



KODEN

OPERATION MANUAL

REMOTE DISPLAY

KRD-10

Declaration of Conformity



This declaration is issued according to the Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating electromagnetic compatibility.

We, Koden Electronics Co., Ltd.; 5278 Uenohara Uenohara-Shi, Yamanashi-Ken ; 409-0112, Japan

declare as manufacturer under our sole responsibility that the

Remote Display KRD-10

intended for use as a Remote Display aboard non-SOLAS vessels to which this declaration relates conforms to the following standard(s):

- **IEC 60945 Ed.4.0 2002 EMC related items**

For assessment, see

- Test report number 78-2731U-F003 prepared by Koden Electronics Co., Ltd.

Our product is also in compliance to Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances (RoHS) in electrical and electronical equipment.

Software: KM-F83*

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For Your Safe Operation


Symbol used in this Operation Manual

The following pictograms are used in this manual. The meaning of each symbols shall be well understood and the maintenance and inspection shall be carried out.





| Symbol | Meaning |
|--|--|
|  Warning | Mark for warning This mark denotes that there is a risk of death or serious injury when dealt with incorrectly. |
|  | Mark for danger of high voltage This mark denotes that there is a risk of death or serious injury due to electric shock when dealt with incorrectly. |
|  Caution | Mark for caution This mark denotes that there is a risk of slight injury or damages of devices when dealt with incorrectly. |
|  | Mark for prohibition This mark denotes prohibition of specified conducts. Description of the prohibition is displayed near the mark. |

Precautions on equipment

| | |
|--|--|
|  | Be careful of high voltage inside High voltage, which may risk you life, is used. This high voltage may remain in the circuit even after the power is switched off. To prevent contact with the high voltage circuits accidentally, a protective cover or the label with this mark is provided on the high voltage circuit. When the inside is to be checked, ensure to switch off the power and to discharge the residual voltage for safety. An engineer authorized by Kodan shall carry out the inspection and maintenance works. |
|  Warning | Power off in the boat An accidental power-on during works may result in worker's electrification. To prevent such accident in advance, ensure that power in the boat and on the equipment are switched off. Furthermore, it is safer to hang a caution tag saying "Under work" near the power switch of equipment. |
|  Warning | Be careful of dust Inhaled dust may cause respiratory affection. At the time of cleaning the inside of equipment, be careful not to inhale dust. Wearing a safety mask is recommended. |
|  Caution | Caution on location of installment The equipment shall not be installed at locations which are excessively damp and suffers from water drops. Otherwise, dew condensation may occur inside the display screen, and corrosion may occur inside the unit box. |

| | |
|---|--|
|  <p>Caution</p> | <p>Measures against static electricity Static electricity may be generated from the carpet on the floor in the cabin or clothes made of synthetic fiber, and it may destroy the electronic components on circuit boards. The circuit boards shall be handled with appropriate measures against static electricity.</p> |
|---|--|

Precautions on handling

| | |
|---|---|
|  <p>Warning</p> | <p>No disassembly or modification of this equipment is allowed. It may lead to failure, firing, smoking or electric shock. In case of failure, please contact Koden's dealers or Koden.</p> |
|  <p>Warning</p> | <p>In case of smoking or firing, switch off the power in the boat and of this equipment. It may lead to firing, electric shock or damages.</p> |
|  | <p>Be careful of residual high voltage High voltage may remain in capacitors for several minutes after switching off the power. Before inspection of the inside, please wait at least 5 minutes after switching off or discharge the residual electricity in an appropriate manner. Then, start the work.</p> |
|  <p>Caution</p> | <p>The information displayed on this equipment is not intended to use for your navigation. For your navigation, be sure to see the specified materials.</p> |

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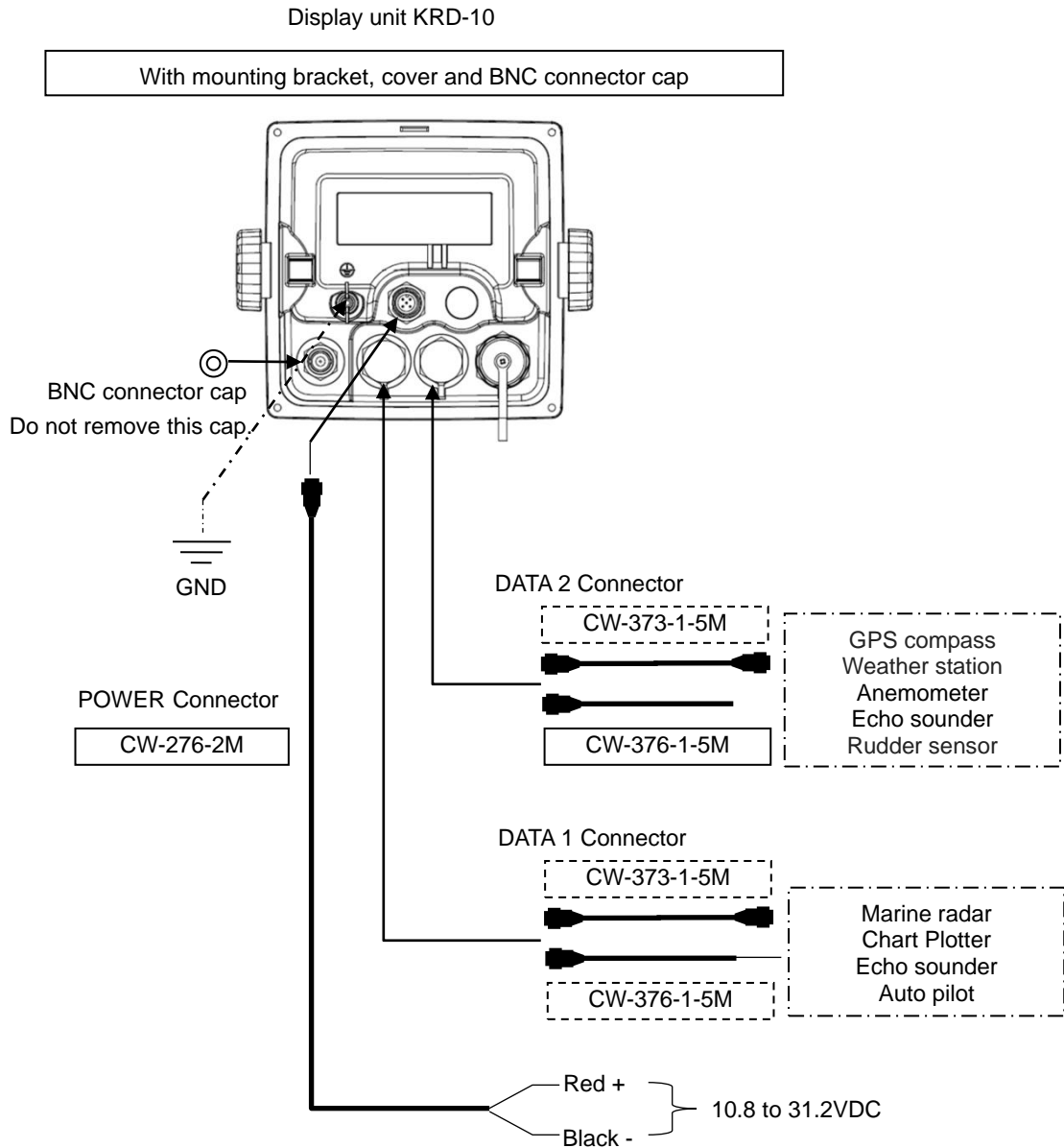
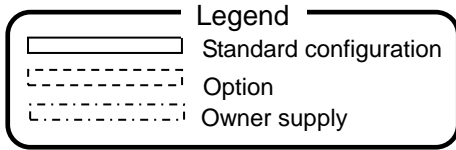
Introduction

