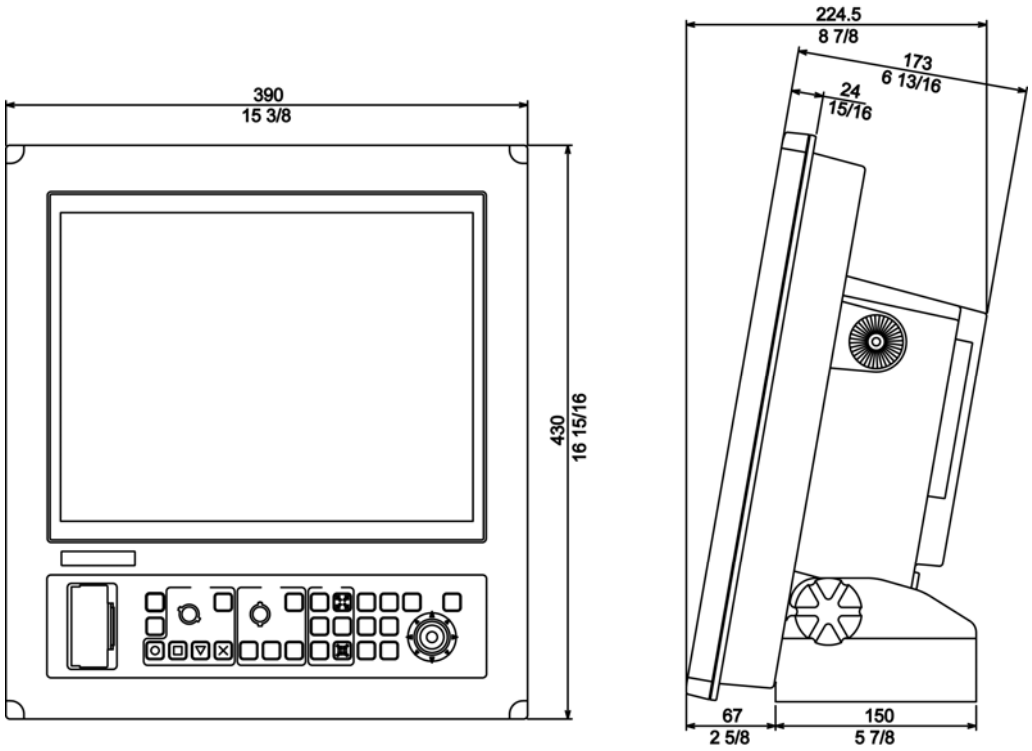

Figure 3.3 The Exterior of GTD-150 with dimensions

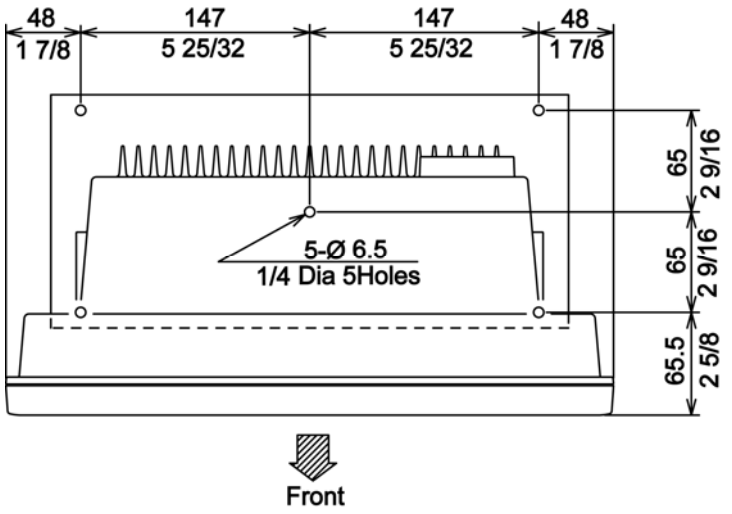

Figure 3.4 Service space required for GTD-110

Chapter 4

Installation

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Chapter 4 Installation

4.1 Installation consideration

General

Qualified service technicians should perform the installation of the GTD-110/150 series that comprises the following operations.

(1) Unpacking each component of the system.

(2) Inspection of the exterior of each component unit and accessory.

(3) Checking the ship's mains voltage and current capacity.

(4) Determining the installation site

(5) Installing the Display unit

(6) Planning the cable routing and connections

(7) Adjustment and setups

4.2 Unpacking of goods

Unpack your package and check if all of the items stated in the packing list are contained in the package. If not, report this to an insurance agent for tracing missing goods or a refund.

4.3 Inspection of goods

Carefully check the exterior of each component unit for dents, damage, etc. Also check the inside of component units for electrical and mechanical damages.

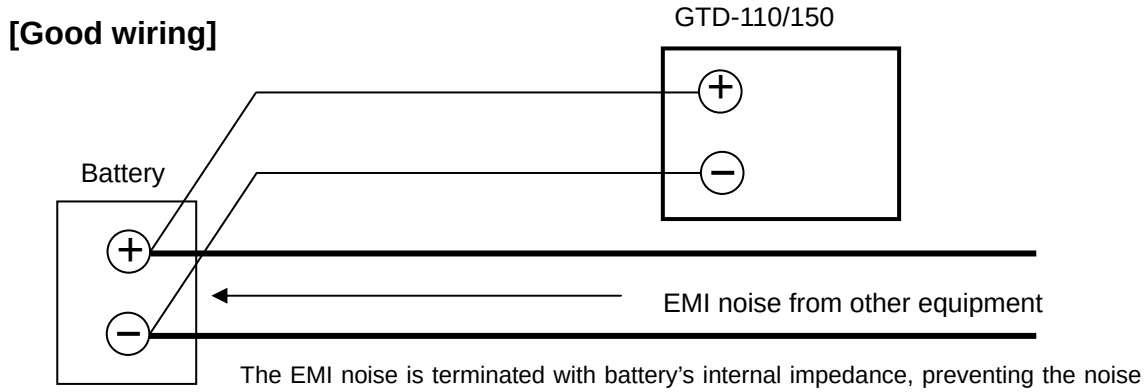
4.4 Siting the units

To achieve best operational performance, the following factors must be considered.

4.5 Cable routing and connections

(1) The display unit should be grounded to the hull as short as possible. We recommend using a wide and heavy copper braid or plate to be connected to a grounding stud at the rear of the display unit.

(2) The power supply cable should be connected directly to the ship's battery to avoid RF noise conducted from other equipment on board.



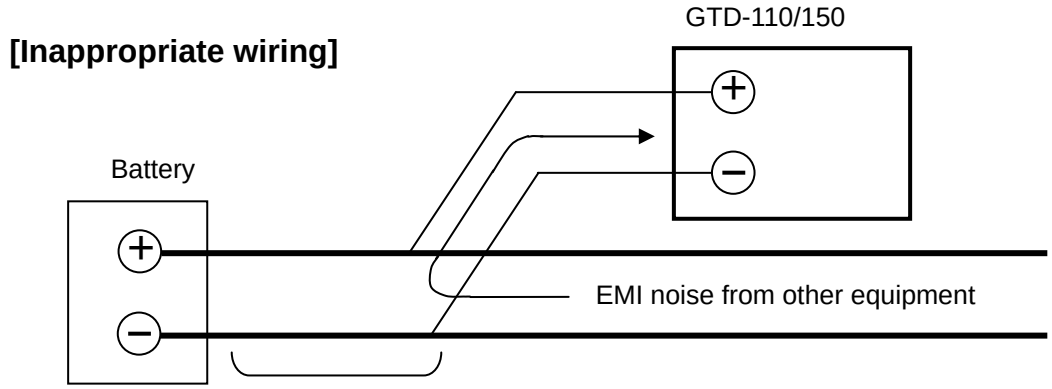


Figure 4.1 Recommended power supply line connections

4.6 Display Installation

The display unit is designed for table mount and flush mount. Refer to the following descriptions for installation.

4.6.1 Table mounting

(1) Remove the two fixing knobs that fix the display unit to the mounting bracket.

(2) Remove the display unit from the bracket and place it on a flat and safe area.

(3) Place the mounting bracket to the place where the display unit is to be installed, and fix the bracket with four (4) tapping screws.

(4) Reset the display unit on to the bracket and fix it using the two screws that were removed in step (1).

Refer to the following figures for detail.

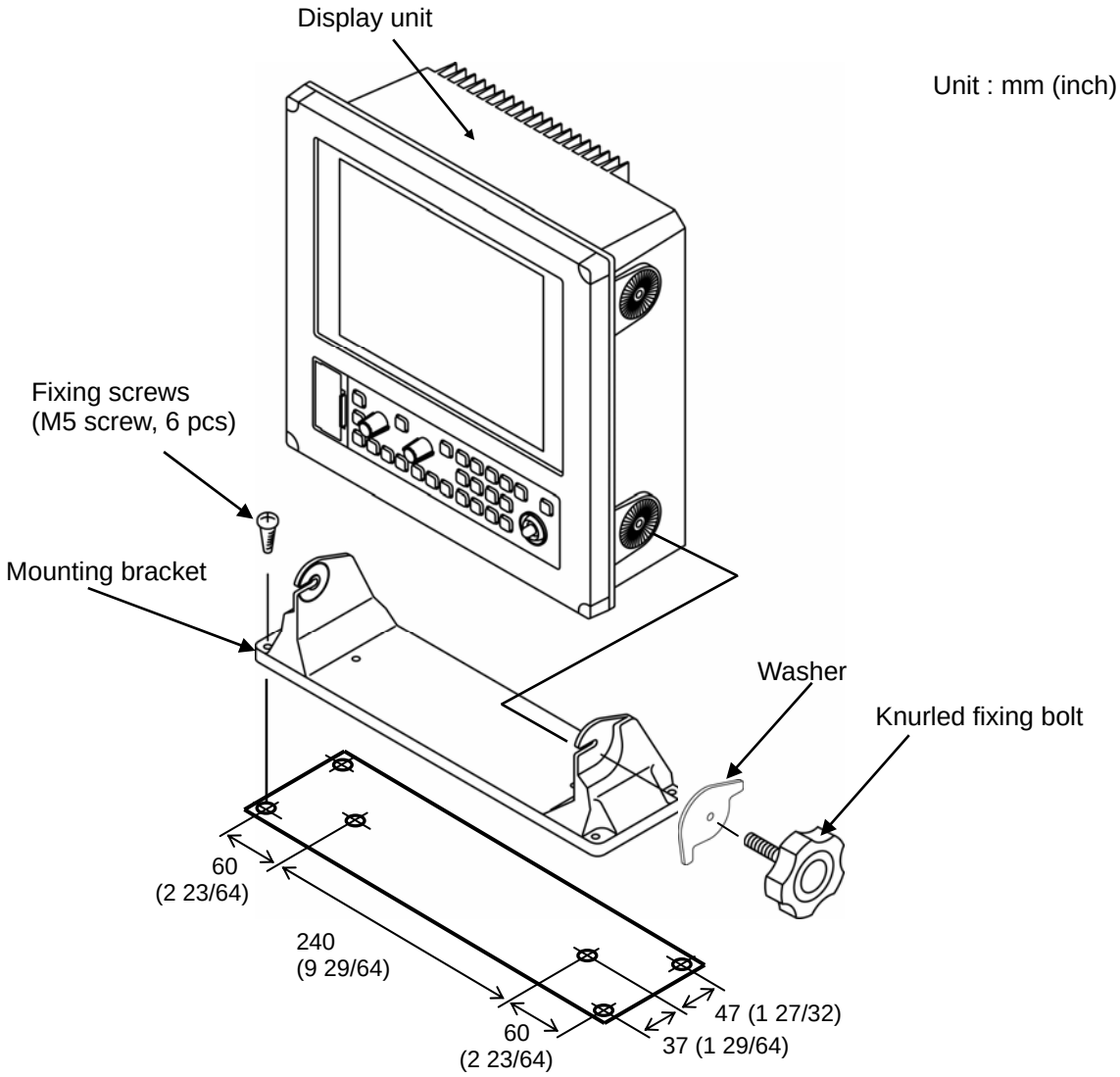


Figure 4.2 Fitting detail of GTD-110 in table mounting mode

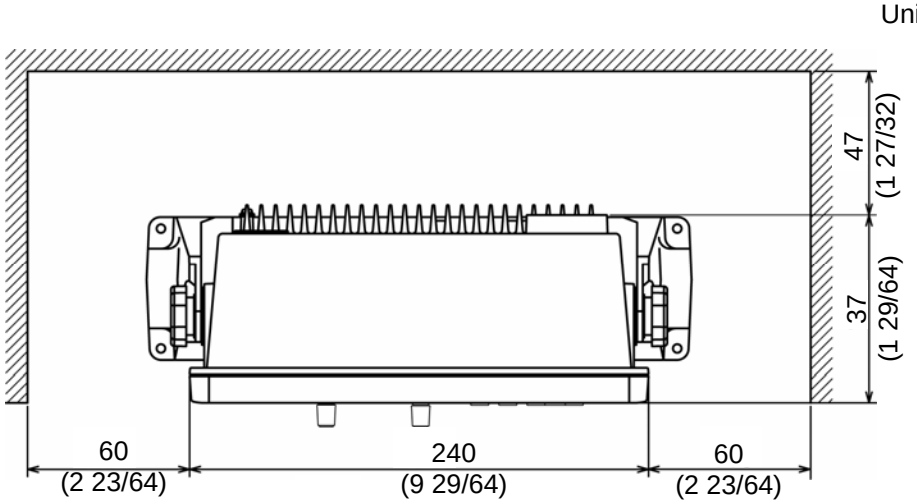


Figure 4.3 Service space required for GTD-110

Unit : mm (inch)

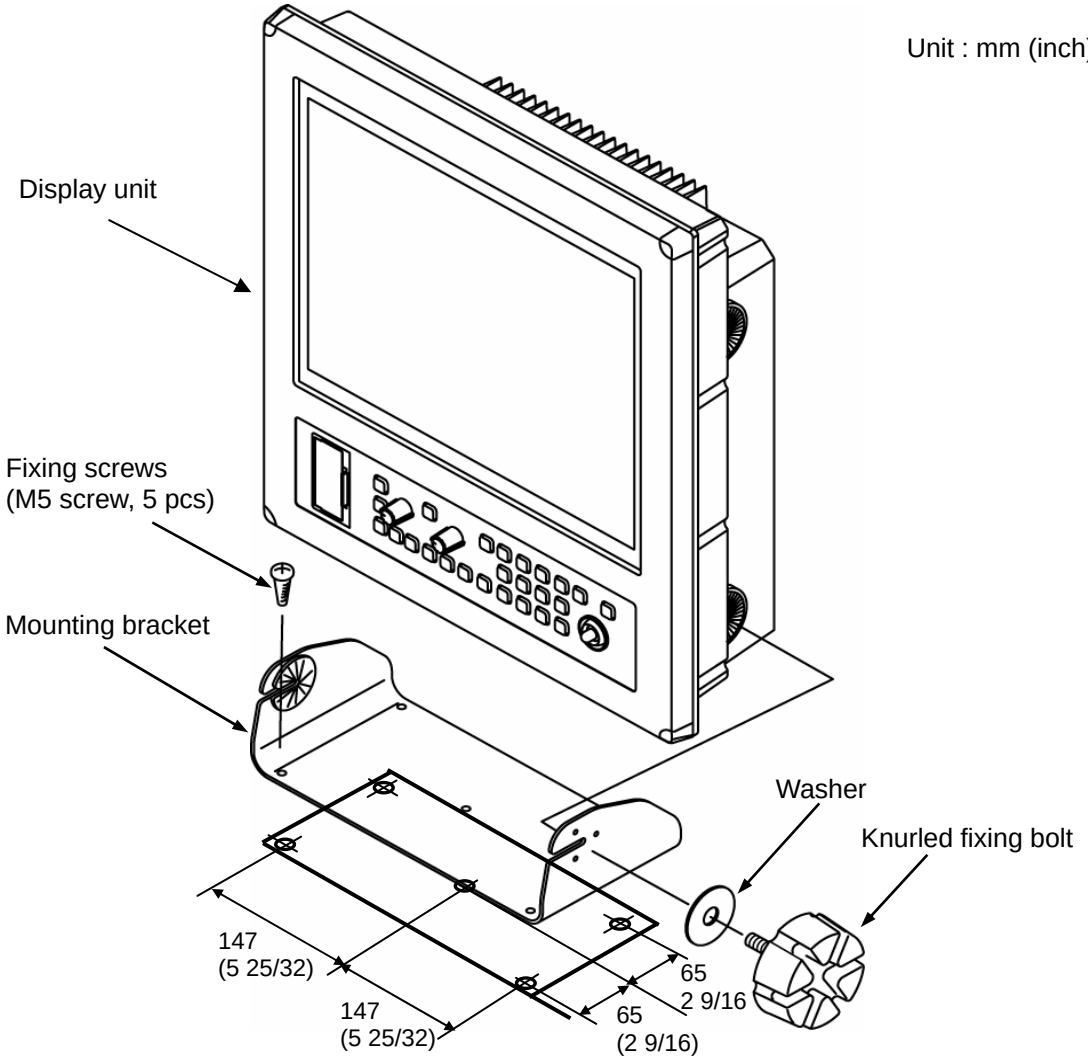


Figure 4.4 Fitting detail of GTD-150 in table mounting mode

Unit : mm (inch)

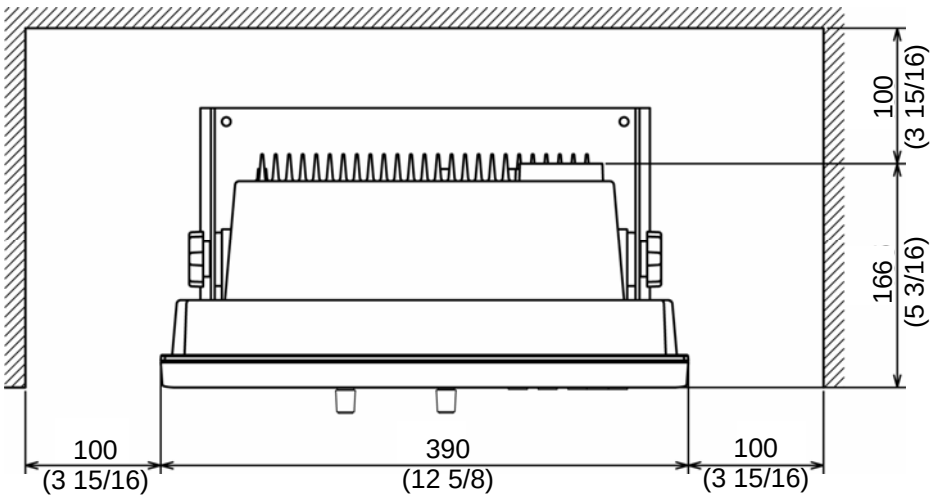


Figure 4.5 Service space required for GTD-150

4.6.2 Flush mounting

(1) Make a rectangle hole at the location to be installed.(See Figure 4.7 and Figure 4.9)

(2) Loosen the two (2) fixing knobs that fasten the display unit onto the fixing bracket.

(3) Remove the four (4) plastic screw covers, which are fitted on each corner of the display front face.

(4) Put the display on the opening and fix with four (4) tapping screws. In case you use M4 screws to fix the display, select an appropriate screw length that best suits fixing the unit to the panel thickness.

(5) Refit the coverings removed in step (3).

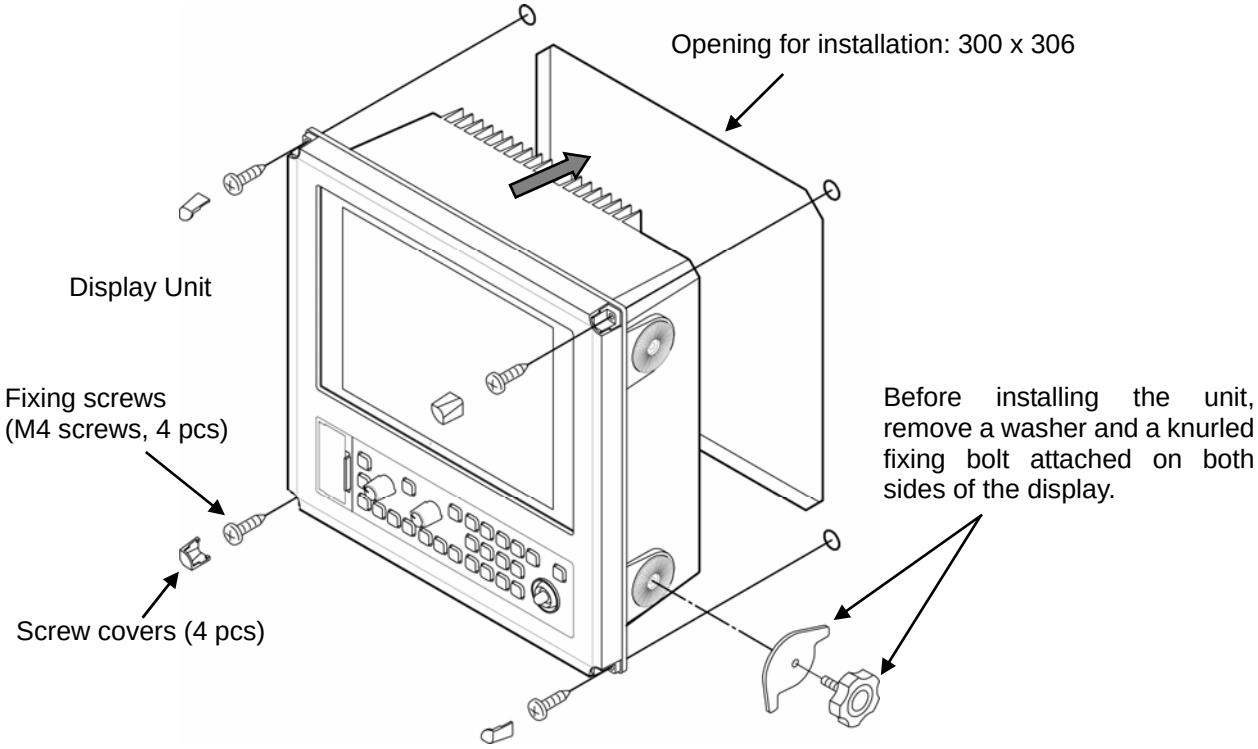


Figure 4.6 Fitting GTD-110 in flush mounting mode

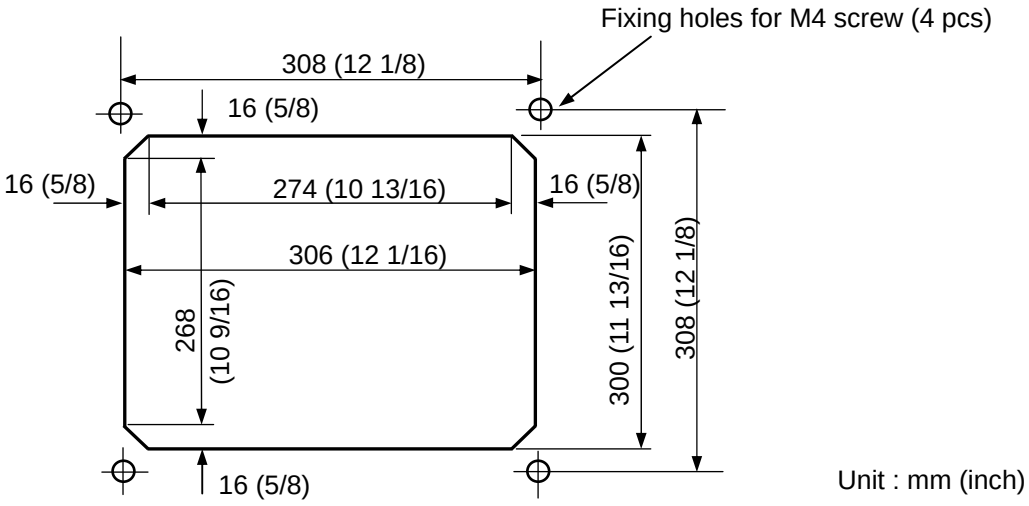


Figure 4.7 Dimensions of opening and fixing holes for GTD-110

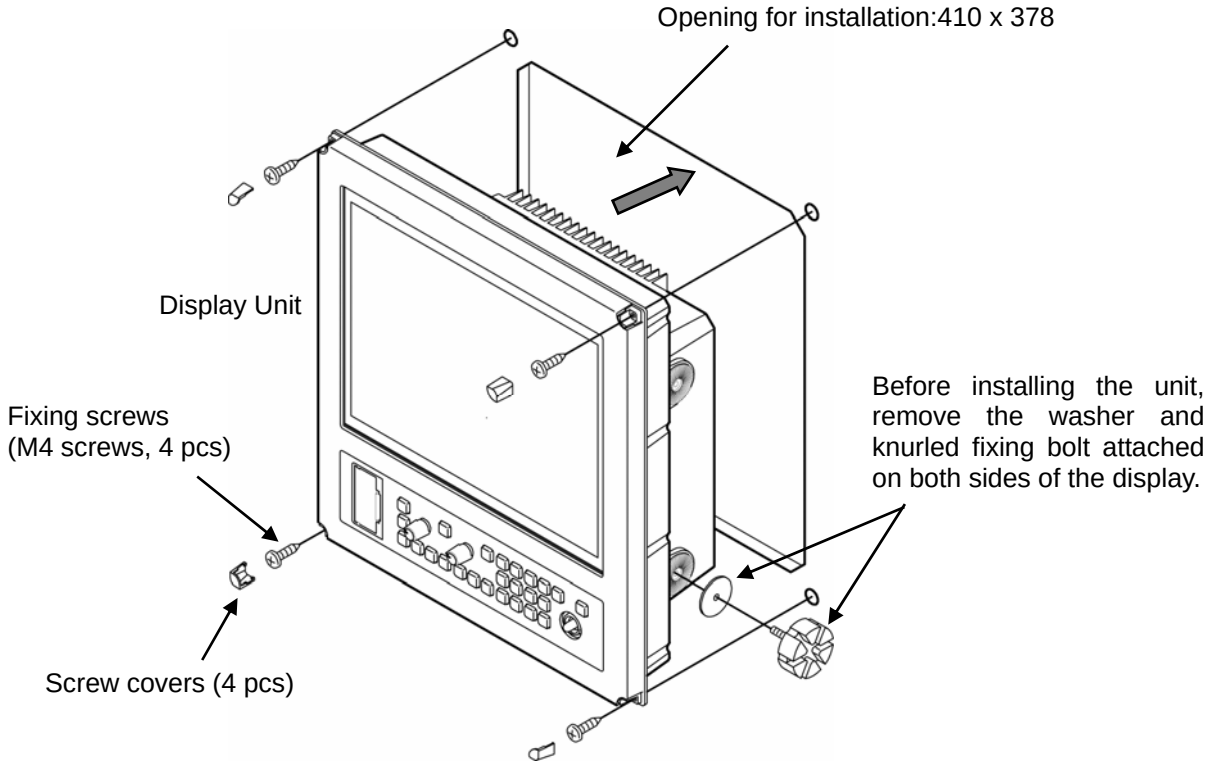


Figure 4.8 Fitting GTD-150 in flush mounting mode

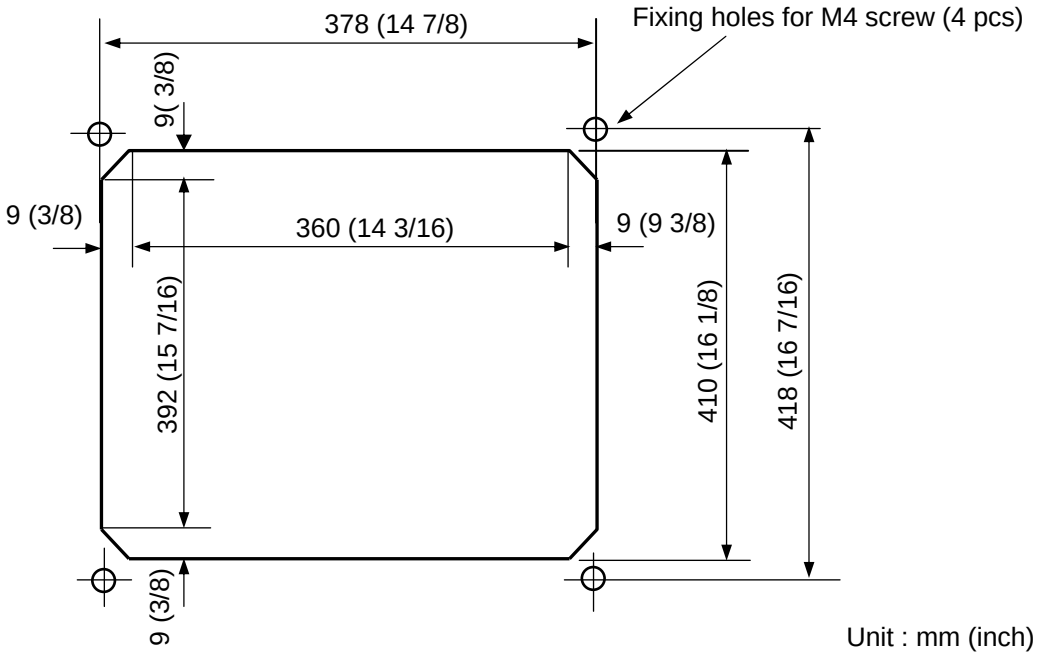


Figure 4.9 Dimensions of opening and fixing holes for GTD-150

4.7 Cable connections to the GTD-110/150

Connect the power cable, antenna cable and data cable to GTD-110/150 on the rear panel.

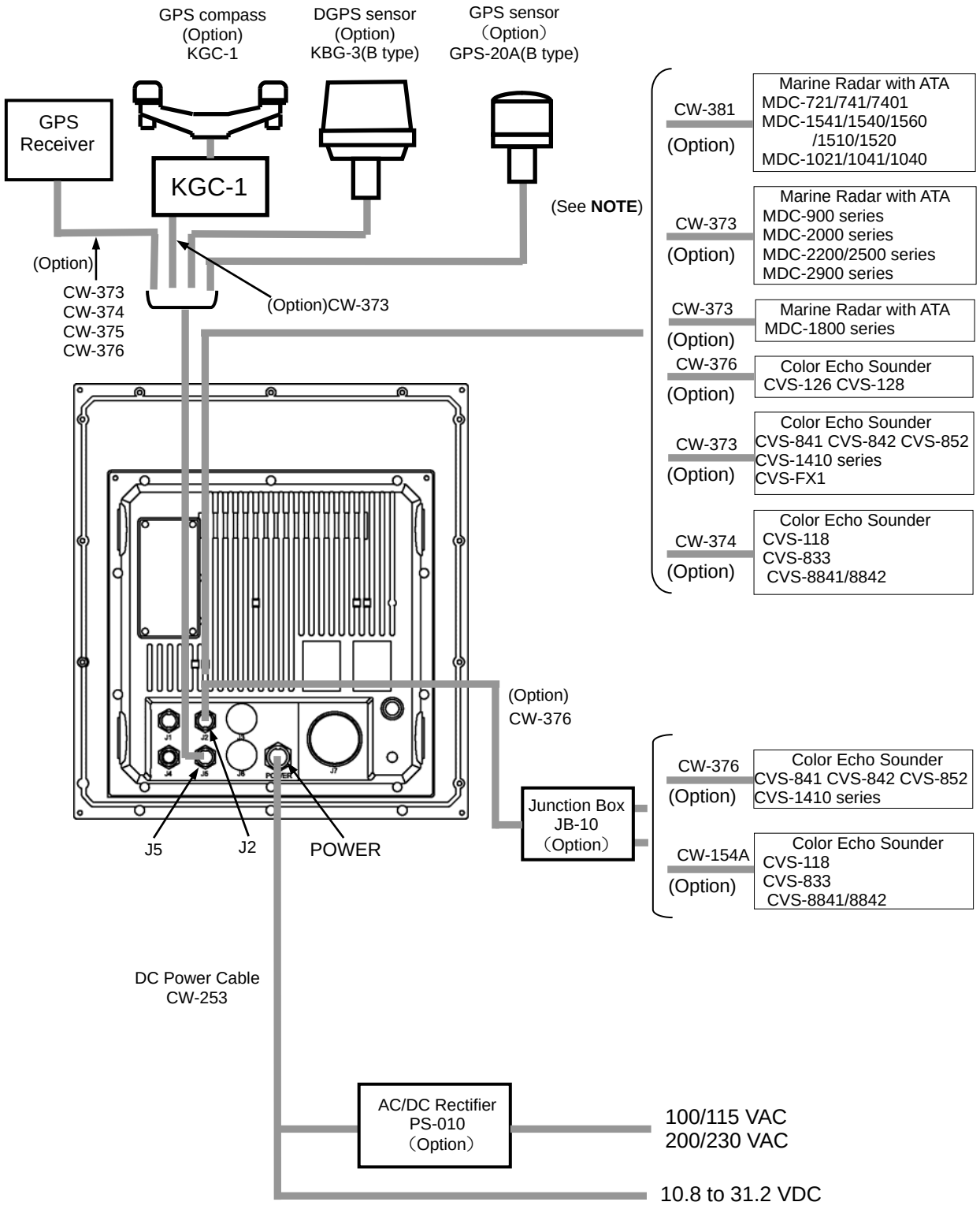


Figure 4.10 Cable connections GTD-110/150

NOTE
Connecting an existing GPS/DGPS sensor to the GTD-110/150 Track Display

The GTD-110/150 series of Track display has a waterproof design, meeting the requirements of IPX-5 (Resistive against driven water). In order to maintain this specification, all the connectors used in an existing external sensor must be replaced with waterproof type connectors.

For detail, please contact KODEN or nearest KODEN service agent.

4.7.1 Pinouts of connectors on the rear panel

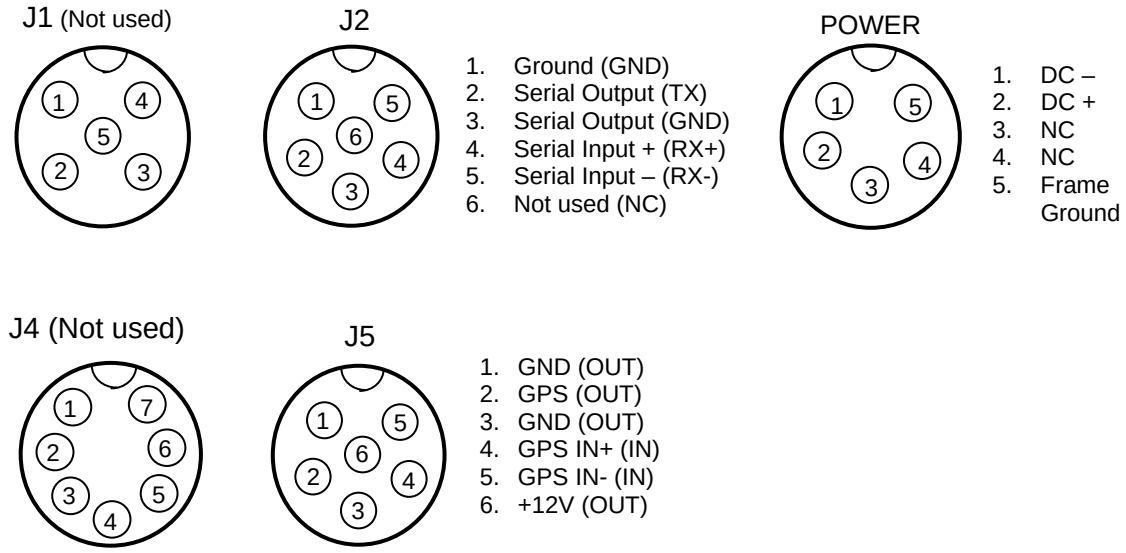


Figure 4.11 Pinouts of connectors on the rear panel

4.8 Inspections after installation

Before you turn the unit on, check the following points to make sure the GTD-110/150 operates properly.

(1) Is the ship's supply voltage and current within the rated range?

(2) Is the transducer wiring normal? No wrong connections, no short circuits, etc?

(3) Are the cables routed and connected properly according to Para. 4.5 "Cable routing and connections"?

Chapter 5

Basic Operation

Contents

Chapter 5 Basic Operation

5.1 Operating controls and functions

All operating controls and keys are grouped on the control panel. Details of each function are explained below.

5.1.1 Power switch and brightness controls

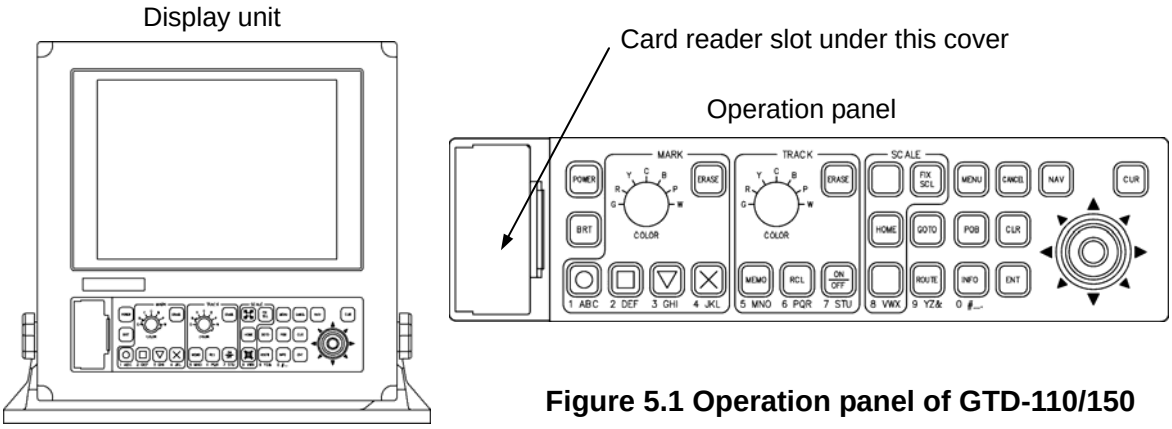


Figure 5.1 Operation panel of GTD-110/150

POWER key

Turns system on and off.

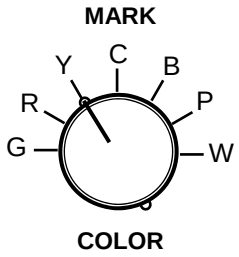
BRIGHTNESS key

Controls screen brightness and illumination on the control panel. The first press of the key displays the brightness scale bar graph. A further press of the key changes the brightness and illumination first increasing and then decreasing.

5.1.2 Marking control and keys

This function provides various marks for object identification on the screen. The following mark functions are available.

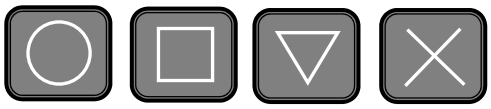
MARK COLOR control



Selects the mark color. Colors are expressed alphabetically, as follows:
G: Green, R: Red, Y: Yellow, C: Cobalt-Blue, B: Blue, P: Pink, W: White

MARK key

Displays a designated mark when its relevant key is pressed.



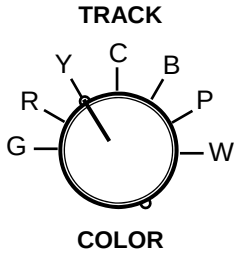
MARK DELETE key

Deletes a mark shown on the display when this key is pressed.

5.1.3 Track color controls and related keys

This function enables you to display and edit the ship's track. Functional details of controls and key switches involved in this function are as follows:

TRACK color control



Selects the color of a track. Colors are expressed alphabetically as follows:
G: Green, R: Red, Y: Yellow, C: Cobalt-Blue, B: Blue, P: Pink, W: White

MEMO key

Stores a ship's track.

RECALL key

Recalls a stored track.

ON/OFF key (TRACK)

Turns the ship's track display on or off.

ERASE key (TRACK)

Deletes a ship's track.

5.1.4 Chart control keys

This function includes various display control functions involved in setting the map scale, functional input and cancel, panning and scrolling the screen, etc. Details are as follows:

SCALE 1/SCALE 2/SCALE 3

Sets the display to a preset map scale, which is assigned to each scale key.

Zoom out key

Enlarges the whole display when it is pressed. When pressed and held the map is continuously enlarged.

HOME key

Puts own ship's position or cursor position in the center of the screen.

Zoom in key

Contracts the map scale when pressed. When it is pressed and held the map is continuously contracted.

5.1.5 Navigational setting keys

POB key

Enters an emergency event such as a person over board. The POB screen is displayed, as a result.

GOTO key

Enters a waypoint position and the screen is set to Waypoint mode.

ROUTE key

Designate a registered route and the screen is set to Route mode.

NAV key

Changes display top orientation to North, East, South, West, Waypoint direction and the ship's bearing.

INFO key

Displays information about the various icons used.

5.1.6 Menu related keys

MENU key

Opens the menu screen.

ENT key

Enters a preset menu item.

CANCEL key

Cancels an entered menu item.

CLR key

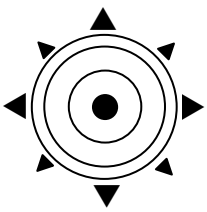
Cancels the anchor watch or waypoint designation.

5.1.7 Screen control keys

CUR key

Turns the cross cursor display on and off at each press of this key.

Joystick



Moves the screen display, cursor, etc. as well as scrolls the menu list.

5.2 C-MAP NT MAX INFORMATION

MAX is a major evolution of NT/NT+ product technology. The key points are:

New Data Features

Tides and Currents (Intuitive arrows show direction and strength)

World Background Charts with terrestrial data

Value Added Data (Pictures and Diagrams. Land Data)

Enhanced Port Info

New Presentation Features

Clear View (advanced legibility techniques providing chart data on the screen)

Dynamic Nav-Aids (an innovative and dynamic presentation mode)

Dynamic Elevation Data (optimized palettes for chart plotter with more than 256 colors; includes new NOAA palette)

Perspective view (“Real World” perspective view of the chart, Updated real-time during navigation**)**

MAX and NT/NT+ C-CARD coexistence

When NT+ data and MAX data cover different areas, the chart plotter gets data from both charts (depending on the current position).

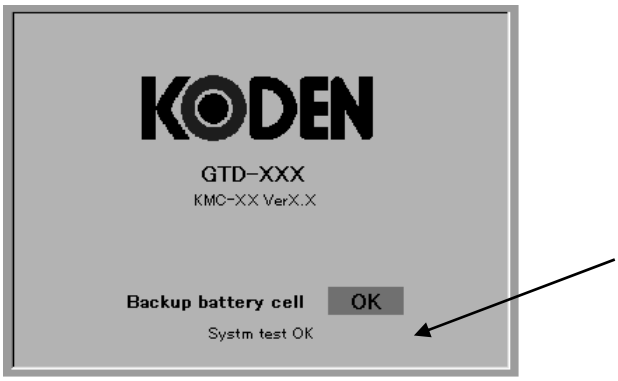
When NT+ data and MAX data cover the same area, the chart plotter gets data only from the MAX chart.

This is for the World Wide Background as well.

5.3 Getting started

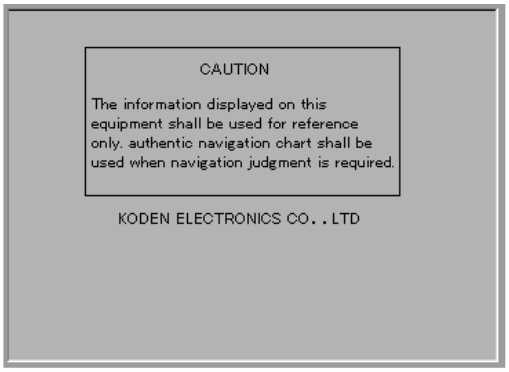
5.3.1 Turning the power on

Press the POWER key on the top left corner of the operating panel. The following screen displays will be shown in sequence before the normal display appears with GPS fix information shown at the top left corner of the screen.



The display shown when the unit is turned on

The battery status display is shown at first. When the battery is near the end of its life, the display "Replacement needed" is shown and an audio alarm will be activated. In such a case, contact KODEN or your nearest KODEN dealer for replacement.



The "CAUTION" display is shown next, notifying the operator that the display shown on GTD-110/150 series GPS Track Display should be used as reference only in making decisions in navigation.

The DGPS (GPS) sign is shown here when the positioning is fixed.

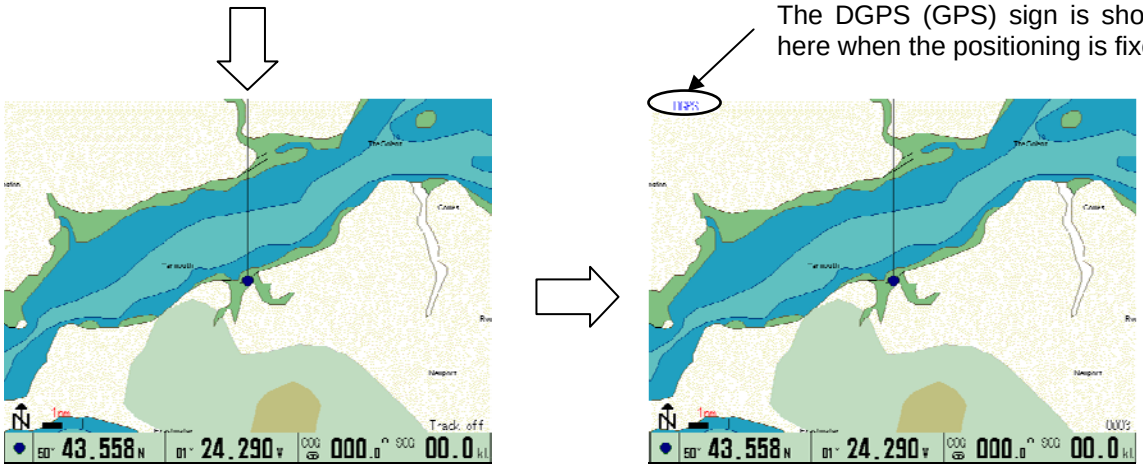


Figure 5.2 Position fix display on the screen

5.3.2 Turning the power off

Press the POWER key. All the user settings are saved to the internal memory.

CAUTION

The time between turning the power on and off must be at least 1 second to avoid malfunction of the system. If the screen display becomes abnormal, turn the power off and then turn it on.

5.3.3 Changing the display and panel brightness

Every press of the BRT key changes the display brightness in 6 steps and illumination level in 3 steps. The first press of the BRT key shows the brilliance scale and the brightness of the screen is set to the maximum. Subsequent presses of the key lowers and then increases the brightness of the screen and the illumination in a cyclic way.

5.4 Displaying the current position

Your own ship's position will be displayed in latitude/longitude or LOP (Lane Of Position) coordinate.

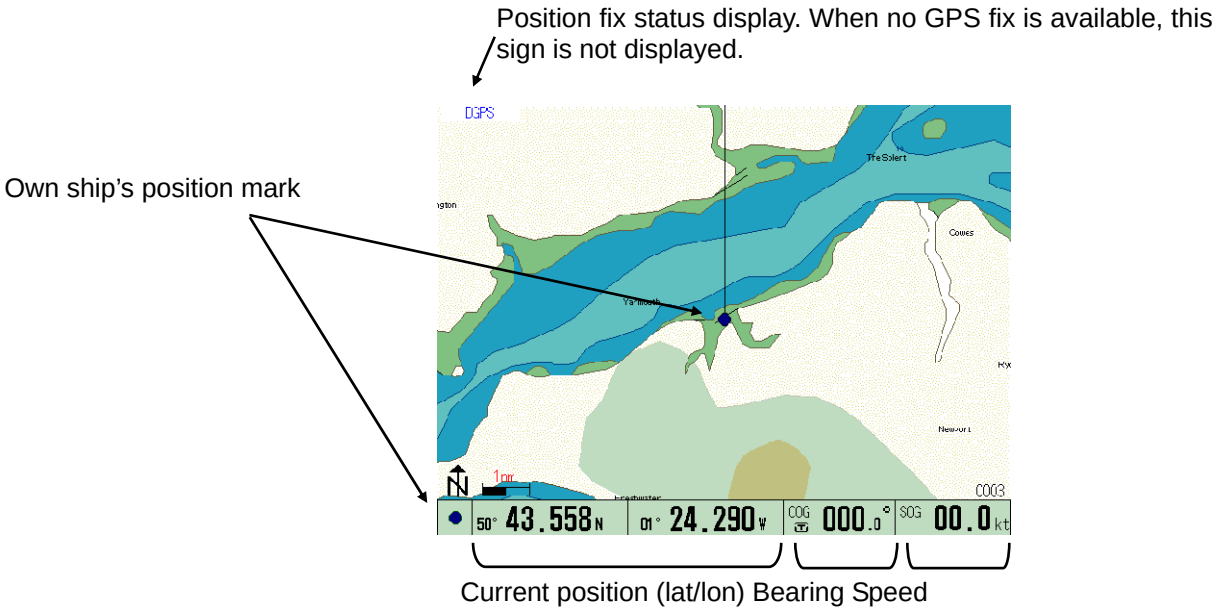


Figure 5.3 Own ship's position

The LOP coordinate display is available for Loran C. Select "DISPLAY SETTINGS" and then "POSITION DATA DISPLAY" to display own ship's position. For detail, refer to Para 6.4.1 "Position data display" for setting procedure.

CAUTION

To achieve a proper position fix by GPS, the GPS receiver needs signals from more than 3 satellites. If this condition is not met, the receiver cannot carry out a position fix calculation, and the error message "Fixing unable" is shown on the screen.

5.5 Operation on the map display

The following paragraphs describe how to move the map display and show the ship's track display, using the cross cursor and Joystick.

5.5.1 Moving the cross cursor

(1) Press the CUR key to display the cross cursor.

(2) Operate the Joystick in the direction to which you want to move the cross cursor.

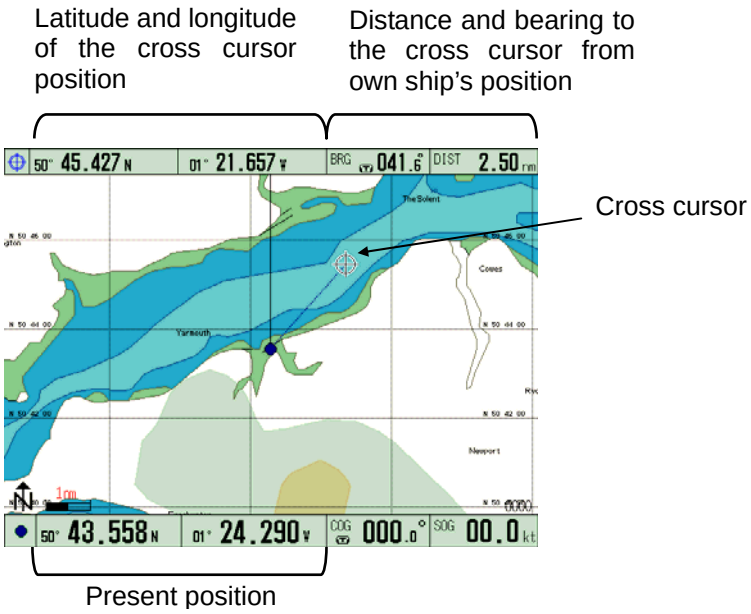


Figure 5.4 Moving the cross cursor

WARNING

When the GTD-110/150 is operated in CURSOR ON mode, the own ship position will not be brought back to the center of the display even if own ship goes beyond the screen itself. To resume OWN SHIP mode, turn the cross cursor off.

5.5.2 Image shift with CROSS CURSOR off

In this mode, you can shift a map by operating the Joystick to a desired direction with own ship's mark displayed at any position within the screen. This feature allows image movement where own ship's mark will always be displayed within the screen. Pressing the HOME key resets the map display with own ship's mark being centered on the screen.

5.5.2.1 Shifting the map display

There are two shift modes available; VIEW POINT and CHART. Select SYSTEM SETTINGS (1/2) => SCRL DIRECTION and then select either one. When you select OWN SHIP, the own ship's position can be shifted towards the direction the Joystick is operated to. If you select MAP, the map display can be shifted towards the direction the Joystick is operated to. The shifting area is limited within the screen. To use this function:

(1) Press the CUR key to delete the cross cursor.
(2) Press the MENU key to select “IMAGE SCROLL DIRECTION” and select OWN SHIP or MAP.
(3) Operate the Joystick to shift the image to a desired direction.

The following figure shows how own ship is moved in OWN SHIP mode. In MAP mode, own ship is moved in the opposite direction to which the Joystick is operated.

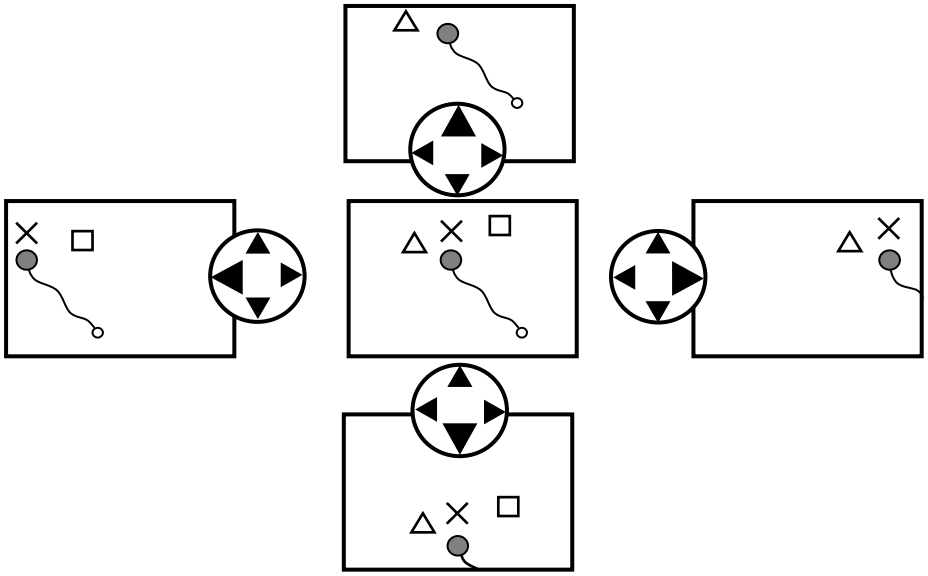


Figure 5.5 Shifting own ship’s position in OWN SHIP mode

5.5.2.2 Image shift with CROSS CURSOR on

In this mode, you can shift the map display by the Joystick to any position within the screen, regardless of the ship’s marked position, whether it is within or outside the screen. Pressing the HOME key resets the map display with own ship’s mark to be centered on the screen.

Press the CUR key to turn the cross cursor off. Own ship’s mark will be brought to the center of the screen.

5.5.3 Changing the map scale

There are two methods available for zooming, Continuous Zooming or Fix Zooming

Continuous zooming:

Press the Zoom Out or Zoom In key to change the map scale. The zooming reference point changes whether the cross cursor is shown or not as follows:

With Cursor ON: Zooming is referenced to the cross cursor position

With Cursor OFF: Zooming is referenced to own ship’s current position

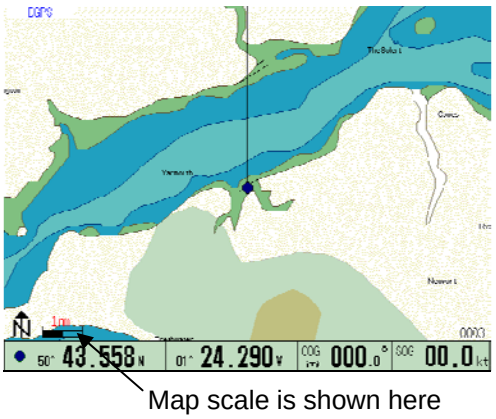


Figure 5.6 Map scale display

Fix zooming:

Press the FIX SCL key to select the map scale. Each press of the key toggles Scale 1, Scale 2 and Scale 3. The following table shows default map scales in nm and km unit systems.

Table 5.1 Default map scale

	Map scale 1	Map scale 2	Map scale 3
Map scale in nm	700 nm	60 nm	3 nm
Map scale in km	1300 km	120 km	6 km

To change map scale settings, select “SYSTEM” and then “SETTING”. For detail, refer to Para 6.6 “System Settings”.

Note: About C-MAP chart

When a C-MAP chart card for a special area is used, there are cases where no chart could be displayed at some positions or at some ranges.

This is because that there is no most appropriate chart information and not because of the failure. In those cases, please try to change the range to get the chart.

5.5.4 Displaying a ship’s track

(1) Select a ship’s track color using the COLOR TRACK selection switch. Available colors are shown in code on the control panel as follows:

G: Gray, R: Red, Y: Yellow, C: Cobalt-Blue, B: Blue, P: Pink, W: White

(2) Press the TRACK ON/OFF key to store the ship’s track. The number of ship’s track plots is shown in the lower right corner of the screen.

NOTE: Frequent pressing of the ROUTE key toggles the ship’s track line display between ON and OFF.

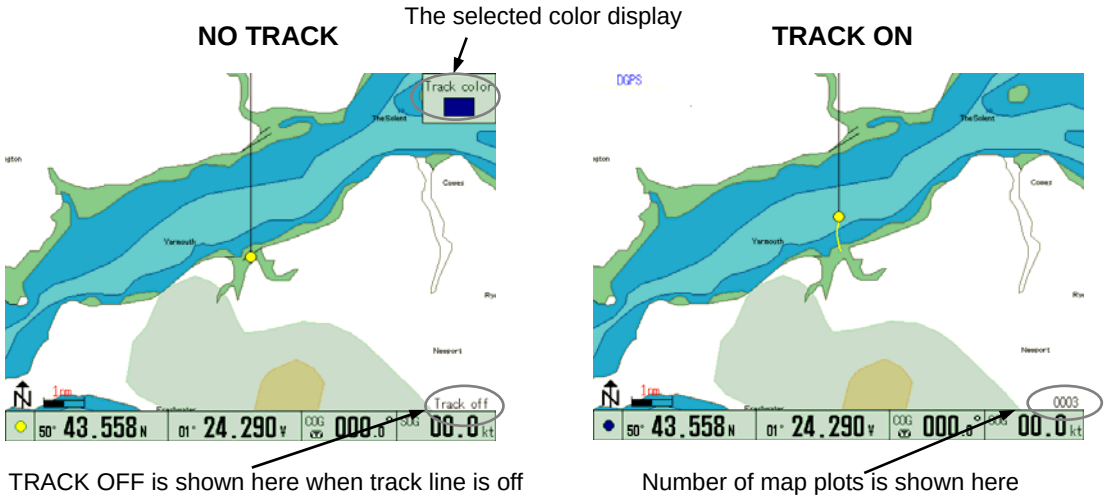


Figure 5.7 Displaying the ship’s track line

For setting plotting intervals, select “SYSTEM” and then “SETTING”. For detail, refer to Para 6.6 “System Settings”.

The color of the ship’s track can be changed even if the ship’s track plotting is in progress. When no

track line function is required, press the TRACK ON/OFF key to turn the track line off.

CAUTION

Maximum plot number of ship's track is 7,000 points. If the plot number exceeds this limit, the first plot will be over-written. Record important data separately, referring to Para 6.3.3 "Storing the ship's track line".

(3) Press the TRACK ON/OFF key to turn off the ship's track.

5.5.5 Storing a ship's track

(1) Press the TRACK MEMO key. The "Track store table" will appear.

(2) Operate the Joystick up or down to select a memory block number.

(3) Press the ENT key. The ship's track will be stored into the block number designated.

The list of ship's track memory

A prompt shown for over-writing ship's track line

Figure 5.8 Storing a ship's track line

GTD-110/150 can store up to 49,000 points arranged in 7 blocks, 7000 points each. Select "TRACK STORE" to store the track points. By performing the TRACK STORE function the track points data is protected from erasure that happens when the back-up battery is nearing its life or is removed. We recommend deleting unnecessary track points before attempting to store track points. Refer to Para 5.5.7 and Para 5.5.8 for the procedure.

5.5.6 Recalling ship's track

(1) Press the RCL key.

(2) Operate the Joystick up or down to select the block number to be recalled.

(3) If an unwanted ship's track is recalled, select the same block number. The unwanted ship's track will be deleted from the screen.

The list of track to be recalled

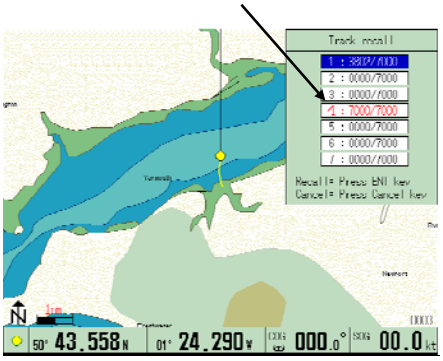


Figure 5.9 Registered track list

5.5.7 Deleting a ship's track by specifying a color

(1) Press the CUR key to delete the cross cursor.
(2) Press the TRACK ERASE key.
(3) Operate the Joystick up or down to select the color of the ship's track to be deleted.
(4) Press the ENT key to delete the assigned track.

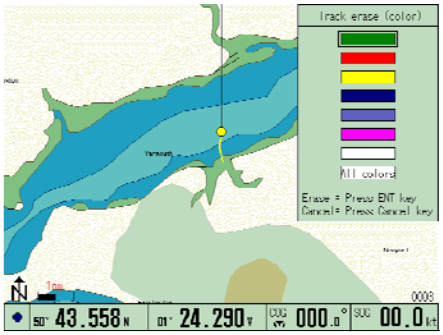


Figure 5.10 Track color list

WARNING

A deleted track cannot be resumed. Take utmost care in selecting the track to be deleted.

5.5.8 Deleting a ship's track by specifying an area

(1) Press the CUR key. The "Track erase (area)" window will appear.
(2) Press the TRACK ERASE key.
(3) Operate the Joystick to designate the start point of the area to be erased.
(4) Press the ENT key to enter the point.
(5) Operate the Joystick to designate the end point of the area to be erased.
(6) Press the ENT key to enter the point. The designated area is erased.

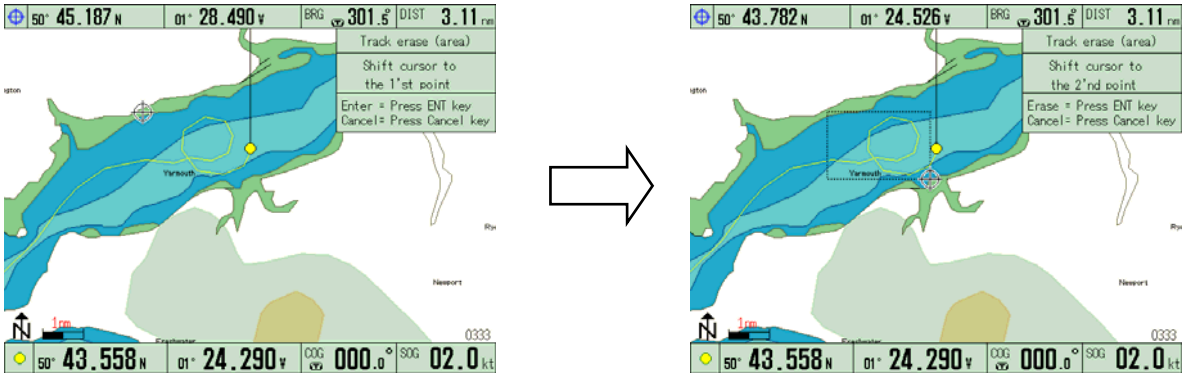


Figure 5.11 Erasing a ship's track

WARNING

An erased track cannot be resumed. Take care not to ruin recorded ship's tracks.

5.5.9 Deleting a ship's track by specifying a block

(1) Press the CUR key. "Track erase (block)" window will appear.

(2) Press TRACK ERASE key twice.

(3) With the joy stick, move the cursor to a track block to be erased.

(4) Press ON/OFF key to select the track block.

(5) For selection of another track block, continue ON/OFF key pressed.

(6) Press ENT key to erase the track block.

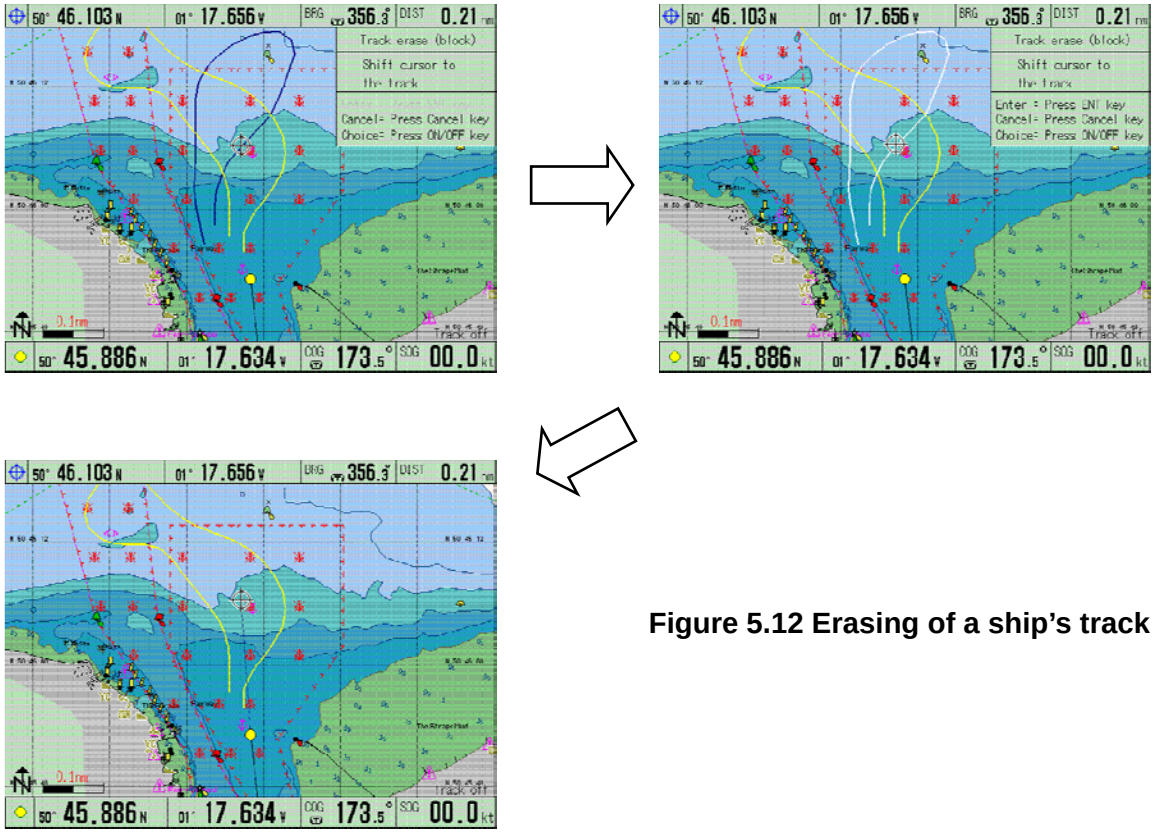


Figure 5.12 Erasing of a ship's track

WARNING

An erased track cannot be resumed. Take care not to ruin recorded ship's tracks.

5.6 Mark registration

The GTD-110/150 can register up to 8,300 points with registration numbers assigned from 0 to 8,299. Each point can be assigned with different marks and colors. Registering points with marks is called “Mark registration”.

5.6.1 Registering own ship’s position

(1) Press the CUR key to delete the cross cursor.

(2) Select a mark color by the MARK COLOR selection switch.

(3) Select a mark shape by pressing any of the mark keys.

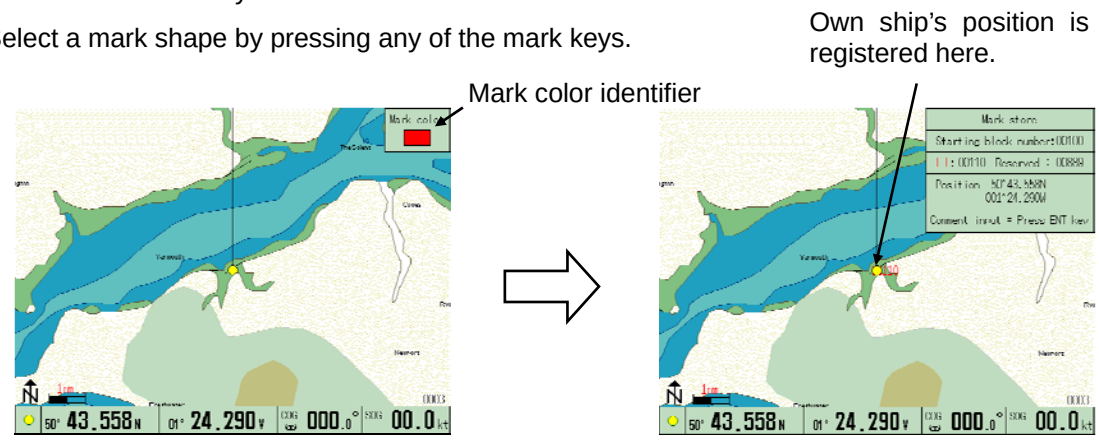


Figure 5.13 Registration of ship’s position

5.6.2 Mark registration for the cursor assigned point

(1) Display the cross cursor by pressing the CUR key.

(2) Assign the mark color by the MARK COLOR switch.

(3) Move the cross cursor by operating the Joystick to cover the point to be registered.

(4) Assign the mark shape by a mark key switch (◯, □, ▽ or ╳). An assigned mark is registered on that point.

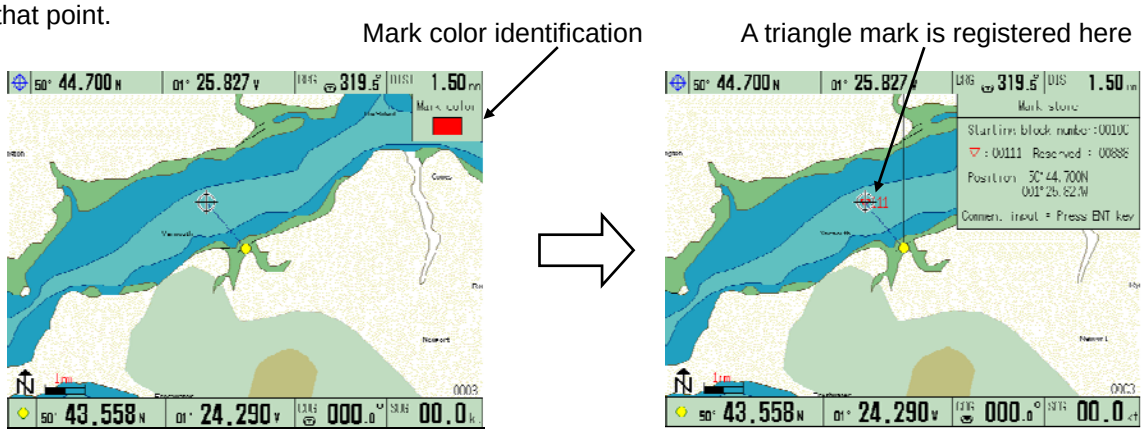


Figure 5.14 Mark registration of a cursor assigned point

5.6.3 Erasing a registered mark by color and shape

(1) Delete the cross cursor display by pressing the CUR key.

(2) Press the MARK ERASE key. The MARK ERASE pop up window will appear.

(3) Operate the Joystick in the window to point to the color and shape to be erased. If you wish to delete all the registered data, point to ALL COLORS and ALL SHAPES.

(4) Press the ENT key. Assigned registered colors and shapes will be deleted.

WARNING

Erased marks cannot be resumed. Take utmost care not to ruin recorded marks.

5.6.4 Assigning a mark to be deleted by the cross cursor

(1) Display the cross cursor by pressing the CUR key.

(2) Operate the joystick to move the cross cursor to the mark position to be deleted.

(3) Press the MARK ERASE key. Colors and mark shapes are shown in the “Mark erase” window.

(4) Press the ENT key. Assigned color and shape will be cancelled from registration.

NOTE 1: *When the mark color and shape are not shown in the window, retry to move the cross cursor over the same position and press the MARK ERASE key.*
NOTE 2: *If marks are overlapped in the same position, press the MARK ERASE key repeatedly until the mark in concern is shown in the MARK ERASE window.*

WARNING

Erased marks cannot be resumed. Take utmost care not to ruin recorded marks.

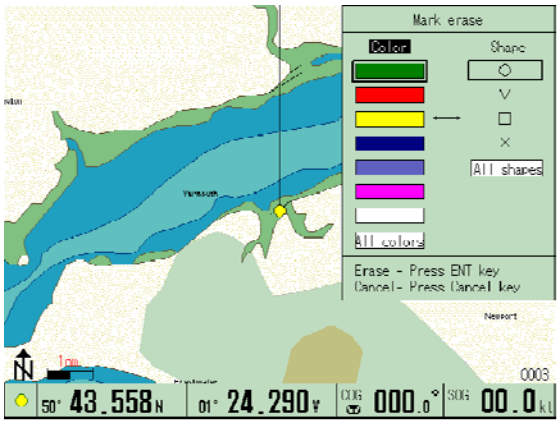


Figure 5.15 Erasing the registered mark

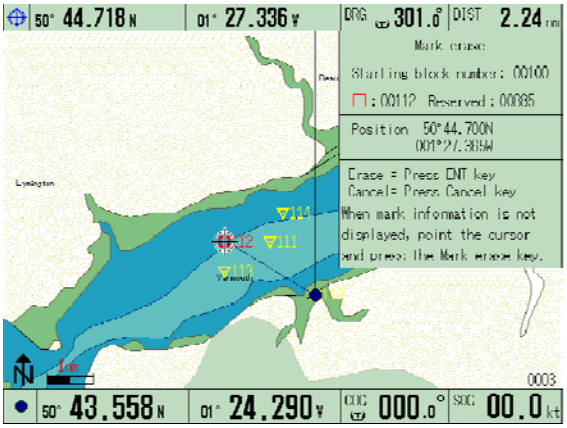


Figure 5.16 Deleting the registered mark

5.6.5 Mark moving

Mark moving function can be moved the marks already registered to other. There are 2 methods, one is by inputting numerical value, the other is by moving cross cursor.

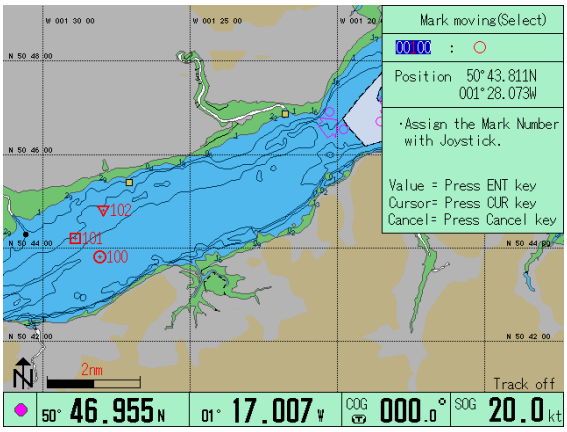


Figure 5.17a Moving the registered mark (Mark select window)

5.6.5.1 Mark moving (Numerical value)

(1) Press the CUR key to delete the cross cursor.
(2) Press the ENT key. The “Mark moving (Select)” popup window appears. (Figure 5.17a)
(3) Operate the Joystick up or down to select the mark number.
(4) Press the ENT key to input the numerical value. The “Mark moving (Value)” popup window appears. (Figure 5.17b)
(5) Operate the Joystick to select the mark position.
(6) Press the ENT key. The new numerical value is set as the new mark. The popup window closes.

5.6.5.2 Mark moving (Cross cursor)

(1) Press the CUR key to delete the cross cursor.
(2) Press the ENT key. The “Mark moving (Select)” popup window appears. (Figure 5.17a)
(3) Operate the Joystick up or down to select the mark number.
(4) Press the CUR key to move the cross cursor. The “Mark moving (Cursor)” popup window appears. (Figure 5.17c)
(5) Operate the Joystick and move the cross cursor to the new position.
(6) Press the ENT key. The new cross position is set as the new mark. The popup window closes.

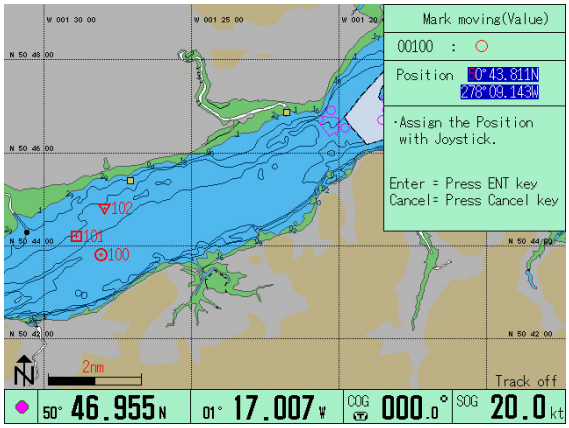


Figure 5.17b Moving the registered mark (Numerical value input window)

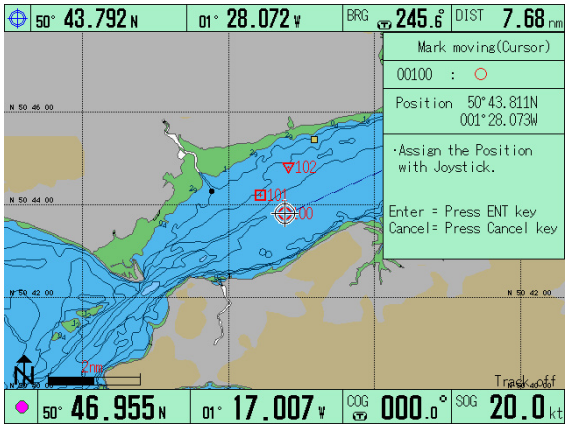


Figure 5.17c Moving the registered mark (Cursor input window)

5.7 Setting up for waypoint navigation

The following two methods of waypoint navigation are available:

(1) To use the mark-registered position data.

(2) To directly assign waypoints by the cross cursor.

5.7.1 Setting a waypoint by recalling a mark-registered position

Waypoint navigation is a navigation method that takes one even point on the route as a waypoint. Use the following procedure to set a waypoint.

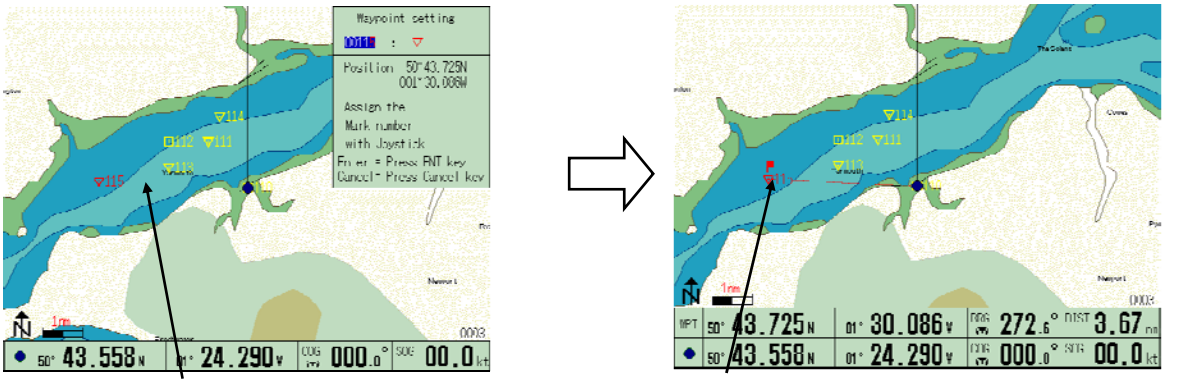
(1) Delete the cross cursor by pressing the CUR key. The following example shows that mark number 53 is set as a waypoint.

(2) Press the GOTO key. The WAYPOINT SET window will appear.

(3) Operate the Joystick up or down to select the waypoint number.

(4) Press the ENT key. The recalled mark number position is set as the waypoint. When the mark is registered, it will blink.

We recommend recording mark numbers, which are to be used for waypoints.



This point is to be set as a waypoint. The No. 115 point is now set as a waypoint.

Figure 5.18 Setting waypoints by registered marks

5.7.2 Setting a waypoint by the cross cursor

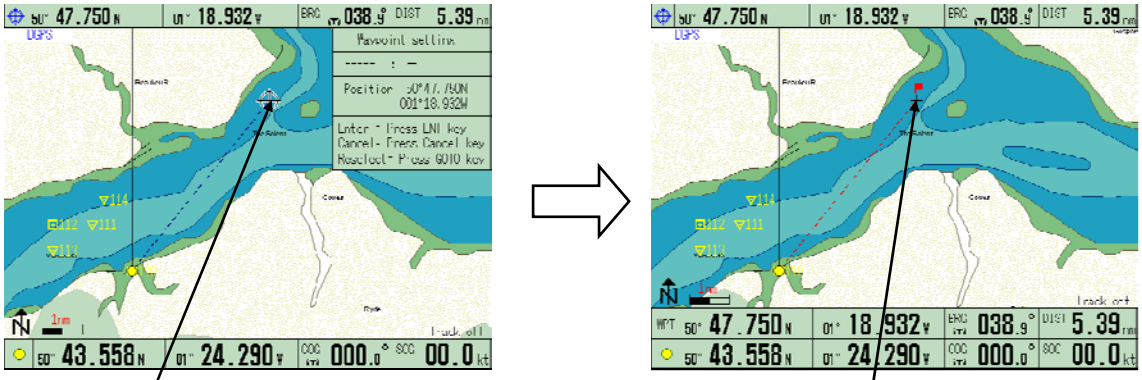
(1) Press the CUR key to display the cross cursor.

(2) Operate the Joystick to move the cross cursor on to the point to be assigned as a waypoint.

(3) Press the GOTO key. (The cross cursor can be moved even after the GOTO key is pressed)

(4) Press the ENT key. The point assigned by the cross cursor is set as a waypoint.

(5) If there is a mark-registered point on the screen, place the cross cursor on the mark and press the GOTO key. The marked point is set as a waypoint.



Place the cross cursor on to the point.

The assigned point is set as a waypoint.

Figure 5.19 Setting the waypoints by the cross cursor

5.7.3 Resetting a waypoint by a mark number

> **NOTE:** *To use this function, the points to be assigned as waypoints must be mark-registered in advance.*

(1) Press the GOTO key. The “Waypoint setting” pop-up window will appear with prompt.

(2) Operate the Joystick up or down to select the number of the point to become a waypoint.

(3) Press the ENT key. The point assigned is set as the waypoint.

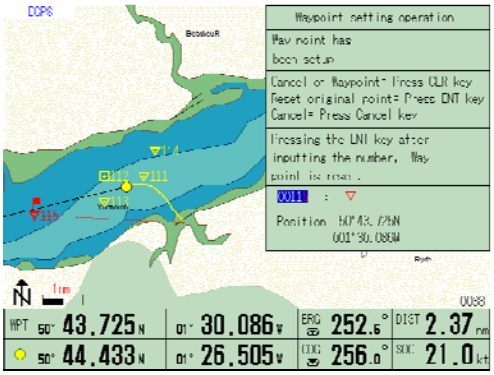


Figure 5.20 Resetting the waypoints by a mark number

5.7.4 Resetting a point of origin for waypoint navigation

When a waypoint has already been set up, own ship's current position can be set as a new point of origin. To do so:

(1) Press the GOTO key. The "Waypoint setting" window will appear.

(2) Press the ENT key. The ship's current position is reset as a new point of origin for the current waypoint navigation.

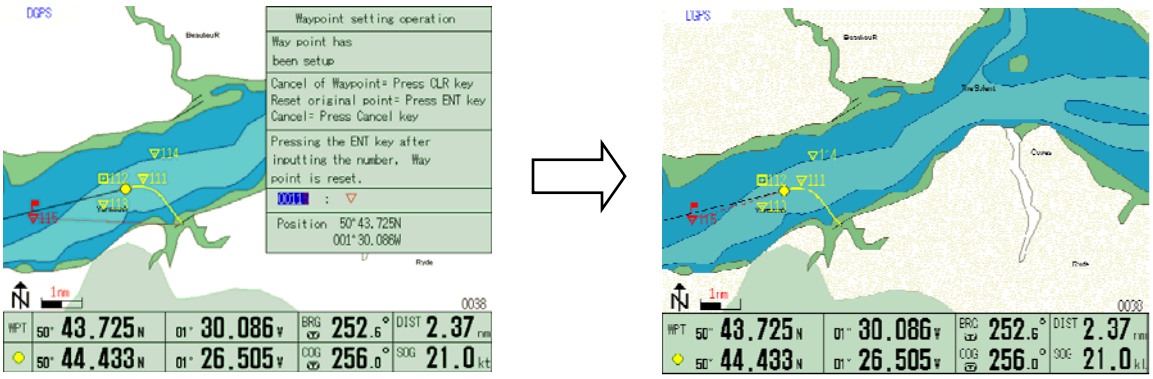
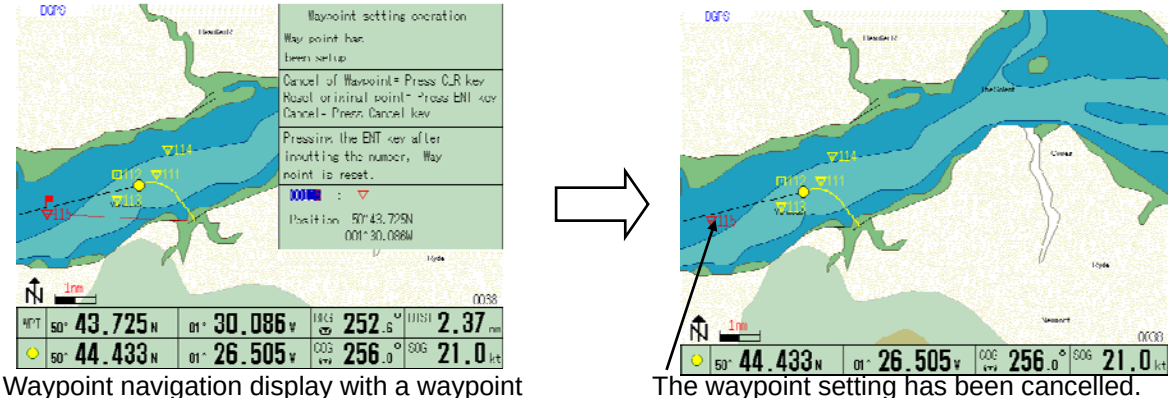


Figure 5.21 Resetting a waypoint of origin

5.7.5 Canceling waypoint navigation

(1) Press the GOTO key. The "Waypoint setting" window will appear.

(2) Press the CLR key. The waypoint setting is cancelled.



Waypoint navigation display with a waypoint

The waypoint setting has been cancelled.

Figure 5.22 Canceling waypoint navigation

5.8 Marking the POB (Person Over Board) location

This is an emergency event function to mark the location of an accident such as a man overboard. To use this function, simply press the POB key. The POB point is marked with its position (latitude/longitude), bearing and distance (nm) shown at the bottom of the screen

5.8.1 Resetting the POB point

To renew the POB point, press the POB key and then press the ENT key. A new POB point will be set with a POB mark and its latitude and longitude are shown on the screen.

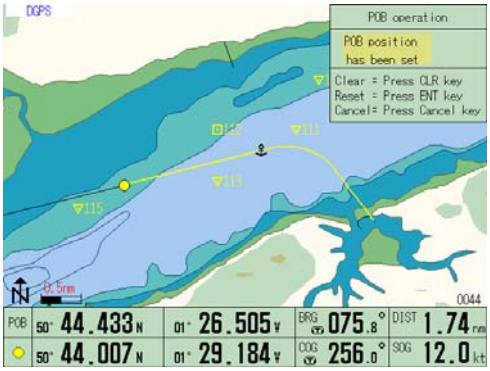


Figure 5.23 Resetting the POB point

5.8.2 Canceling the POB

(1) Press the POB key.

(2) Press the CLR key. The POB mark is deleted and the POB display is changed to ship's current position.

5.9 Changing the screen top direction

(1) Press the NAV key. The NAV window will be shown in the screen.

(2) Operate the Joystick up or down to select a picture orientation mode.

(3) Press the ENT key. The picture will be set to the selected mode.

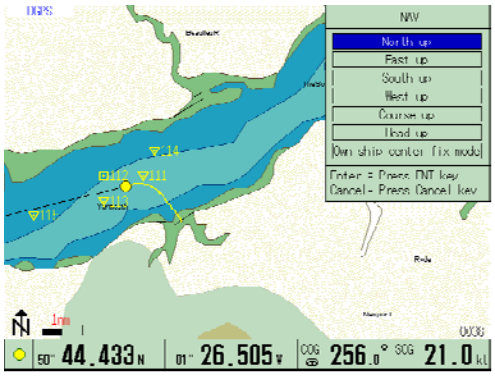


Figure 5.24 Changing the screen top direction

Table 5.2 Available picture modes

Picture mode	Descriptions
N up	True north is set at the top of the screen.
E up	True east is set at the top of the screen.
S up	True south is set at the top of the screen.
W up	True west is set at the top of the screen.
Course up	The waypoint position is set at the top of the screen.
Head up	Own ship's heading is always set at the top of the screen. Own ship is fixed in the center of the screen while the map moves according to own ship's movement.
Own ship center fix	Picture is stabilized as North up, however, the map moves while own ship stays in the center of the screen.

Operational notes:

1. When the cross cursor is shown, the cursor position is prioritized and the map movement is suspended. When the cross cursor is turned off, the map starts to move according to the own ship's movement.
2. If the ship's speed is less than 1 knot (1.8 km/h), Head Up mode is disabled to prevent erratic map movement.
3. To operate GTD-110/150 in Head Up mode, you need to input the VTG sentence (in NMEA 0183) sent from an external navigation receiver. As long as the KODEN GPS sensor KBG-2/KBG-3/GPS-10A is connected, you do not need to worry about this setting. The VTG sentence is already set up. When you use a navigation receiver other than specified, please check if they can provide TRUE bearing data in the VTG sentence. The GTD-110/150 cannot accept MAGNETIC bearing. If the navigation receiver can supply both bearing data, refer to the operation manual or contact the manufacturer for resetting.

5.10 Quick Info

The Quick Info shows information simply when the cursor is placed on points on the map (such as Ports, Tide, Lighthouse, Buoys, Beacons, Obstructions, Landmarks etc.)

(1) Make "Quick Info" function effective by the MENU setting. Press MENU key.
(2) Move the highlight to "DISPLAY SETTING" using the joystick.
(3) Operate the joystick right. The submenu “DISPLAY SETTINGS” will be displayed.
(4) Move the highlight to “SCREEN DISPLAY SETTING” using the joystick.
(5) Operate the joystick right. The submenu “SCREEN DISPLAY SETTING” will be displayed.
(6) Move the highlight to “QUICK INFO” using the joystick.
(7) Move the highlight to “ON” by operating the joystick to the right.
(8) End MENU by pushing the MENU key 3 times.

Operation of Quick Info

(1) Display the cursor pushing the CUR key.

(2) Using the joystick, place the cursor on the icon to which you want to refer.

The information will be displayed about one second after you position the cursor. If there is no information at that point, nothing will be displayed. If you carry out other operations while the Quick Info window is displayed, the information will disappear.

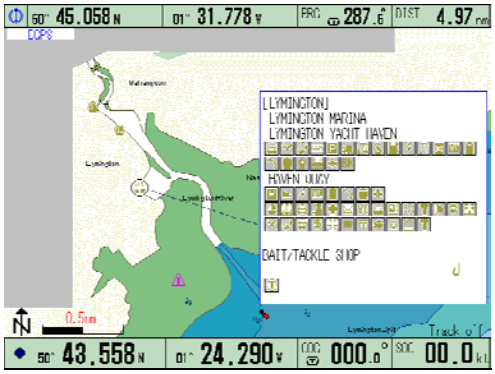


Figure 5.25 Quick Info

5.11 Object information

Using this function, information on objects shown on the chart can be displayed. Available information differs depending on whether the cross cursor is displayed or not as shown below:

With the cross cursor OFF: The object information around the ship is shown in the OBJECT INFORMATION window.

With the cross cursor ON: The object information around the cross cursor is shown in the OBJECT INFORMATION window.

To display the object information:

(1) Press the INFO key. The OBJECT INFORMATION window will appear, showing the object item.

(2) Move the joystick to highlight the item you wish to select.

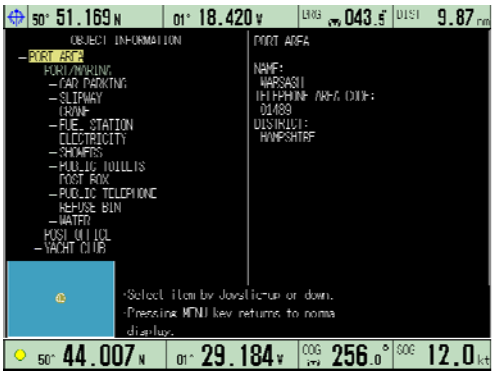


Figure 5.26 Object Info(1)

Detailed information display

Detailed information on selected items is displayed in the window at the right of the screen. When the detailed information amounts to many pages, it can be accessed by the following method.

(3) Operate the joystick right. The frame of the detailed information window will change to yellow.

(4) You can then select the page of the detailed information window by scrolling the joystick up and down.

(5) Operate the joystick left when you want to return to the item selection operation.

Photograph display

Among the items of OBJECT INFORMATION, photographs are included in the MULTIMEDIA CONTENT and PORT/MARINA section. The color of the items which can display photographs is mint green.

Press the ENT key after the mint green item has been highlighted.

Then, photographs will start appearing. It takes several tens of seconds for photographs to be transmitted in full. A transmission progress bar is displayed in the lower screen section.

Press the MENU key to end the photograph display.

Tidal information display

TIDE HEIGHT STATION and TIDE STREAM STATION contain Tide graph data. The color of items that can display Tide graphs is brown.

Press the ENT key after highlighting a brown item.

The Tide graph screen will be displayed.

The operation of Tide graphs will be explained in detail in the next section.

Press the MENU key to end the Tide graph display.

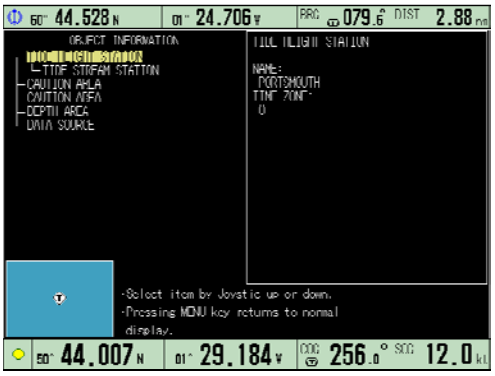


Figure 5.27 Object Info (2)

5.12 Tidal Info

(1) The horizontal red line in the graph is the cursor to read the draught. By operating the joystick, this cursor can be moved up and down and the draught can be displayed on a particular graph point.

(2) The vertical red line in the graph is the cursor to read the time and the rise of the tide. By operating the joystick, this cursor can be moved right and left and the time and tide rise can be displayed on a particular graph point.