The main features of this unit are as follows:

- KRD-10 has high-resolution color LCD of high brightness type.
- KRD-10 can support high accuracy positioning system by connecting an external receiver such as V104S.
- Various display is possible by inputting various data information.
- KRD-10 can storage 10,000 waypoints, 100 routes, and 3,000 track points.
- KRD-10 has two data port of NMEA 0183.

System Configuration

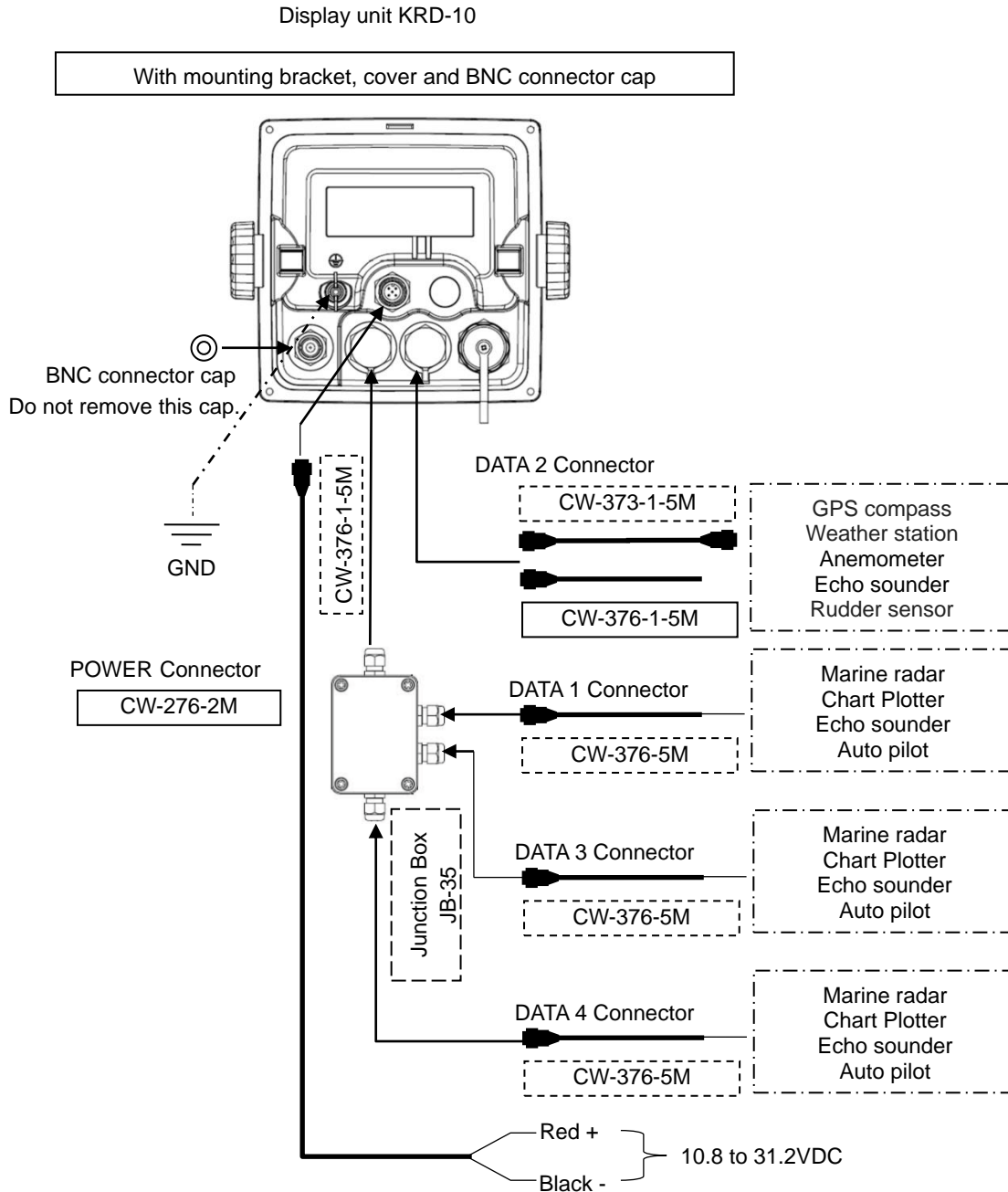
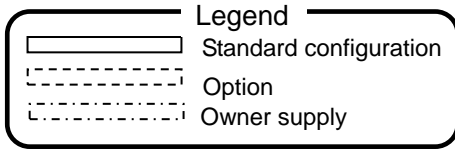
Connection diagram



Note: When connecting a data cable from an external device to KRD-10, please use a connecting cable with a ferrite core.
 Do not remove connector cap when not connected to the cable.

System Configuration (with Junction box)

Connection diagram



Note: When connecting a data cable from an external device to KRD-10, please use a connecting cable with a ferrite core.
Do not remove connector cap when not connected to the cable.

Configuration of Equipment

Standard Equipment Configuration List

| No | Item | Type name | Remarks | Weight/Length | Q'ty |
|----|---------------------|-------------|---|---------------|------|
| 01 | Display unit | KRD-10.MU | With mounting bracket, hard cover and BNC connector cap | 0.74 kg | 1 |
| 02 | DC power cable | CW-276-2M | With 5-pin connector and one end plain | 2m | 1 |
| 03 | Connecting cable | CW-376-1-5M | 6 pin water resistant connector and one end plain (with ferrite core) | 5m | 1 |
| 04 | Truss tapping screw | TPT5X20U | For mounting bracket | | 4 |
| 05 | Operation manual | KRD-10.OM.E | English | | 1 |

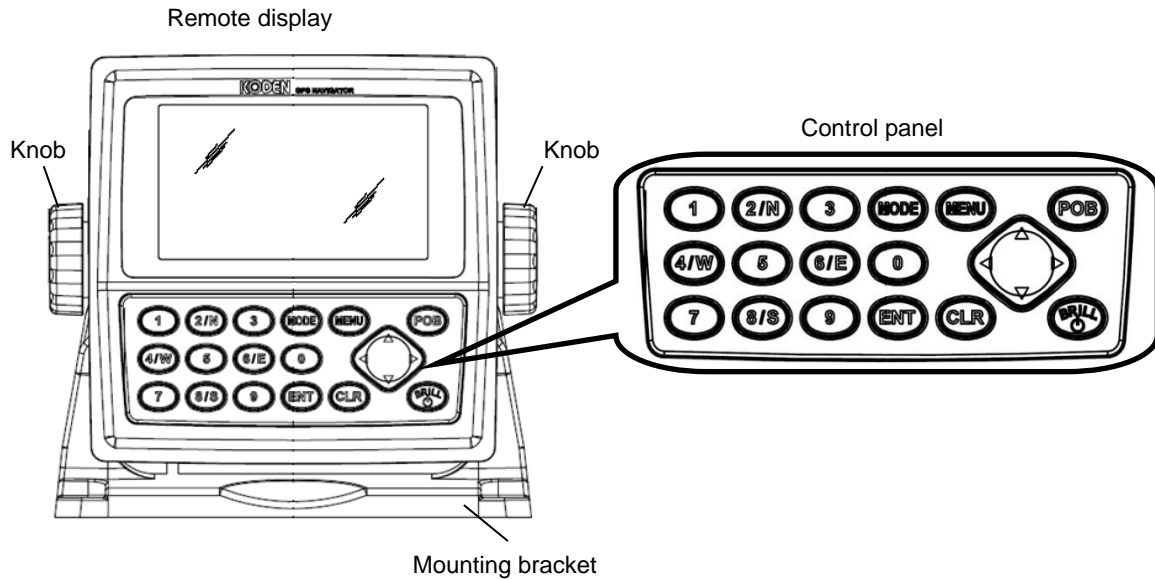
Option List

| No | Item | Type name | Remarks | Weight/Length |
|----|------------------|-------------|---|---------------|
| 01 | Connecting cable | CW-373-1-5M | 6 pin water resistant connectors both ends (with ferrite core) | 5m |
| 02 | | CW-376-1-5M | 6 pin water resistant connector and one end plain (with ferrite core) | 5m |
| 03 | | CW-376-5M | 6 pin water resistant connector and one end plain | 5m |
| 04 | Junction box | JB-35 | 3 inputs / outputs | -- |
| 05 | Power rectifier | PS-010 | With 5A fuses 2pcs | 3.5kg |
| 06 | AC power cable | VV-2D8-3M | For PS-010, both ends plain | 3 m |
| 07 | Operation manual | KRD-10.OM.E | English | -- |

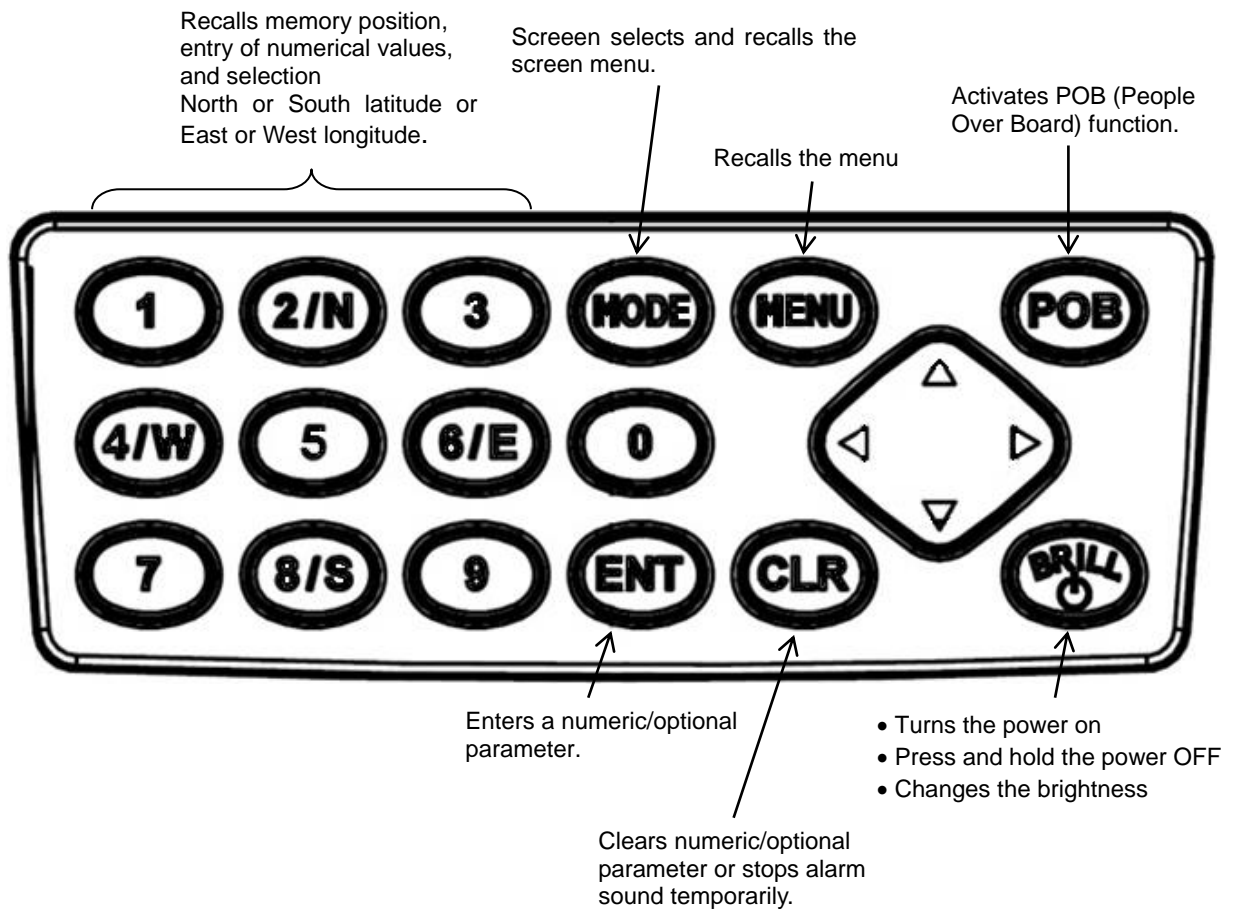
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Chapter 1 Basic Operation