(3) When key is pressed, the graph gives previous day-by-day information updates. If the key is pressed at length, previous month-by-month reports can be accessed.

(4) When key is pressed, the graph gives updated forecasts for the following days, day by day. If the key is pressed at length, it advances month-by-month.

(5) Press the MENU key to return to the Object Information display.

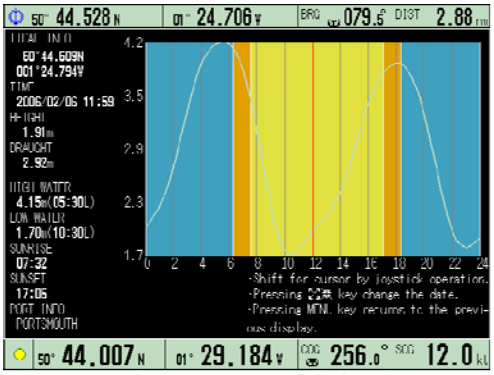


Figure 5.28 Tidal Info

NOTE: Tide graphs are an approximation of the tide and they should be used in conjunction with traditional tide tables and navigational methods.

5.13 Event temporary store

EVENT TEMPORARY STORE is a function to memorize events (the ship's position) one by one using 0~99 mark numbers as ring buffers. This section explains the display when inputting and operating the EVENT TEMPORARY STORE.

Refer to Para 6.2 "MARK BLOCK NUMBER" and 6.6.14 "EVENT TEMPORARY STORE" for the setting of this function.

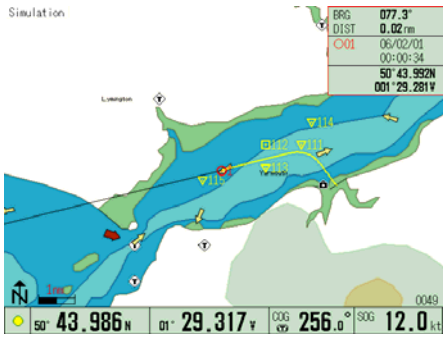


Figure 5.29 EVENT TEMPORARY STORE

5.13.1 Input means of EVENT TEMPORARY STORE

The following are the three ways to input EVENT TEMPORARY STORE.

- Input with keyboard
- Input with external event switch
- Input by reception of TLL sentence of NMEA-0183 (from Sounder or Radar).

Each feature is shown in the table.

Input means	Feature
Keyboard (○ □ ▽ ☒)	The shape of the mark depends on the kind of key. The color of the mark depends on the setting of the mark color control knob.
External event switch	The color and the shape of the mark are the same as the mark input of the last key operated before the external event switch was turned on.
TLL	The shape of the mark is ☆, and the color is red.

5.13.2 The operation of EVENT TEMPORARY STORE

When the event is input, the event window is displayed on the right of the screen .As more events are input one after another, they are memorized with numbers until 99. After that, the next event to occur is memorized with the mark 0. In this event, the old recorded marks are overwritten with the new. When a new event is input, its mark blinks on the screen's map.

The following items are displayed in the event window.

Bearing and distance from ship position to event position. Whenever the ship position is updated, this display is updated.

Event mark number and shape.

Event input's date and time.

Event position

5.13.3 Reference to temporary stored events

Information about mark numbers 0-99 can be referred to by operating the joystick up and down when the event window frame is red (active).

5.13.4 Re-display of event window

When the event window is not showing, events will not be input. In order to display the event window again, press CANCEL and the event window will be displayed with a red frame (active window).

5.13.5 Re-activate the event window

To return to the activated state after it has been cancelled, (black window), press CLR then the CANCEL key.

5.13.6 Event Display Change

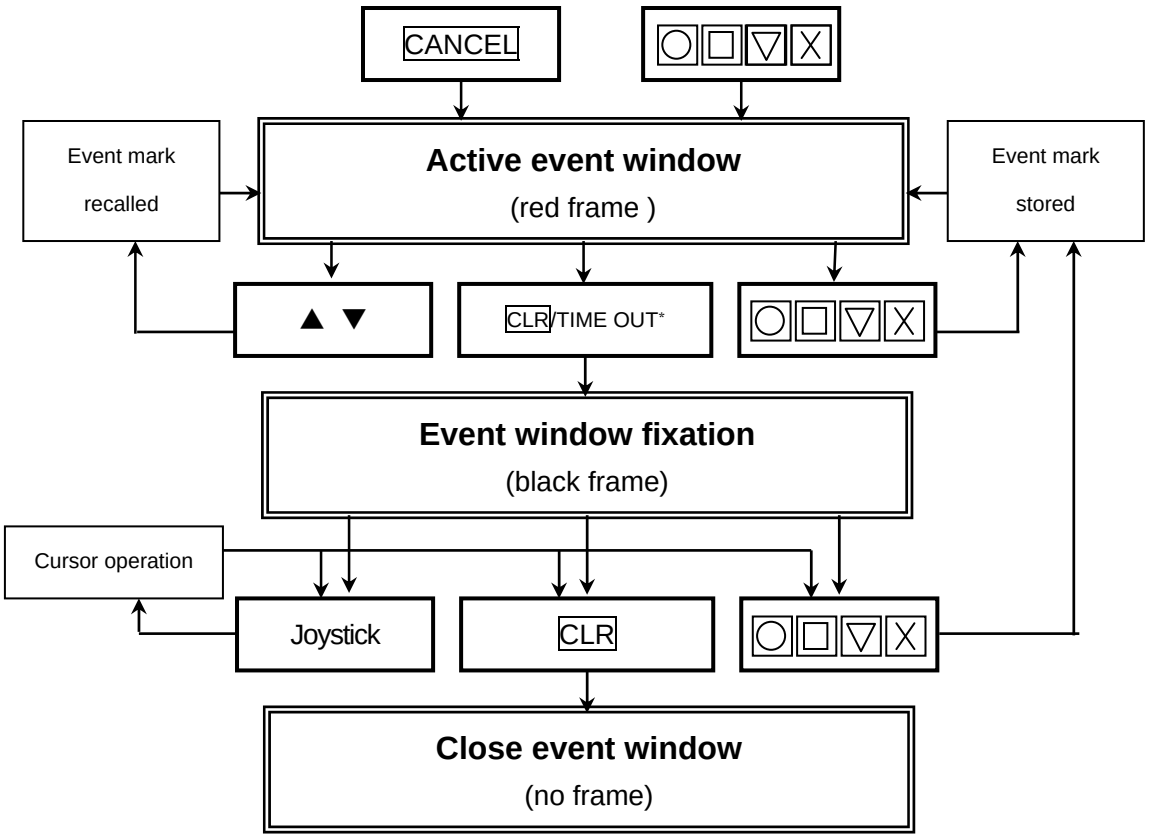
There are two methods of changing the state of the event window from active to fixed. These can be selected in the MENU setting. The two methods are “MANUAL” and “TIME-OUT”.

For “MANUAL”, when the CLR key is pressed, active is changed to fixed.

For “TIME OUT”, five seconds after the event input or reference operation has been carried out, active will automatically change to fixed.

Refer to Para 6.6.15. “EVENT DISPLAY CHANGE” for an explanation of how to change the setting.

Transition of EVENT TEMPORARY STORE



Explanatory notes：

= Internal processing = State of window = Operation

*Similar to the "EVENT DISPLAY CHANGE” setting, select (MANUAL)/TIME-OUT and press (CLR key to cancel the transition to non-active.

5.14 Measuring the bearing and distance between two points

(1) Press the CUR key to display the cross cursor.

(2) Move the cross cursor using the Joystick on to the first point and press the ENT key. A pop up window labeled “POINT TO POINT” will appear at the top right corner of the screen. (Figure 6.15)

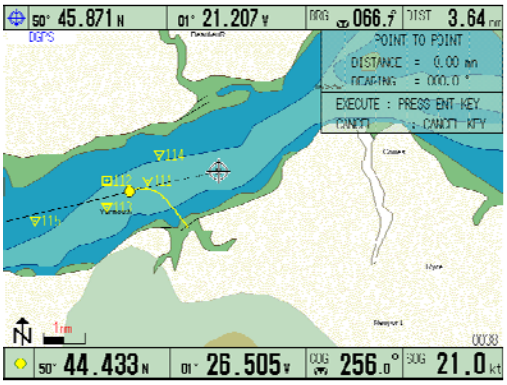


Figure 5.30 POINT TO POINT window (1)

(3) Move the cross cursor on to the second point and press the ENT key. The bearing and distance between two points will be shown in the window at the top right corner of the screen for 5 seconds. (Figure 6.16)

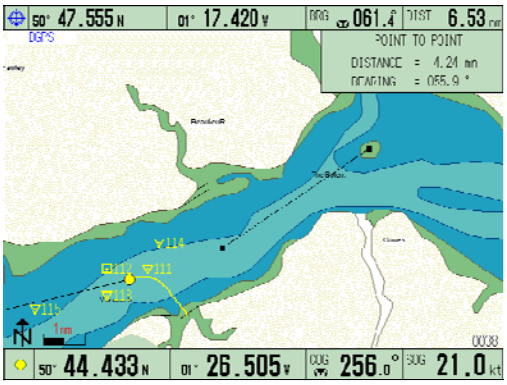


Figure 5.31 POINT TO POINT window (2)

Chapter 6

Using the Menu

Contents

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Chapter 6 Using the menu

6.1 Menu functions

The menu functions used in the GTD-110/150 are as shown in the following table.

Table 6.1 The list of menu functions

Menu functions			Descriptions	
MARK BLOCK NUMBER			To specify the starting number of a mark number	
ALARM SETTINGS			To set up the alarm displays for Arrival, POB, Cross Track Error, Alarm range, Depth Limit, and Grounding	
DISPLAY SETTINGS	POSITION DATA DISPLAY		Lat/long, LORAN-C	
	CHART DISPLAY		Various settings for the maps	
	MARINE DISPLAY		Various settings for marine information	
	LAND DISPLAY		Various settings for land information	
	DEPTH DISPLAY		Various settings for depth information	
	SCREEN DISPLAY SETTINGS		Course track, Course, Own ship's position mark, thickness of track history, mark size, cursor type, background of positional information, ring markers, safety status bar, quick info, added info of POS/WPT/POB	
	INFORMATION WINDOW SETTING		NO, L/L, TIME/W_TEMP, TIME/TTG, TIME/ETA, LORAN C, TIME/DPT, W_TEMP/DPT	
	CURSOR WINDOW SETTING		NO, L/L, LORAN C	
GPS/DGPS SETTINGS			To set up GPS, DGPS for proper operation	
SYSTEM SETTINGS			Distance, speed unit, track history plotting interval, number of track history plots, speed averaging, fixed scale, auto scroll position, scroll direction, positional correction, local time correction, compass correction, navigation mode, output setting, event temporary store, event display change	
MARK EDIT		EDIT	To edit or set the mark shape, color, display Y/N, number display, comment, lat/lon	
		TRANSFER	To transfer a mark	
		DELETE	To erase a mark	
		OPERATION OF BLOCKS	Display ALL blocks	Display bock by block Number display control
			Transfer of blocks	Transfer block by block
			Delete ALL blocks	Delete block by block
ROUTE	ROUTING	CURSOR/VALUE	To create the route using the cursor or lat/lon values	
	ROUTE ERASE	CURSOR/LIST	To delete the route using the cursor or the list	
	ROUTE EDIT	CURSOR/VALUE	To move, add or delete the waypoint used in the route using the cursor or the list	

GPS MONITOR			To monitor GPS reception and health status	
DRAWING	DRAWING		To create a boundary line, dangerous zone, etc. by combining lines.	
	DRAWING EDIT	CURSOR/ VALUE	MOVEMENT	To move the node of a drawing using the cursor or the values (lat/lon or LOP)
			ADDITION	To add the node of a drawing using the cursor or the values (lat/lon or LOP)
			ERASE	To erase the node of a drawing using the cursor or the values (lat/lon or LOP)
	DRAWING ERASE		To erase drawings created by the user	
	DRAWING RECALL		Turning drawings on and off	
TRACK COLOR SETTING			Setting track color (Normal or Water temperature)	
OTHER SHIP'S PLOT SETTINGS			Setting other ship's data	
USER C-CARD	STORE		To save the data into the User C-Card	
	RECALL		To recall the data from the User C-Card	
	ERASE		To cancel the data stored in the User C-Card	
	FORMAT		To format the User C-Card	
NEAREST PORT			To view the Nearest port info	
MAINTENANCE	SIMULATION		To perform a simulated plotting function	
	SYSTEM TEST		Operation test	
	COLOR PALETTE OPERATION		To select and adjust the color tone	
	DATA COMMUNICATION		Communication with another GTD-110/150 unit in terms of mark data, etc	
	FLASH ROM ERASE		To erase data stored in the Flash ROM (Read Only Memory)	
	LANGUAGE		To change the language	

6. 1. 1 Basic menu operation

(1) Press the MENU key to display the menu.
(2) Move the Joystick up or down to select a menu item.
(3) Press the Joystick to the right to enter a sub setting menu.
(4) Select or set up the setting item in the sub menu.

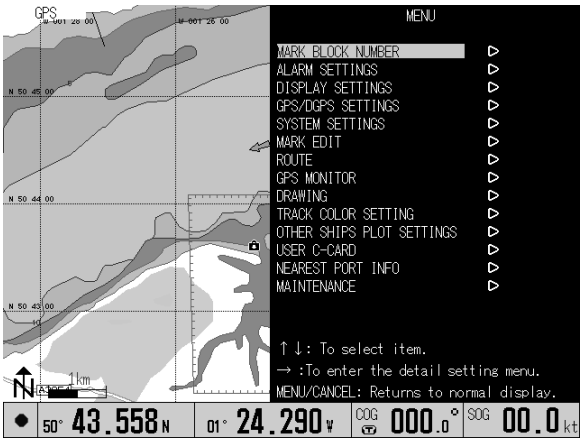


Figure 6.1 Main Menu

6.2 Mark block number, Setting the start number of the mark block

This function allows assigning the start number of the mark.

To set:

(1) Press the MENU key and select MARK BLOCK NUMBER.

(2) Press the Joystick to the right and move the Joystick.

(3) up or down to select the start number.

(4) Press the ENT key.

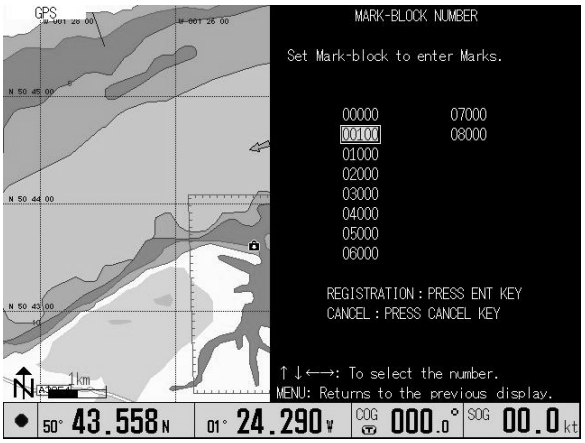


Figure 6.2 Mark block starting number setting menu

6.3 Alarm settings, Setting the alarm

Using this function you can set up various alarms such as, ARRIVAL ALARM, POB ALARM, XTE (Cross Track Error) ALARM, ALARM ZONE. To set up:

(1) Press the MENU key to display the MENU display.

(2) Highlight ALARM SETTINGS and press the Joystick to the right. The ALARM SETTINGS set up menu will appear. Confirm ARRIVAL ALARM YES is highlighted. (If NO is highlighted, press the Joystick to the left to highlight YES)

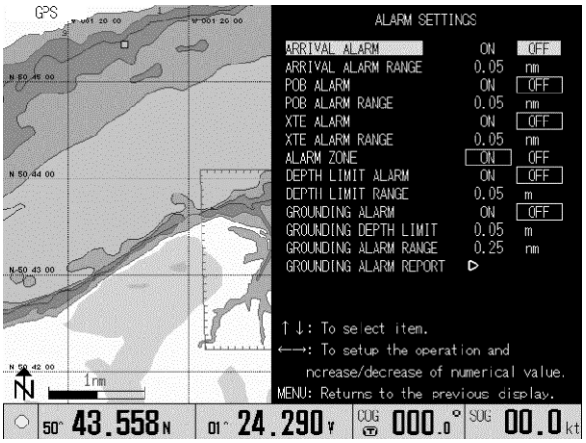


Figure 6.3 Alarm settings menu

(3) Press the Joystick downward to select ARRIVAL ALARM RANGE and press the Joystick to the right or left to select the alarm range. Press the Joystick downward to select another item and continue the above Joystick operation to set up each parameter.

6.3.1 Arrival alarm

This alarm (audio) is activated when own ship enters a preset alarm range

Setting range: 0.05 to 5.00 nm or km

Initial setting: 0.05 nm or km

6.3.2 POB (Person Over Board) alarm

This alarm (audio) is activated when own ship leaves a preset POB alarm range.

Setting range: 0.05 to 5.00 nm or km

Initial setting: 0.05 nm or km

6.3.3 XTE (Cross Track Error) alarm

This alarm (audio) is activated when own ship deviates from a preset course deviation width.

Setting range (width): 0.05 to 5.00 nm or km

Initial setting: 0.05 nm or km

6.3.4 Alarm zone

This function sets up the above alarm displays to be shown or not.

6.3.5 Depth limit alarm

This alarm (audio) is activated when the depth value of own ship's position becomes shallower than the set value.

Setting range (depth): 0 to 999 m, fm or ft

Initial setting: 0.05 m, fm or ft

6.3.6 Grounding alarm

This alarm (audio) is activated when the danger of running aground is detected. This function has been achieved by regularly scanning the map data forward of own ship's position. The execution interval of the scanning is 2 seconds. The Figure below shows the range of scanning.

Detected dangerous items are as follows.

shallow water, land, rocks, obstructions, shoreline constructions

When the alarm is activated, the source of the grounding can be confirmed by the GROUNDING ALARM REPORT menu.

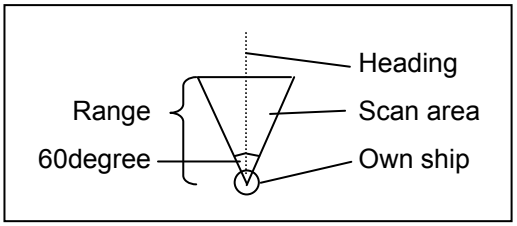
When the GROUNDING ALARM is set to ON, a warning message window is displayed. Operate it after it agrees to the content of the warning.

Setting range (depth): 0 to 99 m, fm or ft

Initial setting: 0.05 m, fm or ft

Setting range (front distance): 0.25, 0.5, 1 nm or km

Initial setting: 0.25 nm or km



NOTE: The GROUNDING ALARM function only operates with the new C-CARDs. It also affects the speed of the redraw of the screen. If this function is not used it maybe disabled.

6.4 Display settings

This menu allows turning the position data display, chart display and various screen display settings on or off the screen. To open this menu, press the MENU key and select DISPLAY SETTINGS.

In this menu, the following sub menus are shown. Press the Joystick to the right to enter each sub menu.

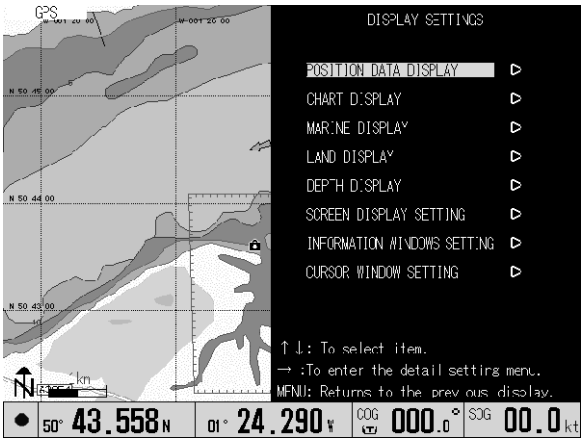


Figure 6.4 DISPLAY SETTINGS menu

1. POSITION DATA DISPLAY
2. CHART DISPLAY
3. MARINE DISPLAY
4. LAND DISPLAY
5. DEPTH DISPLAY
6. SCREEN DISPLAY SETTING
7. INFORMATION WINDOW SETTING
8. CURSOR WINDOW SETTING

6.4.1 Position data display

This sub menu selects and sets up the position data display. When you select L/L, the ship's position is available in latitude and longitude supplied from an external GPS receiver. When you select LORAN-C, you need to select GRI, slave stations and their correction times.

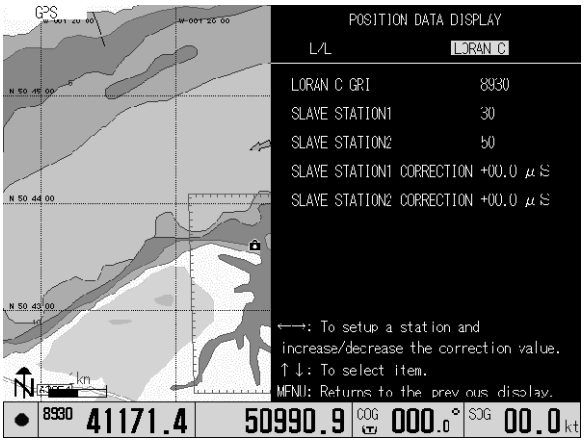


Figure 6.5 POSITION DATA DISPLAY menu

6.4.2 Chart display

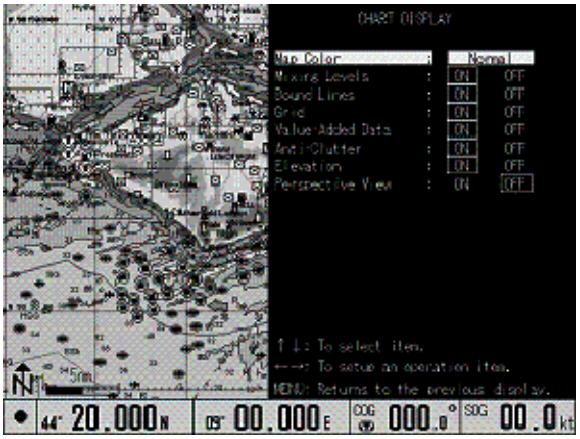


Figure 6.6 CHART DISPLAY menu

Selects or changes the colors of land or ocean, Value-Added Data, Perspective View, etc., which are shown on the chart. Use the Joystick to select and set an item in the sub menu.

Table 6.2 CHART DISPLAY menu items

Items	Detail	Initial Setting
Map Color	Selects the arrangement of color in the map from 4 settings (Normal / Sunlight / NightVision / NOAA)	Normal
Mixing Levels	Superimposes and displays where the reduced scale level is different on the map	OFF
Bound Lines	The range of the map data is shown with the frame	OFF
Grid	Displays the latitude longitude line In the Perspective View mode, the depth of the screen is shown in the grid	ON
Value-Added Data	Displays Value-Added Data (VAD) on the map	OFF
Anti-Clutter	Makes anti-clutter effective	OFF
Elevation	Depth and Land elevation are shown by color graduation.	ON
Perspective View	Displays the map with perspective view In the Perspective View mode, Mixing Levels becomes invalid. Some other functions might be restricted	OFF

6.4.3 Marine display

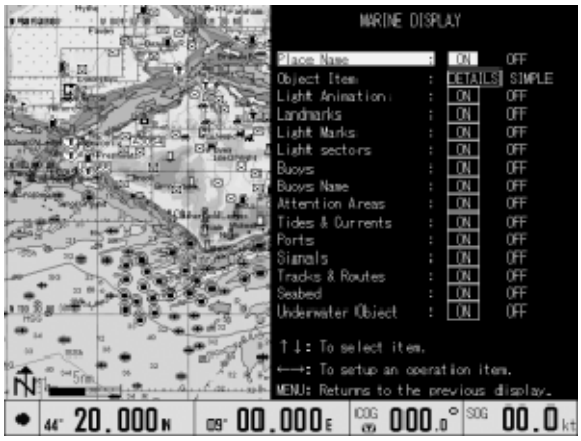


Figure 6.7 MARINE DISPLAY menu

Selects or changes the various marine markers such as lighthouse, ports, buoys, etc., which are shown on the chart. Use the Joystick to select and set an item in the sub menu.

Table 6.3 MARINE DISPLAY menu items

Items	Detail	Initial Setting
Place Name	Displays the place name	ON
Object Item	Selects the display form of a lighthouse or a buoy (Simple / Detail)	Detail
Light animation	Displays a light mark on the lighthouse or buoy blinking. Typically this function is used to show the visible lighthouses from the actual ship's position Black light: The light of the lighthouse is not visible from the point of observation Grey light: The light of the lighthouse is off (Red/Green/Yellow) light: Color of the lighthouse	OFF
Landmarks	Displays landmarks	OFF
Light marks	Displays the light mark on a lighthouse or buoy	ON
Light sectors	Displays light sectors	OFF
Buoys	Displays buoys	ON
Buoys Name	Displays name of the buoy	OFF
Attention Areas	Displays areas for attention (Fishing facility, Anchor berth, etc.)	ON
Tides & Currents	Displays tides and currents	OFF
Ports	Displays ports	ON
Signals	Displays signals	OFF
Tracks & Routes	Displays tracks and routes	OFF
Seabed	Displays seabed (sand waves, weed, kelp, etc)	OFF
Underwater objects	Displays underwater objects (Obstruction, Wreck, Cable, etc.)	OFF

6.4.4 Land display

Selects or changes the various marks on land such as landmarks, roads, airports, etc., which are shown on the chart. Use the Joystick to select and set an item in the sub menu.

Table 6.4 LAND DISPLAY menu items

Items	Detail	Initial Setting
Lake & River	Displays a lake or river	OFF
Cultural Features	Displays cultural features	OFF
Roads	Displays roads	OFF
Road Name	Displays road names	OFF
Railway	Displays railways	OFF
POI	Displays points of interest	OFF

6.4.5 Depth display

Selects or changes the depth range, depth contour, depth unit, which are shown on the chart. Use the Joystick to select and set an item in the sub menu.

Table 6.5 LAND DISPLAY menu items

Items	Detail	Initial Setting
Soundings	Selects the setting for the display of soundings (ON/OFF)	OFF
Sounding Range Min	Sets the minimum value for the Sounding Range setting	0m
Sounding Range Max	Sets the maximum value for the Sounding Range setting	9999m
Rocks	Selects the setting for the display of Rocks (ON/OFF)	ON
Depth Contour Labels	Selects the setting for the display of Depth Contour Labels. (ON/OFF)	OFF
Depth Unit	Selects the setting for the display of Depth Unit (m, fm, D.fm, ft)	m
Depth Area Highlights	Selects the setting for the display of Depth Area Highlights. (ON/OFF)	OFF
Highlights Range Min	Sets the minimum value for the Highlights Range setting	0m
Highlights Range Max	Sets the maximum value for the Highlights Range setting	0m
Reverse Contour Color	Reverses the order of the contour coloring	OFF

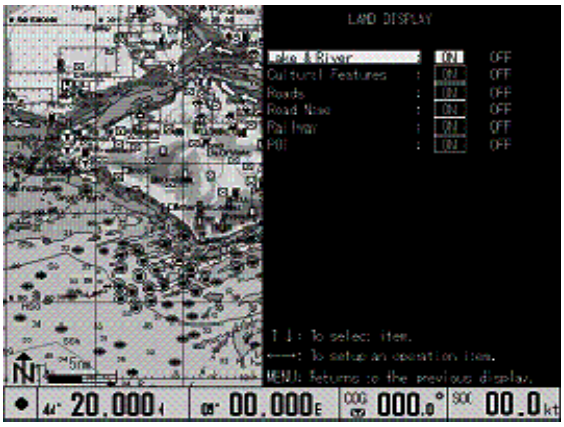


Figure 6.8 LAND DISPLAY menu

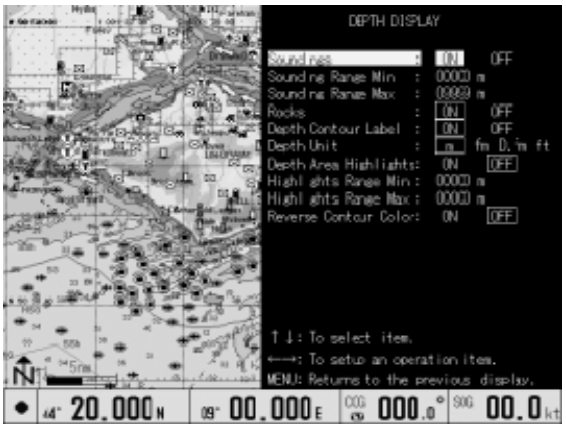


Figure 6.9 DEPTH DISPLAY menu

6.4.6 Screen display setting

Sets up various screen displays such as the course line, position mark, track line, mark size, cursor type, information window, etc.

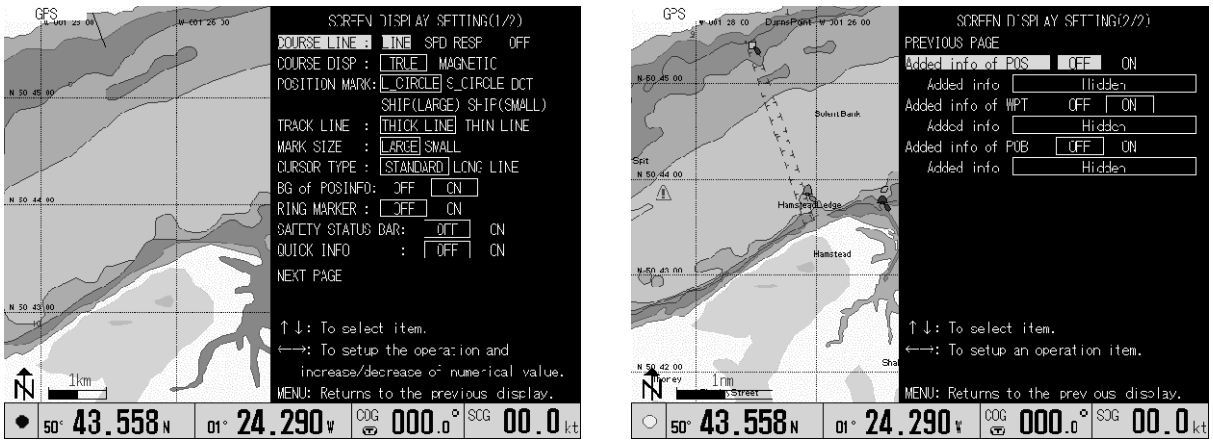


Figure 6.10 SCREEN DISPLAY SETTING menus

6.4.6.1 Course line

COURSE LINE is the line that indicates own ship's heading course. The following kinds of course lines are available.

LINE	A line is drawn from own ship to the edge of the screen.
SPD RESP	The line length changes according to own ship's speed.
NO	No Course Line is shown.

Initial setting: LINE

6.4.6.2 Course disp (Course display)

Using this menu, you can set the bearing mode to True or Magnetic.

TRUE	In this mode, own ship's heading is stabilized to true bearing.
MAGNETIC	In this mode, own ship's heading is stabilized to magnetic bearing.

Initial setting: TRUE

6.4.6.3 Position mark

Using this function you can indicate own ship's position with a circle or a ship's profile, the size of each mark can be changed. If you select SHIP, the ship's profile is always directed to own ship's heading.

Selections: L_CIRCLE (Large circle), S_CIRCLE (Small circle), DOT, SHIP (LARGE) (Large ship's profile), SHIP (SMALL) (Small ship's profile)

Initial setting: L_CIRCLE

6.4.6.4 Track line

Selects the thickness of a ship's track.

Selections:

THICK LINE and THIN LINE

Initial setting: THICK LINE

6.4.6.5 Mark size

Selects the size of a mark.

Selections: LARGE and SMALL.

Initial setting: LARGE

6.4.6.6 Cursor type

Selects the cursor type.

Selections:

STANDARD: The cursor shape is a cross cursor on double circles

LONG LINE: The cursor shape is a cross that extends to the edge of the screen.

Initial setting: STANDARD

6.4.6.7 BG of POSINFO (Background of positional information)

The BG of POSINFO stands for Background of Position Information window. Using this feature, the INFO WINDOW can be transparent and the chart behind the window can be seen through.

Selections: NO and YES

Initial setting: YES

6.4.6.8 Ring marker

Displays equally spaced rings referenced to own ship as a distance marker. The scale bar shown at the left bottom of the screen indicates the interval of each ring.

Selections: NO and YES

Initial setting: NO

Scale bar:
Full scale is 1 nm with a 0.5 nm interval.

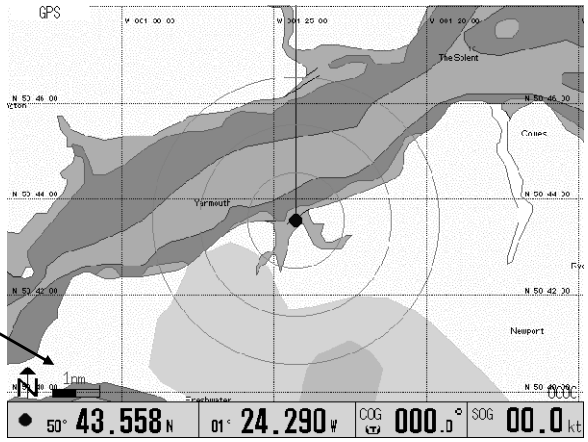


Figure 6.11 RING MARKER

*In the Perspective View mode, the ring marker is not displayed.

6.4.6.9 Safety status bar

This feature displays a status bar with six boxes showing the status of certain functions. Any warning or alarm condition is identified by the color red to indicate possible risk.

① Zoom

Normal Zoom	When the chart is displayed at normal scale
Under Zoom	Red when the chart is under-zoomed out more than twice the normal scale. Otherwise white
Over Zoom	Red when the chart is over-zoomed in more than twice the normal scale, Otherwise white

② Best Map

Red when a more detailed chart is available under the own ship's position.

③ Data Off

Red when at least one of the following objects or layers is turned off (by the user): Depth*, Attention Areas, Track & Routes, Lighthouse, Buoys, Signals, Light animation, Underwater Objects.

(*Depth Range Min setting is more than 20m, or Depth Range Max setting is less than 20m)

④ Declutter

Red when Anti clutter function is ON.

⑤ Dangers

Red when "Guardian Technology" detects one of the following objects: Land, Intertidal, Depth Area, Rocks, Obstruction, Shoreline Constructions, Fishing Facility, Wrecks, Dragged area, Diffuser, Mooring/Warping facility, Pingo, Production instruction

⑥ Cautions

Red when "Guardian Technology" detects a cautionary or restricted area.

6.4.6.10 Quick info

The type of Quick info is user selectable.

OFF	Disabled, no Quick Info shown at all	
ON	Only one point	Port Service, Tides, Lighthouse, Wrecks, Rocks, Buoys, Beacons, Obstructions, Landmarks, etc.

Default setting: OFF

Refer to chapter 5.9"Quick Info" for the operation explanation.

6.4.6.11 Added info of POS

Select information displayed on the right edge of the Present Position display.

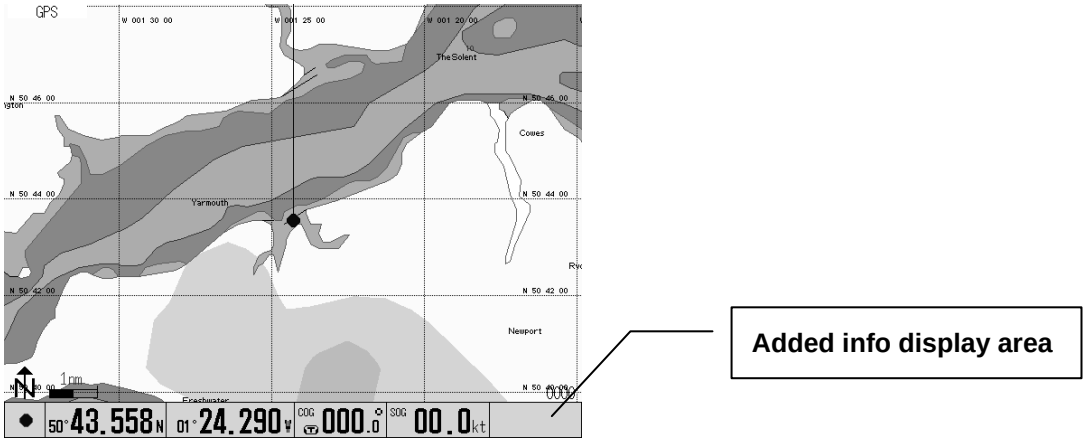
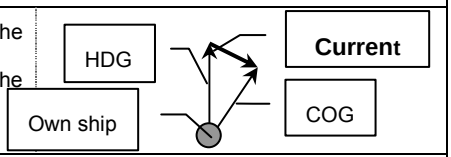


Figure 6.12 Added info display of Present Position

Table 6.6 Added information items

Clock	2004/12/31 23:59:59	Displays present time
HDG	HDG 277.3°	Displays the heading. COG and HDG can be displayed together by selecting this
Water Temperature	Temp 14.6°C L H	Displays the water temperature. The correspondence of the track color to the water temperature becomes clear when the Track color setting is set to W_Tmp_RESP.
ATA info	ATA	The presence of another ship, the registration mark color, and the direction another ship exists in can be confirmed in real time. The direction of the other ship is seen from the own ship's position.
Current Direction	CDR 123.4°	Calculates from the vector of the COG and the HDG, and displays the current direction 
COG	COG 000.0°	Displays the COG. An arrow icon displays the azimuth.

Menu operation

1. Make the setting of Added Info of POS "ON" by operating the joystick to the right.
2. Move the highlight down using the joystick. Select information by operating the joystick to the left or right.

Note: If the setting of Added Info of POS is not "ON", selection of information cannot be carried out.

6.4.6.12 Added info of WPT

Select information displayed on the right edge of the Waypoint display.

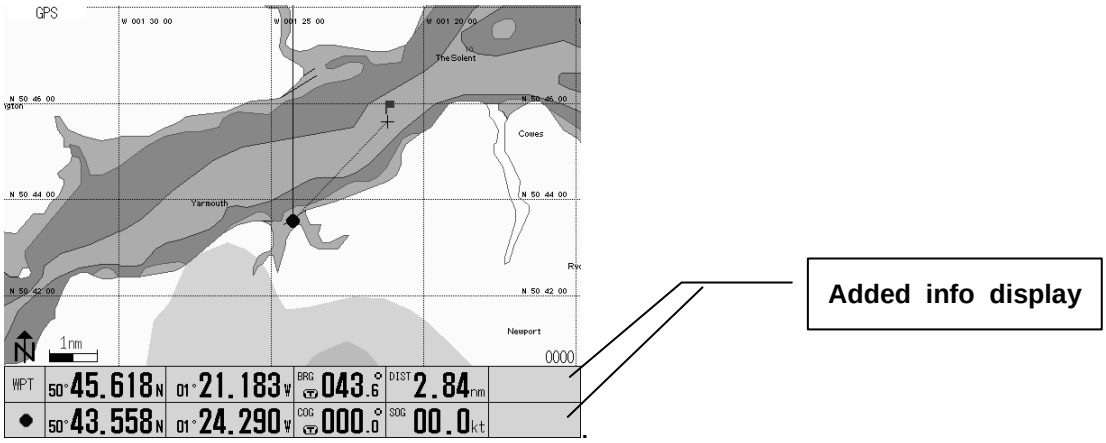


Figure 6.13 Added Info display of Waypoint

Table 6.7 Added information items

XTE (To the course)	To the course S 00.00nm	Displays the distance from the own ship position to the course line and the corrected direction. “S” means starboard. “P” means portside.
XTE (From the course)	From the course L 00.00nm	Displays the distance and the direction from the course line to the own ship position. “L” means left side. “R” means right side
Time To Go	R/N : 00/00 TTG 12:34	Displays the route number, the waypoint number, and Time Required
Estimated Time of Arrival	R/N : 00/00 ETA 12:34	Displays the route number, the waypoint number, and estimated time of arrival
TTG/ETA	TTG 12:34 ETA 12:34	Displays Time Required and the estimated time of arrival to go to the waypoint
Passed time of WPT	R/N : 00/00 P.Time 12:34	Displays the route number of the waypoint and the passed time of the waypoint

Menu operation

1. Make the setting of Added Info of WPT "ON" by operating the joystick to the right.
2. Move the highlight down using the joystick. Select information by operating the joystick to the left or right.

Note: If the setting of Added Info of WPT is not "ON", selection of information cannot be carried out.

6.4.6.13 Added info of POB

Select information displayed on the right edge of the POB display.

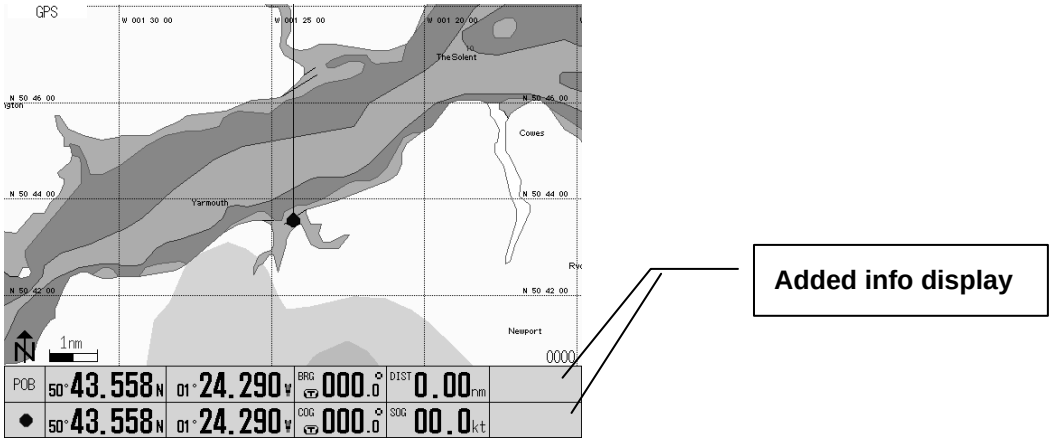


Figure 6.14 13 Added Info display of POB

Table 6.8 Added information items

Speed Average	Speed average -.---kt	Displays the amount of the movement from the POB point as an average speed
Elapsed time of POB	Elapsed time --:--:--	Displays the elapsed time after POB was set
Setting time of POB	Setting time --:--:--	Displays the time when POB was set

Menu operation

1. Make the setting of Added Info of POB "ON" by operating the joystick to the right.
2. Move the highlight down using the joystick. Select information by operating the joystick to the left or right.

Note: If the setting of Added Info of POB is not "ON", selection of information cannot be carried out.

6.4.7 Information window setting

Displays the selected information at the bottom or top right corner of the screen, one item per one INFO WINDOW. Available display items are as follows:

Selections:

NO (None), L/L (Latitude/Longitude), TIME/W_TEMP, TIME/TTG, TIME/ETA, LORAN C, TIME/DPT and W_TEMP/DPT

Initial setting: NO

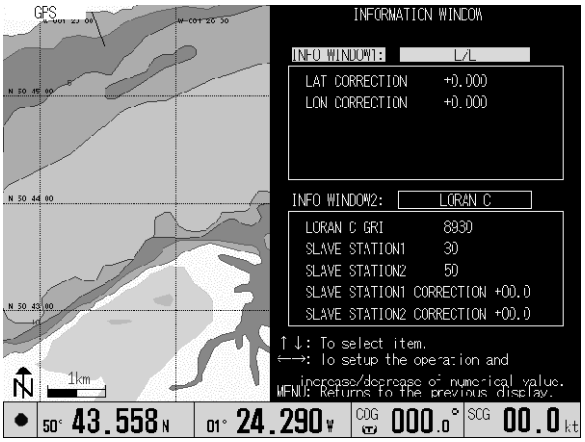


Figure 6.15 Example display of the Information Window

6.4.8 Cursor window setting

Displays the selected information at the bottom or top right corner of the screen. Available display items are as follows:

Selections:

NO (None), L/L (Latitude/Longitude) and LORAN C

Initial setting: NO

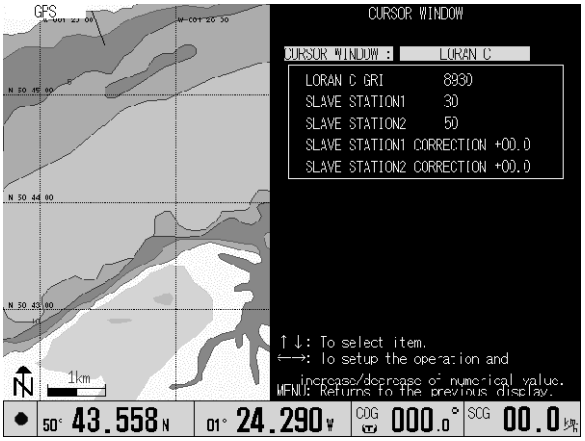


Figure 6.16 Example display of the Cursor Window

6.5 Setting the KODEN GPS/DGPS sensor

The following setting items are available for GPS/DGPS sensor.

Table 6.9 GPS/DGPS setting items

Items to be set	Selections	Description
DATUM	WGS-84	DATUM is fixation with WGS-84.
AVERAGE	1, 2, 3	Initial value has been set to 3, the fastest response to the ship's movement. This index may be reduced to 1 for better speed tracking when a GPD/DGPS sensor is used on a slow moving ship like a trawler. Initial setting: 3
BEACON SELECT	AUTO MANUAL	When your local beacon station is not registered in the DGPS receiver, and its functional parameters such as the frequency and the baud rate are known, select MANUAL. Use the following procedures to set. (1) First select FREQUENCY by moving the Joystick downward. If

		the frequency shown is not correct, move the Joystick to the right (to increase) or the left (to decrease) to set the right frequency value. Initial setting: 283.5 KHz (2) Press the Joystick downward to select BAUD RATE and move it to the right or the left to select the baud rate. Initial setting: 100
DGPS MODE	OFF BEACON SBAS	Select "Beacon" when you use it as DGPS. Select “SBAS” when you use it as SBAS.
GPS INIT	NO, YES	When this function is set to ON, the GPS/DGPS sensor is initialized. As long as the sensor operation is in good order, you do not need to use this function. If the GPS/DGPS signal reception is interrupted or the sensor is out of function, select YES and press the ENT key. If the failure still persists, contact KODEN or your nearest service agent for repair.