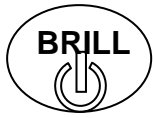
1.1 The name and function of each part



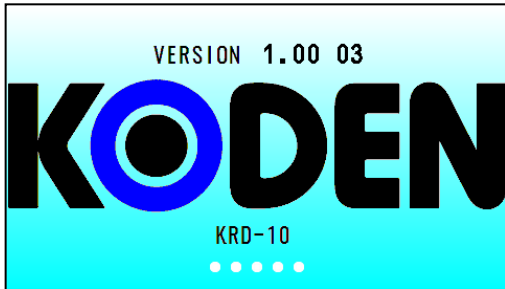
1.1.1 Control panel



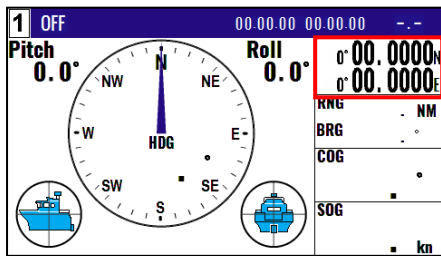
1.2 Power On/Off



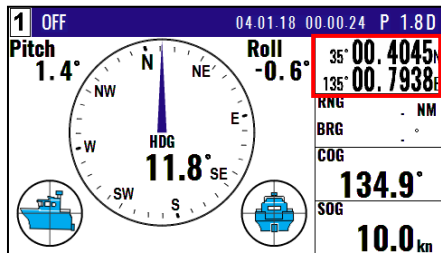
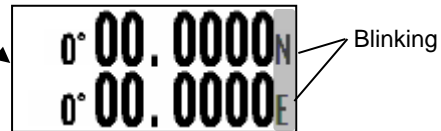
Press to power on.



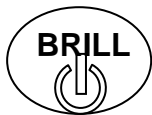
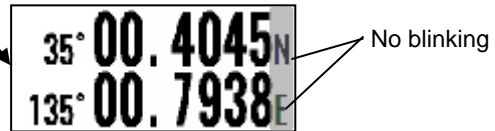
Initial message appears during power-on. The receiver is performing the self-check.



Blink when NAVIGATOR is searching GPS satellites.



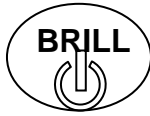
When NAVIGATOR receives signals from 3 or more satellites, it displays present latitude and longitude position with solid N (or S) and W (or E).




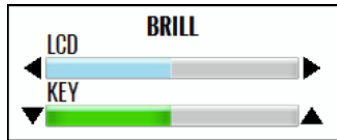
Press until [Power off 3sec] is displayed for turn NAVIGATOR off. All data before power-off is kept in memory for later use.

1.3 Adjusting brightness of display and panel key

1.3.1 Adjusting brightness of display and panel key




Press to change the LCD brightness in 7 levels.
After the popup of below was displayed, push the  key.

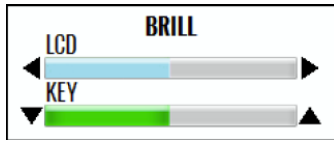



NOTE: This setup is memorized and turns into the same setup next time at the time of a power supply ON.

1.3.2 Switching between Day mode / Night mode

Switch between Day mode, which is used during bright daylight hours, and night mode, which is used with reduced brightness in a dark ship at night.

1. Press  key short time and the following display appears.



2. With the above "Brightness Pop-up" screen displayed, press  key.

Determine "Day mode" and "Night mode".

| | | | | |
|---------------|-----|----------|----------|--------|
| 1 | OFF | 09.20.18 | 12.02.50 | H 0.0D |
| 35° 30.8140N | | RNG | . | NM |
| 140° 00.1580E | | BRG | . | ° |
| TTG | : | COG | 0.0° | |
| ETA | : | SOG | 0.0 | km |

Day mode

| | | | | |
|---------------|-----|----------|----------|--------|
| 1 | OFF | 09.20.18 | 12.02.50 | H 0.0D |
| 35° 30.8140N | | RNG | . | NM |
| 140° 00.1580E | | BRG | . | ° |
| TTG | : | COG | 0.0° | |
| ETA | : | SOG | 0.0 | km |

Night mode

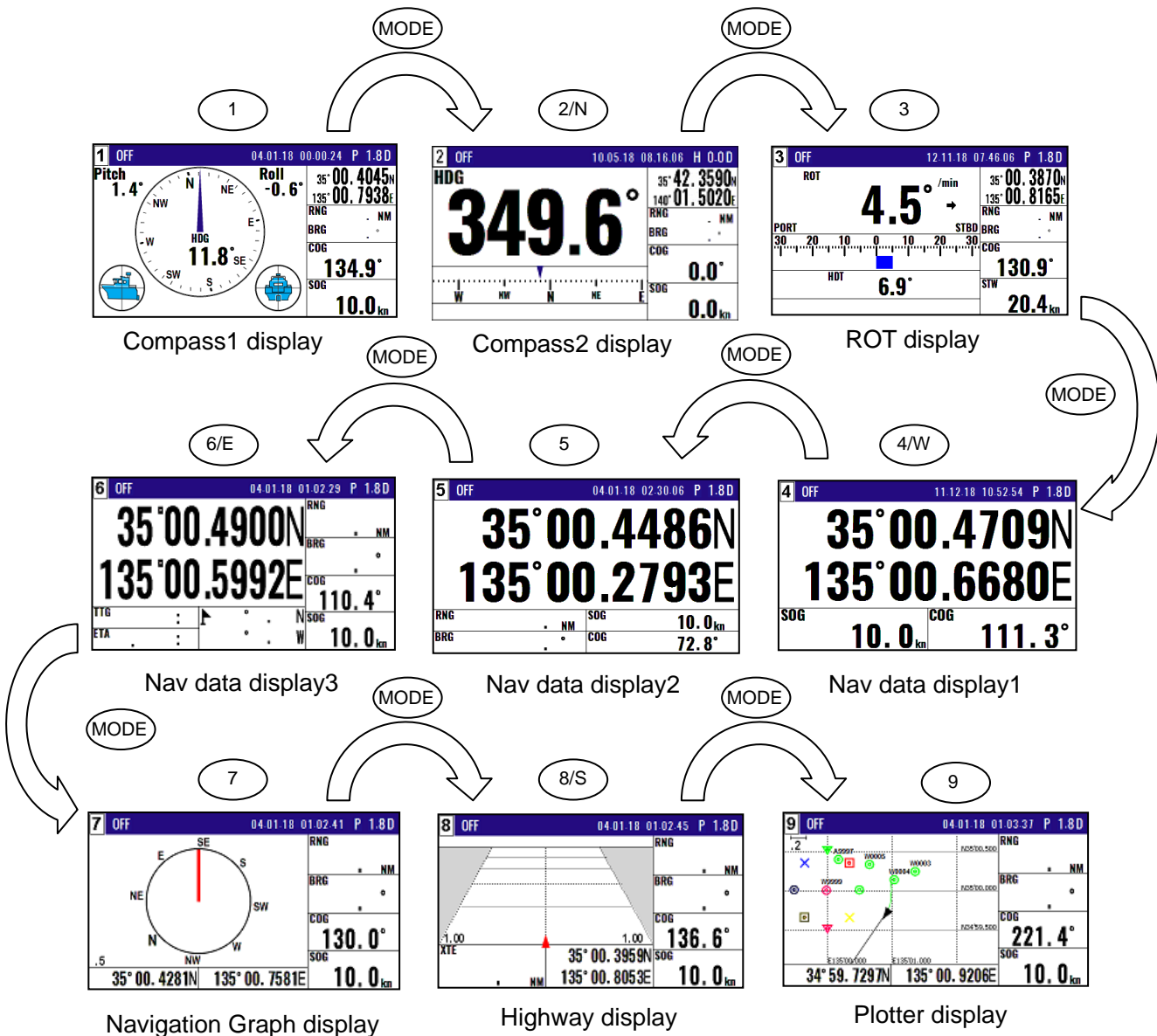
1.4 Selecting the screen

1.4.1 Display Modes

KRD-10 has 20 display modes: Nav data display1, Nav data display2, Nav data display3, Navigation Graph display, Highway display, Plotter display, Compass1 display, Compass2 display, ROT display, Wind direction / Wind speed display, Water temperature graph, Rudder angle display, Distance info display, General1 display, General2 display, Tide current display, Weather info display, Rain gauge display, Custom info display, NOT USE (non-display).

9 display modes selected from 20 kinds of modes are displayed. There are two ways to change the display modes.

1. Press numeric key on the upper-left corner of the screen.
2. Press **MODE** key to select the display mode.



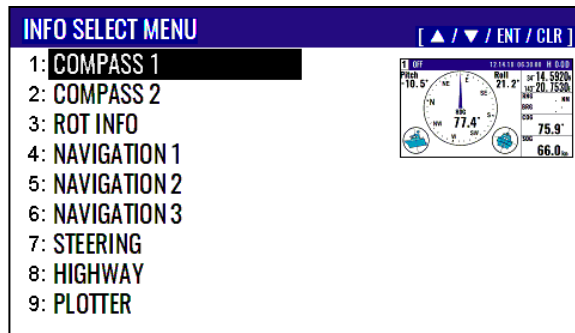
1.4.2 Screen selection menu

CLR NOTE: Press to clear incorrect Input. You can reenter Numeric data.

MODE NOTE: When exiting from the screen selection menu. Please press the key.

Select from 20 kinds of display modes (including NOT USE: non-display).

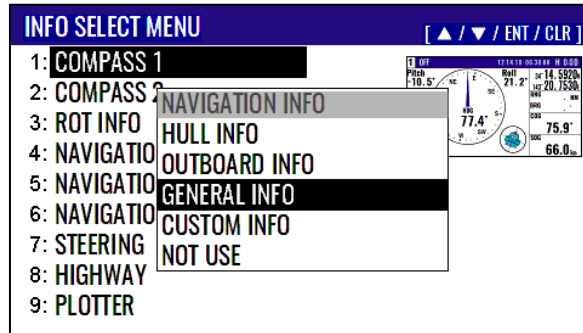
1. Press and hold **MODE** key to display "INFO SELECT MENU".
2. Press "▲" or "▼" key to move the cursor to the screen number to be registered.



The currently selected screen is displayed.

3. Press **ENT** key.
4. The selected information pops up.
5. Press "▲" or "▼" key to move the cursor to select the information.

Pop-up screen: NAVIGATION INFO, HULL INFO, OUTBOARD INFO, GENERAL INFO, CUSTOM INFO, NOT USE



6. Press **ENT** key.

1.4.2.1 Select the display screen from "NAV INFO", "HULL INFO", "OUTBOARD INFO" or "GENERAL INFO"

When "NAVIGATION INFO", "HULL INFO", "OUTBOARD INFO" or "GENERAL INFO" is selected, move to [INFO SELECT MENU].