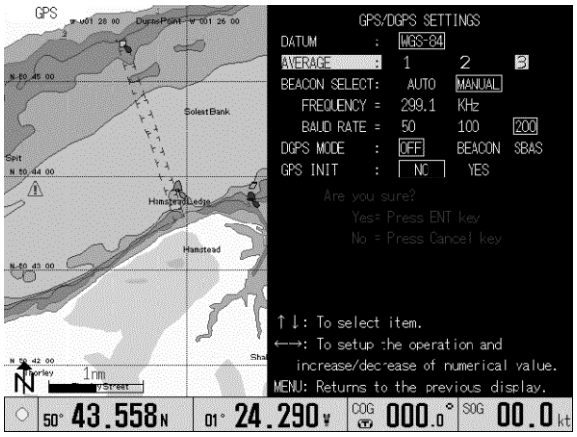


Figure 6.17 GPS/DGPS SETTINGS menu

6.6 System settings

This sub menu allows setting various functional parameters used in the GTD-110/150 GPS Track Display. The parameters to be set are as follows:

Table 6.10 Parameters to be set up

No	Setting items	No	Setting items	No	Setting items
1	Distance/Speed	8	FIX SCALE 1	15	LOCAL TIME CORRECTION
2	PLOT INTERVAL	9	FIX SCALE 2	16	COMPASS CORRECTION
3	TIME INTERVAL	10	FIX SCALE 3	17	NAVIGATION MODE
4	DIST INTERVAL	11	AUTO SCROLL	18	OUTPUT SETTING
5	NUMBER OF PLOT	12	SCRL DIRECTION	19	EVENT TEMPORARY STORE
6	AVERAGE SPEED	13	EST POSITION	20	EVENT DISPLAY CHANGE
7	AVERAGE NUMBER	14	CORRECTION		

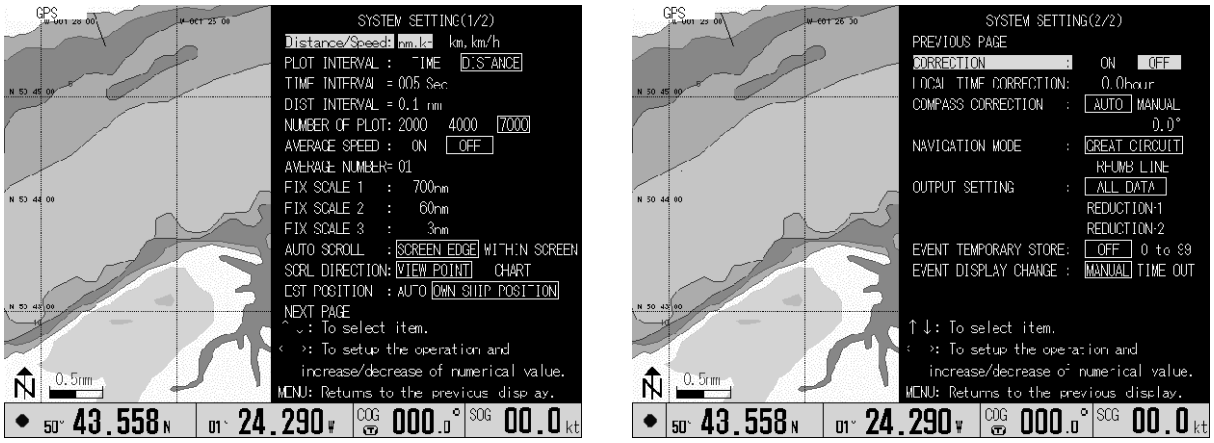


Figure 6.18 SYSTEM SETTINGS menus

6.6.1 Distance/Speed

Selects the units of distance and speed shown on the screen.

Selections: nm,kt / km,km/h

Initial setting: nm,kt

6.6.2 Plot interval

Selects either time interval or distance interval for plotting. The smaller the value, the finer the plots are, but this consumes memory. Select an appropriate plotting interval taking these points into account.

Selections:

Time: 1 second to 600 seconds

Distance: 0.01nm to 10.0nm

Initial setting: 10 seconds

6.6.3 Number of plots

This function is used to set up the upper limit of plotting numbers. Plots are erased on a first-in first-out basis.

Selections: 2000, 4000, 7000 points

Initial setting: 7000 points

6.6.4 Average speed and average number

This function is used to stabilize the speed display when own ship is moving at low speed. Increasing the number of the averaging index stabilizes the indication but sacrifices the response to the speed variation.

Selections:

AVERAGE SPEED: NO

AVERAGE NUMBER: 01 to 60

Initial setting:01

6.6.5 FIX SCALE 1 to 3

This function is used to allocate most frequently used map scales to 3 different fix scales, SCALE 1, SCALE 2 and SCALE 3 from the map scale library. Once set, you can select the desired scale by simply pressing the FIX SCL key.

Selections: 0.5 to 9,600 nm / 1.0 to 17,800 km

Initial setting: Scale 1: 1,000 nm, SCALE 2: 50 nm, SCALE 3: 2 to 5 nm

6.6.6. Auto scroll

Sets up the position of the auto scroll within the screen.

Selections:

SCREEN EDGE: The map display is scrolled automatically when own ship reaches the edge of the screen.

WITHIN SCREEN: The map display is scrolled automatically when own ship reaches the inside of the screen edge.

Initial setting: SCREEN EDGE

6.6.7 SCRL direction

Sets up the screen scroll direction.

Selection:

VIEW POINT: The chart moves towards the direction to which the Joystick is pressed. Own ship moves opposite to the chart.

CHART: The chart moves with own ship towards the direction the Joystick is pressed.

Initial setting: VIEW POINT

6.6.8 EST position

If the mark position entered in LOP system is deviated, use this function for correction.

Selections: AUTO, OWN SHIP POSITION

Initial setting: OWN SHIP POSITION

6.6.9 Correction

Selects YES or NO for the correction of own ship's position. If own ship's position has deviated on the screen, select YES and move own ship position to the correct position and press the ENT key.

.

NOTE: The latitude and longitude of own ship's position will not be changed even if this correction is performed. If you need to correct the latitude and longitude, enter the DISPLAY SETTINGS menu and select POSITION DATA DISPLAY.

Selections: YES, NO
Initial setting: NO

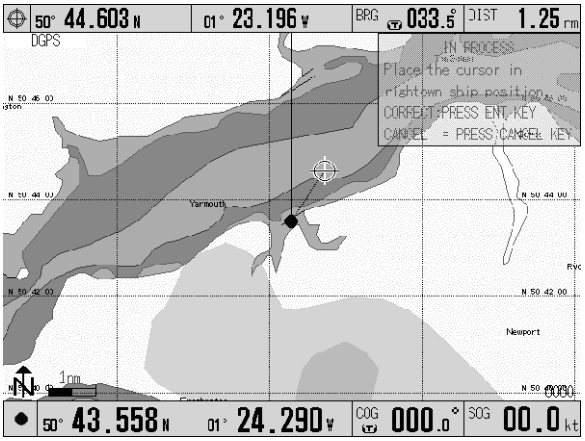


Figure 6.19 Correcting own ship's position

6.6.10 Local time correction

This function allows you to set up the local time by modifying the UTC (Universal Standard Time) supplied from a GPS receiver. Entering the time difference between your local time and the UTC makes the correction to set up the local time. After completion of this correction, the following time displays will be available.

- The time when the Mark and Route are registered.
- The current time display in the Information window.

Selection: -13.5 to +13.5 (hours)
Initial setting: 0.0 (hours)
Use the following procedures to set up the local time.

(1) Press the MENU key to open the menu.
(2) Press the Joystick up or down to highlight SYSTEM SETTING.
(3) Press the Joystick to the right to enter the SYSTEM SETTING (1/2) menu.
(4) Press the Joystick downward to scroll the menu to page 2/2.
(5) Highlight LOCAL TIME CORRECTION using the Joystick. (Figure 6.20a)
(6) Press the Joystick to the right or the left to set up the time difference. (Figure 6.20b)
(7) To return to normal display, press the MENU key once.

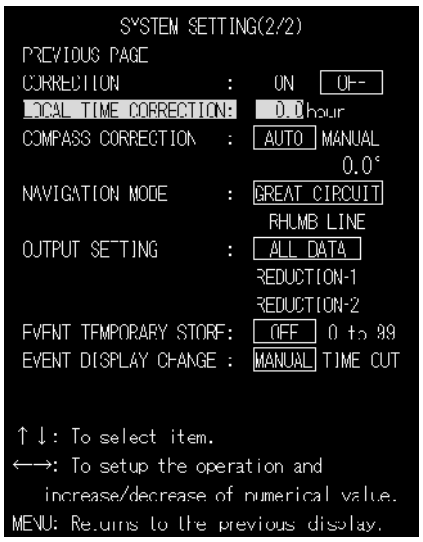


Figure 6.20a SYSTEM SETTING (2/2) menu

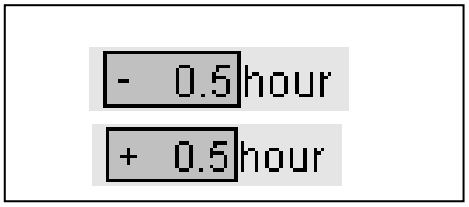


Figure 6.20b Adjusting the Time Difference

NOTE: *Pressing the Joystick to the right increases the time and to the left decreases the time. Unit increment of time is 0.5 hours (30 minutes)*

6.6.11 Compass correction

This procedure allows you to modify the bearing shown on the screen, which is obtained from the GPS receiver, to the magnetic compass bearing.

Selection: AUTO / MANUAL, -90.0° - +90.0°

Initial setting: AUTO 0.0°

Use the following procedure for correction.

Figure 6.21 SYSTEM SETTING (2/2) menu

(1) Press the MENU key to display the menu.
(2) Press the Joystick up or down to highlight SYSTEM SETTINGS.
(3) Press the Joystick to the right to enter the SYSTEM SETTING (1/2) menu.
(4) Press the Joystick downward to scroll the menu to page 2/2.
(5) Highlight COMPASS CORRECTION using the Joystick.
(6) Press the Joystick to the left or the right and select AUTO or MANUAL.

When selecting a MANUAL, the amount of compensation shall be set in a range of –90.0° to +90.0°. The amount of compensation can be set in a unit of 0.1 each by pressing the Joystick. (To the right : 0.1 each increase, to the left : 0.1 each decrease)

6.6.12 Navigation mode

You can select a navigation mode from the following modes.

GREAT CIRCLE: The intersection of the spherical surface and a plane containing the two points A and B and the center of the sphere.

RHUMB LINE: A straight line on a Mercator projection.

Initial setting: GREAT CIRCLE

(1) Press the MENU key to display the menu.
(2) Press the Joystick up or down to highlight SYSTEM SETTINGS.
(3) Press the Joystick to the right to enter the SYSTEM SETTING (1/2) menu.
(4) Press the Joystick downward to scroll the menu to page 2/2. (Figure 6.14)
(5) Highlight NAVIGATION using the Joystick.
(6) Press the Joystick to the right to select a navigation mode.
(7) To return to normal display, press the MENU key twice.

6.6.13 Output setting

Switch the amount of the sentence that NMEA-0183 outputs. This switch is useful for the output of data to auto-pilot and radar.

Table 6.11 Output data table by difference of setting

Selection	Normal sentence output		Sentence output when waypoint was set
ALL DATA	ZDA (When RMC or GGA and PKODG were received.) GGA (When GGA was received.) GLL (When GLL of 1/1000' was received.)	VTG(When VTG was received) PKODA (When GLL of 1/100' was received.) GTD(*1)	BOD, XTE , APB, BWC, WPL
REDUCTION-1	GGA (When GGA was received.) VTG (When VTG was received.)	GTD(*1)	BOD, XTE, APB, BWC
REDUCTION-2	GGA (When GGA was received.) VTG (When VTG was received.)	GTD(*1)	BOD, XTE, APB, BWC, RMB, WPL

*1 When the setting of "POSITION DATA DISPLAY" was set to "LORAN C", and GLL or RMC or GGA was received.

6.6.14 Event temporary store

Use the event temporary store function by putting events into memory using mark numbers 0 to 99. The "EVENT TEMPORARY STORE" functions by setting "MARK BLOCK NUMBER" to "00000", and selecting "0-99" by this setting. When this set function becomes effective, every-time you press the ○, □ ,▽, and × key, the present position is sequentially memorized as an event. Moreover, the event window is displayed at the same time as the key's input. Items which are displayed in the window are as follows.

The distance and the bearing from the event position to the own ship position, the event number, the date, and the own ship's position.

NOTE: An event number returns to 0 once 99 is reached, and past data is thus overwritten.

Selections: Off, 0 to 99

Initial setting: OFF

6.6.15 Event display change

Set the method of switching the event display.

The color of the frame of the event window will be red immediately after its display. When the frame of the window is red, event inspection can be operated. Under such a condition, a past event can be

displayed by operating the joystick up or down.

When the color of the frame of the window changes to black, these operations can no longer be carried out.

You can switch the method of changing the color of the frame of the window by this setting.

When "TIME OUT" is selected, the color of the frame of the window automatically changes to black five seconds after an event’s operation ends.

When "MANUAL" is selected the color of the frame of the window doesn't change from red, unless the CLR key is input.

Selections: MANUAL、TIMEOUT

Initial Setting: MANUAL

6.7 Mark edit

Allows the editing of mark designations. This menu includes EDIT, TRANSFER, DELETE and OPERATION OF BLOCKS. Positional data to be entered is latitude/longitude or Loran-C LOP selected in DISPLAY SETTINGS of the POSITION DATA DISPLAY menu.

6.7.1 Edit

Allows the editing of mark shape, mark color, comments and latitude/longitude of the marked point. Move the Joystick right or left to select an item and up and down for selecting a value or mark shape.

6.7.2 Transfer

Transfers the contents of a designated mark number registration to a specified mark number. Once the transfer is completed, the original data will be deleted.

6.7.3 Delete

Deletes designated mark numbers to be registered.

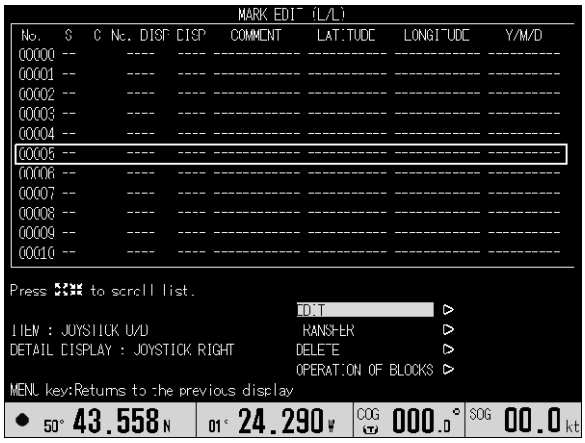


Figure 6.22 EDIT sub menu

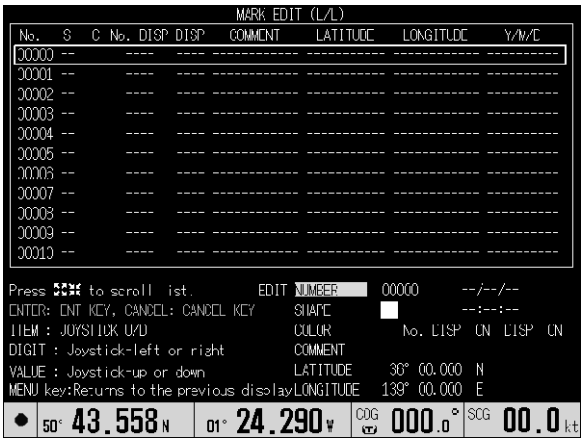


Figure 6.23 MARK EDIT sub menu

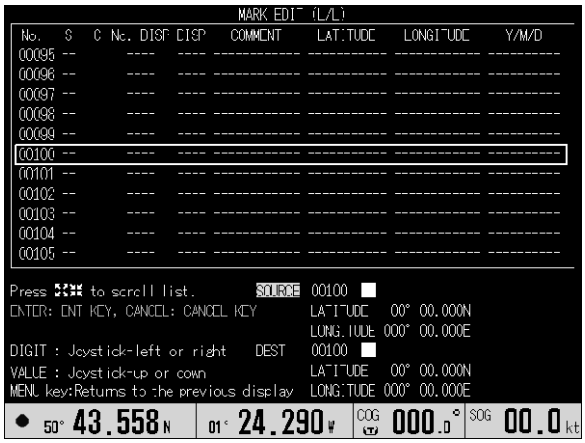


Figure 6.24 TRANSFER sub menu

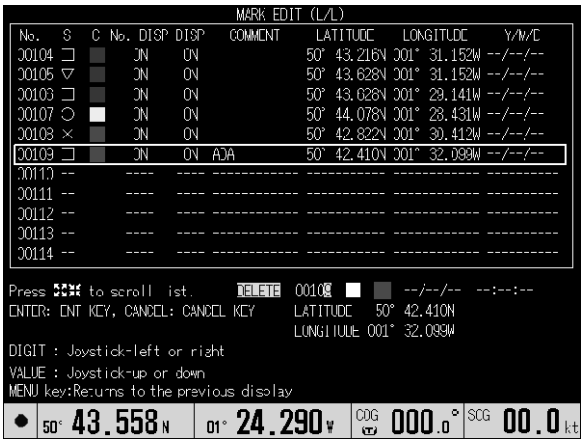


Figure 6.25 DELETE sub menu

6.8 Operation of blocks

Selects DISPLAY OF BLOCKS, TRANSFER OF BLOCKS or ERASE OF BLOCKS.

6.8.1 Display of blocks

Select YES or NO in the mark display and in the number display. This feature is useful in grouping areas of interest for various purposes. (Figure 6.27)

6.8.2 Transfer of blocks

Transfers the data of a certain block number to another block number. Original block number data will be deleted after this operation. (Figure 6.28)

6.8.3 Erase of blocks

Deletes the mark data registered in designated block numbers. (Figure 6.29)

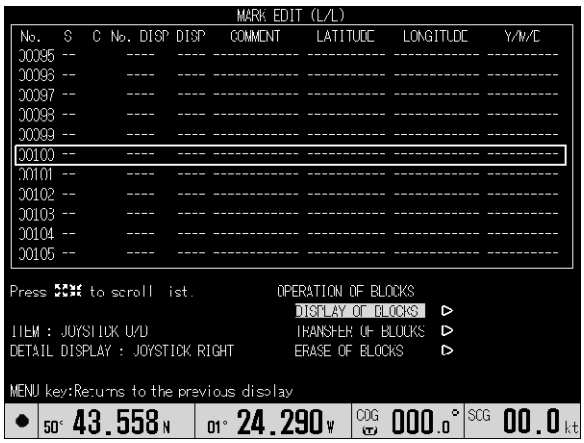


Figure 6.26 OPERATION OF BLOCKS sub menu

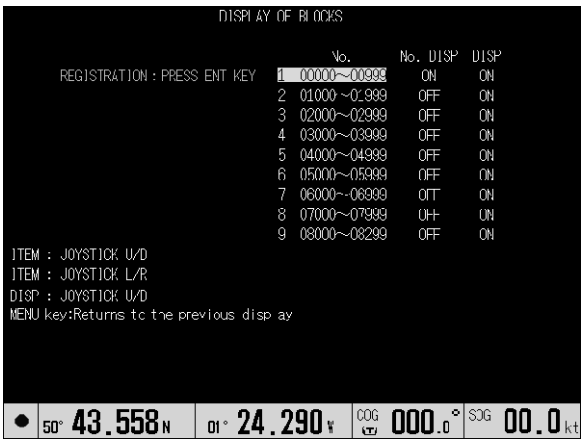


Figure 6.27 DISPLAY OF BLOCKS sub menu

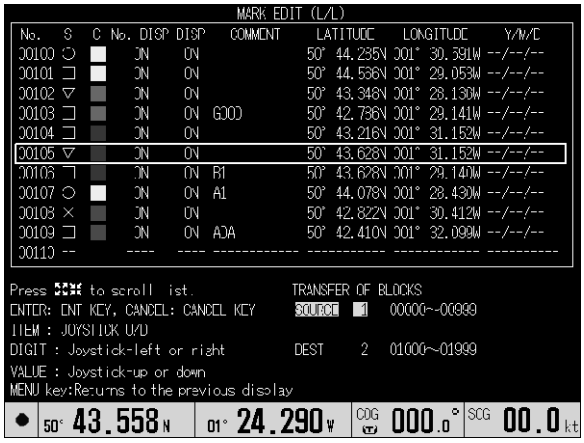


Figure 6.28 TRANSFER OF BLOCKS sub menu

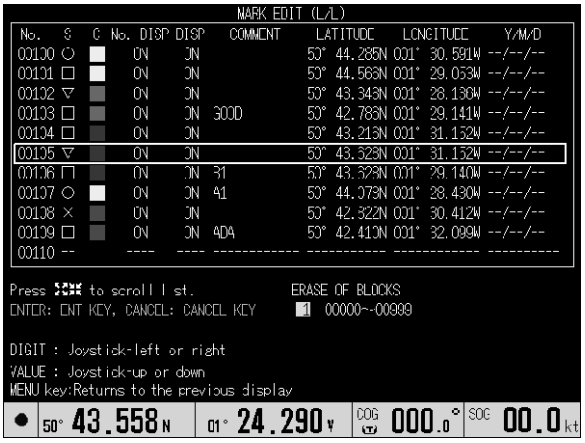


Figure 6.29 ERASE OF BLOCKS sub menu

6.9 GPS monitor

Displays the status of GPS and Beacon reception.

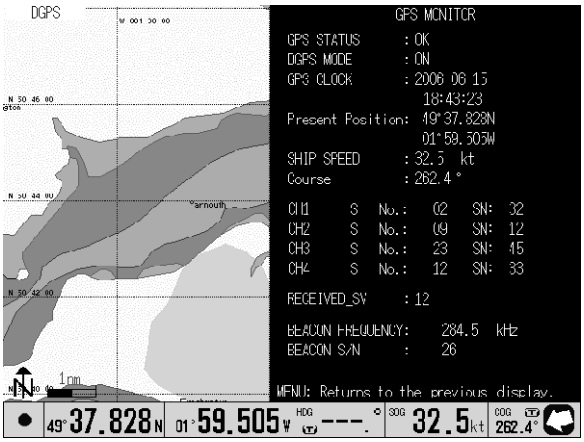


Figure 6.30 GPS MONITOR sub menu

Table 6.12 The list of GPS/Beacon reception status

GPS STATUS	GPS reception normal: OK No GPS reception: BAD
DGPS MODE	DGPS mode: ON Other modes: OFF
GPS CLOCK	Indicates the current time sent from the GPS.
Present position SHIP SPEED Course	Displays the measured data.
CH1 - CH4	Displays the numbers and reception S/N of 4 satellites from a large elevation angle. The S/N index of 5 or larger indicates the GPS signal reception is in good order.
RECEIVED_SV	Displays the number of GPS satellites received. Reception of 4 or more satellites is satisfactory for normal GPS/DGPS operation.
BEACON FREQUENCY	Displays the frequency of the beacon signal reception.
BEACON S/N	Displays the beacon signal reception index. An index of 10 or more is satisfactory for normal reception.

6.10 Drawing edit sub menu

For any operation concerning drawing, selects DRAWING from the MAIN menu. This menu includes “DRAWING”, “DRAWING ERASE”, “DRAWING RECALL” and “DRAWING EDIT”.

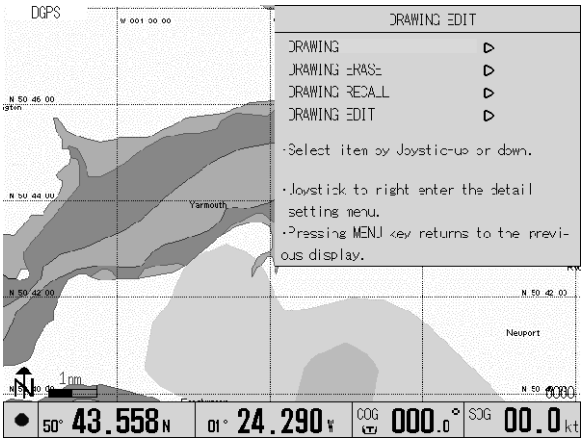


Figure 6.31 DRAWING EDIT sub menu

6.10.1 Drawing

Using this function, you can create lines, squares, polygons etc. on the screen. GTD-110/150 has drawing memory arranged in 7 blocks, 500 points each. A graphic drawing can be created by the cross cursor and specifying the latitude/longitude grid.

6.10.1.1 Drawing by entering the latitude and longitude

This method is used when each node of the area can be read from a chart such as a fishery zone, a dangerous zone, etc. To draw:

(1) In the DRAWING menu, select a DRAWING BLOCK from 1 to 7.
(2) Select the LINE THICKNESS, either THIN or THICK.
(3) Select VALUE in the INPUT METHOD.
(4) Select the mark by the COLOR (MARK) switch.
(5) Press the ENT key. The chart display and the DRAWING (VALUE) window will appear.
(6) In the black-shaded area in the menu, enter a starting node in latitude and longitude and then press the CUR key.
(7) Enter the latitude and longitude of the next node and then press the ENT key. Repeat this procedure for other nodes.
(8) Press the MENU key for the registration of the drawings.

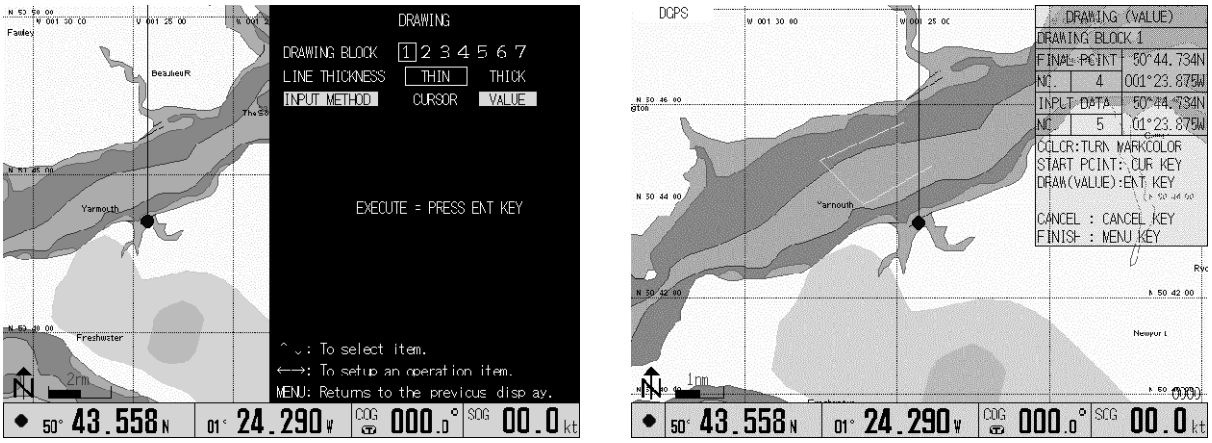


Figure 6.32 Drawing a graphic by specifying nodes

NOTE: *If you enter a block number by mistake, press the CANCEL key. Each press of this key brings the block number back by one.*
Similarly, if you enter data by mistake, press the CANCEL key.

6.10.1.2 Drawing (Drawing a graphic using the cross cursor)

To draw a graphic instantly without knowing the precise location in latitude and longitude, use the drawing method by the cross cursor. To do so:

(1) In the DRAWING menu, select a DRAWING BLOCK number (1 to 7).
(2) Select LINE THICKNESS, THIN or THICK.
(3) Select CURSOR as an INPUT METHOD.
(4) Select a line color using the COLOR (MARK) select switch.
(5) Press the ENT key. The chart display and the DRAWING (CURSOR) window will appear.
(6) Move the cross cursor onto a starting point and press the CUR key. The starting point will be entered.
(7) Move the cursor to the first node and press the ENT key to fix. Repeat this procedure for other nodes. If you enter a node position by mistake press the CANCEL key. Each time this key is pressed, the entered block number returns to the previous number.
(8) To finish drawing, press the MENU key.
(9) Maximum number of nodes including the starting point is 500. To assign more nodes, temporarily exit this sub menu by pressing the MENU key and restart.
(10) Assign a new block number among 500, which can be overwritten. You can change the color any time during this operation.

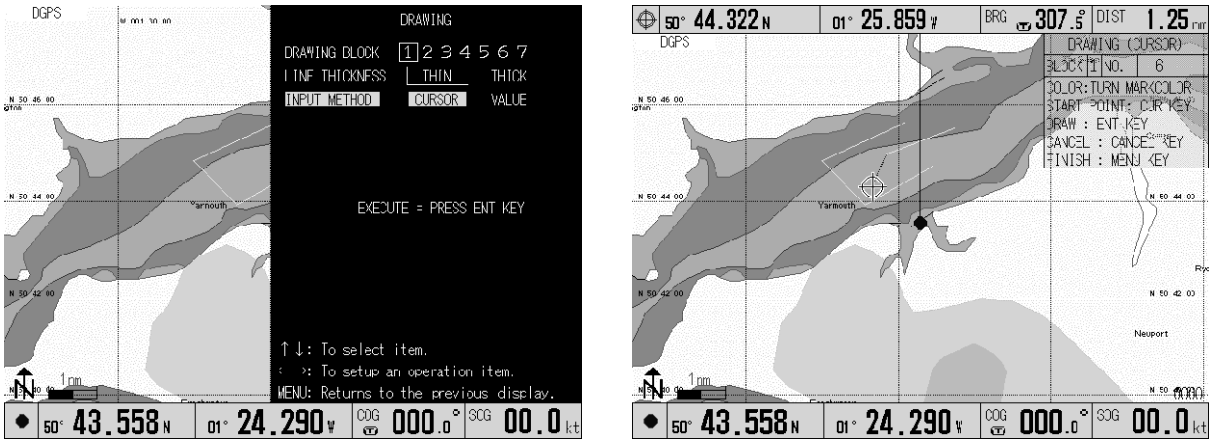


Figure 6.33 Drawing lines

6.10.2 Drawing erase

(1) Select DRAWING ERASE in the DRAWING EDIT sub menu as shown in Figure 6.3.
(2) Move the cross cursor on to any node on the drawing. (NOTE: The selected node will be

acknowledged as long as it lies within the cross cursor.)

(3) Press the ENT key. The drawing will be erased.

(4) If you have erased a drawing by mistake, press the CANCEL key. The erased drawing will be redrawn.

(5) This erasing operation applies to the data of a starting point and all nodes contained in a single drawing.

(6) Press the ENT key.

(7) Press the MENU key to exit.

All data including the starting point and all nodes will be erased.

Cross cursor

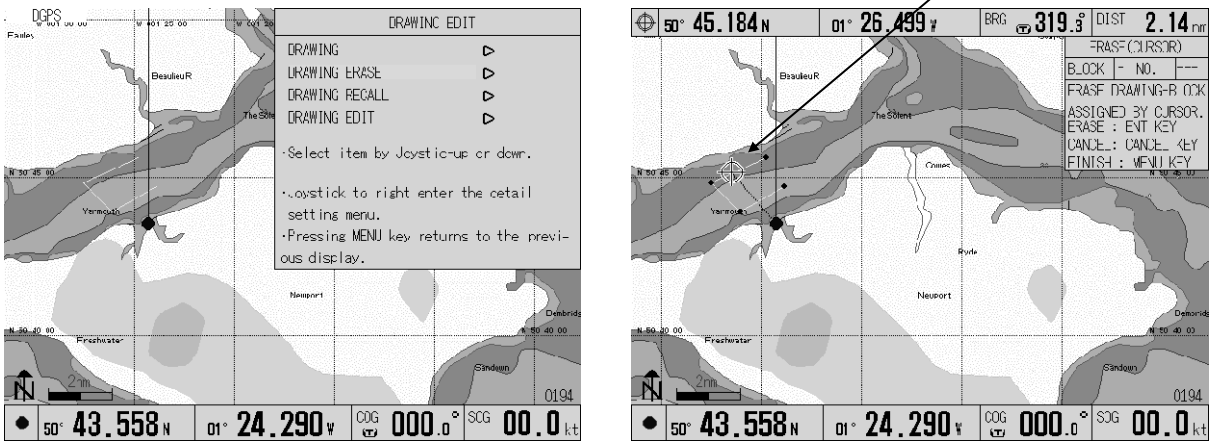


Figure 6.34 Erasing a drawing by specifying a node

6.10.3 Drawing recall

All the drawing displays can be recalled or cancelled one by one. Use the following procedure to perform this function:

(1) In the DRAWING RECALL menu, select a block number.

(2) Press the Joystick to the right or the left to select YES (to erase) or NO.

(3) On the far right, the numbers of nodes used are shown against the maximum of 500.

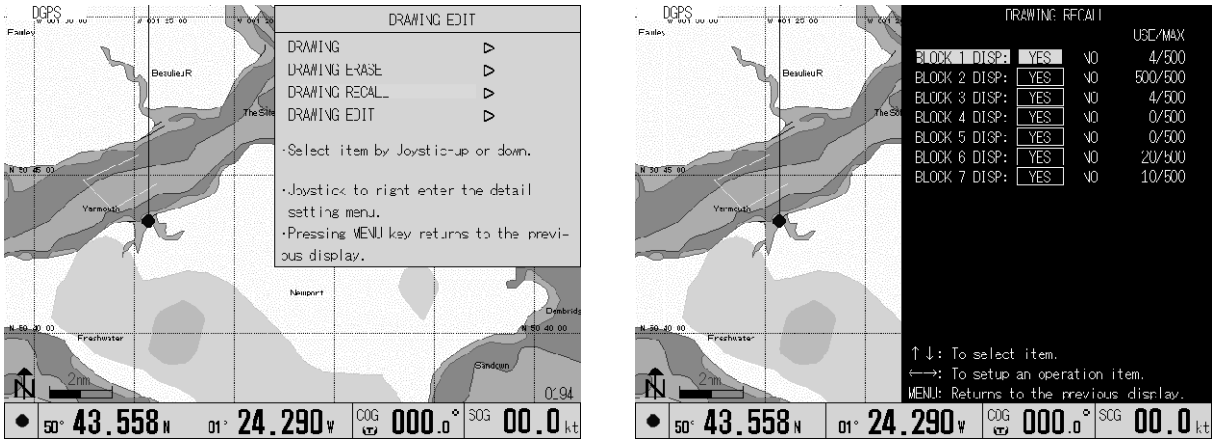


Figure 6.35 Recalling a drawing

6.10.4 Drawing edit

This function allows you to edit the graphics to be registered.

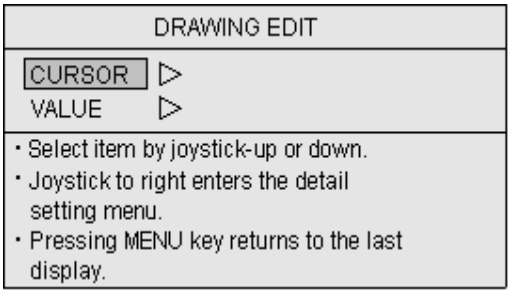


Figure 6.36 DRAWING EDIT menu

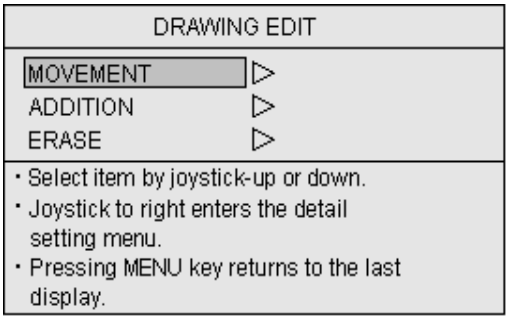


Figure 6.37 DRAWING EDIT sub menu

6.10.4.1 Editing the graphics using the cross cursor

The following 3 methods are available to edit a graphic drawing using the cross cursor.

- Moving existing graphic nodes
- Adding graphic nodes
- Deleting unnecessary nodes

a. Moving an existing node

(1) Press the MENU key to display the Main menu.
(2) Press the Joystick up or down to highlight DRAWING EDIT.
(3) Press the Joystick to the right to display the DRAWING EDIT menu. (Figure 6.36)
(4) Press the Joystick up or down to highlight CURSOR and then press it to the right. The DRAWING EDIT sub menu will appear. (Figure 6.37)
(5) Highlight MOVEMENT and press the Joystick to the right. The MOVEMENT menu will appear. (Figure 6.38)
(6) Move the Joystick to place the cross cursor on to a node of a graphic drawing.
(7) Press the ROUTE key to display the selected node data. (Figure 6.39a)

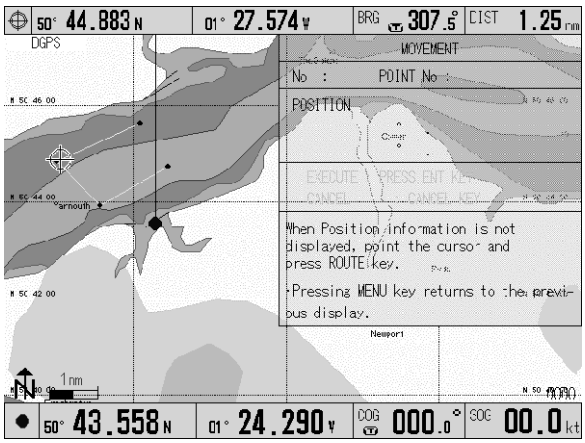


Figure 6.38 MOVEMENT menu (1)

NOTE: *If other nodes are nearby, press the ROUTE key repeatedly. Each press of the key selects a node, one by one.*

(8) Move the node using the Joystick. (Figure 6.39b)
(9) Press the ENT key to fix the position. (Figure 6.39c)
(10) To return to the normal display, press the MENU key 4 times.

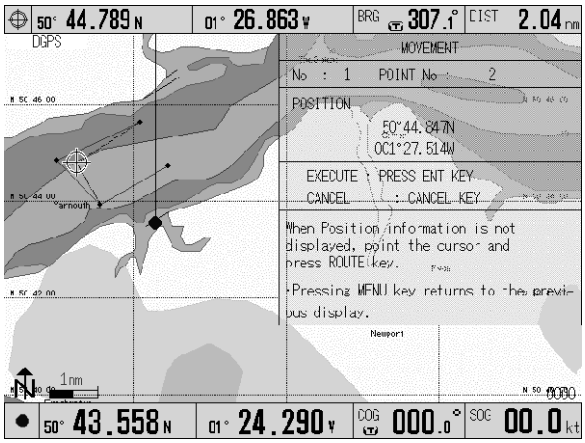


Figure 6.39a MOVEMENT menu (2)

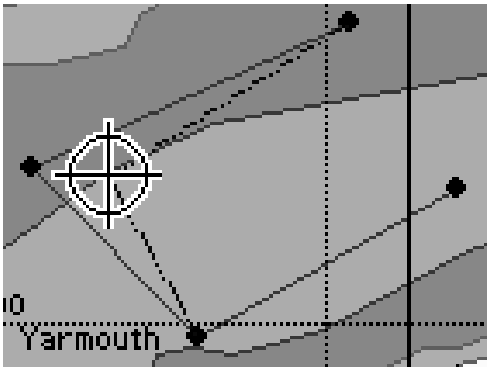


Figure 6.39b MOVEMENT menu (3)

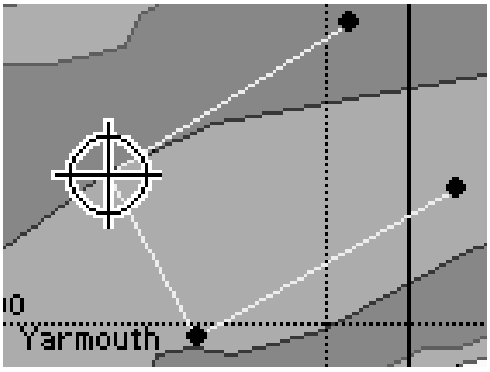


Figure 6.39c MOVEMENT menu (3)

b. Adding a node

(1) Press the MENU key to display the menu.
(2) Press the Joystick up or down to highlight DRAWING EDIT.
(3) Press the Joystick to the right to display the DRAWING EDIT menu. (Figure 6.40)
(4) Press the Joystick up or down to highlight ADDITION.

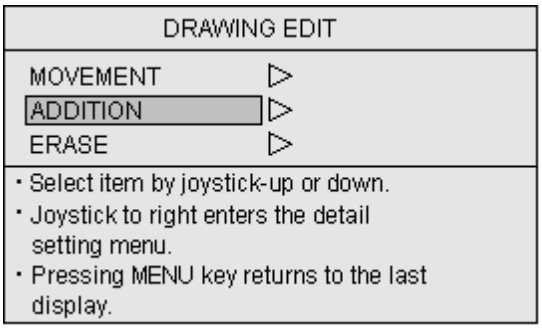


Figure 6.40 DRAWING EDIT menu

(5) Press the Joystick to the right to enter the ADDITION menu. (Figure 6.41)
(6) Move the Joystick to place the cross cursor on a node of a graphic drawing.

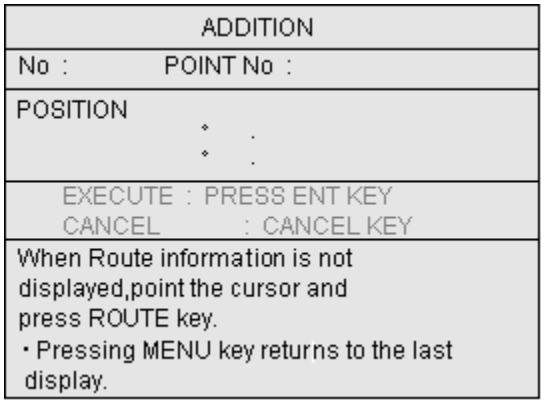


Figure 6.41 ADDITION menu (1)

WARNING

If more than 50 nodes data are already registered, the following WARNING message will appear. Take necessary action according to the instruction.

The registration capacity is full. To register a new node data, delete unnecessary data first.

(7) Press the ROUTE key to enter the added node.

NOTE: *If other nodes are situated nearby, press the ROUTE key repeatedly. Each press of the key selects a node one by one.*

(8) Move the added node to a desired point using the Joystick. (Figure 6.42a)

(9) Press the ENT key to fix the position of the node. (Figure 6.42b)

(10) To return to the normal display, press the MENU key 4 times.

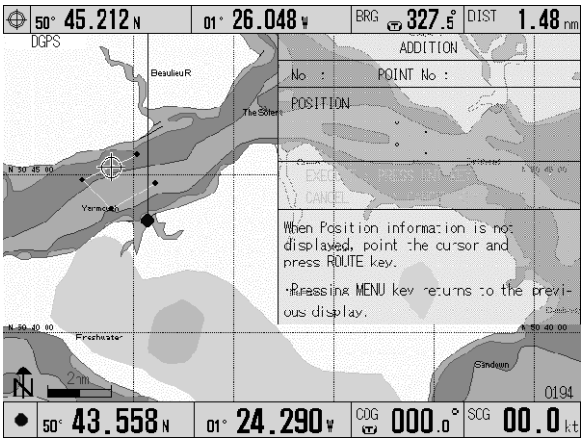


Figure 6.42a ADDITION menu (2)

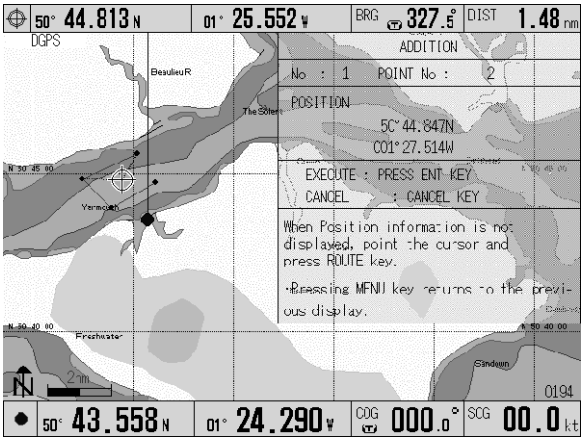


Figure 6.42b ADDITION menu (2)

c. Deleting a node

(1) Press the MENU key to display the menu.

(2) Press the Joystick up or down to highlight DRAWING EDIT.

(3) Press the Joystick to the right to enter the DRAWING EDIT menu. (Figure 6.43)

(4) Press the Joystick up or down to highlight ERASE.

(5) Press the Joystick to the right to enter the ERASE menu. (Figure 6.44)

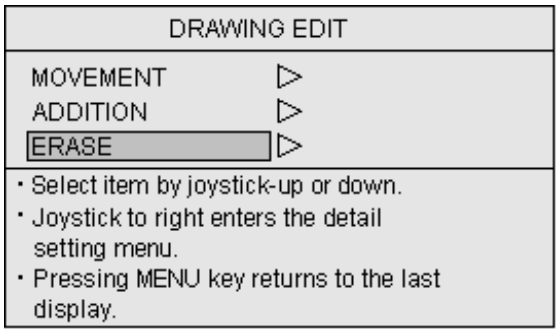


Figure 6.43 DRAWING EDIT menu

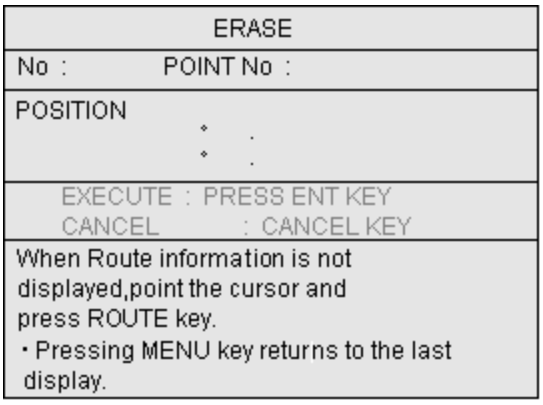


Figure 6.44 ERASE menu

(1) Move the Joystick to place the cross cursor on a node of the graphic drawing to be deleted. (Figure 6.45)

(2) Press the ROUTE key to display the selected node data.

NOTE: *If other nodes are situated nearby, press the ROUTE key repeatedly. Each press of the key selects a node, one by one.*

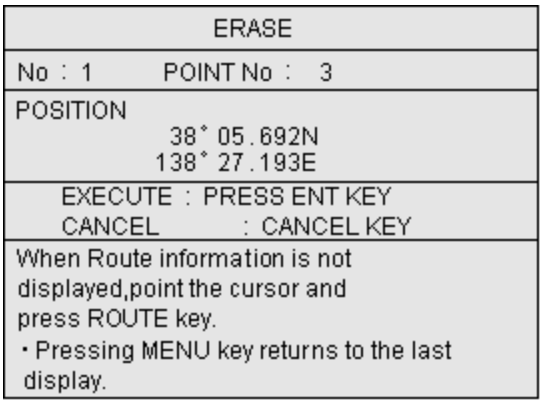


Figure 6.45 ERASE sub menu

6.10.4.2 Editing the graphic by lat/lon or LOP

This function allows you to edit a graphic drawing by specifying a node in latitude/longitude or LOP, available from the graphic drawing list. The following 3 methods are available to edit the graphics using the cross cursor.

- Moving an existing graphic nodes
- Adding graphic nodes
- Deleting unnecessary nodes

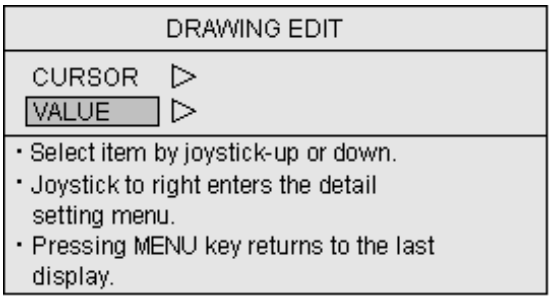


Figure 6.46 DRAWING EDIT menu

a. Moving an existing graphic node

(1) Press the MENU key to display the menu.

(2) Move the Joystick up or down to highlight DRAWING EDIT.

(3) Press the Joystick to the right to display the DRAWING EDIT menu. (Figure 6.46)

(4) Press the Joystick up or down to highlight VALUE.

(5) Press the Joystick to the right to enter the DRAWING EDIT (LIST) menu.(Figure 6.47)

(6) Enter the drawing number using the alphanumeric keys or pressing the Joystick up or down.

(7) Press the ENT key to fix the entry. The DRAWING EDIT menu will appear. (Figure 6.48)

(8) Press the Joystick up or down to Highlight MOVEMENT.

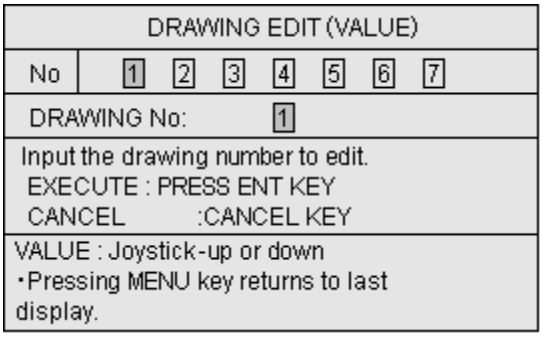


Figure 6.47 DRAWING EDIT (LIST)

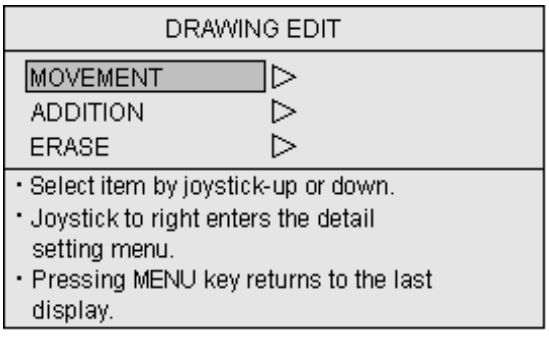


Figure 6.48 DRAWING EDIT sub menu

(9) Press the Joystick to the right to enter the MOVEMENT menu.

(10) Enter the number of the node to be move using the numeric keys or moving the Joystick up or down. (Figure 6.49)

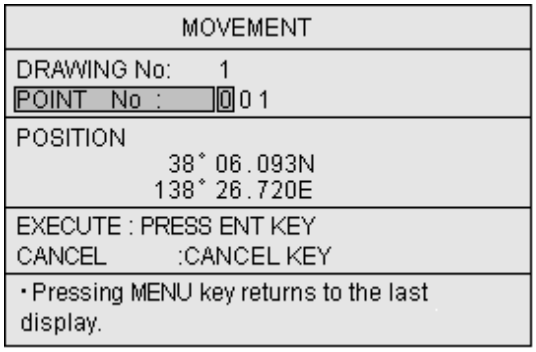


Figure 6.49 MOVEMENT (1) menu

(11) Move the Joystick to the left to highlight "POINT No". (Figure 6.50)

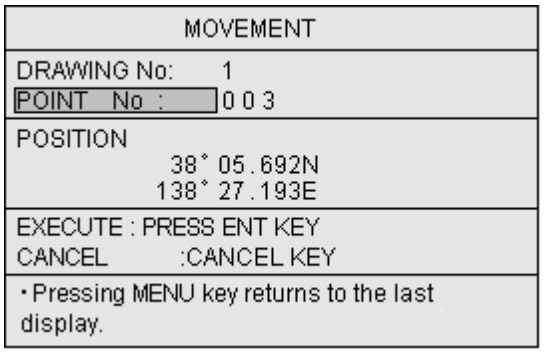


Figure 6.50 MOVEMENT (2) menu

(12) Move the Joystick up or down to highlight POSITION. (Figure 6.51a)

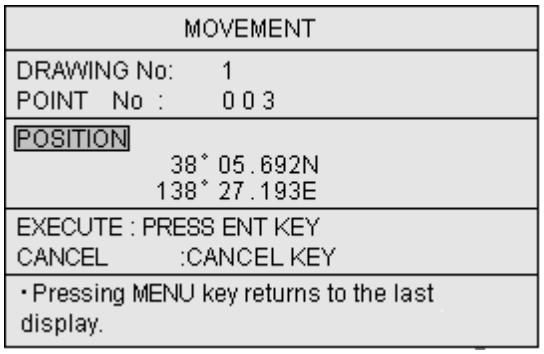


Figure 6.51a POINT No menu

(13) Press the Joystick to the right to highlight the first digit of the latitude value. (Figure 6.51b)

(14) Enter the latitude value and then longitude value using the alphanumeric keys.

(15) Press the ENT key to fix the value.

(16) To return to the normal display, press the MENU key 5 times.

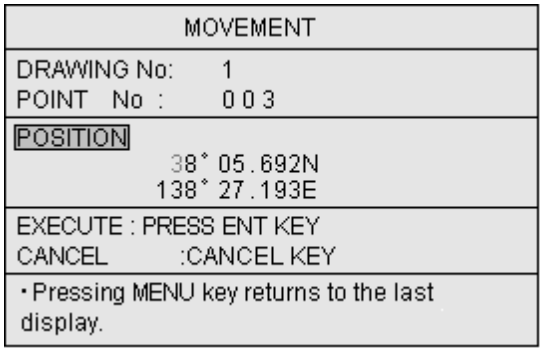


Figure 6.51b POINT No menu

b. Adding a node

(1) Press the MENU key to display the menu.
(2) Move the Joystick up or down to highlight DRAWING EDIT.
(3) Press the Joystick to the right to enter the DRAWING EDIT menu. (Figure 6.52)
(4) Press the Joystick up or down to highlight VALUE.

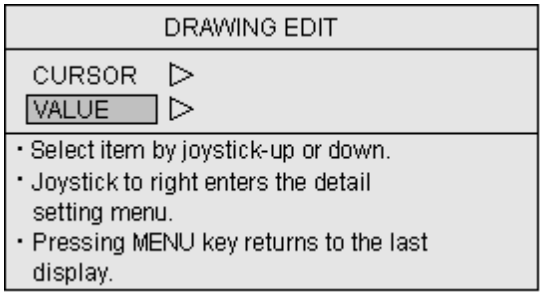


Figure 6.52 DRAWING EDIT menu

(5) Enter the drawing number using the alphanumeric key or moving the Joystick up or down. (Figure 6.53)
(6) Press the ENT key to fix the entry.

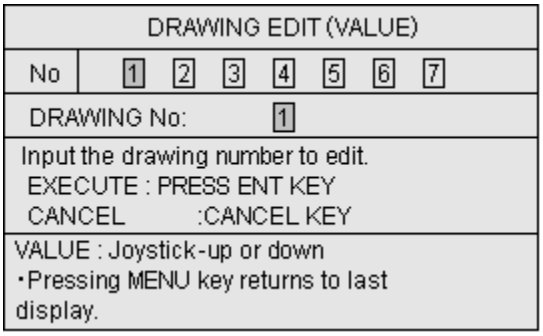


Figure 6.53 DRAWING EDIT (LIST)

(7) Press the Joystick up or down to highlight ADDITION in the DRAWING EDIT (VALUE) menu. (Figure 6.54)
(8) Press the Joystick to the right to enter the DRAWING EDIT menu.
(9) Press the Joystick up or down to highlight ADDITION.

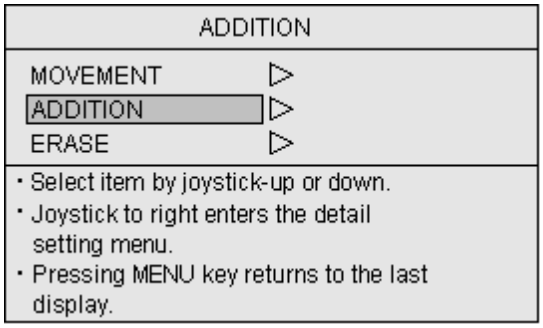


Figure 6.54 DRAWING EDIT sub menu

(10) Press the Joystick to the right to enter ADDITION menu.
(11) Enter a node number (POINT No in the menu) using the alphanumeric keys. (Figure 6.55)

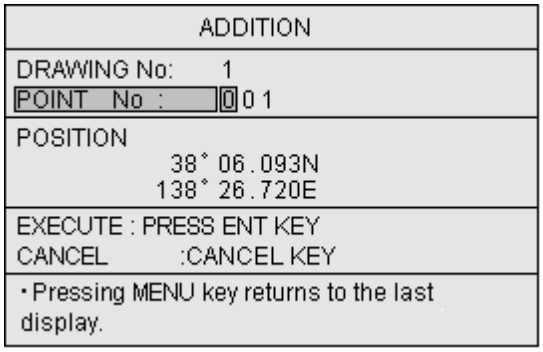


Figure 6.55 DRAWING EDIT sub menu

c. Deleting a node

(1) Press the MENU key to display the menu.
(2) Press the Joystick up or down to highlight DRAWING EDIT.
(3) Press the joystick to the right to enter the DRAWING EDIT menu. (Figure 6.56)
(4) Highlight VALUE pressing the Joystick up or down.

(5) Press the Joystick to the right to enter the DRAWING EDIT (VALUE) menu. (Figure 6.57)
(6) Enter the drawing number using the alphanumeric keys or moving the Joystick up or down.
(7) Press the ENT key to fix the entry.

(8) Press the Joystick up or down to highlight ERASE. (Figure 6.58)

(9) Press the Joystick to the right to enter the ERASE menu.
(10) Enter the node number (POINT No in the menu) using the alphanumeric keys. (Figure 6.59, 6.60)

(11) Press the ENT key to fix the entry.
(12) Press the MENU key 5 times to return to the normal display.

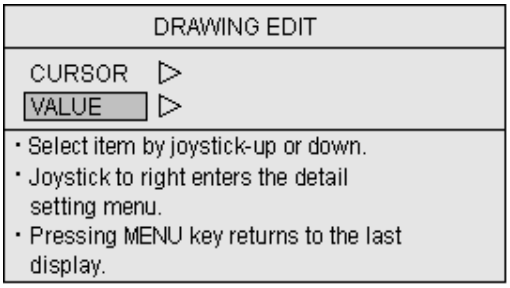


Figure 6.56 DRAWING EDIT menu

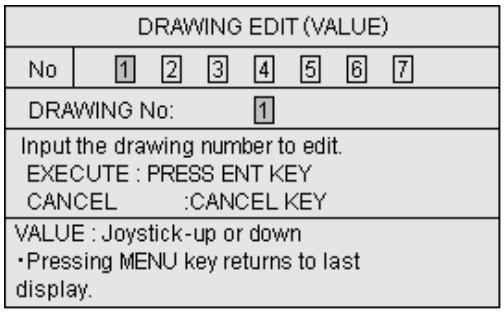


Figure 6.57 DRAWING EDIT (LIST) menu

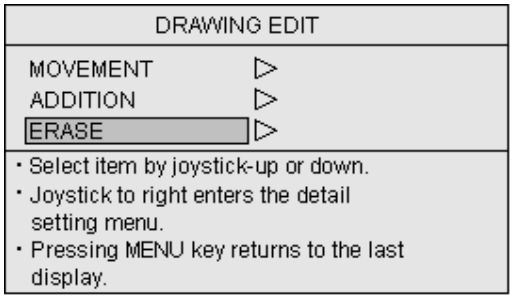


Figure 6.58 DRAWING EDIT menu

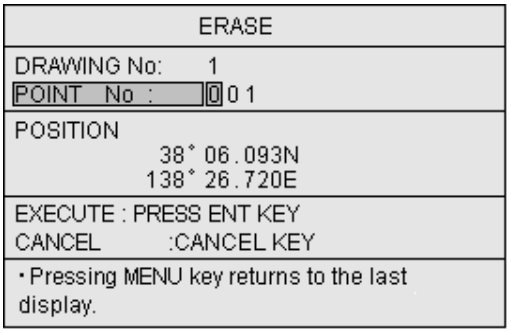


Figure 6.59 ERASE menu (1)

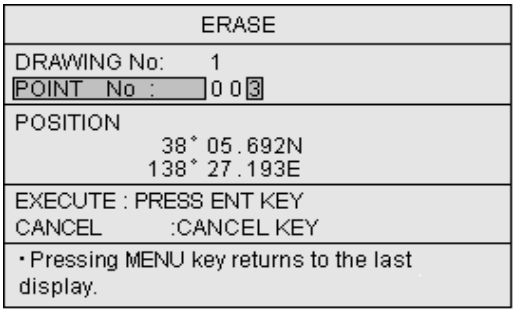


Figure 6.60 ERASE menu (2)

6.11 Track color setting

To set the track color.

In setting of a track color, there are three setting ways of "Normal", "W_Temp RESP" and “Depth RESP”.

6.11.1 Normal

"Normal" is a mode in which a track color is changed by means of the track color rotary knob operation.

6.11.2 W_Temp RESP

"W_Temp RESP" is a mode in which a track color can be changed by inputting water temperature information from the outside, according to the range of set water temperature. In this case, the track color rotary knob operation becomes invalid.

Each color of water temperature has a numerical value designated in the order of colors: green < red < yellow < cobalt blue < blue < pink < white.

The water temperature’s value for each color cannot be set to a value more than the value for the next higher color.

Menu operation (Switching-over of mode and setting of water temperature)

<Switching-over of mode>

1. For setting of a water temperature, move the highlight to the mode selection using the joystick.
2. Switchover "Normal" or "Depth RESP" to "W_Temp RESP" by operating the joystick sideways.

<Setting of water temperature>

1. Select a color for the temperature to be changed by operating the joystick upward or downward.
2. Change the value for the color by operating the joystick sideways.
3. End this setting by pressing the MENU key.

Selections: Normal, W_Temp RESP, Depth RESP

Range: - 1.0 to 50.0

Initial setting: Normal, 14.6, 14.8, 15.0, 15.2, 15.4, 15.6

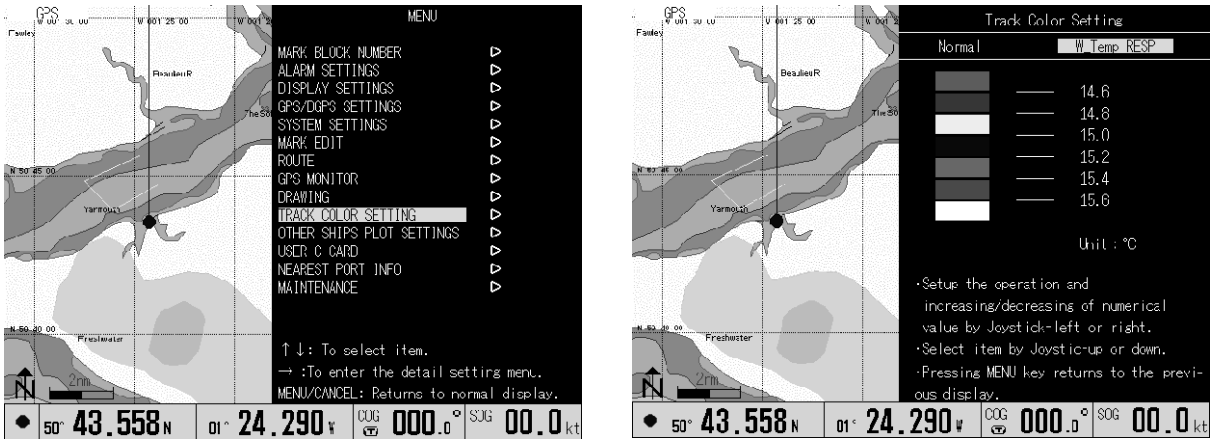


Figure 6.61 (1) Track Color Setting

6.11.3 Depth RESP

"Depth RESP" is a mode in which a track color can be changed by inputting water depth information from the outside, according to the range of the set water depth. In this case, the track color rotary knob operation becomes invalid.

Each color for water depth is designated for a numerical value in the order of the followings: green < red < yellow < cobalt blue < blue < pink < white.

The value of depth for each color cannot be set to a value bigger than the value for the next higher color.

Menu operation (Switching-over of mode and setting of water depth)

<Switching-over of mode>

1. For setting of water depth, move the highlight to the mode selection using the joystick.
2. Switchover "Normal" or "W_Temp RESP" to "Depth RESP" by operating the joystick sideways.

<Setting of water temperature>

1. Select a color to be changed by operating the joystick upward or downward.
2. Change the value for the color by operating the joystick sideways.
3. End this setting by pushing of the MENU key.

Selections: Normal, W_Temp RESP, Depth RESP

Range: 0.0 to 999.9

Initial setting: Normal, 15.0, 25.0, 35.0, 45.0, 55.0, 65.0 (Unit: m, fathom or ft)

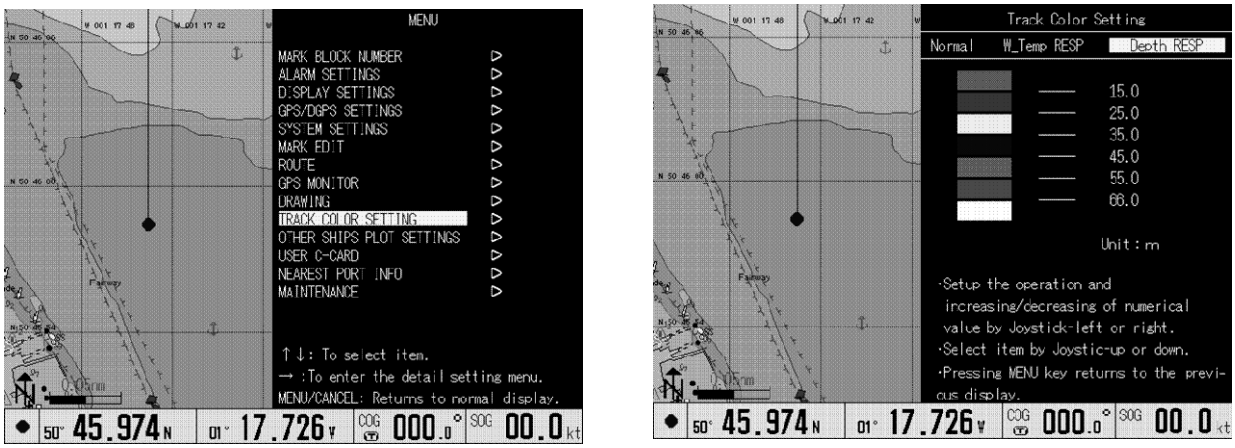


Figure 6.61 (2) Track Color Setting

6.12 Other ships plotting settings

By connecting a radar set with the ATA function provided, the GTD-110/150 can plot a ship's track for up to 10 targets with 1,000 points each. Each track's property can be added to or modified as below.

Table 6.12 OTHER SHIPS PLOTTING SETTING items

Items	Features	Selections
SHIP MARK	Displays ship's mark	YES / NO
MARK	Selects size of ship's mark	L_CIRCLE / S_CIRCLE / DOT
ID NO.	Displays target ID number	YES / NO
TRK DISP	Displays ship's track	YES / NO
TRACK LINE	Selects ship's track thickness	THICK / THIN
Color	Selects ship's track color	GRN / RED / YEL / CBL /BLU / PNK / WHT
PLOT LIMIT	Selects maximum number of plots	50 / 100 / 200 / 500 / 1000
CRS LINE	Selects type of course line	SPD RESP / NO (See NOTE)

NOTE: *When you select SPD RESP, the course line length changes according to the target ship's speed. With NO, a fixed length course line is shown.*

Operating procedure:

(1) Press the MENU key to display the Main menu.

(2) Move the Joystick up or down to highlight "OTHER SHIPS PLOT SETTINGS." (Figure 6.62)

(3) Move it to the right to enter its sub menu.

(4) Move the Joystick up or down to highlight a ship's number to be selected.

(5) Move it to the right to enter its sub menu "OTHER SHIPS PLOT SETTINGS." (Figure 6.63)

(6) Move the Joystick up or down to highlight the item to be selected.

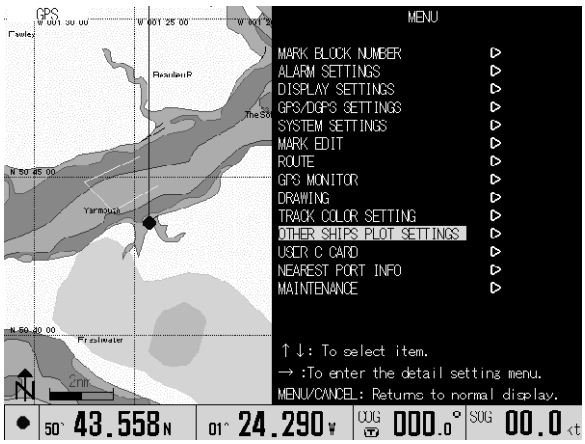


Figure 6.62 Main menu

(7) Move the Joystick to the right or the left to select a parameter. (Figure 6.64)

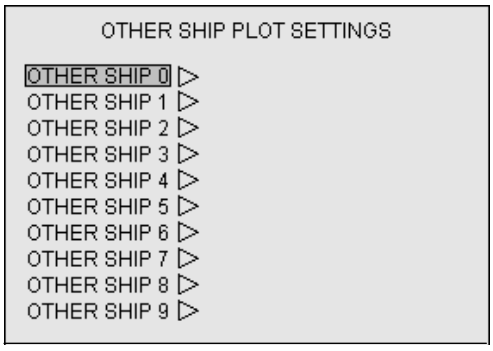


Fig 6.63 OTHER SHIP PLOT SETTINGS menu

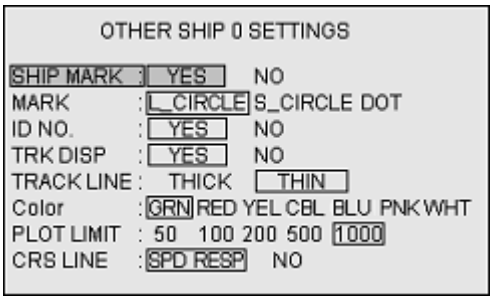


Figure 6.64 OTHER SHIP 0 SETTINGS menu

An example display of the ship's plot display is shown in Figure 6.65, in which 3 ships are under plot with own ship's track, other ship's ID numbers and their SPD RESP course lines being shown.

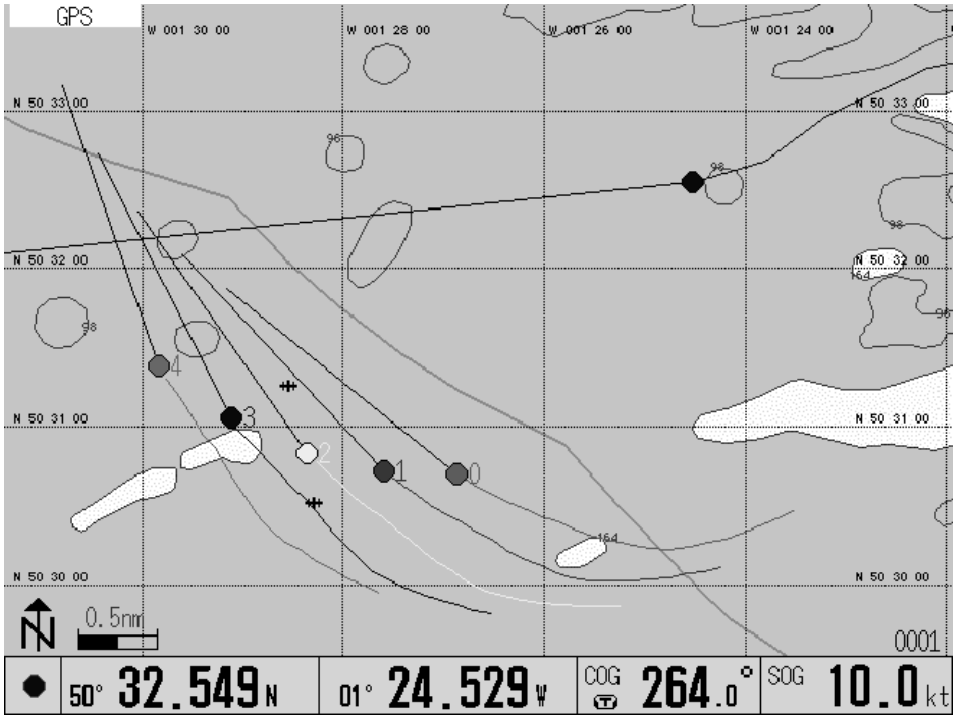


Figure 6.65 Example display of the ship's plot menu

6.13 User C-CARD

The User C-Card is a data storage media supplied from C-Map or its dealer. Using the User C-Card, the following user defined data can be saved.

MARK: To be saved on a block basis.

ROUTE: To be saved on a route basis.

TRACK: To be saved on a track basis for current track and stored track up to seven kinds.

DRAWING: To be stored on a block basis.

OTHER SHIPS PLOT: OTHER SHIPS PLOT DATA of 10 kinds (0 to 9) to be stored on a track basis.

SYSTEM: To set the setting environment.

6.13.1 Store

(1) Press the MENU key to display the Main menu.

(2) Press the Joystick up or down to highlight "USER C-CARD."

(3) Press the Joystick to the right to enter its sub menu. (Figure 6.66)

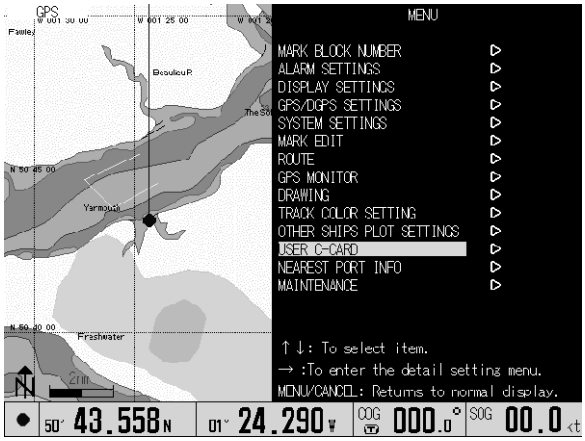


Figure 6.66 MAIN MENU

(4) Move the Joystick up or down to highlight STORE and press the Joystick to the right to enter the item selection menu. (Figure 6.67)

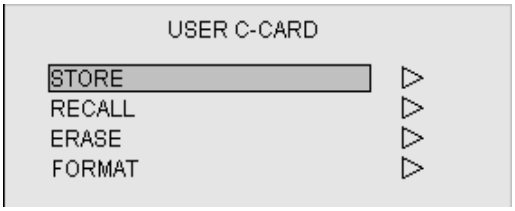


Fig 6.67 USER C-Card MENU

(5) Move the Joystick up or down to highlight the item to be saved and press the Joystick to the right to enter the set-up menu, USER C-Card STORE. (Figure 6.68)

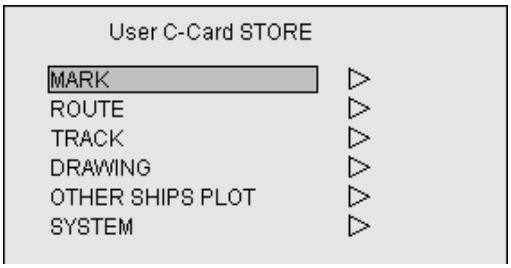


Fig 6.68 USER C-Card MENU

(6) Storing data

Storing MARK / ROUTE / TRACK / DRAWING / OTHER SHIP'S PLOT

1) Move the Joystick up or down to highlight the block number to be saved. (Figure 6.69)
2) Move the Joystick to the right to enter its setting menu.
3) Enter the file name using the Joystick. Moving the Joystick right or left selects a digit and up or down to choose a number. Note that two leading letters are uniquely specified to the kinds of the data as follows:

MK ***: Used for saving a mark.
RT ***: Used for saving a route.
TK *** : Used for saving a track.
DR ***: Used for saving a drawing.
OT *** : Used for saving another ships plot.

For the asterisks (***) space, enter the file number in 3 digits, from 000 to 399. (Figure 6.70)

4) After the file name entry is finished, press the ENT key to save the data. When the data is successfully saved, the message "Data storage complete" will appear.
5) To return to the normal Nav display, press the MENU key 4 times.

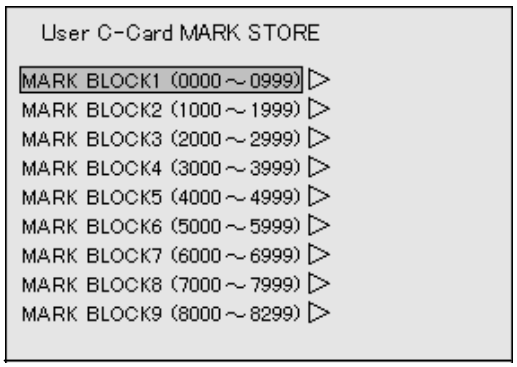


Figure 6.69 MARK STORE MENU

Figure 6.70 Specifying the file name

Storing SYSTEM

This menu is used to backup the setting environment. Use the following procedure to backup.

(1) Enter the file number in 3 digits to complete the file name.
SYS (Code for system backup)***(3 digits numbers)
(2) After the file name entry, press the ENT key to save the data. The message "Data storage complete!" will appear.
(3) To return to the normal Nav display, press the MENU key 4 times.

Redoing the file name entry

Press the CANCEL key during the file name entry.

Maximum number of files to be saved

Mark data: 36 files, assuming each file contains one block composed of 1000 points.

Track data: 18 files, assuming each file contains one track composed of 7000 points.

Prompt messages

If any of the following messages appear, redo the operation as instructed.

"Please insert User C-Card"

This message indicates that the User C-Card is not inserted or not fully inserted into the slot. Reinsert the User C-Card.

"User C-Card is not formatted"

When this message appears, format the User C-Card according to the procedure described in Para 6.6.14.4 "FORMAT."

"Please replace the User C-Card"

This message indicates there is no memory space left. Delete unnecessary file(s) or insert a new User C-Card. Refer to Para 6.6.14.3 "ERASE" for details.

"The data storage has failed. Please retry from the first step."

This message indicates that data saving has failed due to extraction of the User C-Card during the data saving operation. Reinsert the User C-Card and redo the saving operation.

6.13.2 Recall

This function allows you to recall the data stored in the User C-Card.

To do:

(1) Press the MENU key to display the Main menu.
(2) Move the Joystick up or down to highlight "USER C-CARD."
(3) Press the Joystick to the right to enter its sub-menu RECALL. (Figure 6.71)
(4) Move the Joystick up or down to highlight RECALL.
(5) Press the Joystick to the right to enter its sub menu. (Figure 6.72)
(6) Move the Joystick up or down to highlight the item to be selected.

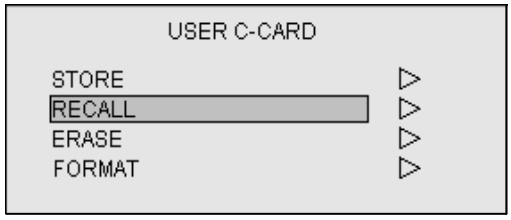


Figure 6.71 USER C-CARD MENU

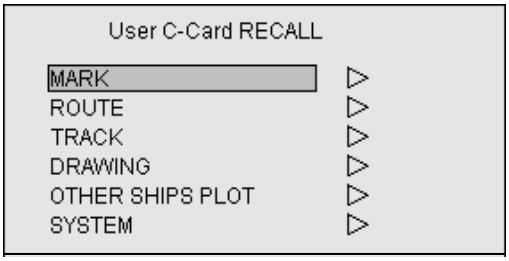


Figure 6.72 User C-Card RECALL MENU

(7) Recalling the data

Use the following procedure to recall the item.

Recalling MARK / ROUTE / TRACK / DRAWING / OTHER SHIP'S PLOT

1) Move the Joystick up or down to highlight the file you wish to recall and press the ENT key.
2) Move the Joystick up or down to highlight an object to which the file is to be transferred and press the ENT key. The message "Data recall complete!" appears.
3) To return to normal Nav display, press the MENU key 4 times.

Recalling SYSTEM

This menu is used to resume the backed up set-up environment

1) Move the Joystick up or down to highlight the file to be recalled and press the ENT key. The message "Do you wish to overwrite SYSTEM?" will appear.
2) If YES, press the ENT key. When the SYSTEM recall has finished, the message "Data recall complete!" will appear.

To return to the normal Nav display, press the MENU key 4 times.

(8) Canceling the data recall

Press the CANCEL key before recalling the data. The screen resumes the previous display.

(9) Displaying the Mark data stored in the User C-Card

1) Using step (7) to recall Mark, highlight the file and press the HOME key. This allows showing the Mark list in the file. (Figure 6.73)
2) To return to the previous display, press the MENU key.

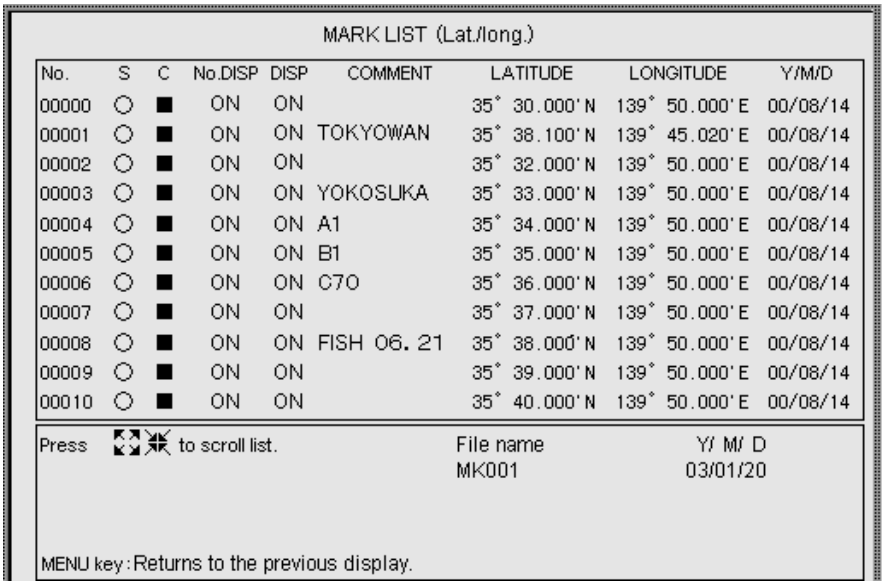


Figure 6.73 MARK LIST

Prompt messages

If any of the following messages appears, redo the operation as instructed.

"Please insert User C-Card"

This message indicates that the User C-Card is not inserted or not properly inserted into the slot. Reinsert the User C-Card.

"Some data exists in this block. Do you wish to overwrite?"

If YES, press the ENT key. The existing data will be overwritten with the new data. Take care not to overwrite any important data when this message appears.

6.13.3 Erase

Using this function, you can erase the data stored in the User C-Card.

To do:

(1) Press the MENU key to display the Main menu.

(2) Move the Joystick up or down to highlight USER C-CARD and press the Joystick to the right to enter its menu. (Figure 6.74)

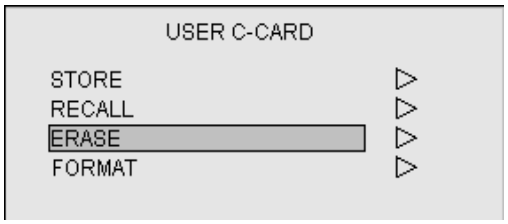


Figure 6.74 USER C-CARD MENU

(3) Move the Joystick up or down to highlight ERASE and press the Joystick to the right to enter the sub menu, User C-Card ERASE. (Figure 6.75)

(4) Move the Joystick up or down to highlight the item to be erased and move the Joystick to the right. The file list will appear.

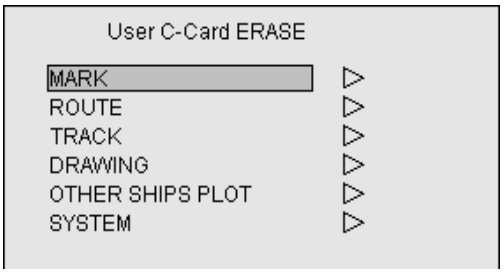


Figure 6.75 User C-Card ERASE MENU

(5) Canceling the data

Canceling the mark / route / track / drawing / other ship's plot / system data

1) Move the Joystick up or down to highlight the file name to be deleted and press the ENT key. The message "Do you wish to erase the file?" will appear.
2) If YES, press the ENT key. When the file is successfully erased, the message "Data erasure complete" will appear.
3) To return to the normal Nav display, press the MENU key 4 times.

Canceling the data erasure

Press the CANCEL key. The screen will return to the previous display.

Prompt messages

If the following messages appear, redo the operation as instructed.

"Please insert User C-Card"

This message indicates that the User C-Card is not inserted or not properly inserted into the card slot. Reinsert the User C-Card.

6.13.4 Format

Prior to using a User C-Card, you need to format the User C-Card for GTD-110/150 storage application. Take care not to overwrite any data already stored in the User C-Card by an unintentionally formatting. Formatting time is about 10 seconds. Use the following procedure to format.

(1) Press the MENU key to open the Main menu.

(2) Move the Joystick up or down to highlight USER C-CARD and press the Joystick to the right. The USER C-CARD menu will appear. (Figure 6.76)

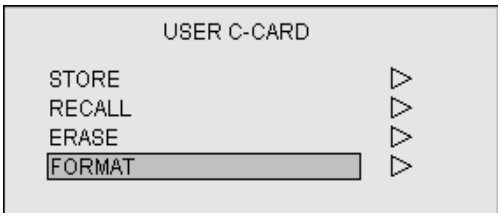


Figure 6.76 USER C-CARD MENU

(3) Move the Joystick up or down to highlight FORMAT and press the Joystick to the right. The User C-Card FORMAT menu will appear. (Figure 6.77)

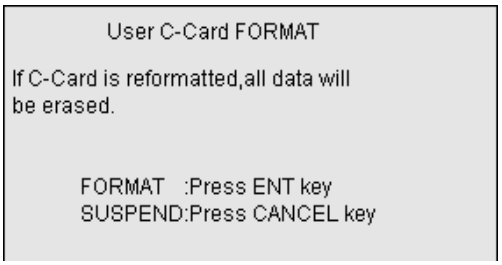


Figure 6.77 User C-Card FORMAT MENU

(4) Press the ENT key to start the formatting procedure.
When formatting is complete, the message "User C-Card format complete!" will appear.

(5) To return to the normal Nav display, press the MENU key 3 times.

6.14 Nearest port info

Display information on the port in the vicinity of own ship's position or the cursor position.

(1) Turn off the cursor when you want to obtain information on the vicinity of the position of the ship. When the cursor is turned on, information on the vicinity of the position of the cursor is obtained. If the cursor is moved to an arbitrary position, information on the nearest vicinity of that is obtained.

(2) Under MENU, using the joystick, move to highlight "NEAREST PORT INFO"

(3) Operate the joystick to the right, and display the subscreen of "NEAREST PORT INFO".

(4) In this subscreen, the information to be retrieved is displayed as a list of icons. Move the highlight to the item that you want to inspect, using the joystick.

(5) When you input ENT, a list giving the place, the distance, and the azimuth etc., (max 12 features) concerning the selected item is displayed. Move the highlight to a target item using the joystick.

(6) When ENT is input, detailed information on the item is displayed. The screen of NEAREST PORT INFO shuts when ENT is input again, and the cursor position jumps to the place of the target item on the map.

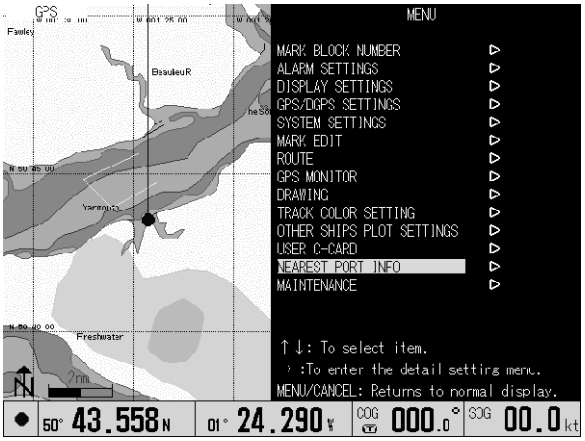


Figure 6.78 MAIN MENU

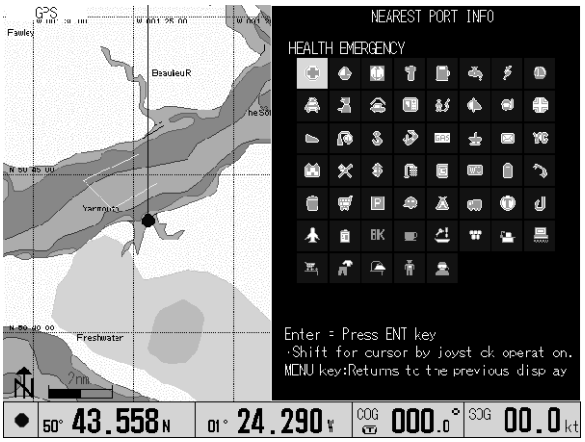


Figure 6.79 NEAREST PORT MENU(1)

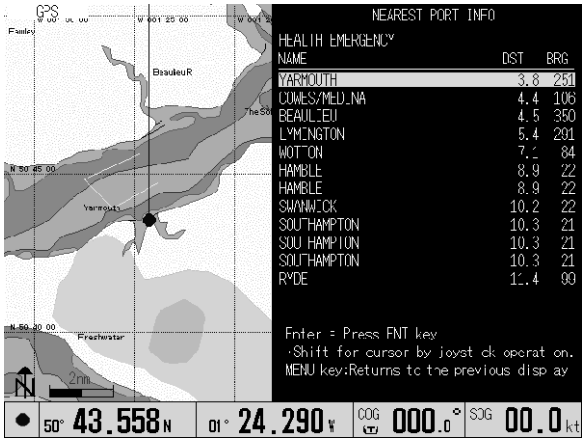


Figure 6.80 NEAREST PORT MENU(2)

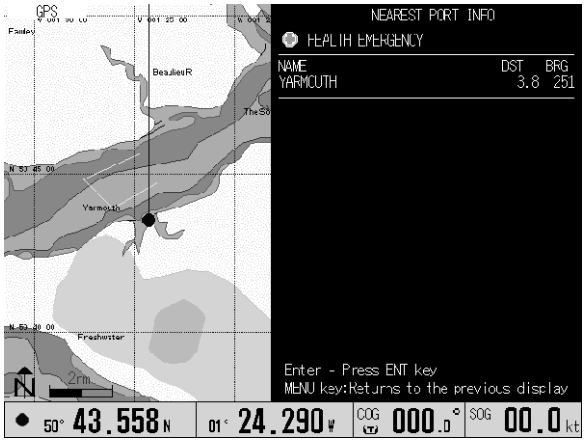


Figure 6.81 NEAREST PORT MENU(3)

6.15 Maintenance

This menu contains the following test menu to confirm the system operation is in good order.

SIMULATION

SYSTEM TEST

COLOR PALETTE OPERATION

DATA COMMUNICATION

FLASH ROM ERASE

LANGUAGE

Details are given in the following descriptions.

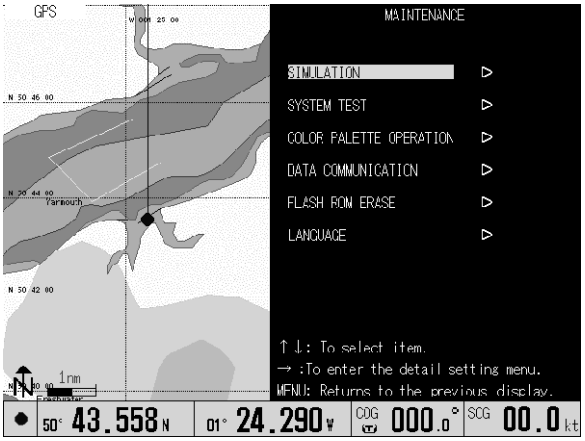


Figure 6.82 MAINTENANCE menu

6.15.1 Simulation

A simulation of own ship moving in a circular or linear pattern is displayed.

6.15.2 System test

This menu contains a self-test program for testing electronic components like the LCD (Liquid Crystal Display), RAM (Random Access Memory), Key switches, the Joystick, rotary switches, and the buzzer. Tests for LCD brilliance and the COM port are also carried out.

6.15.3 Color palette operation

Using this function you can change the color of each drawing element used in the display. For information about the palette numbers, drawing elements and RGB code, refer to the ANNEX at the end of this manual.

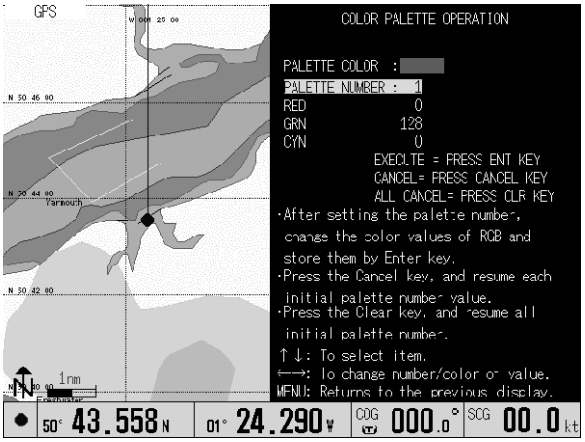


Figure 6.83 COLOR PALETTE OPERATION menu

6.15.4 Data communication

For service use only.

6.15.5 Flash rom erase

For service use only.

6.15.6 Language

For service use only.

Chapter 7

Route navigation

Contents

Chapter 7 Route/Mark navigation

7.1 Routes

This paragraph describes the methods concerning route creation and edition.

7.1.1 Creating a route

There are three methods available to create the route in the GTD-110/150. These are; using the cross cursor, specifying a point (lat/lon or LOP) and using the registered Mark number. Details are given in the following paragraphs.

7.1.1.1 Creating a route using the cross cursor

(1) Press the menu key to display the MENU window.
(2) Press the Joystick up or down to highlight ROUTE.
(3) Press the Joystick to the right to enter the ROUTE sub menu.
(4) Press the Joystick up or down to highlight ROUTING. (Figure 7.2)
(5) Press the Joystick to the right to enter the ROUTING sub menu.
(6) Press the Joystick up or down to highlight CURSOR. (Figure 7.3)
(7) Press the Joystick to the right. The ROUTING (Route Name Registration) menu will appear. The route number 1 is automatically assigned, which is shown in the menu. (Figure 7.4)

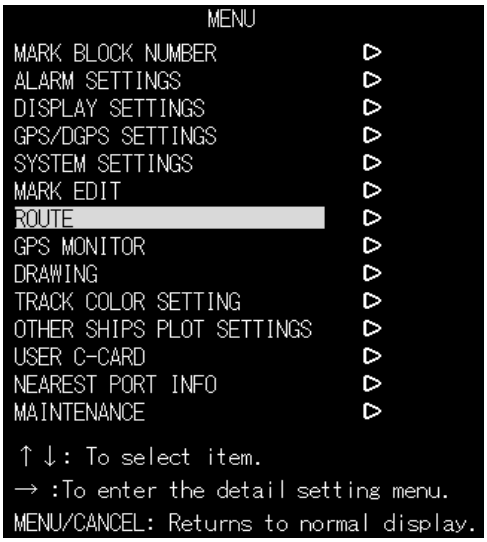


Figure 7.1 MENU window

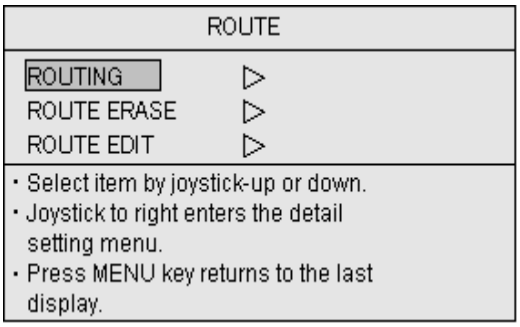


Figure 7.2 ROUTE menu

(Route name registration)

(1) Press the Joystick down to highlight COMMENT.
(2) Press the Joystick to the right to enter the font type.
(3) Enter texts using the apha-numeric keys (See NOTE) and press the ENT key to fix the entry. (Figure 7.5) The maximum number of texts are 12. In case you press the ENT key without the entry of a comment, the current date will be entered automatically as shown below.