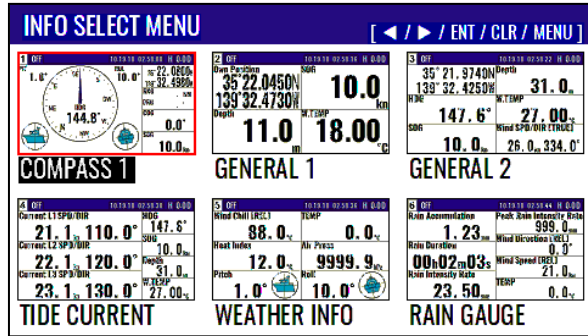
NAVIGATION INFO: NAVIGATION 2, NAVIGATION 3, STEERING, HIGHWAY, PLOTTER, COMPASS 2

HULL INFO: NAVIGATION 1, ROT INFO, RUDDER ANGLE, DISTANCE INFO

OUTBOARD INFO: WIND DIRECTION, WATER TEMP

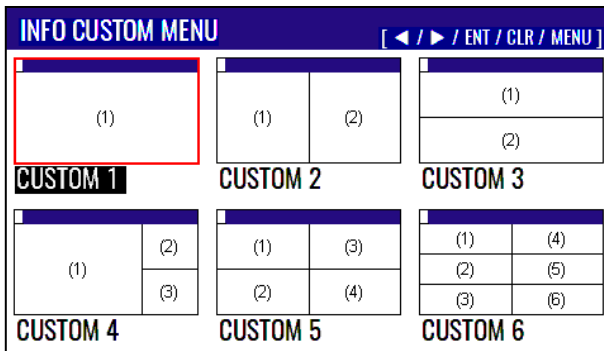
GENERAL INFO: COMPASS 1, GENERAL 1, GENERAL 2, TIDE CURRENT, WEATHER INFO, RAIN GAUGE

1. Press "▶" or "◀" key to move the cursor to select the screen.
2. Press **ENT** key to move to [INFO SELECT MENU].

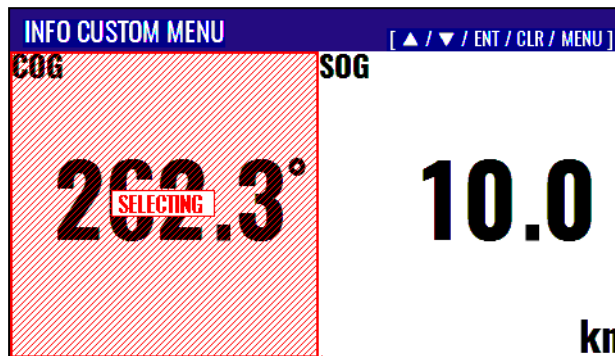


1.4.2.2 Select the display screen from "CUSTOM MENU"

When "CUSTOM INFO" is selected, move to [INFO CUSTOM MENU].

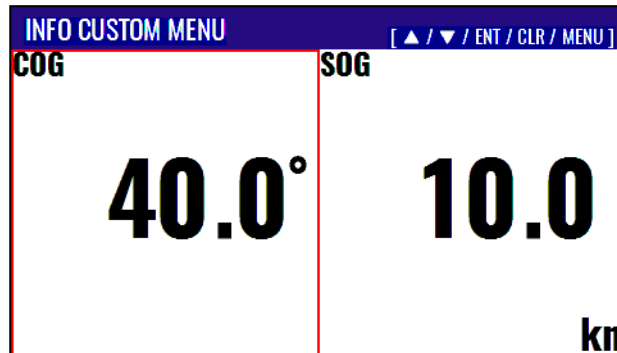


1. Press "▶" or "◀" key to move the cursor to select the layout screen.
2. Press **ENT** key. Move to each screen position selection screen.



3. Press "▲" or "▼" key to move the cursor to select the screen position.
4. Press **ENT** key.

A red frame is displayed and the screen shifts to screen selection status.



5. Press "▲" or "▼" key to switch the screen information.

Select the screen information to display.

Types of numeric display screen. (31 screens):

Own Position, HDG, COG, RNG, BRG, TTG, ETA, Depth, W.TEMP, R.ANGLE, ODO, Wind SPD/DIR [TRUE], Current L1 SPD/DIR, Current L2 SPD/DIR, Current L3 SPD/DIR, Wind Chill [REL], Wind Chill [TRUE], Heat Index, Air Pressure, Heave, Pitch, Roll, Rain Accumulation, Rain Duration, Rain Intensity Rate, Peak Rain Intensity Rate, TEMP, Humidity, Dew Point, Wind Direction [TRUE], Wind Speed [TRUE]

Types of analog screen and graph that can be selected in 3 screen configuration.

(9 screens):

Wind direction / Wind speed display, Water temperature graph, Rudder angle display, Compass1 display, Compass2 display, Rate of turn display (ROT), Navigation Graph display, Highway display, Plotter display

6. Press **ENT** key. The screen shifts to the selected screen.

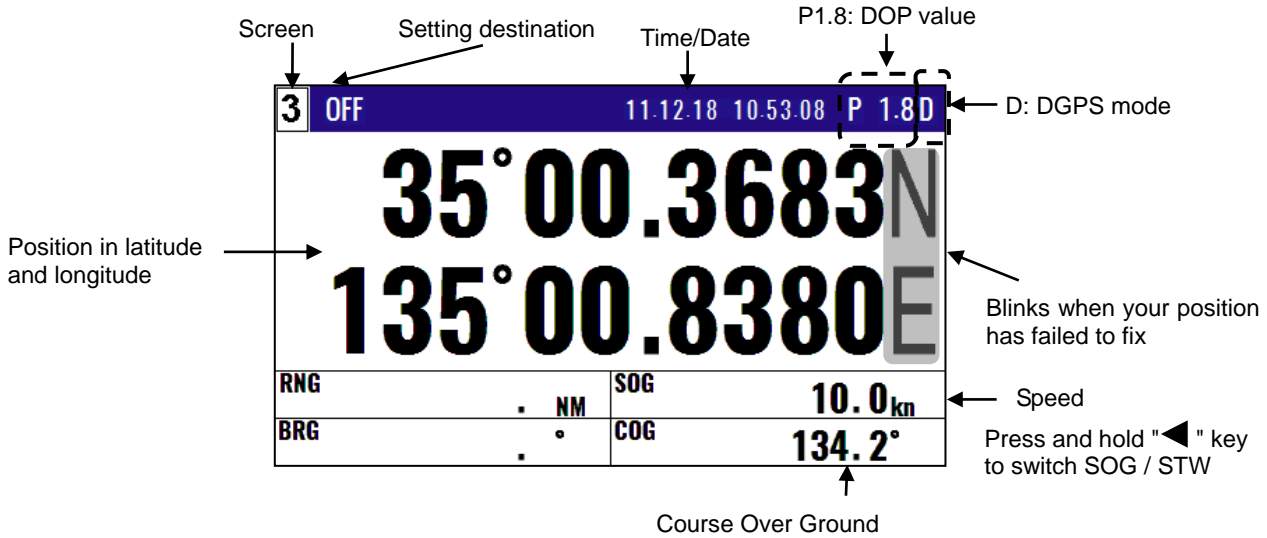
7. To change the screen position, repeat steps 3 to 6.