R RTE YY. MM. DD
RTE: Route
YY: The lower 2 digit year
MM: Number of month
DD: day

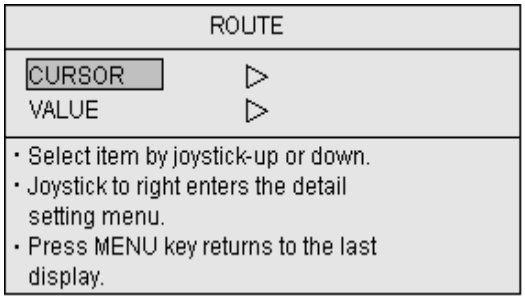


Figure 7.3 ROUTING menu

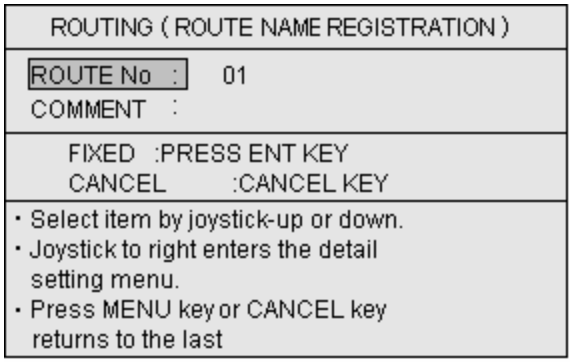
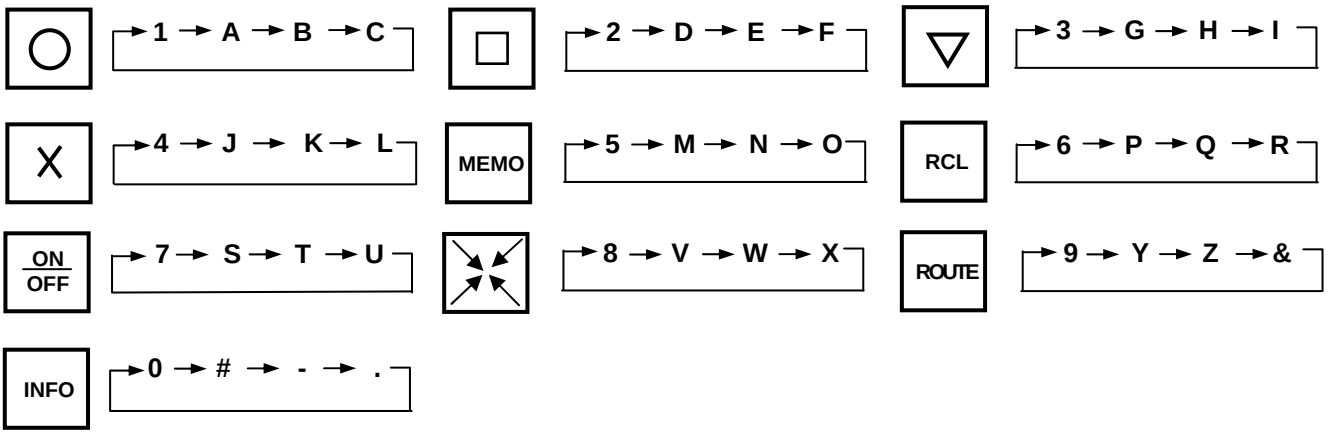


Figure 7.4 ROUTING menu (1)

Figure 7.5 ROUTING menu (2)

NOTE: The *keying sequence to enter alphabets and numbers are as follows:*



(Setting waypoints)

(1) Use the Joystick to move the cross cursor to designate a waypoint.

(2) Press the ENT key to register the waypoint.

(3) Repeat step 1 and step 2 for further waypoint registrations.

(4) Press the MENU key to register the route specified, which is constituted by the waypoints set above.

(5) The route and waypoints are deleted and again the ROUTING (Route Name Registration) menu window will appear. To register another route, perform the procedure described in Para 7.1.1.3 “Route name registration”.

(6) To return to normal navigation display, press the MENU key 4 times.

7.1.1.2 Creating a route by specifying a waypoint

(Opening the ROUTE menu)

(1) Press the MENU key to display the MENU window.
(2) Move the Joystick up or down to highlight ROUTE.
(3) Press the Joystick to the right to enter the ROUTE menu. (Figure 7.6)

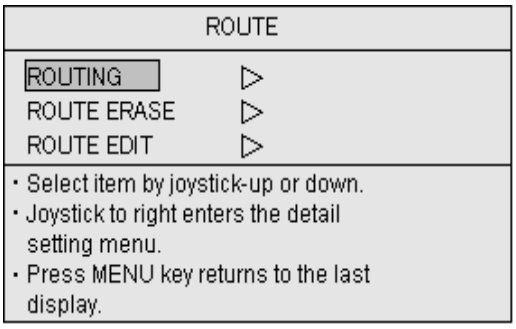


Figure 7.6 ROUTE menu

(Entering the ROUTE menu)

(1) Press the Joystick up or down to highlight ROUTING. (Figure 7.7)
(2) Press the Joystick up or down to highlight VALUE.
(3) Press the Joystick to the right to enter the ROUTING sub menu. (Figure 7.8)

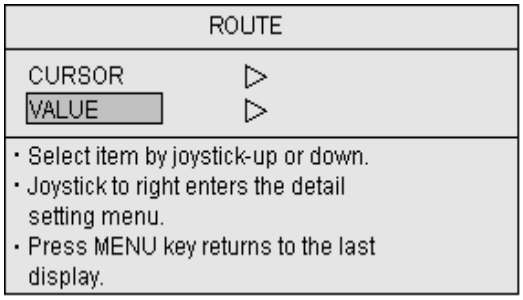


Figure 7.7 ROUTING menu

(Route name registration)

(1) Press the Joystick to the right. The ROUTING menu will appear. In the menu, the route number 1 is assigned automatically.
(2) Press the Joystick down to highlight COMMENT.
(3) Press the Joystick to the right to enter COMMENT sub menu.
(4) Enter texts using the alphanumeric keys (See NOTE) and press the ENT key to fix the entry. The maximum numbers of texts are 12. In case you press the ENT key without the entry of comment, the current date will be automatically entered as shown below.
RTE YY. MM. DD
RTE: Route
YY: The lower 2 digit year
MM: Number of month
DD: day

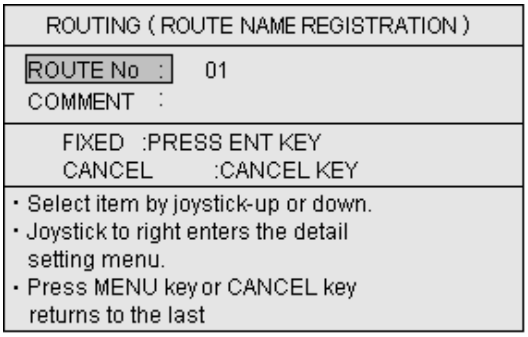
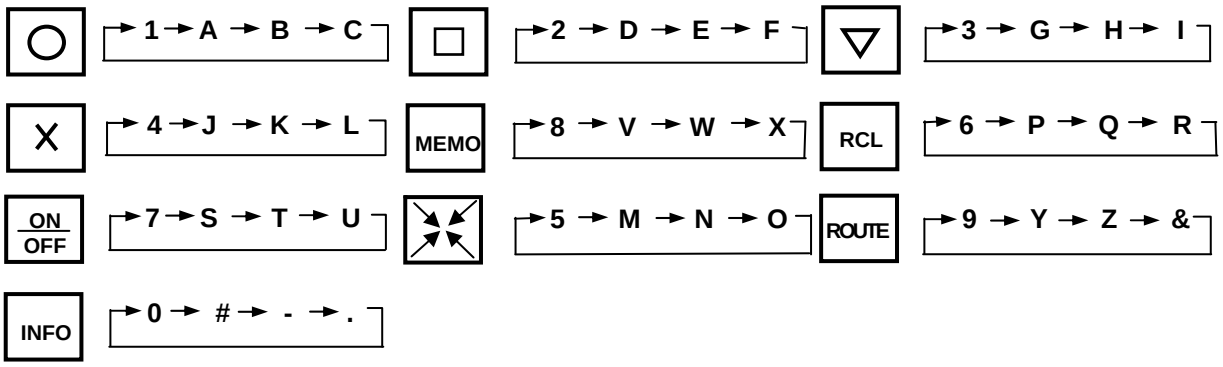


Figure 7.8 ROUTING sub menu

NOTE: *Keying sequence to enter alphabets and numbers are as follows:*



7.1.1.3 Specifying a waypoint

a. By latitude and longitude coordinate

(1) Press the Joystick to the left to highlight MARK NUMBER.
(2) Press the Joystick down to highlight POSITION.
(3) Press the Joystick to the right and highlight Position in the lat/lon box.
(4) Enter the latitude value at first and then the longitude.
(5) Press the ENT key to register the waypoint.
(6) Repeat step 1 and step 2 for further waypoint registrations.
(7) Press the MENU key to fix the entries.

Figure 7.9 Waypoint registration by L/L

b. By LOP value

(1) Press the Joystick to the left to highlight MARK NUMBER.
(2) Press the Joystick down to highlight POSITION.
(3) Press the Joystick to the right and highlight Position in the LOP box.
(4) Enter the LOP value of the point to be registered.
(5) Press the ENT key to register the waypoint.
(6) Repeat step 1 and step 2 for further waypoint registrations.
(7) Press the MENU key to fix the entries.
(8) Press the MENU key 4 times to return to normal display.

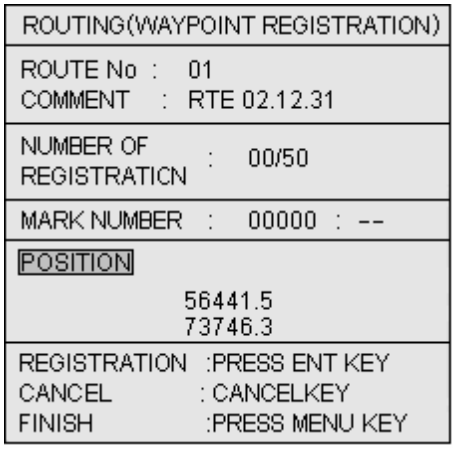


Figure 7.9a Waypoint registration by LOP

c. By Mark number entry.

(1) Enter the mark number using the assigned alphanumeric keys. (Figure 7.10)
(2) Press the ENT key to register the waypoint.
(3) Repeat step 1 and step 2 for further waypoint registrations.
(4) Press the MENU key to fix the route.
(5) To return to normal display, press the MENU key.

Figure 7.10 Waypoint registration by Mark No.

7.1.2 Setting a route

This function refers to recalling and displaying the registered route on the screen.

7.1.2.1 Designating a route using the cross cursor

(1) Press the CUR key to display the cross cursor key.
(2) Press the ROUTE key to display the ROUTE EXECUTE window. (Figure 7.11)
(3) Press the Joystick to allow the cross cursor to fall on the route.
(4) Press the ROUTE key to select the route. The route number and its name, date of creation, etc) will be shown in the ROUTE EXECUTE window. (Figure 7.12)

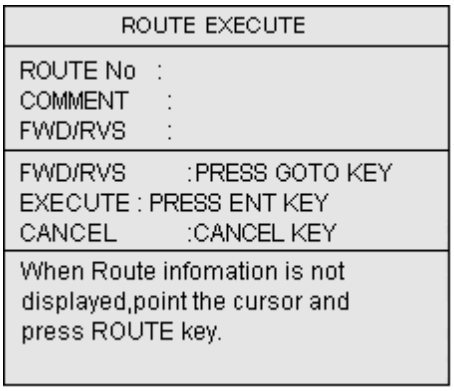


Figure 7.11 Waypoint registration by Mark No.

NOTE1: *In case plural routes are overlapped on the screen, you can select each route by repeatedly pressing the ROUTE key.*

NOTE 2: *To change the route follow-up order, press the GOTO key. Each press of the key changes the order, starting from the beginning or from the end of the route.*

(5) Press the ENT key to fix the selection. The entire selected route is shown with a flag on the first waypoint.

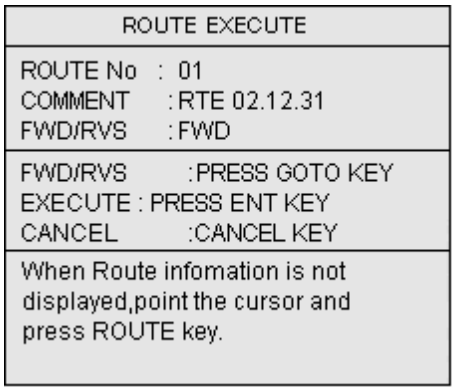


Figure 7.12 Waypoint registration by Mark No.

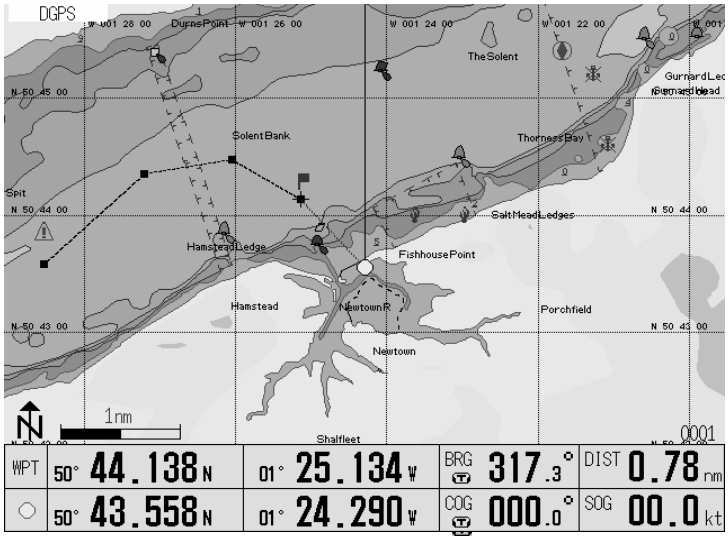


Figure 7.13 Route display shown on the screen

7.1.2.2Designating a route from the list

(1) Press the ROUTE key without the cross cursor shown on the screen. The registered route information will be shown in the ROUTE EXECUTE window. (Figure 7.14)

(2) Press the Joystick up or down to highlight the route number. Alternatively, you can use the alphanumeric keys to enter the route number.

NOTE: *To change the course follow-up order, press the GOTO key. Each press of the key changes the order, starting from the beginning or from the end of the route.*

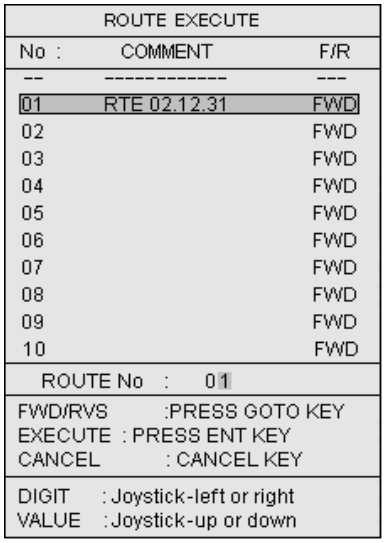


Figure 7.14 ROUTE EXECUTE window (1)

(3) Press the ENT key to fix the selection. The entire selected route is shown with a flag on the first waypoint.

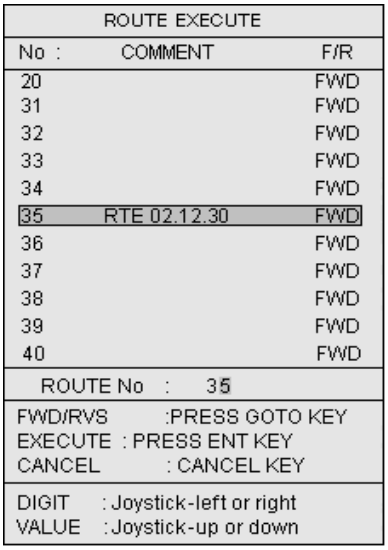


Figure 7.15 ROUTE EXECUTE window (2)

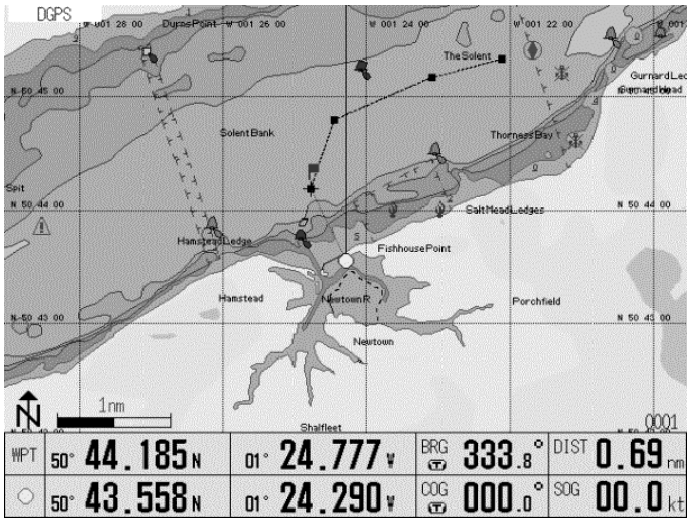


Figure 7.16 Route display shown on the screen

7.1.3 Changing a waypoint

This function allows you to skip the current waypoint to the next one. To do:

(1) Press the ROUTE key while the GTD-110/150 is in the navigation mode.

(2) Press the GOTO key to change the waypoint. The course line will be re-drawn from own ship's position to the next waypoint.

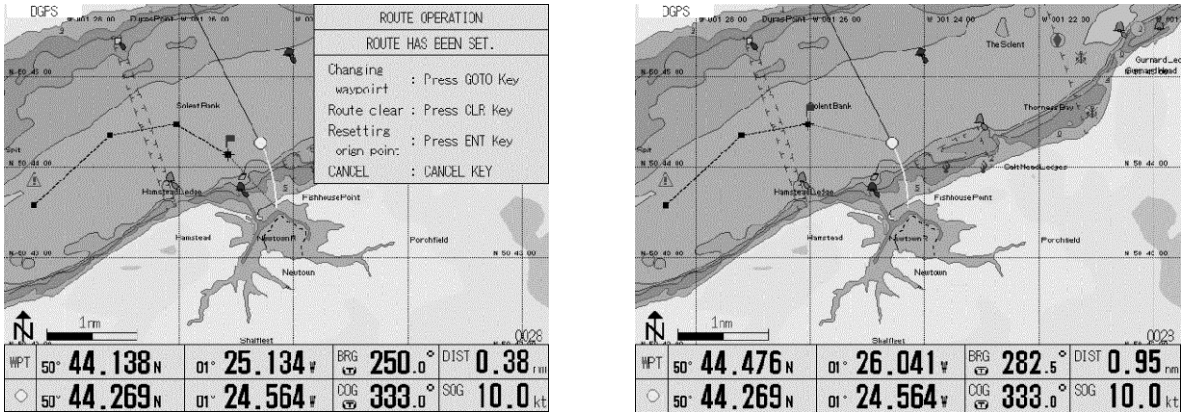


Figure 7.17 Route display shown on the screen

7.1.4 Resetting a point of origin

This function allows you to reset the current own ship's position to a new point of origin. To do:

(1) In Navigation mode, press the ROUTE key. The ROUTE OPERATION window will appear.

(2) Press the ENT key to set current own ship's position to be the new point of origin.

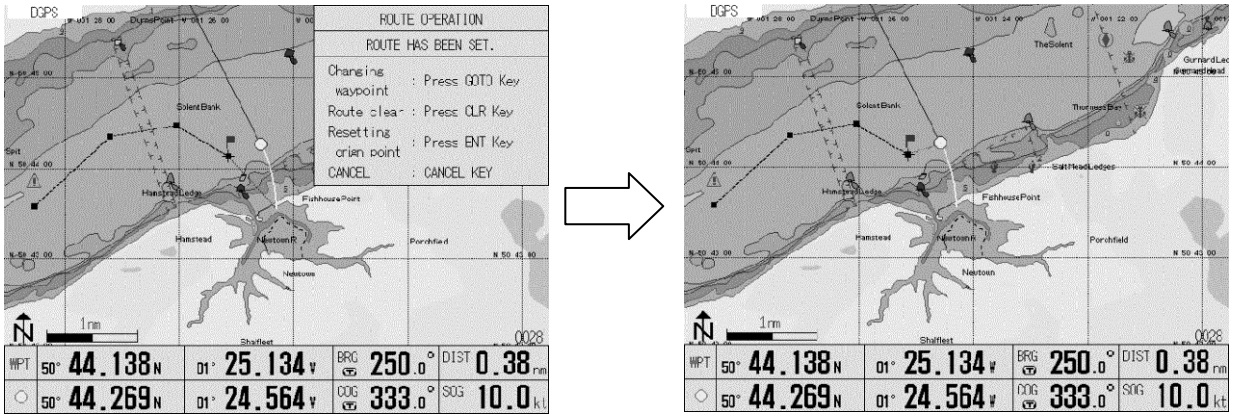


Figure 7.18 Resetting a new point of origin

7.1.5 Canceling a route

Upon setting the GTD-110/150 to Route mode, this function allows you to cancel an active route display on the screen. Press the CLR key and the displayed route will be erased from the screen. (The registered data will not be deleted even if this operation is performed)

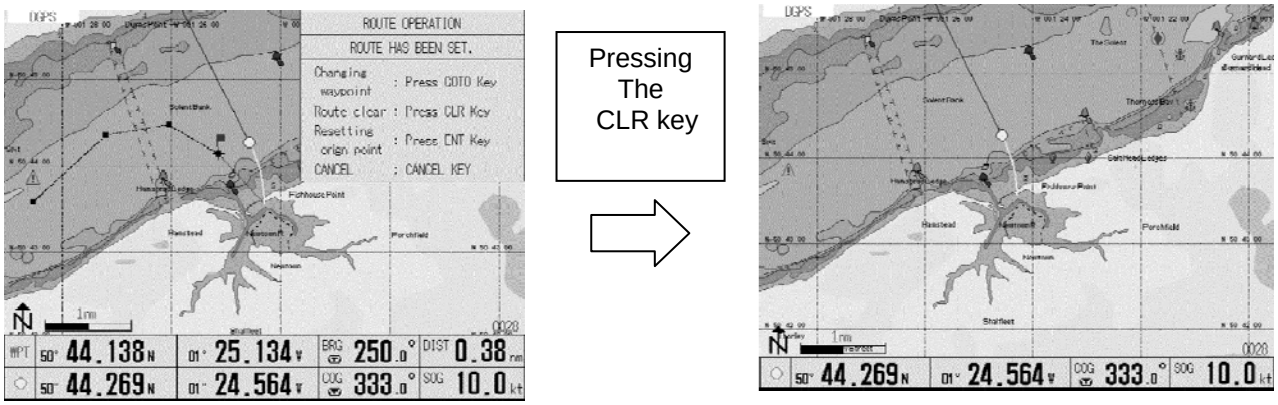


Figure 7.19 Canceling the route

7.1.6 Editing a route

This function allows you to edit a registered route by moving, adding or deleting waypoints on the route.

7.1.6.1 Editing a route using the cross cursor

Using this function, you can edit a route using the following operations:

- Moving a waypoint
- Adding a waypoint
- Deleting a waypoint

a. Moving a waypoint

(1) Press the MENU key to display the MENU window.

(2) Press the Joystick up or down to highlight ROUTE.

(3) Press the Joystick to the right to enter the ROUTE menu. The ROUTE window will appear. (Figure 7.20)

(4) Press the Joystick up or down to highlight ROUTE EDIT.

(5) Press the Joystick to the right to enter the ROUTE EDIT window.

(6) Press the Joystick up or down to highlight CURSOR. (Figure 7.21)

(7) Press the Joystick to the right to show the ROUTE EDIT sub menu window.

(8) Press the Joystick up or down to highlight WAYPOINT MOVEMENT. (Figure 7.22)

(9) Press the Joystick to the right to show the WAYPOINT MOVEMENT window. All routes will be displayed on the chart screen. (Figure 7.23)

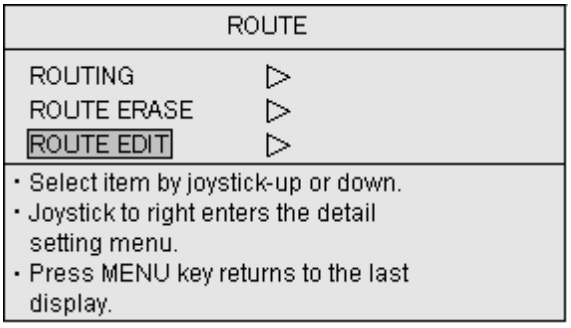


Figure 7.20 MENU window

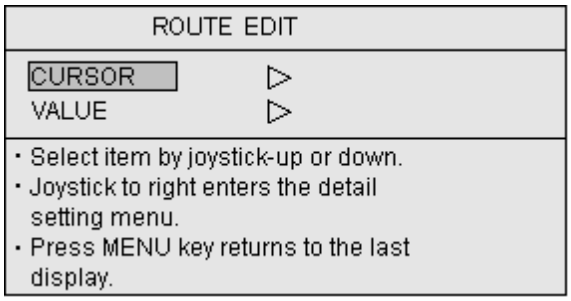


Figure 7.21 ROUTE window

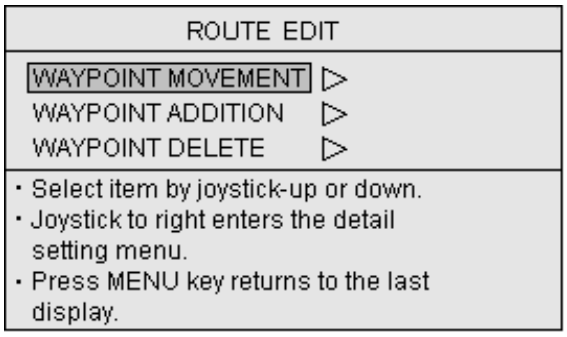


Figure 7.22 ROUTE EDIT window

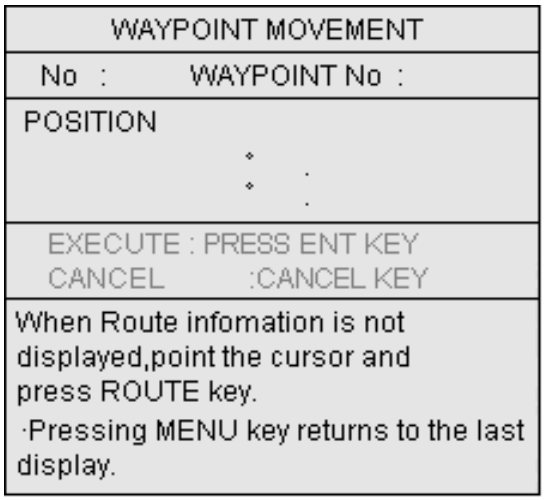


Figure 7.23 WAYPOINT MOVEMENT window (1)

(10) Use the Joystick to allow the cross cursor to fall on the waypoint to be moved.

(11) Press the ROUTE key to select the waypoint. The waypoint data (waypoint number, lat/lon) will be shown in the WAYPOINT MOVEMENT window.

NOTE: *If some waypoints are overlapped or situated nearby, you can choose each waypoint one by one by repeatedly pressing the ROUTE key.*

(12) Use the Joystick to move the waypoint to a desired point. (Figure 7.24)

(13) Press the ENT key to fix the position.

(14) To return to normal display, press the MENU key 5 times.

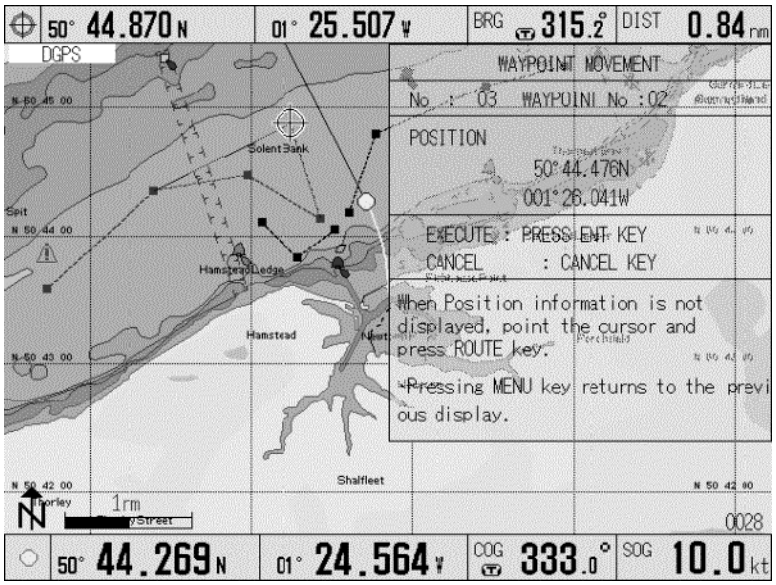


Figure 7.24 WAYPOINT MOVEMENT window (2)

b. Adding a waypoint

(1) Press the MENU key and select ROUTE.
(2) Press the Joystick to the right to enter the ROUTE EDIT menu.
(3) Press the Joystick up or down to highlight CURSOR. (Figure 7.26)

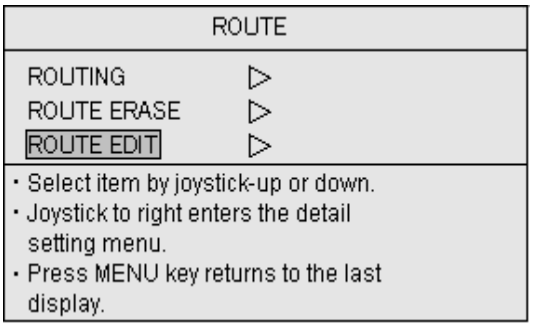


Figure 7.25 ROUTE menu

(4) Press the Joystick to the right to enter the ROUTE EDIT menu.

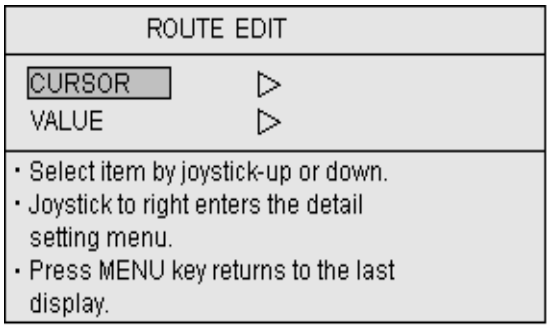


Figure 7.26 ROUTE EDIT menu (2)

(5) Press the Joystick up or down to highlight WAYPOINT ADDITION. (Figure 7.27)
(6) Press the Joystick to the right to display the WAYPOINT ADDITION menu.

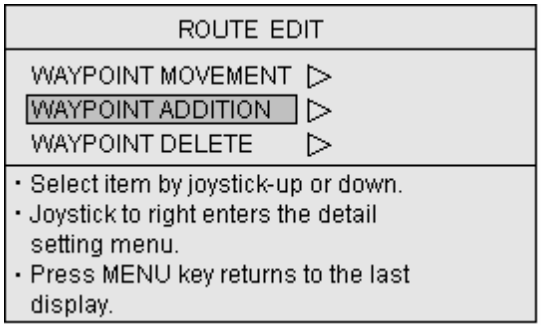


Figure 7.27 ROUTE EDIT menu (1)

(7) Use the Joystick to move the cross cursor on to a point the waypoint to be added. (Figure 7.28)
(8) Press the ROUTE key.

NOTE 1: *If plural routes are overlapped on the screen, press the ROUTE key repeatedly. Each route will be selected one after the other.*

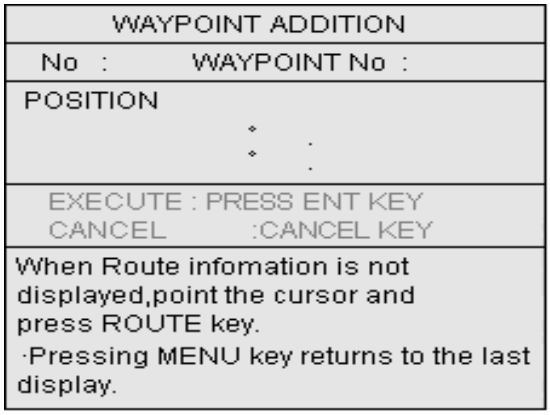


Figure 7.28 WAYPOINT ADDITION window (1)

(9) Move the designated waypoint to a desired point. (Figure 7.29)

(10) Press the ENT key to register a new waypoint. The lat/lon data of the new waypoint will be shown in the WAYPOINT ADDITION window. (Figure 7.29)

(11) To return to normal display, press the menu key 5 times.

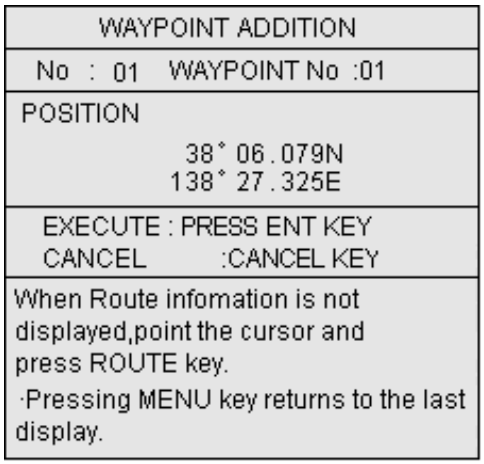


Figure 7.29 WAYPOINT ADDITION window (2)

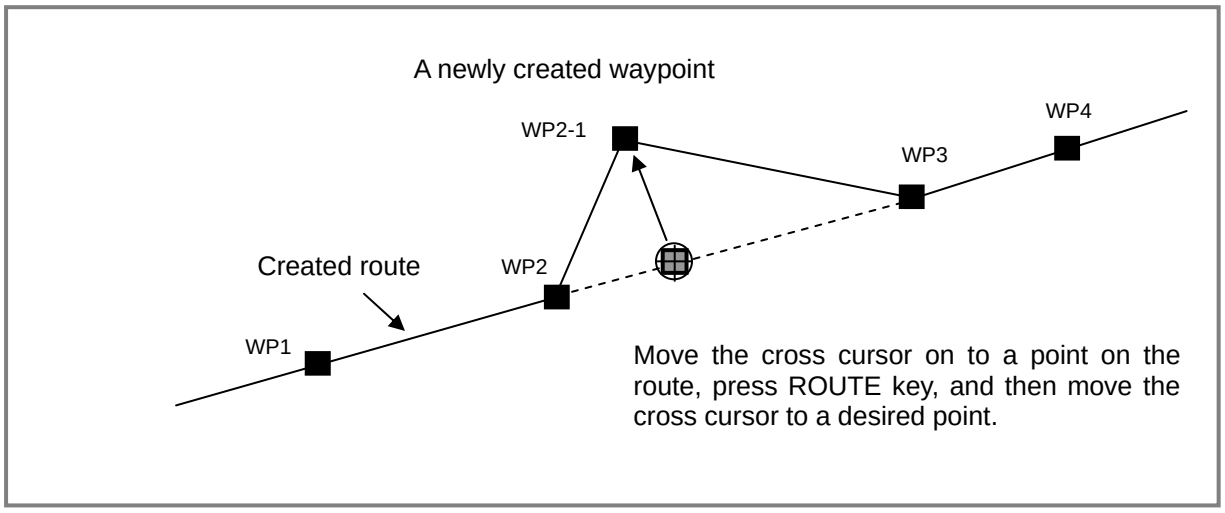


Figure 7.30 Creating a new waypoint

NOTE 2*: If more than 50 waypoint data are entered, the following message will be shown to notify that memory is full.*

The registration memory is full. To register new data, delete unnecessary data first.

c. Deleting a waypoint

(1) Press the MENU key and highlight ROUTE.

(2) Press the Joystick to the right to display the ROUTE window.

(3) In the ROUTE window, move the Joystick up or down to highlight ROUTE EDIT.

(4) Move the Joystick to the right and the ROUTE EDIT window will appear. (Figure 7.32)

(5) Move the Joystick up or down to highlight CURSOR.

(6) Move the Joystick to the right to enter the ROUTE EDIT sub menu.

(7) Move the Joystick up or down to highlight WAYPOINT DELETE.

(8) Press the Joystick to the right to enter the WAYPOINT DELETE menu. (Figure 7.34a)

(9) Use the Joystick to move the cross cursor on to the waypoint to be deleted.

(10) Press the ROUTE key to select the waypoint. The waypoint data (waypoint number, lat/lon) will be shown in the WAYPOINT DELETE window. (Figure 7.34b)

(11) Press the ENT key to delete the waypoint.

(12) To return to normal display, press the MENU key 5 times.

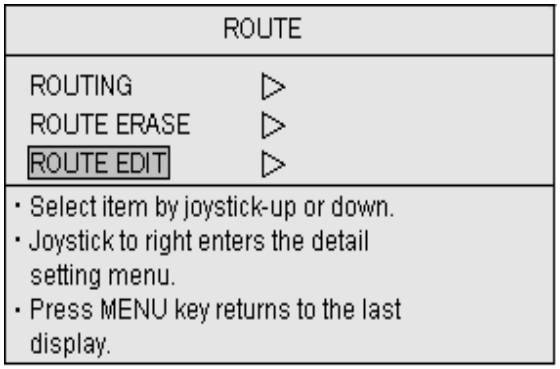


Figure 7.31 ROUTE window

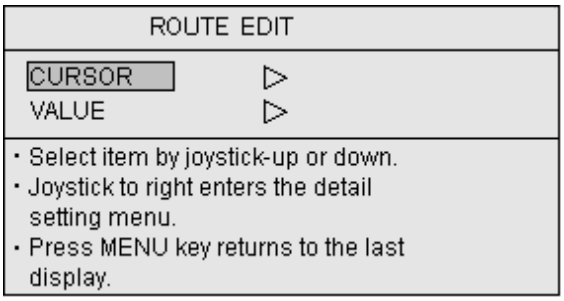


Figure 7.32 ROUTE EDIT window

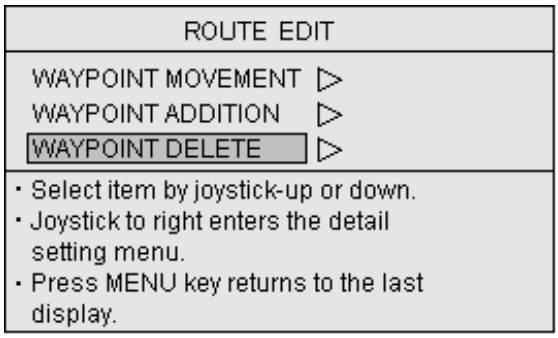


Figure 7.33 ROUTE EDIT sub menu

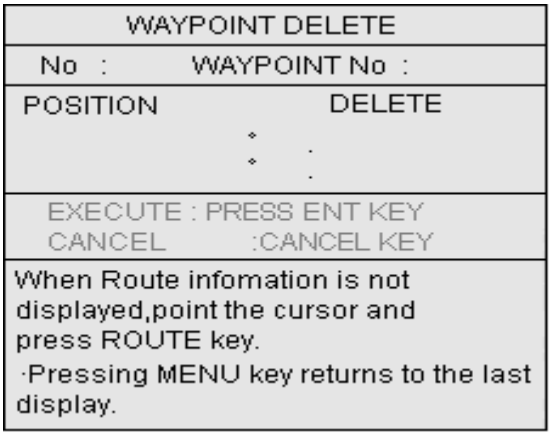


Figure 7.34a WAYPOINT ERASE menu

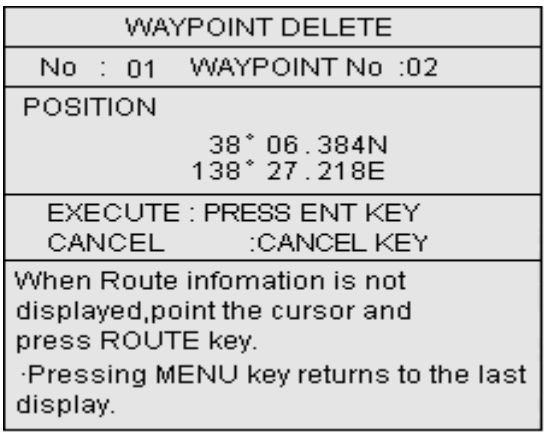


Figure 7.34b WAYPOINT ERASE menu (2)

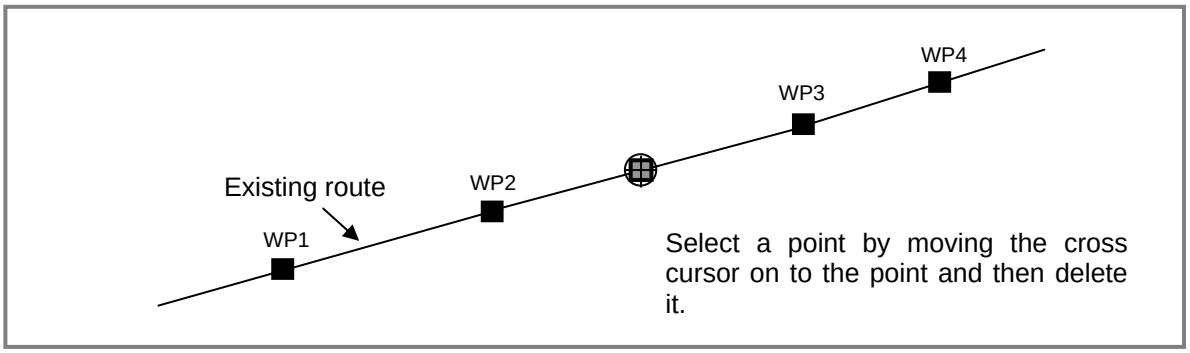


Figure 7.35 Erasing a waypoint

7.1.6.2 Editing a route by specifying a point (lat/lon or LOP)

a. Moving a waypoint

(1) Press the MENU key to open the MENU window.

(2) Press the Joystick up or down to highlight ROUTE.

(3) Press the Joystick to the right to enter the ROUTE menu. The ROUTE menu will appear.

(4) Highlight ROUTE EDIT and press the Joystick to the right. The ROUTE EDIT menu will appear. (Figure 7.37)

(5) Press the Joystick up or down to highlight VALUE and press the Joystick to the right to enter its sub menu. The ROUTE EDIT (LIST) menu will appear. (Figure 7.38)

(6) Assign the route number by pressing the Joystick up or down or by the Alphanumeric keys.

(7) Press the ENT key to fix the route number assigned. The ROUTE EDIT (LIST) sub menu will appear. (Figure 7.39)

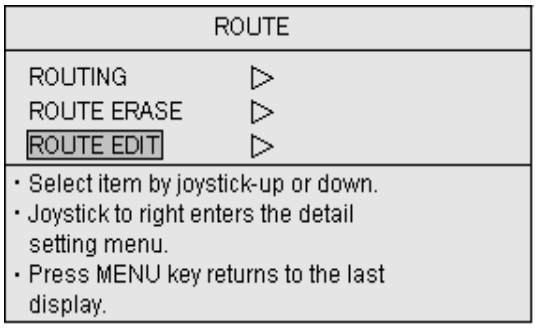


Figure 7.36 ROUTE menu

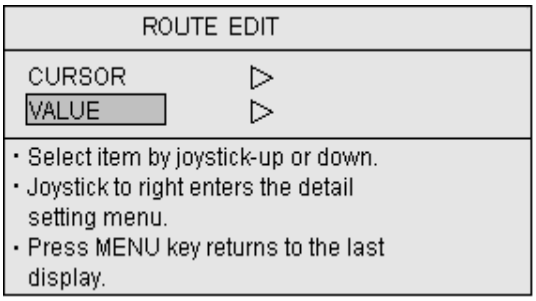


Figure 7.37 ROUTE EDIT menu

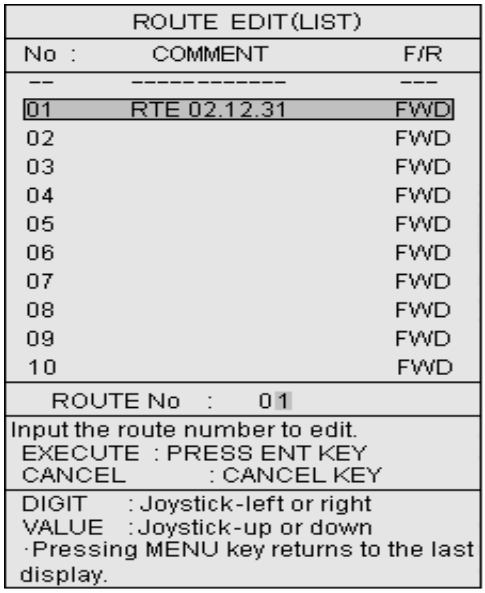


Figure 7.38 ROUTE EDIT (LIST) menu

(8) Press the Joystick up or down to highlight WAYPOINT MOVEMENT.

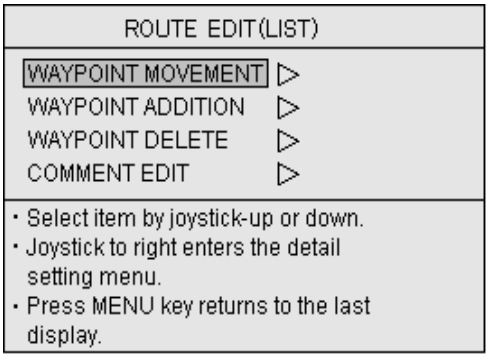


Figure 7.39 ROUTE EDIT (LIST) sub menu

(9) Press the Joystick to the right and the WAYPOINT MOVEMENT menu will appear. (Figure 7.40)

(10) Select the waypoint to be moved by entering its number by the alphanumeric keys.

(11) Press the Joystick to the left to highlight WAYPOINT No.

(12) Press the Joystick down to highlight POSITION.

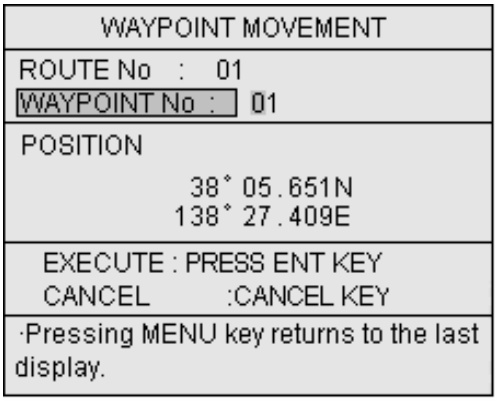


Figure 7.40 WAYPOINT MOVEMENT menu

(13) Press the Joystick to the right to highlight the first digit of the latitude. (Figure 7.41a or Figure 7.41b)

(14) Use the alphanumeric keys to enter the latitude value and then the longitude.

(15) Press the ENT key to fix the entries.

(16) To return to normal display, press the MENU key 6 times.

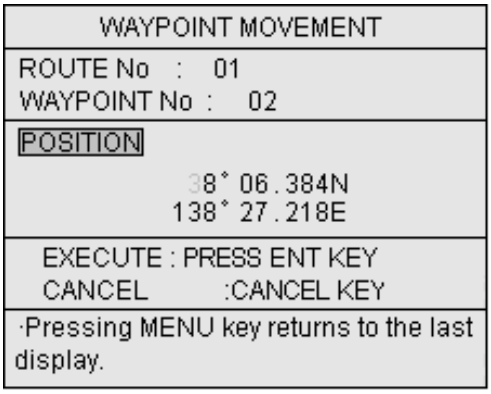


Figure 7.41a WAYPOINT MOVEMENT sub (lat/lon) menu

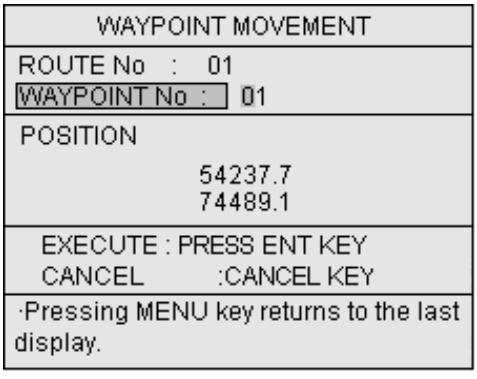


Figure 7.41b WAYPOINT MOVEMENT sub (LOP) menu

b. Adding a waypoint

(1) Press the MENU key to open the menu and highlight ROUTE.