8. After determining the screen of all screen positions, press **MENU** key on the selected screen.

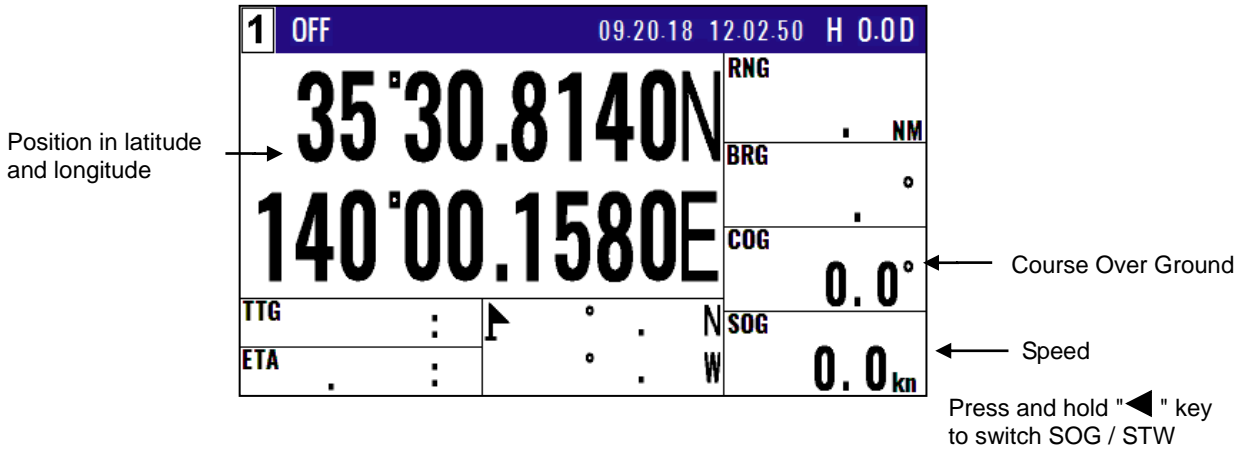
1.4.2.3 Select "NOT USE"

When "NOT USE" is selected, move to [INFO SELECT MENU].

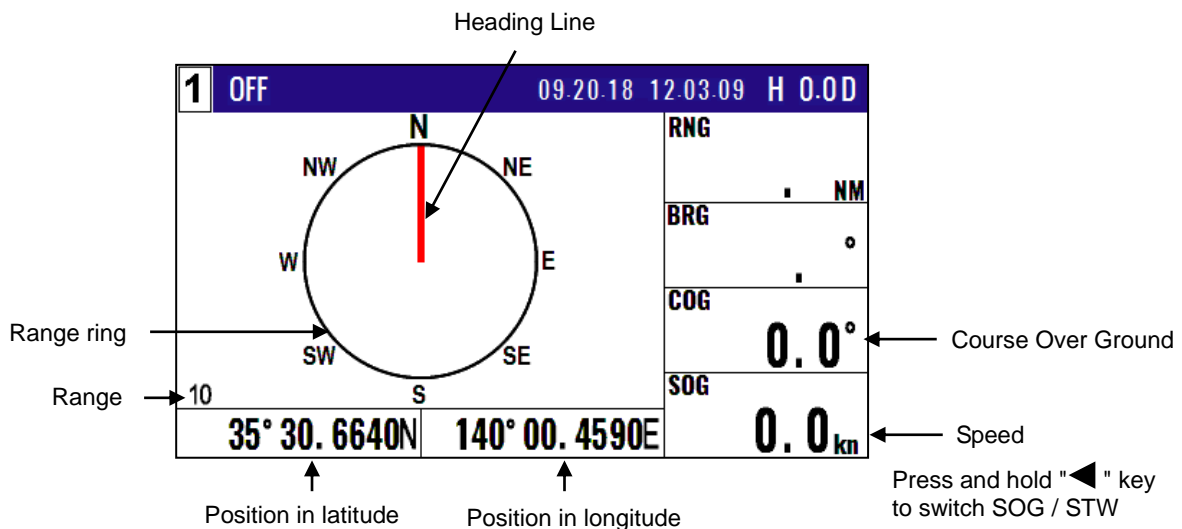
1.4.3 Nav data display2 screen (NAVIGATION INFO)



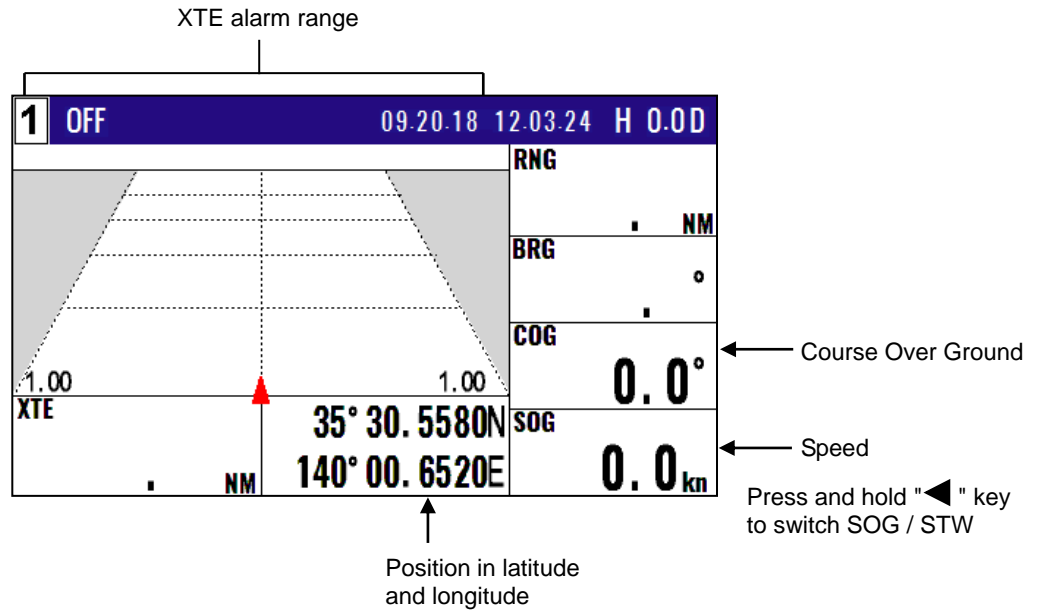
1.4.4 Nav data display3 screen (NAVIGATION INFO)