(2) Press the Joystick to the right and the ROUTE menu will appear. (Figure 7.42)

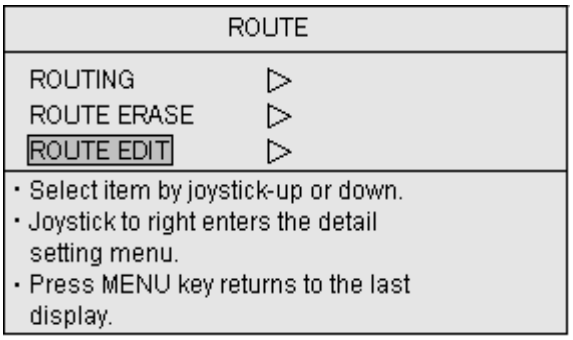


Figure 7.42 ROUTE menu

(3) Highlight ROUTE EDIT and press the Joystick to the right. The ROUTE EDIT menu will appear. (Figure 7.43)

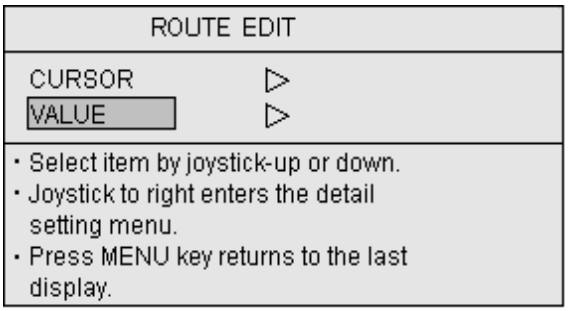


Figure 7.43 ROUTE EDIT menu

(4) Highlight VALUE and press the Joystick to the right. The ROUTE EDIT (LIST) will appear. (Figure 7.44)

(5) Enter the route number using the alphanumeric keys or the Joystick.

(6) Press the ENT key to fix the entry.

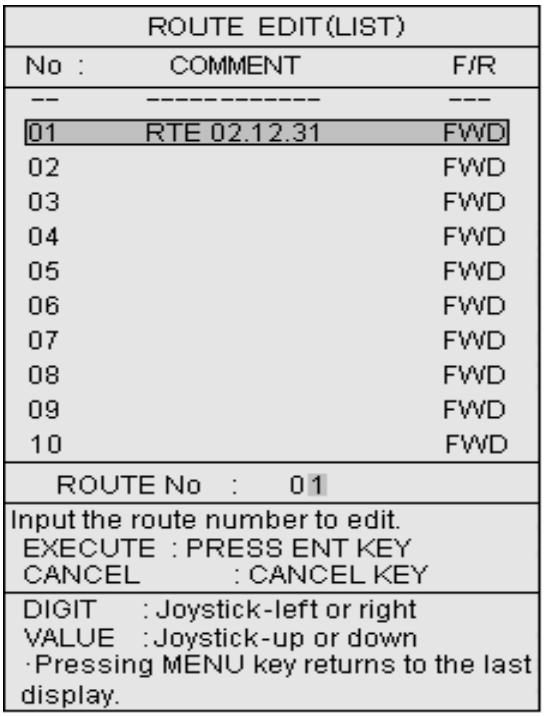


Figure 7.44 ROUTE EDIT (LIST) menu (1)

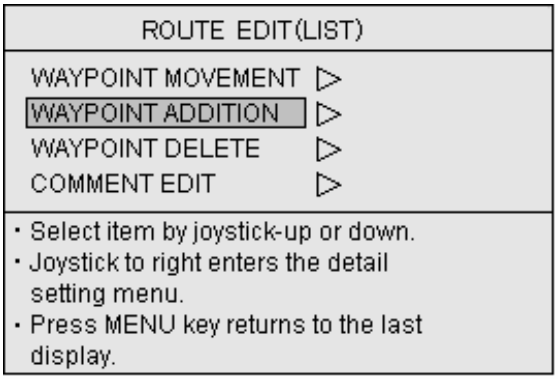


Figure 7.45 ROUTE EDIT (LIST) menu (2)

(7) Press the Joystick up or down to highlight WAYPOINT ADDITION

(8) Press the Joystick to the right to enter the WAYPOINT ADDITION menu. (Figure 7.46)

(9) Enter the waypoint number using the alphanumeric keys or the Joystick.

(10) Press the Joystick to the left to highlight WAYPOINT No.

(11) Press the Joystick down to highlight POSITION.

(12) Press the Joystick to the right to highlight the first digit of the latitude.

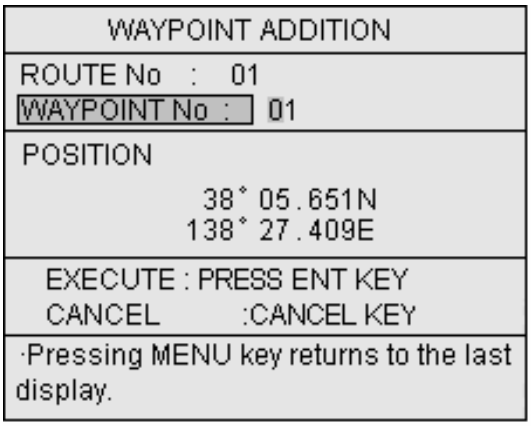


Figure 7.46 WAYPOINT ADDITION menu (1)

(13) Enter the latitude value and then the longitude using the alphanumeric keys. (Figure 7.47a or Figure 7.47b)

(14) Press the ENT key to fix the entry.

(15) To return to normal display, press the MENU key 6 times.

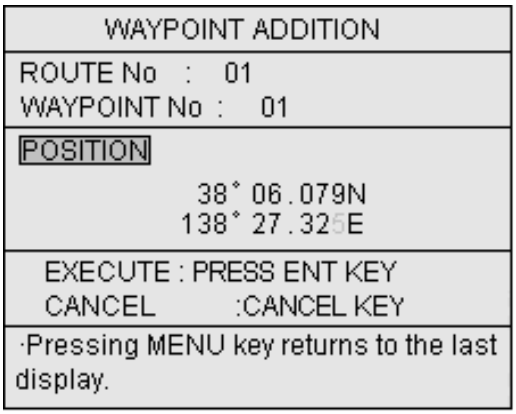


Figure 7.47a Entering the waypoint (lat/lon)menu (2)

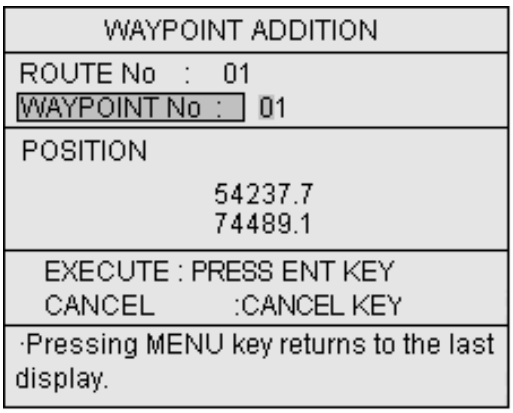


Figure 7.47b Entering the waypoint (LOP) menu (2)

c. Deleting a waypoint

(1) Press the MENU key to open the menu and highlight ROUTE.
(2) Press the Joystick to the right and the ROUTE menu will appear. (Figure 7.48)

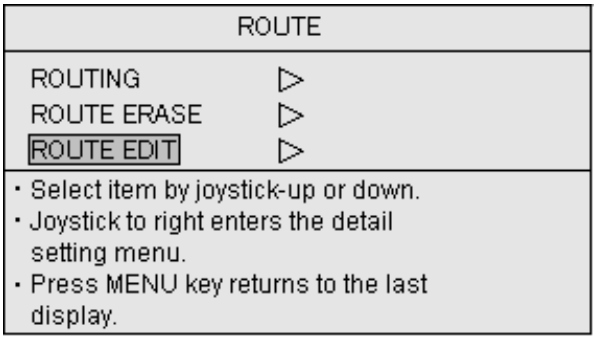


Figure 7.48 ROUTE menu

(3) Highlight ROUTE EDIT and press the Joystick to the right. The ROUTE EDIT menu will appear. (Figure 7.49)

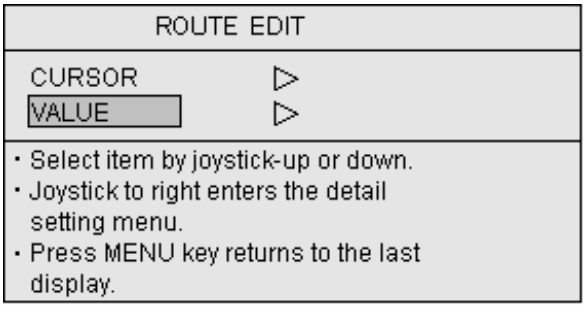


Figure 7.49 ROUTE EDIT menu

(4) Highlight VALUE and press the Joystick to the right. The ROUTE EDIT (LIST) will appear. (Figure 7.50)
(5) Enter the route number using the alphanumeric keys or the Joystick.

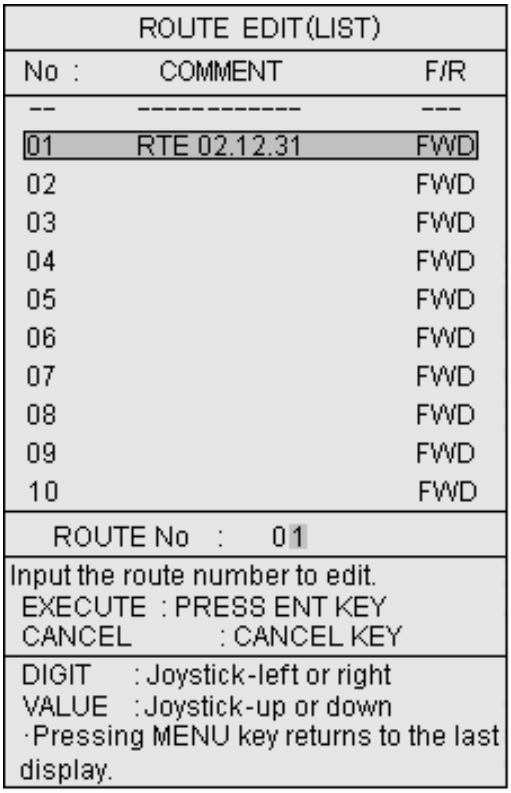


Figure 7.50 ROUTE EDIT (LIST) menu

(6) Press the ENT key to fix the entry. The ROUTE EDIT (LIST) menu will appear. (Figure 7.51)

(7) Press the Joystick up or down to highlight WAYPOINT DELETE.

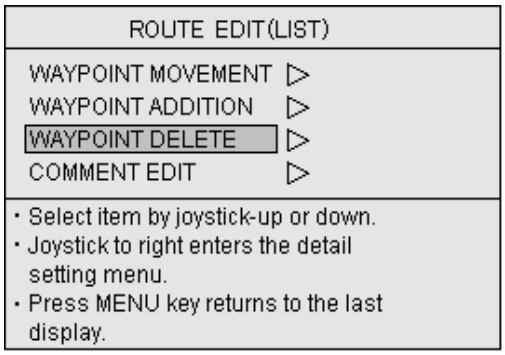


Figure 7.51 ROUTE EDIT (LIST) sub menu

(8) Press the Joystick to the right. The WAYPOINT DELETE menu will appear. (Figure 7.52a or Figure 7.52b)

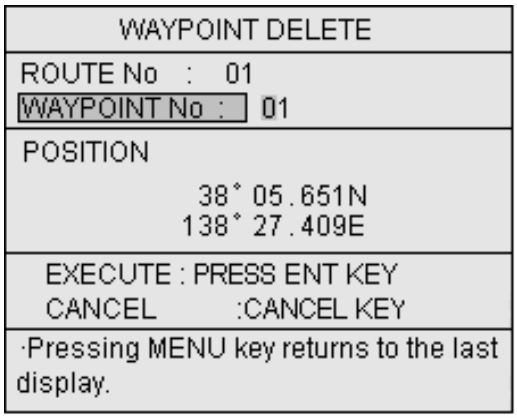


Figure 7.52a WAYPOINT DELETE (lat/lon) menu

(9) Enter the waypoint number to be deleted using the alphanumeric keys or the Joystick. (Figure 7.53)

(10) To return to normal display, press the MENU key 6 times.

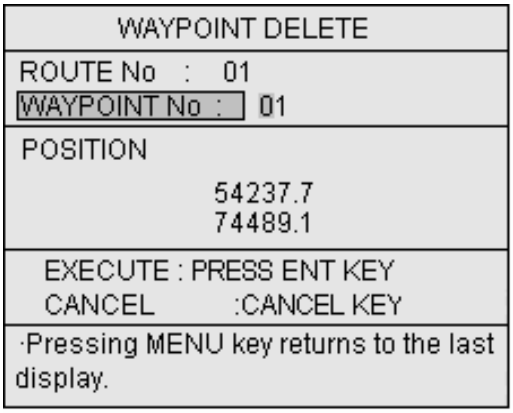


Figure 7.52b WAYPOINT DELETE (LOP) menu

(11) Press the ENT key to fix the entry.

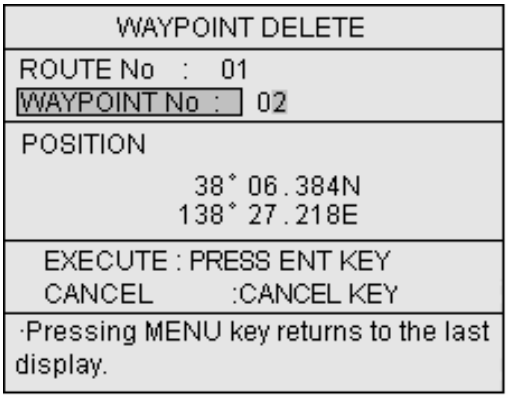


Figure 7.53 WAYPOINT DELETE sub menu

d. Editing the comment

(1) Press the MENU key to show the menu and highlight ROUTE.
(2) Press the Joystick to the right. The ROUTE menu will appear. (Figure 7.54)

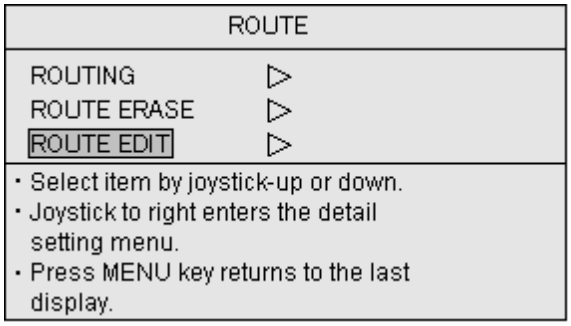


Figure 7.54 ROUTE menu

(3) Press the Joystick up or down to highlight ROUTE EDIT.
(4) Press the Joystick to the right to show the ROUTE EDIT menu. (Figure 7.55)
(5) Highlight VALUE and press the Joystick to the right. The ROUTE EDIT (LIST) will appear. (Figure 7.56)

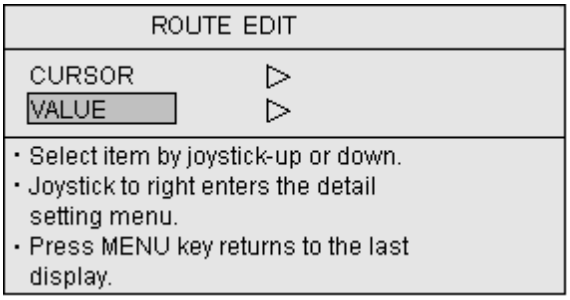


Figure 7.55 ROUTE EDIT menu

(6) Enter the route number using the alphanumeric keys or the Joystick.

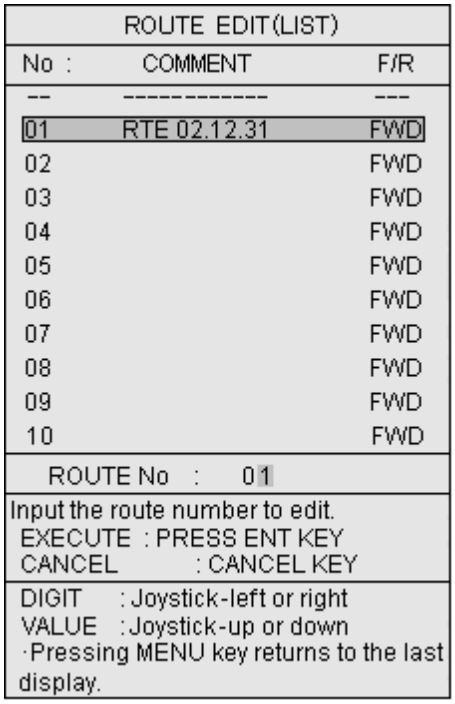


Figure 7.56 ROUTE EDIT (LIST) menu

(7) Press the ENT key to fix the route number. The ROUTE EDIT (LIST) menu will appear. (Figure 7.56)

(8) Highlight COMMENT EDIT in the ROUTE EDIT sub menu.

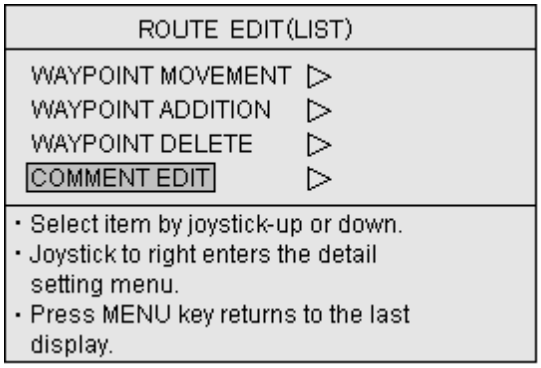


Figure 7.57 ROUTE EDIT sub menu

(9) Press the Joystick to the right to enter the COMMENT EDIT menu. (Figure 7.58)

(10) Enter the comment using the alphanumeric keys.

(11) Press the ENT key to fix the entry.

(12) To return to normal display, press the MENU key 6 times.

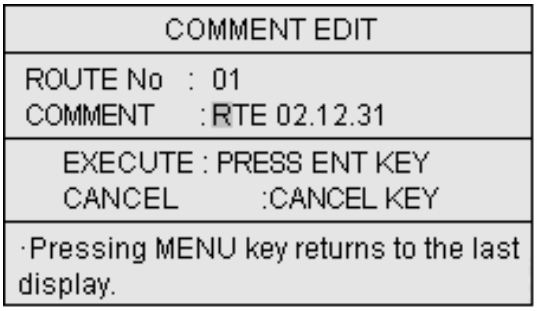
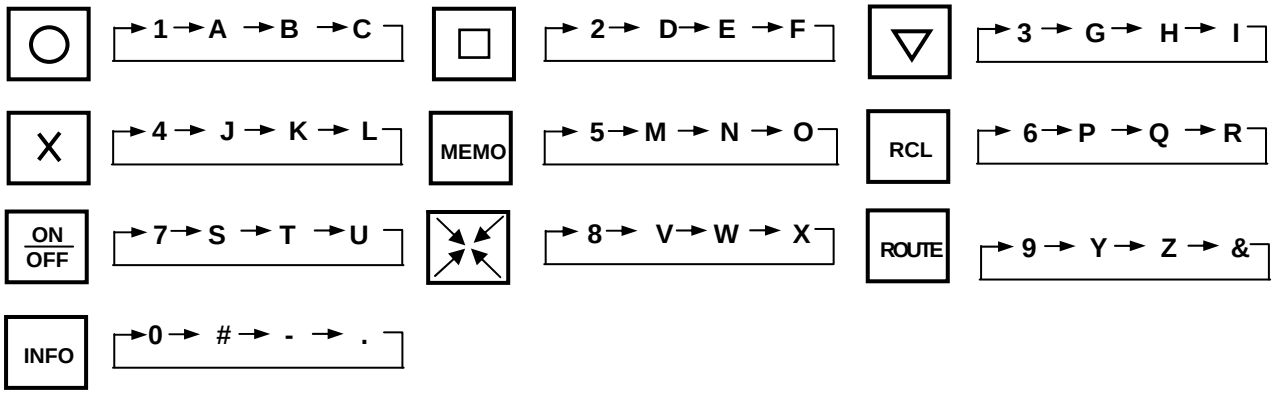


Figure 7.58 COMMENT EDIT menu

NOTE: *Keying sequence to enter alphabets and numbers are as follows:*



7.1.7 Deleting a route

This function allows you to delete the registered route.

7.1.7.1 Deleting a route using the cross cursor

(1) Press the MENU key and highlight ROUTE.

(2) Press the Joystick to the right. The ROUTE menu will appear. (Figure 7.59)

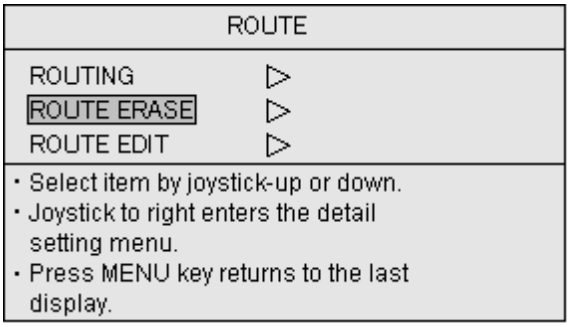


Figure 7.59 ROUTE menu

(3) Highlight ROUTE ERASE and press the Joystick to the right. The ROUTE ERASE menu will appear. (Figure 7.60)

(4) Press the Joystick up or down to highlight CURSOR.

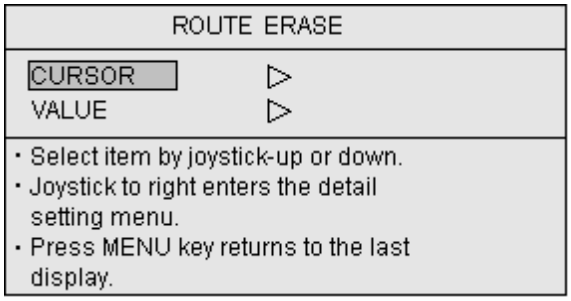


Figure 7.60 ROUTE ERASE menu

(5) Press the Joystick to the right to display the ROUTE ERASE sub menu. (Figure 7.61)

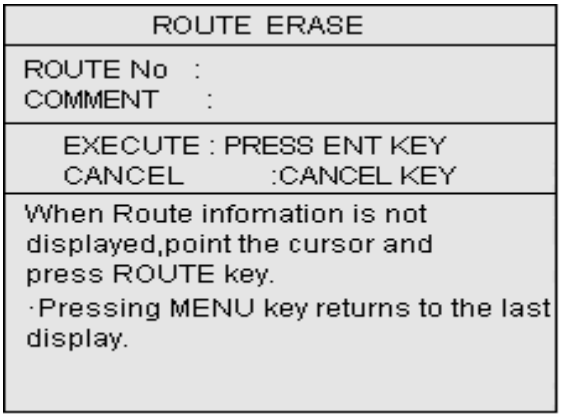


Figure 7.61 ROUTE ERASE sub menu (1)

(6) Move the cross cursor to any point on the route to be deleted.

(7) Press the ROUTE key to select the route. (Figure 7.62)

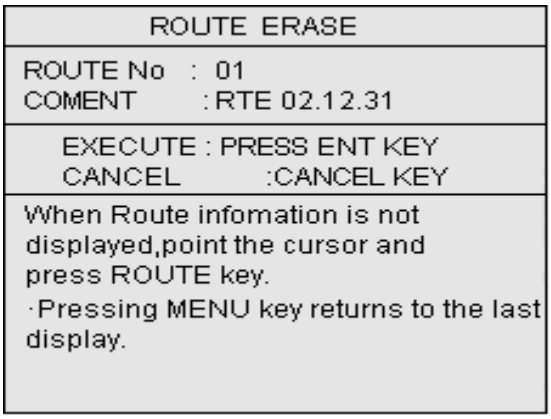


Figure 7.62 ROUTE ERASE menu (2)

NOTE 1: *In case plural routes are overlapped on the screen, press the ROUTE key repeatedly. Each route can be selected one after the other.*

(8) Press the ENT key to fix the selection.

(9) To return to normal display, press the MENU key 4 times.

7.1.7.2 Deleting a route from the list

(1) Press the MENU key to display the menu and highlight ROUTE. The ROUTE menu will appear.

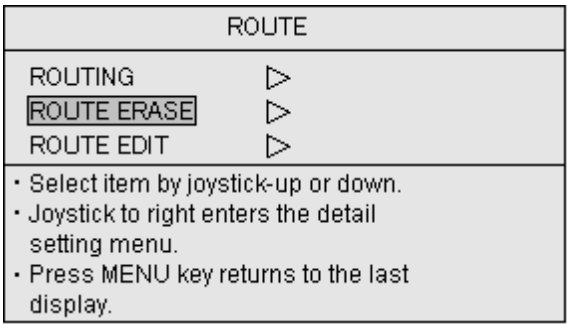


Figure 7.63 ROUTE menu

(2) Press the Joystick up or down to highlight ROUTE ERASE.
(3) Press the Joystick to the right to enter the ROUTE ERASE menu. (Figure 7.64)

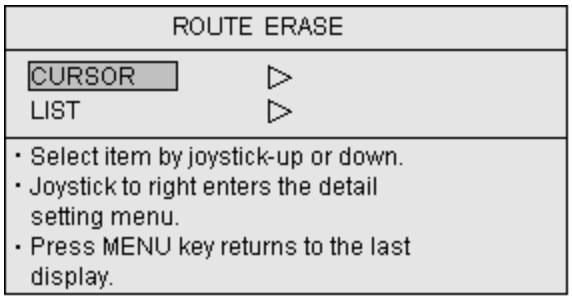


Figure 7.64 ROUTE ERASE menu

(4) Highlight LIST and press the Joystick to the right. The ROUTE ERASE sub menu will appear. (Figure 7.65)
(5) Enter the route number to delete by the alphanumeric keys or the Joystick.
(6) Press the ENT key to fix the route number to be deleted.
(7) To return to normal display, press the MENU key 4 times.

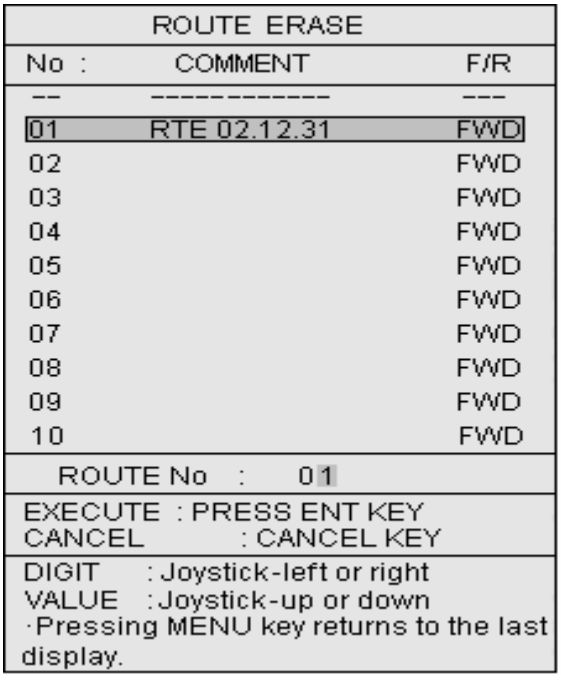


Figure 7.65 ROUTE ERASE sub menu

7.2 Texts for Marks

This function allows you to enter texts (12 texts at maximum) to make a comment (name, note, etc.).

7.2.1 Entering texts

(1) Press the Mark (○ □ ▽ or ×) key to which a comment will be added.

(2) Press the ENT key while the MARK STORE menu is shown. (This menu will disappear in 5 seconds) (Figure 7.66)

(3) Enter texts using the Alphanumeric keys. (Figure 7.67)

NOTE: *If you press the CANCEL key at this stage, all texts entered will be erased. Only the symbol entered at step 1 is registered.*

(4) Press the ENT key to register the texts for comment. The MARK STORE menu will disappear.

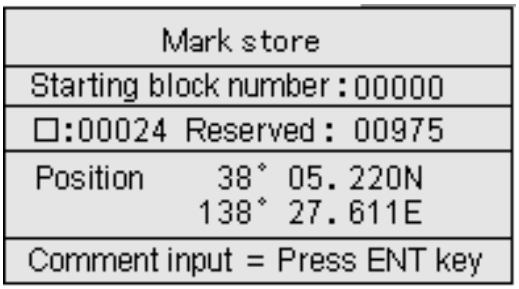


Figure 7.66 MARK STORE menu (1)

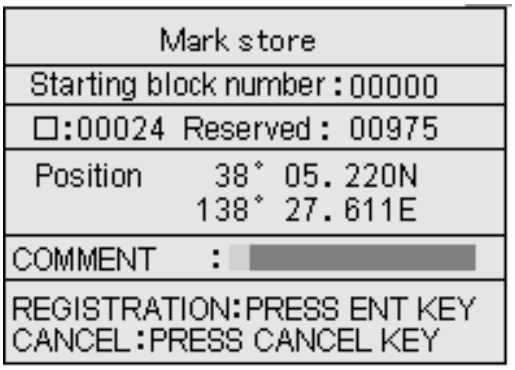
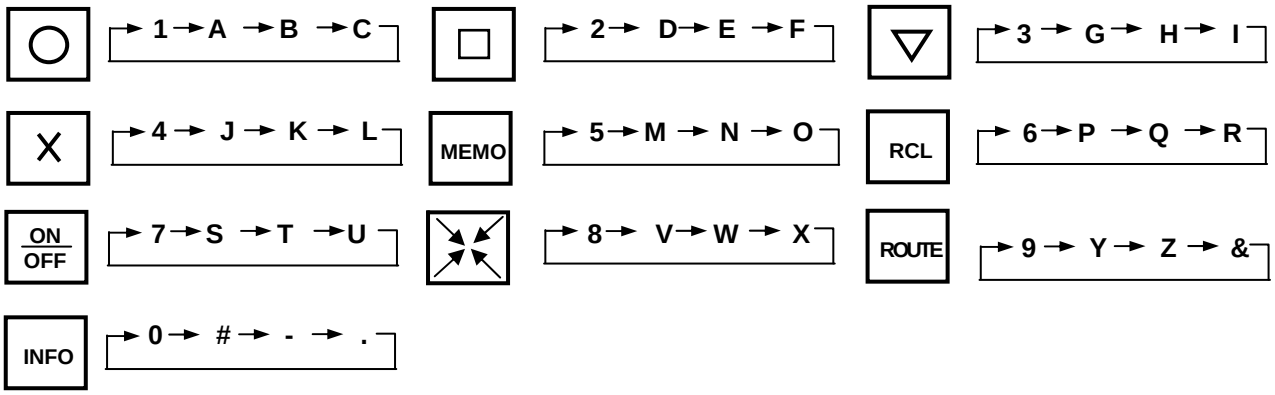


Figure 7.67 MARK STORE menu (2)

NOTE: *Keying sequence to enter alphabets and numbers are as follows:*



7.2.2 Re-editing the comments for a registered Mark

This function allows you to edit the comment for a mark registered.

(1) Press the MENU key to display the menu.

(2) Highlight MARK EDIT and press the Joystick to the right. The MARK EDIT (L/L) menu will appear. (Figure 7.68)

(3) Press the Joystick up or down to highlight EDIT.

(4) Press the Joystick to the right to display the EDIT sub menu. (Figure 7.69)

(5) Enter the Mark number for which the comment will be re-edited. (Figure 7.70)

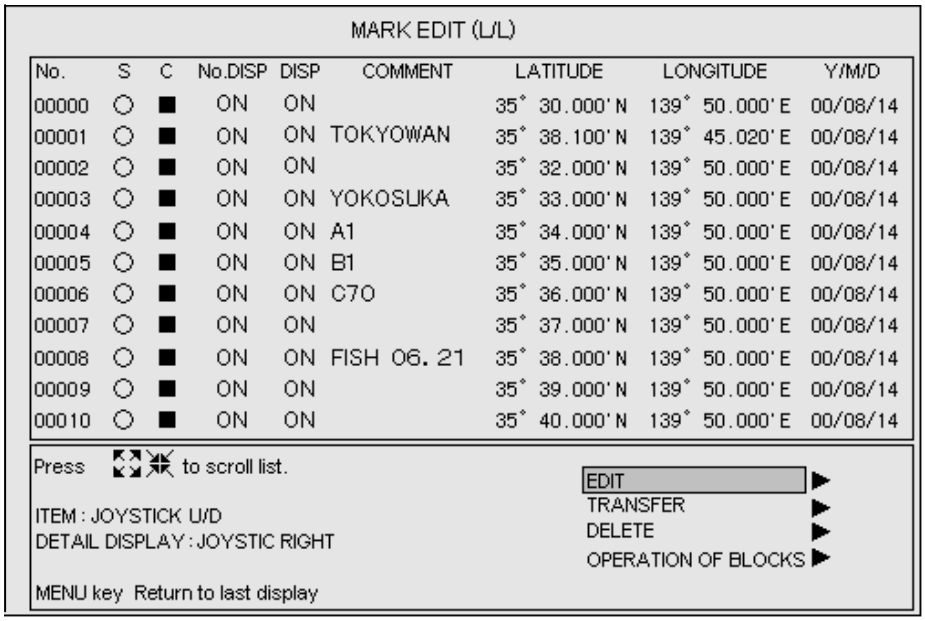


Figure 7.68 MARK EDIT (L/L) menu

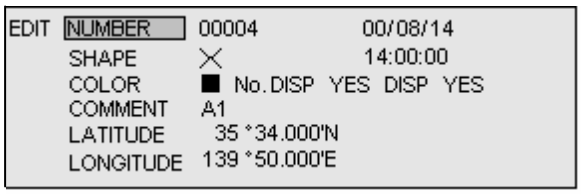


Figure 7.69 EDIT sub menu (1)

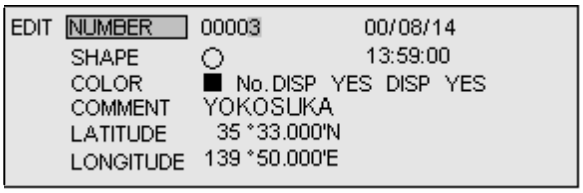


Figure 7.70 EDIT sub menu (2)

(6) Press the Joystick to the left to highlight MARK NUMBER.
(7) Press the Joystick up or down to highlight COMMENT. (Figure 7.71a)
(8) Press the Joystick to the right to enter the comment area.
(9) Press the alphanumeric keys to enter texts for comment. (Figure 7.71b)
(10) Press the ENT key to fix the entry.
(11) To return to normal display, press the MENU key 3 times.

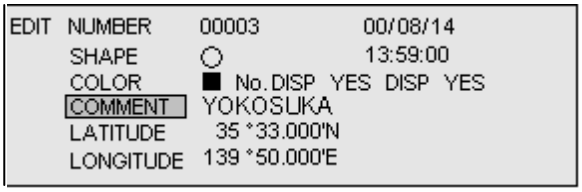


Figure 7.71a Entering texts for comment

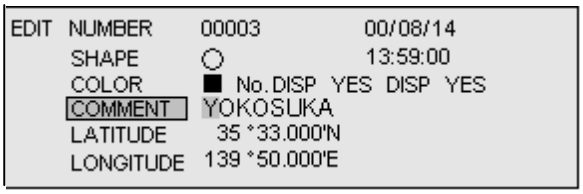
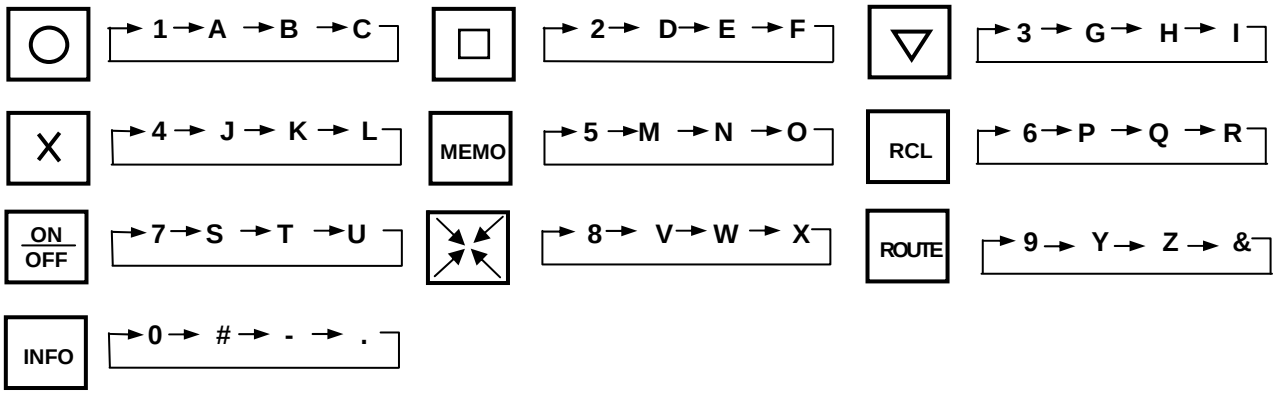


Figure 7.71b Entering texts for comment

NOTE: *Keying sequence to enter alphabets and numbers are as follows:*



Chapter 8

Trouble shooting

Contents

Chapter 8 Trouble Shooting

This chapter covers simplified fault locating procedures to assist the ship's crew to locate a faulty module as well as to replace a fuse.

8.1 Information required for service

Please advise the following details:

(1) Name of vessel, Satcom number if available.
(2) Equipment type name
(3) Equipment serial number
(4) Software type name, shown on the standby screen and stated in this manual.
(5) Next port of call, ETA and ship's agent
(6) Faulty conditions and the result of on board check

8.2 First line fault location

Use the following procedure to locate a faulty area using the following Q&A instructions. If the fault cannot be fixed, contact your local KODEN dealer for repair.

8.2.1 Nothing displayed even if the POWER switch is pressed

Q: Is the main fuse (in-line) blown?

A: Remove the power connector and check the fuse. If it is blown, replace the fuse and turn the unit on. If the failure persists, contact your local KODEN dealer.

Q: Does the main supply voltage lie between 10.8 to 31.2 VDC?

A: If the answer is NO, check the following points.

(1) Check if the MAIN switch at the distribution board is turned on.
(2) Check the connection of the power cable if it is properly connected to the ship's main supply.

8.2.2 Own ship's position is not shown in the screen

A: Confirm if the cross cursor is displayed in the screen. If the cross cursor is displayed, the screen is set to VIEWPOINT mode. In this case own ship that lies beyond the screen cannot be brought in the screen. Delete the cross cursor display from the screen and press the Joystick to move own ship to a desired position within the screen.

8.2.3 Own ship's mark does not blink and no position fix is available

A1: Select GPS MONITOR and open its sub menu. If the GPS CLOCK item is shown without data, it indicates no GPS data supplied from GPS sensor. Check the connection of the GPS cable.

A2: If the GPS CLOCK item is shown with the time, the GPS signals from the satellites are not properly received. Check the position of the GPS antenna and correct, if necessary.

8.2.4 Own ship's position (lat/lon) is deviated from actual position on the chart.

A1: Select GPS/DGPS => DATUM and confirm that the datum selected agrees with the chart in use.

A2: Check if the position correction mark is shown. If it is shown, positional correction is in effect. Undo this function by the following method:

(1) Select DISPLAY SETTINGS => POSITION DATA DISPLAY and incorporate positional corrections.

(2) Select SYSTEM SETTINGS => SYSTEM SETTING (2/2) => CORRECTION and select NO.

8.2.5 Own heading course is not correct

A1: Check if the heading direction is selected to the desired one. To do this, select DISPLAY SETTINGS => COURSE DISP and check if a suitable bearing is selected.

A2: In case own ship speed is less than 1 knot, the heading bearing tends to fluctuate.

8.2.6 Speed response is too slow

A1: If the speed averaging is applied, speed indication update becomes slow. As long as the fast speed update is required, undo this function by selecting AVERAGE SPEED NO in the SYSTEM SETTING(!/2). If the speed averaging is still necessary, select an appropriate index (AVERAGE NUMBER).

A2: Check if the GPS/DGPS averaging constant is set to 3. Select GPS/DGPS SETTINGS => GPS/DGPS SETTINGS and select AVERAGE 3.

8.2.7 Old ship's track is erased

A: Check if the number of plots shown in the right bottom of the screen has reached the maximum 7000. If YES, the oldest track is erased on a first-in-first-out basis. You should save an important track record by referring to Para5.4.6 "Storing ship's track" and then perform the erasing procedure described in Para 5.4.8 "Deleting a ship's track by specifying color" or 5.4.9 "Deleting a ship's track by specifying an area".

8.2.8 Backup battery life

When the message "Backup battery cell. Replacement need" is shown after the unit has been turned on, you need to replace the backup battery immediately. It is near the end of its life. Contact your nearest KODEN dealer for replacement. Even if the battery life is terminated, the registered mark data and ship's track data are stored in the non-volatile memory and protected from erasure. However, new track data and mark data cannot be added.

Chapter 9

Maintenance

Contents

Chapter 9 Maintenance

9.1 Periodic inspection and cleaning

To prolong the equipment life, the following maintenance should be performed on a routine basis. Also, from time to time, check plug connections and cables.

9.1.1 Monthly check

If the display screen is dirty, clean the screen with a soft cloth damped with anti-static agent or pure water. Do not use a dry cloth as it causes static build up, which accumulates dust.

Solvent **WARNING**

Never use solvent such as thinner, alcohol, etc to wipe the surface of the acrylic plate in front of the display. It may damage the transparency of the plate, sacrificing the picture clarity.

Chapter 10

Technical Reference

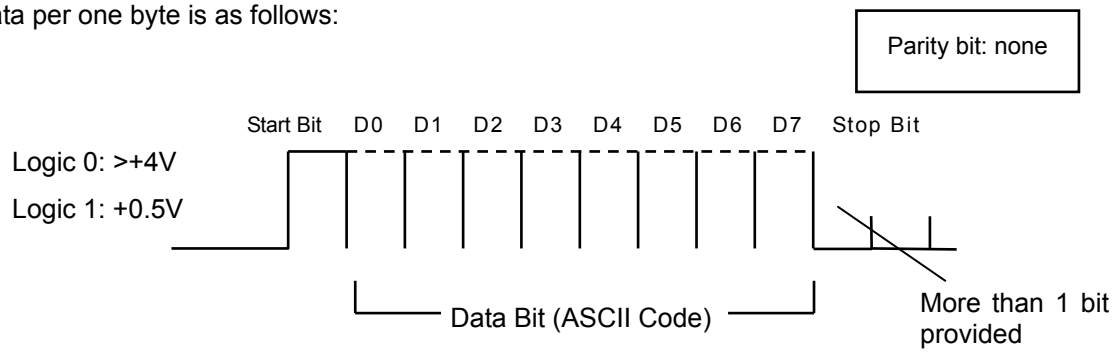
Contents

10.1 Details of input serial data

Sentence name: NMEA-0183 Ver. 1.5/2.0

10.1.1 Input data format

Data per one byte is as follows:



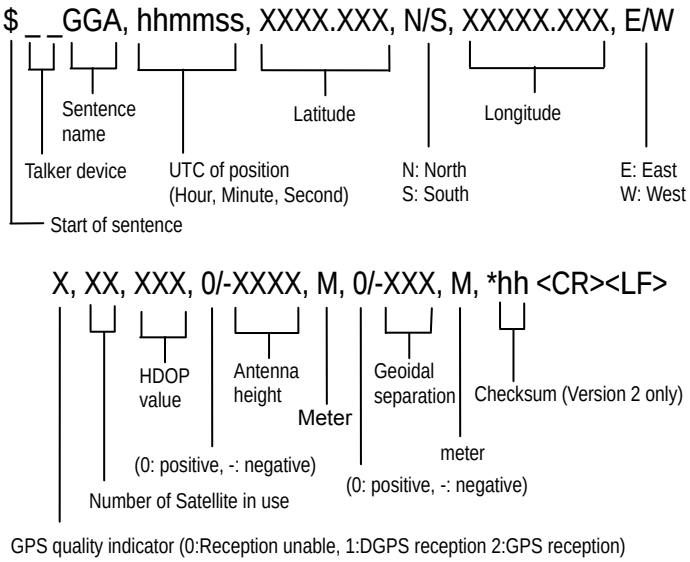
10.1.2 Input data specification

Baud rate	Output level	Output current	Sentence	Update rate
4800	TTL	5mA max	GGA+GLL+VTG+RMC+MSS+MTW+TTM	1 second

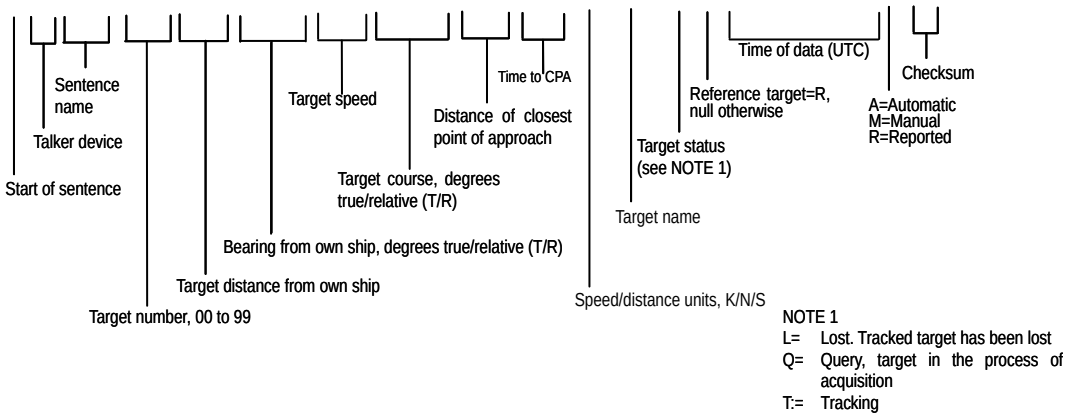
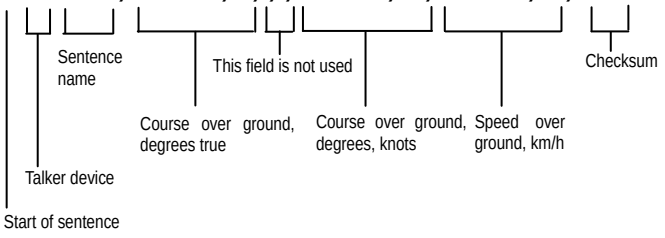
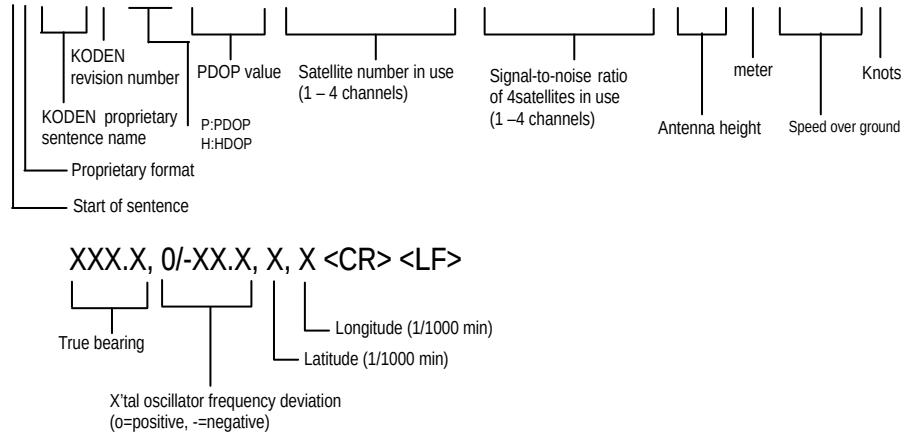
NOTE: *Checksum is a total sum of EX-ORed data that are put between the $ and asterisk (*) signs.*

10.1.3 Details of input sentences

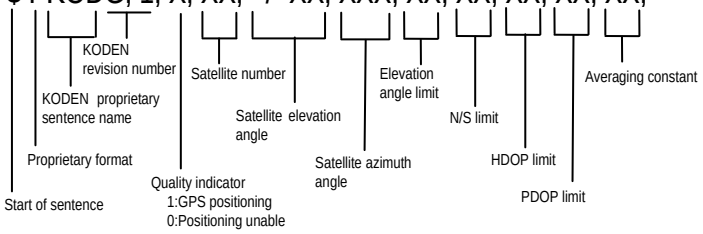
Name & Version	Data name
GGA Ver.1.5 /2.0	GPS Position data

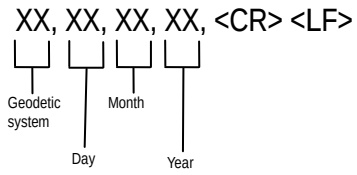


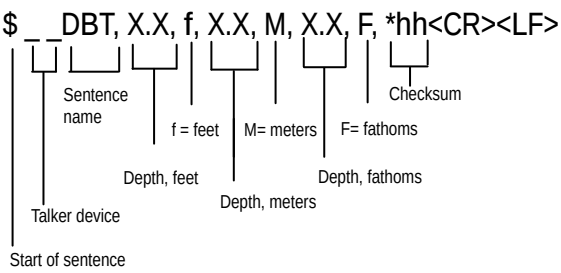
GLL	Geographic position – latitude/longitude
Ver.1.5 /2.0	$ _ _ GLL, XXXX.XXX, N/S, XXXX.XXX, E/W, *hh <CR><LF> Start of sentence Talker device Sentence name Latitude Latitude N/S Longitude Longitude E/W Checksum
MSS	MSK receiver signal status
Ver.2.0	$ _ _MSS, X.X, XX, XXX.X, XXX <CR> <LF> Start of sentence Talker device Sentence name Signal strength (SS), dB/1 μV/m Signal-to-noise ratio (SNR), dB (0 - 30db） Beacon frequency, 283.5 - 325.0kHz） Beacon bit rate (25, 50,100,200) bits/s
MTW	Water temperature
Ver.1.5	$ SD MTW, XX, C *hh <CR><LF> Start of sentence Talker device Sentence name Temperature, degree C Checksum
RMC Ver.2.0	Recommended minimum specific GNSS data $ -- RMC, hhmmss, A/V, XXXX.XXX, N/S, XXXXX.XX, E/W XXX.X, Start of sentence Talker device Sentence name UTC of position fix A:Data valid V:Navigation receiver warning Latitude Latitude N/S Longitude Longitude E/W Speed over ground, knots XXXXXX, XXXXXX, X.X,a,a*hh <CR><LF> Course over ground, degrees true Date: dd/mm/yy Magnetic variation, degrees, E/W Mode indicator) Checksum

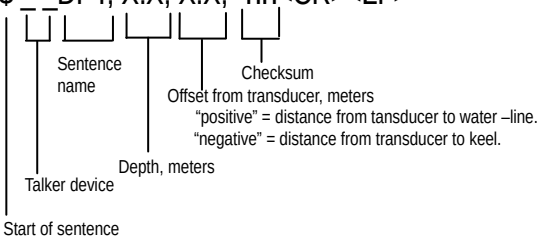
TTM	Tracked target message
Ver.2.0	$ - - TTM, XX, X.X, X.X, a, X.X, X.X, a, X.X, X.X, a, c--c, a, a, hhmmss.ss,a *hh<CR><LF> 
VTG	Course over ground and ground speed
Ver.2.0	**$ - - VTG, XXX.X, T, , , XXX.X, N, XXX.X, K, *hh <CR><LF>** 
PKODA	GPS Satellite information (KODEN proprietary sentence)
Ver.2.0	$ PKODA, P/H, XXX.X, XX, XX, XX, XX, XX, XX, XX, XX, XXX, M, XXX.X, N  XXX.X, 0/-XX.X, X, X <CR> <LF>

PKODG, 1	GPS Satellite information (KODEN proprietary sentence)
Ver.2.0	$ PKODG, 1, X, XX, +/- XX, XXX, XX, XX, XX, XX, XX, XX, XX, XX, XX, <CR> <LF>
DBT	Depth below transducer
Ver.1.5 /2.0	$ _ _DBT, X.X, f, X.X, M, X.X, F, *hh<CR><LF>
DPT	Depth of water
Ver.2.0	$ _ _DPT, X.X, X.X, *hh<CR><LF>







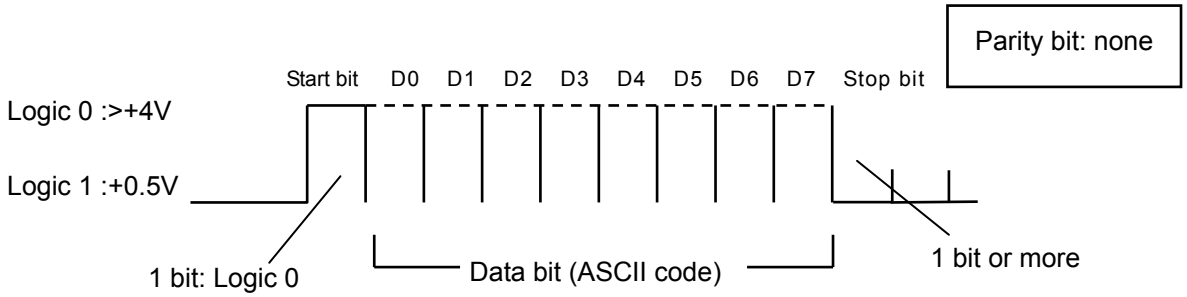


10.2 Details of output serial data sentence

Sentence name: NMEA-0183 Ver. 2.

10.2.1 Output data format

Data per one byte is as follows:



10.2.2 Output data specification

Baud rate	Output level	Output current	Sentence	Update rate
4800	TTL	5mA max	APB+GGA+GLL+VTG+XTE+ZDA+GTD	1 second

10.2.3 Details of output sentences

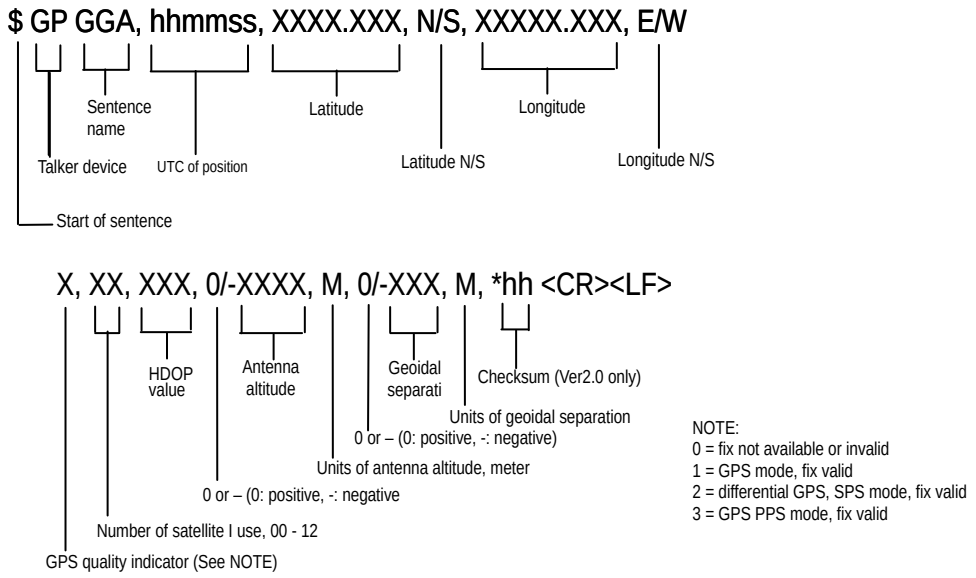
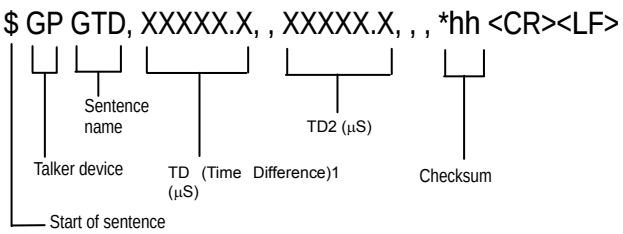
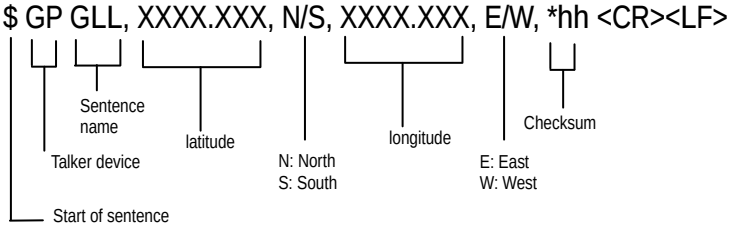
Name & Version	Data name
APB	Heading/Track controller (Autopilot) (This sentence is output only when waypoint is set up)
Ver.1.5	$ GP APB, X, X, XX.X, X, N, X, X, XXX.X, X, XXX.XX, XXX.X, X, XXX.X, X, *hh <CR> <LF>

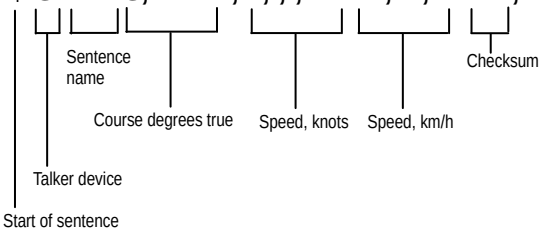
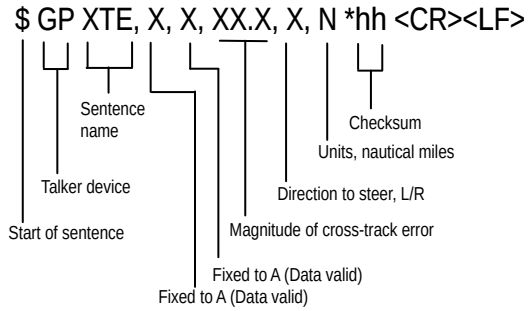
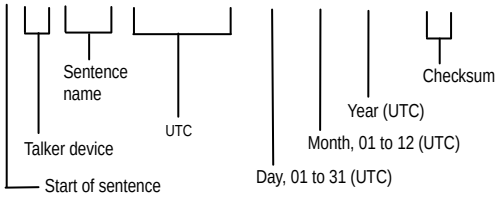
$ GP APB, X, X, XX.X, X, N, X, X, XXX.X, X, XXX.XX, XXX.X, X,

- Start of sentence
- Talker device
- Sentence name
- Status indicator fixed to A
- Status indicator fixed to A
- Magnitude of XTE (Cross Track Error)
- Direction to steer, L/R
- XTE units, nautical miles
- Status A = Arrival circle entered / V = Arrival circle not entered
- Status A = Perpendicular passed at waypoint / V = Perpendicular not entered waypoint
- Bearing origin to destination
- M = Magnetic bearing / T= True bearing
- Destination waypoint ID
- Bearing, present position to destination
- M = Magnetic bearing / T = True bearing

XXX.X, X, *hh <CR> <LF>

- Heading to steer to destination waypoint
- M = Magnetic bearing / T = True bearing
- Checksum

GGA	Global positioning system (GPS) fix data
Ver.1.5 /2.0	
GTD	Geographical position – Loran-C TDs (only available when Loran-C is designated)
Ver.2.0	
GLL	Geographic position – latitude/longitude
Ver.1.5 /2.0	

VTG	Course over ground and ground speed
Ver.2.0	**$ GP VTG, xxx.x, T, , , xxx.x, N, xxx.x, K, *hh <CR><LF>** 
XTE	Cross-track error, measured (to be output only when a waypoint is assigned)
Ver.1.5	$ GP XTE, X, X, XX.X, X, N *hh <CR><LF> 
ZDA	Time and date
Ver.2.0	$ GP ZDA, hhmmss, XX, XX, XX, , *hh , <CR> <LF> 

10.3 Data input/output serial line

10.3.1 Serial data input circuit

Connector name: NMEA/GPS SENSOR

The connector used: Type LTWD-06BFFA-L180

Input impedance: 470 Ω

Device: Opto-coupler Type TLP181-G8 (Toshiba)

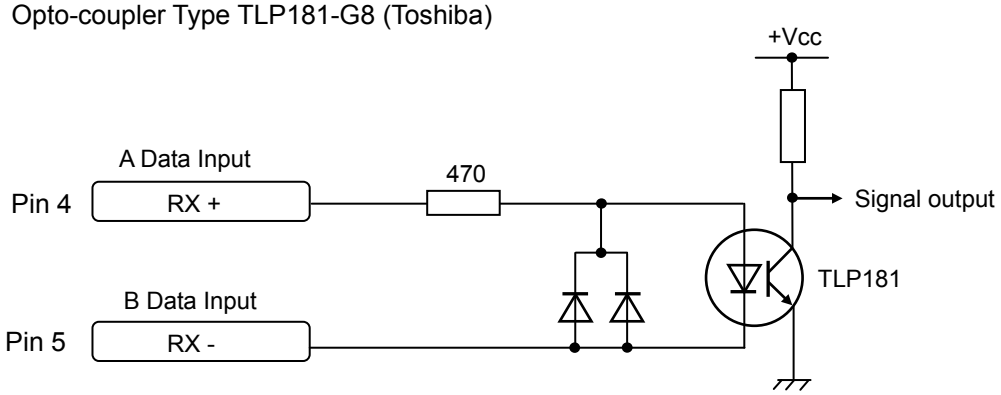


Figure 9.1 Serial data input circuit

10.3.2 Serial data output

Connector name: NMEA/GPS SENSOR

The connector used: Type LTWD-06BFFA-L180

Output current: 20mA max

Device: RS232C Driver IC Type 2SA1162

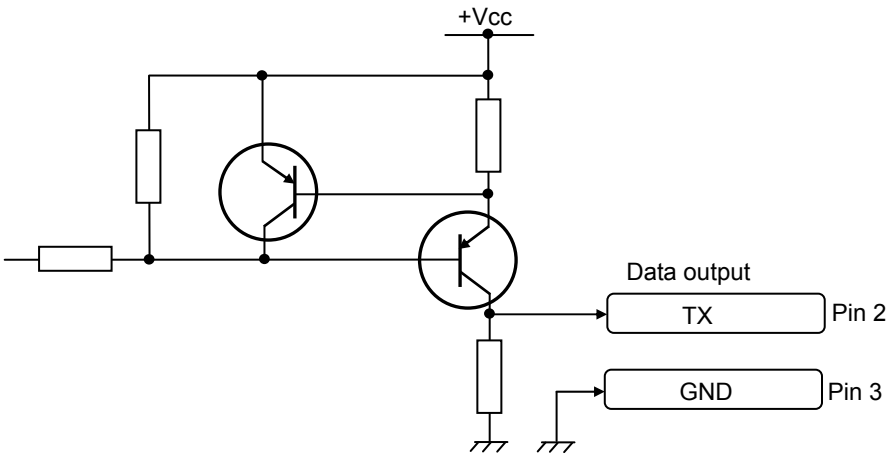
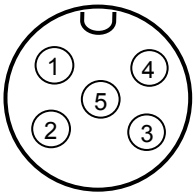


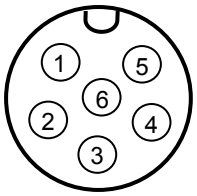
Figure 9.2 Serial data output circuit

10.4 Connector pinouts



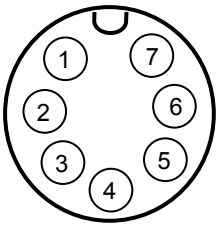
J1

Not used



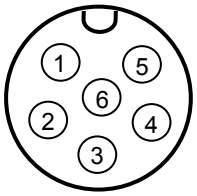
J2

(1) GND
(2) TX (Output)
(3) GND (Output)
(4) RX+ (Input)
(5) RX- (Input)
(6) NC



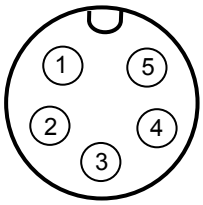
J4

Not used



J5

(1) GND (Output)
(2) GPS OUT(Output)
(3) GND (Output)
(4) GPS IN+ (Input)
(5) GPS IN- (Input)
(6) +12V(Output)



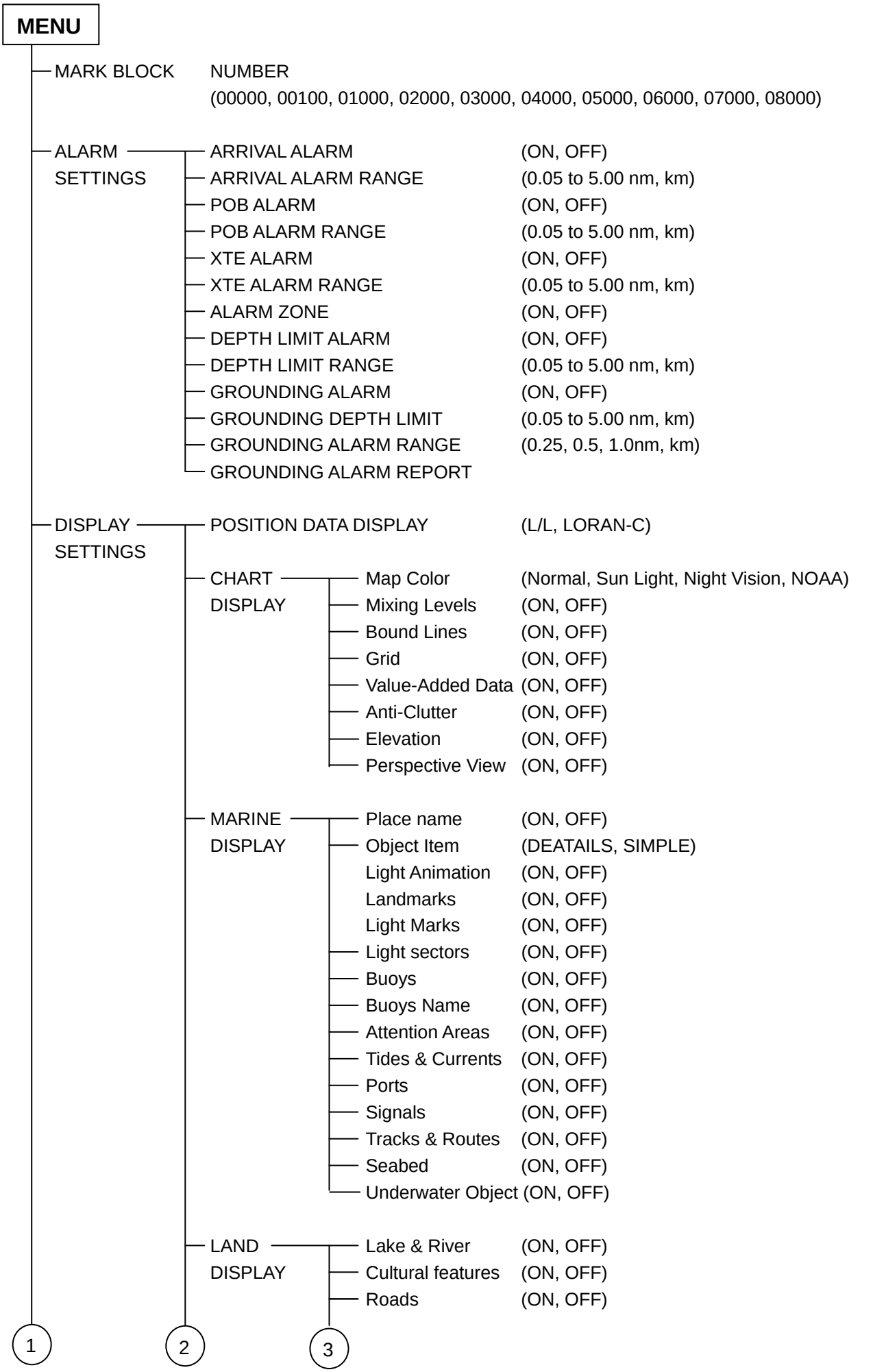
POWER

(1) DC- (Input)
(2) DC+ (Input)
(3) NC
(4) NC
(5) Frame GND

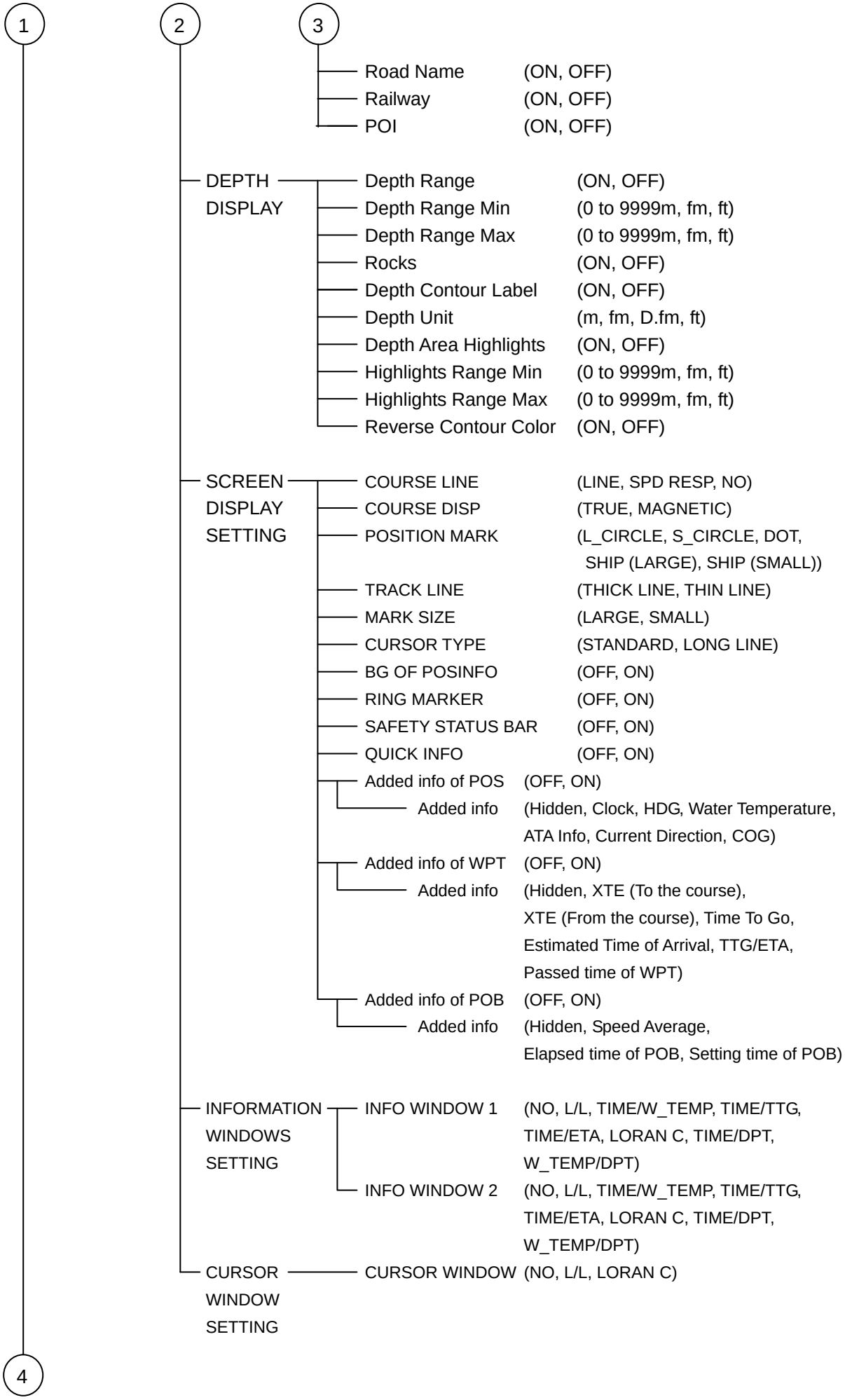
Annex

Contents

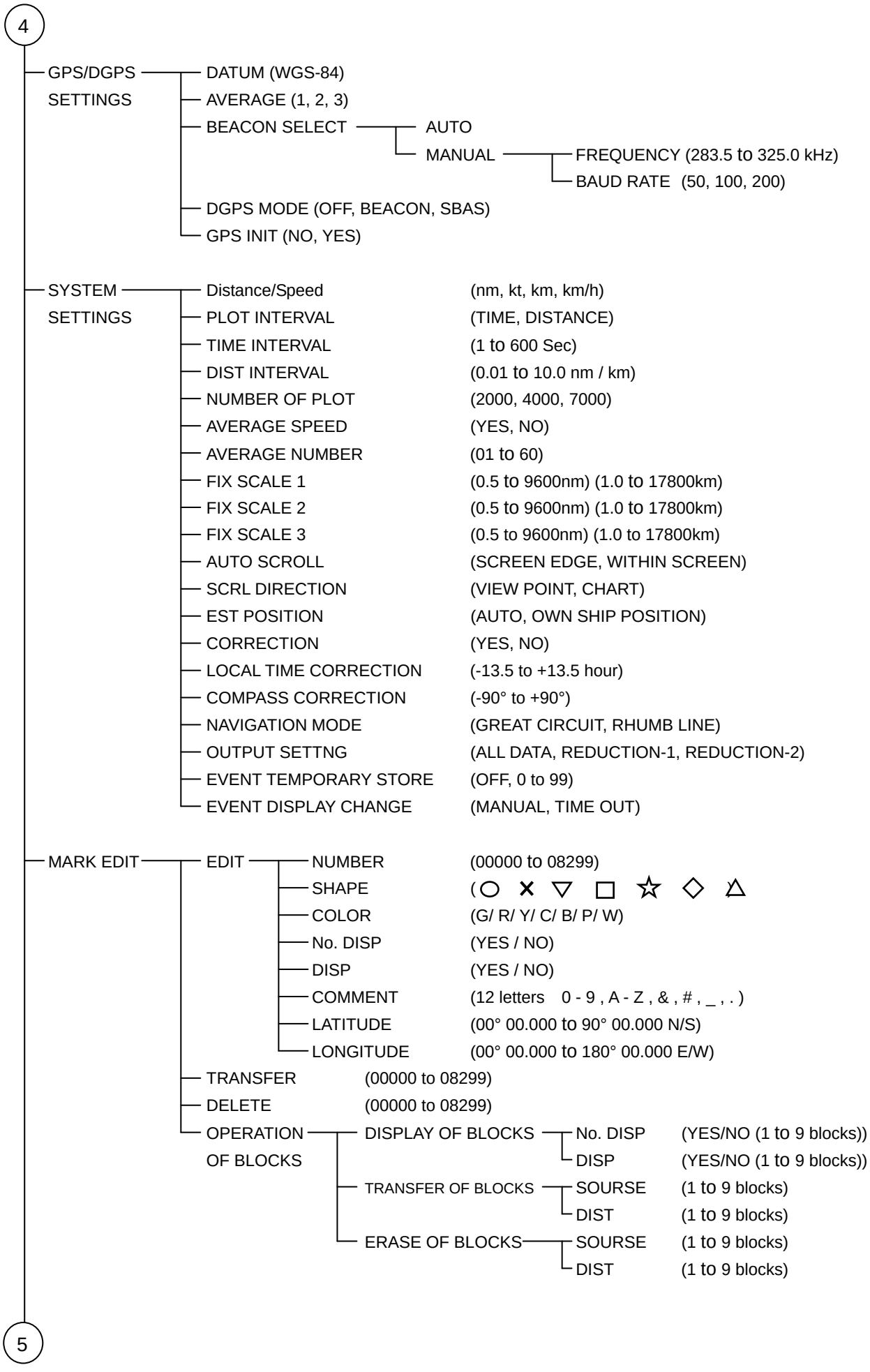
GTD-110/150 Menu tree



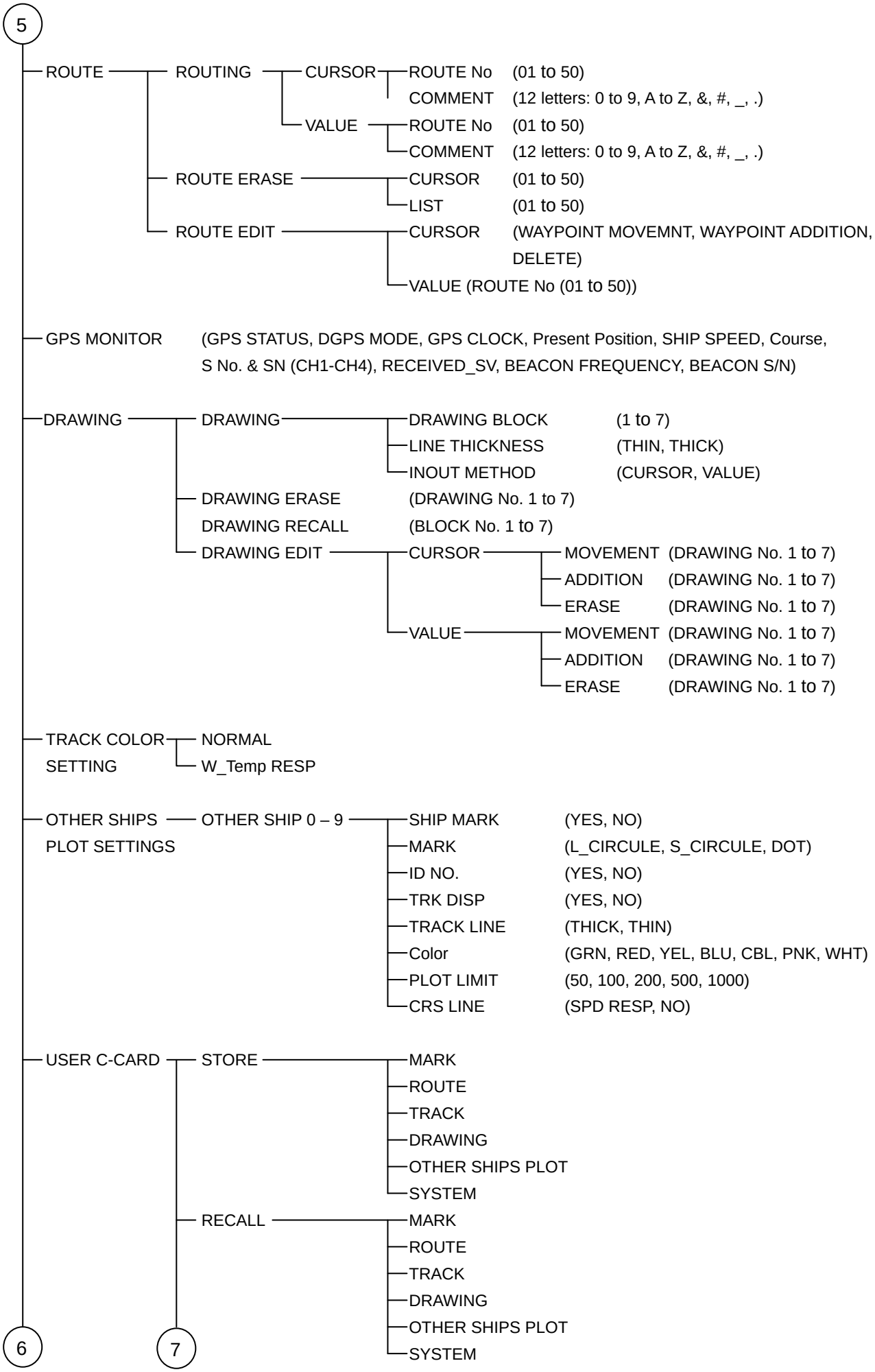
GTD-110/150 Menu tree



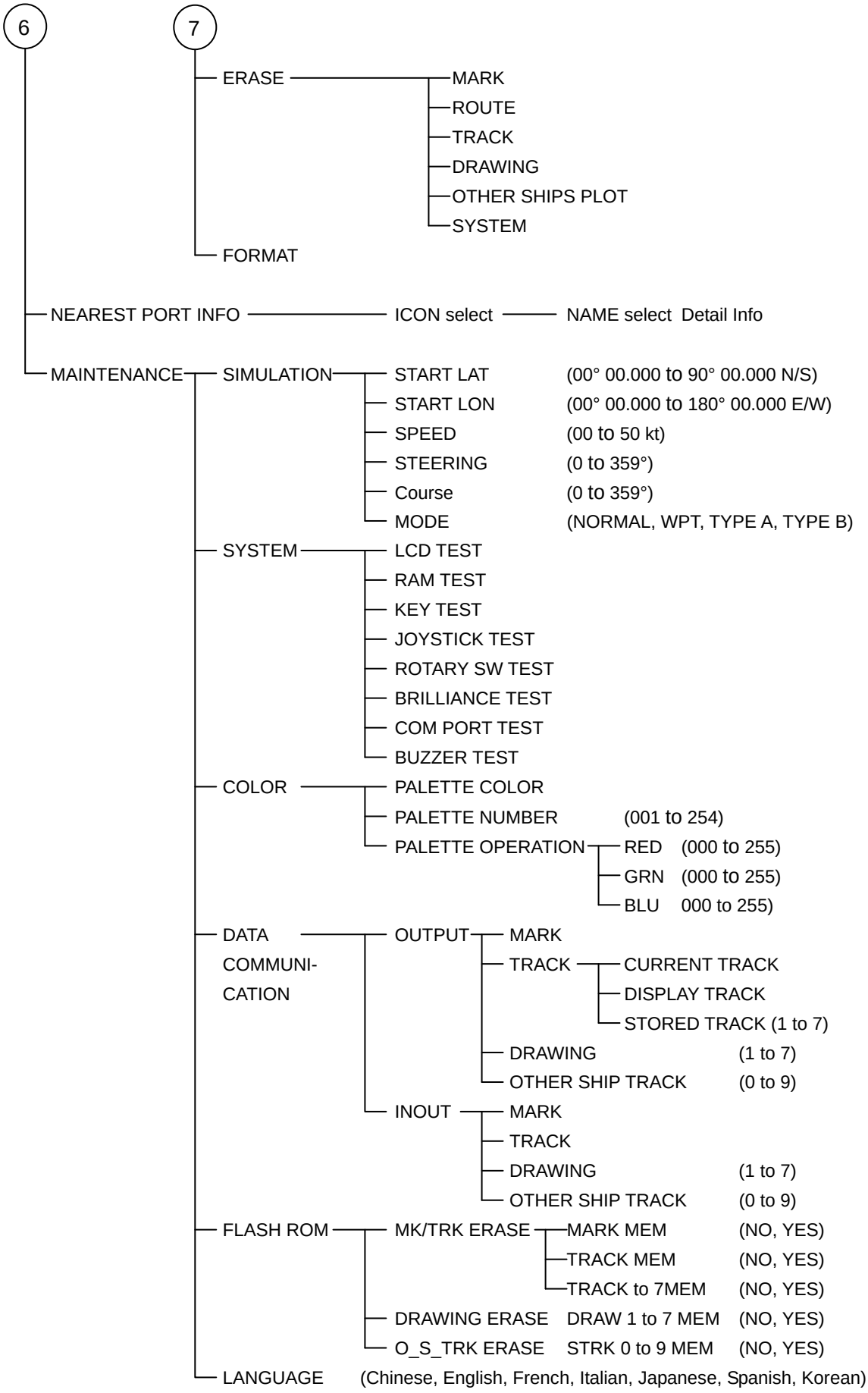
GTD-110/150 Menu tree



GTD-110/150 Menu tree



GTD-110/150 Menu tree



Color palette list for GTD-110/150

Palette No.	Items	Color codings		
		Red	Green	Cyan
1	Track Color (GREEN)	000	128	000
2	Track Color (RED)	255	000	000
3	Track Color (YELLOW)	255	255	000
4	Track Color (COBALT BLUE)	000	000	128
5	Track Color (BLUE)	081	081	255
6	Track Color (PINK)	255	000	255
7	Track Color (WHITE)	255	255	255
8	Recalled Track Color (GREEN)	000	111	000
9	Recalled Track Color (RED)	206	000	000
10	Recalled Track Color (YELLOW)	206	206	000
11	Recalled Track Color (COBALT BLUE)	075	075	105
12	Recalled Track Color (BLUE)	001	101	235
13	Recalled Track Color (PINK)	217	000	217
14	Recalled Track Color (WHITE)	200	200	200
15	Other Ship's Track Color (GREEN)	000	128	000
16	Other Ship's Track Color (RED)	255	000	000
17	Other Ship's Track Color (YELLOW)	255	255	000
18	Other Ship's Track Color (COBALT BLUE)	000	000	128
19	Other Ship's Track Color (BLUE)	081	081	255
20	Other Ship's Track Color (PINK)	255	000	255
21	Other Ship's Track Color (WHITE)	255	255	255
22	Mark Color (GREEN)	000	128	000
23	Mark Color (RED)	255	000	000
24	Mark Color (YELLOW)	255	255	000
25	Mark Color (COBALT BLUE)	000	000	128
26	Mark Color (BLUE)	081	081	255
27	Mark Color (PINK)	255	000	255
28	Mark Color (WHITE)	255	255	255
29	Drawing Color (GREEN)	000	128	000
30	Drawing Color (RED)	255	000	000
31	Drawing Color (YELLOW)	255	255	000
32	Drawing Color (CYAN)	000	000	128
33	Drawing Color (BLUE)	081	081	255
34	Drawing Color (PINK)	255	000	255
35	Drawing Color (WHITE)	255	255	255
36	Course line (Own Ship)	255	054	144
37	Course line (Other Ship)	255	054	144
38	Arrival, POB, XTE alarm range	255	000	000
39	Waypoint Mark	255	000	000
40	Waypoint Mark (cursor designated), POB Mark	000	000	000
41	Cursor	000	000	255
42	Cursor Line (Dashed Line)	000	000	128
43	Course Line (Dashed Line)	255	000	000
44	Designated area frame color shown when erasing track	000	000	189
45	List (SIMULATION)	000	000	000
46	List (GPS)	000	000	000
47	List color (DGPS)	000	000	255
48	BG color for Lists	255	255	255
49	Own ship's mark (Frame)	000	000	000
50	BG (Back Ground) Color for Own ship's Position Window, BG Color for Cursor Information Area, BG Color for Waypoint Information Area, BG Color for POB Information Area	170	242	203

Color palette list for GTD-110/150

Palette No.	Items	Color codings		
		Red	Green	Cyan
51	List Color for Own ship's Position Window, List Color for Cursor Information Area, List Color for Waypoint Information Area, List Color for POB Information Area	000	000	000
52	List color for own ship's position data (w/o BG), List color for cursor position data (w/o BG), List color for waypoint position data (w/o BG), List color for POB position data (w/o BG)	000	000	000
53		000	000	000
54	North Mark, Scale bar (Left), Position Correction Mark, List Color for "Track Off", Plot Number Color	000	000	000
55	Scale List Color	255	000	000
56	Maximum plot number has been reached	255	000	000
57	Selected Route line color	255	000	000
58	Selected Route point color	255	000	000
59	Route line color	000	000	000
60	Route point color	000	000	000
61	Drawing color for mapping	000	000	000
62		128	128	128
63		000	000	000
64		000	000	000
65	Frame Linefor Menu Window	000	000	000
66		000	000	255
67	Menu Window - BG Color	000	000	000
68	Menu Window - List Color, Mark Edit - BG Color for Mark, BG Color for Error Window	255	255	255
69	Error Message, Status display for GPS/DGPS setting menu	255	000	000
70	Menu Window - Cursor color	255	255	123
71	Menu Window - List Color for Cursor	000	000	000
72	Menu Window - Frame color for item entered	255	255	255
73	Menu Window - List color (Half-transparent)	189	189	189
74	Pop-up window - Frame	000	000	000
75	Pop-up window - BG, Display width pop-up window - Display BG, Mark delete pop-up window - Selected BG	170	242	203
76	Brightness control pop-up window - BG color	000	000	255
77	Brightness control pop-up window - Scale BG, BG Color for Mark number (Way point set)	000	000	189
78	Pop-up window - Lists, Display width pop-up window - Lists , Mark delete pop-up window - Selected Lists	000	000	000
79	Brightness control pop-up window - Brightness control Lists, Brightness control pop-up window - Scale, Brightness control pop-up window - Slider box, Track pop-up window - List color for selected plot number,	255	255	255
80	Color for Recalled Track Number	255	000	000
81	Pop-up window - BG color for selecting item	255	255	123
82	Pop-up window - Lists for selecting item	000	000	000
83	Pop-up window - BG color for selected item	000	000	189
84	Pop-up window - Lists for selected item	255	255	255
85	Pop-up window - Halfly-invisible Lists, List Color for Mark Edit (Grey)	189	189	189

Color palette list for GTD-110/150

Palette No.	Items	Color codings		
		Red	Green	Cyan
86	Pop-up window - BG for alarm message for excess entry of mark numbers, BG Color for Message Window (POB operation)	255	255	123
87		000	000	000
88		255	000	000
89		255	255	255
90		000	000	128
91		255	255	255
92	Pop-up window BG color shown when overwriting track	255	222	189
93	Pop-up window List color shown when overwriting track	001	101	235
94		255	217	064
95		215	172	000
96		236	148	000
97		128	128	064
98	Initial display -KODEN logo	107	159	219
99	Initial display -KODEN logo	191	191	191
100	Initial display -KODEN logo	156	191	231
101	Initial display -KODEN logo	063	063	063
102	Initial display -KODEN logo	127	127	127
103	Initial display -KODEN logo	058	128	208
104	Initial display -KODEN logo	000	000	030
105	Initial display -KODEN logo	255	255	255
106	BG color for "Replace Backup Battery Cell"	255	000	000
107	BG color for "Backup Battery Cell NORMAL"	000	128	000
108	Initial display - Display frame color (White)	255	255	255
109	Initial display - Lists	000	000	000
110	Initial display - Display frame color (Grey)	200	200	200
111	Initial display - Display frame color (Dark Grey)	189	189	189
112	Initial display - BG color	189	189	255
113		000	000	000
114		000	000	000
115		255	255	255
116		000	000	255
117		255	000	000
118		040	235	235
119		000	136	000
120	Color shown after key pressing	000	128	000
121	LCD test (LINE color)	255	255	255
122	LCD Test (FRAME color)	000	000	000
123	LCD Test (BG color: RED)	255	000	000
124	LCD Test (BG color: GREEN)	000	128	000
125	LCD Test (BG color: BLUE)	000	000	189
126	LCD Test (BG color: BLACK)	000	000	000
127	LCD Test (BG color: WHITE)	255	255	255
128	Black	000	000	000
129	Dark Red	172	000	000
130	Dark Brown	156	149	074
131	Light Red	255	000	000
132	Dark Blue	000	060	098
133	Dark Green	074	141	074
134	Dark Gray	090	090	090
135	Orange	115	198	115
136	Magenta	255	000	255
137	Light Brown	213	202	098

Color palette list for GTD-110/150

Palette No.	Items	Color codings		
		Red	Green	Cyan
138	Light Blue	065	149	222
139	Light Green	000	178	000
140	Cyan	164	255	255
141	Light Gray	180	180	180
142	Light Yellow	255	242	057
143	White	255	255	255
144	Depth Blue 0	082	186	238
145	Depth Blue 1	131	202	255
146	Depth Blue 2	156	214	255
147	Depth Blue 3	180	222	255
148	Depth Blue 4	197	230	255
149	Pale Green	115	198	115
150	Pale Gray	255	255	255
151	Pale Blue	205	218	238
152	Mid Brown	180	174	098
153	Veg Green	164	214	115
154	Depth Line Blue 0	172	218	230
155	Lndare Contour	090	090	090
156	Red 1	213	085	082
157	Red 2	213	060	057
158	Red 3	180	060	008
159	Red 4	255	109	106
160	Red 5	156	000	000
161	Pink 1	246	218	131
162	Orange 1	238	157	082
163	Orange 2	246	165	065
164	Brown 1	197	170	115
165	Brown 2	189	101	032
166	Brown 3	197	157	082
167	Brown 4	189	145	057
168	Green 1	032	129	041
169	Green 2	000	117	000
170	Green 3	000	226	000
171	Green 4	148	194	139
172	Green 5	189	198	172
173	Green 6	057	080	057
174	Blue 1	074	141	222
175	Blue 2	131	190	230
176	Blue 3	016	068	123
177	Yellow 1	255	255	098
178	Yellow 2	246	242	123
179	Yellow 3	255	255	197
180	Yellow 4	213	218	172
181	Gray 1	117	117	117
182	Gray 2	164	161	139
183	Gray 3	164	157	131
184	Gray 4	189	174	148
185	Gray 5	230	226	213
186	Gray 6	131	117	098
187	Gray 7	222	222	205
188	Gray 8	198	198	198
189	Gray 9	082	089	082
190	Gray 10	238	234	222
191	Brown 5	238	226	164

Color palette list for GTD-110/150

Palette No.	Items	Color codings		
		Red	Green	Cyan
192	Depth Blue 5	213	234	255
193	Depth Blue 6	230	242	255
194	Low Tidal Stream Color	246	242	123
195	Med Tidal Stream Color	238	157	082
196	Hgh Tidal Stream Color	164	012	000
197	Tidal Stream Contour Color	000	000	000
198	Depblu 0	046	160	245
199	Depblu 1	052	164	245
200	Depblu 2	057	166	247
201	Depblu 3	064	169	247
202	Depblu 4	070	171	247
203	Depblu 5	077	174	247
204	Depblu 6	082	177	248
205	Depblu 7	088	180	248
206	Depblu 8	095	183	248
207	Depblu 9	101	185	248
208	Depblu 10	106	188	249
209	Depblu 11	113	191	249
210	Depblu 12	119	193	249
211	Depblu 13	125	197	249
212	Depblu 14	131	199	250
213	Depblu 15	137	202	250
214	Depblu 16	143	205	250
215	Depblu 17	150	207	250
216	Depblu 18	155	210	251
217	Depblu 19	162	213	251
218	Depblu 20	168	216	251
219	Depblu 21	174	218	251
220	Depblu 22	180	221	252
221	Depblu 23	186	224	252
222	Depblu 24	192	226	252
223	Depblu 25	198	230	253
224	Depblu 26	204	232	253
225	Depblu 27	210	235	253
226	Depblu 28	217	238	253
227	Depblu 29	224	241	254
228	Depblu 30	233	245	254
229	Depblu 31	243	250	254
230	Elvbrw 0	230	231	214
231	Elvbrw 1	222	219	197
232	Elvbrw 2	214	202	173
233	Elvbrw 3	206	194	156
234	Elvbrw 4	197	186	148
235	Elvbrw 5	189	178	132
236	Elvbrw 6	189	170	123
237	Elvbrw 7	181	158	090
238	Elvbrw 8	165	146	082
239	Elvbrw 9	148	130	074
240	Elvbrw 10	140	121	066
241	Elvbrw 11	132	117	066
242	Depare Selection	130	255	255
243		000	000	000
244		000	000	000
245		000	000	000

Color palette list for GTD-110/150

Palette No.	Items	Color codings		
		Red	Green	Cyan
246		000	000	000
247		000	000	000
248		000	000	000
249		000	000	000
250		000	000	000
251		000	000	000
252		000	000	000
253		000	000	000
254		000	000	000

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