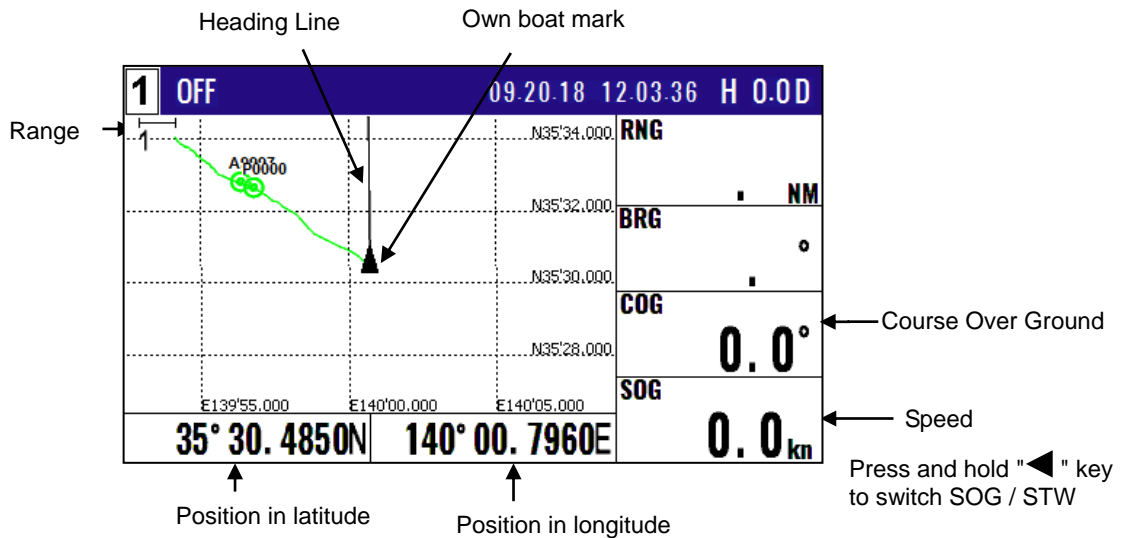
1.4.5 Navigation Graph display screen (NAVIGATION INFO)



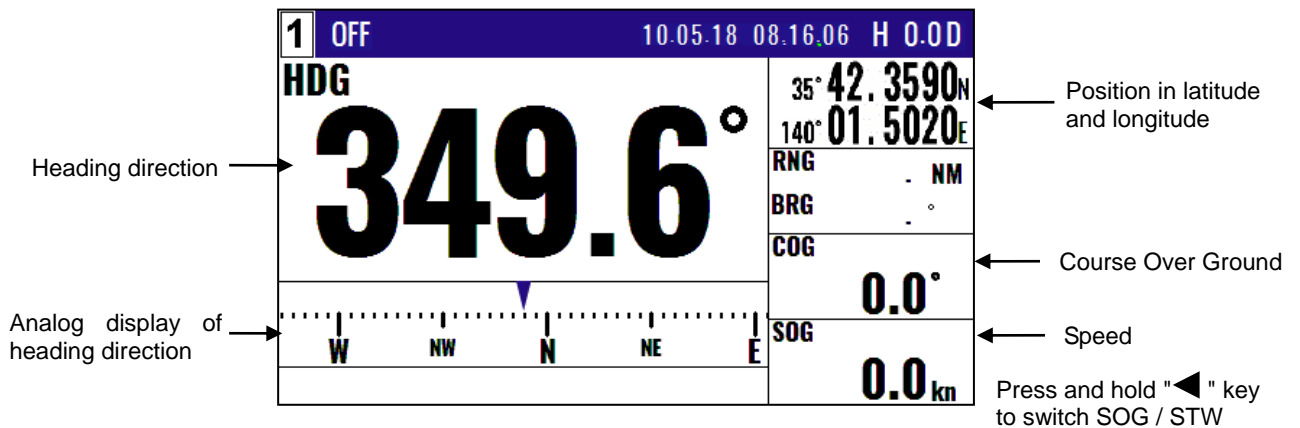
1.4.6 Highway display screen (NAVIGATION INFO)



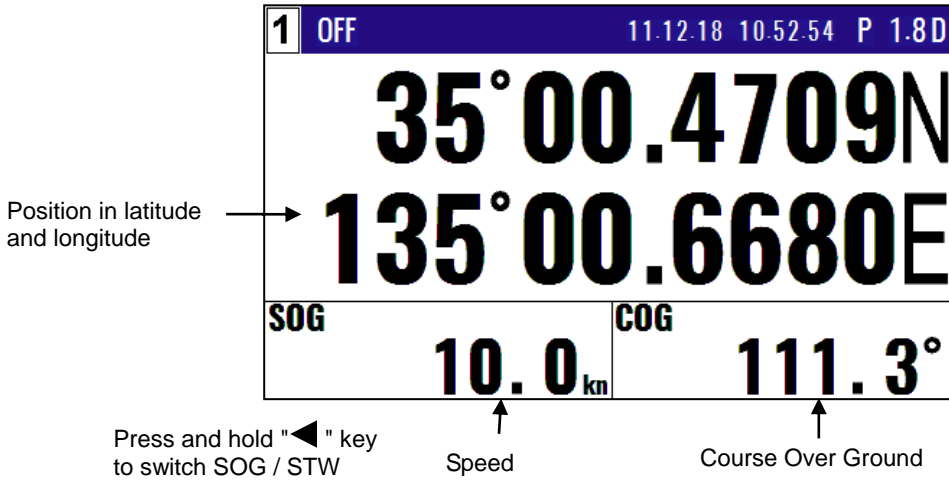
1.4.7 Plotter display screen (NAVIGATION INFO)



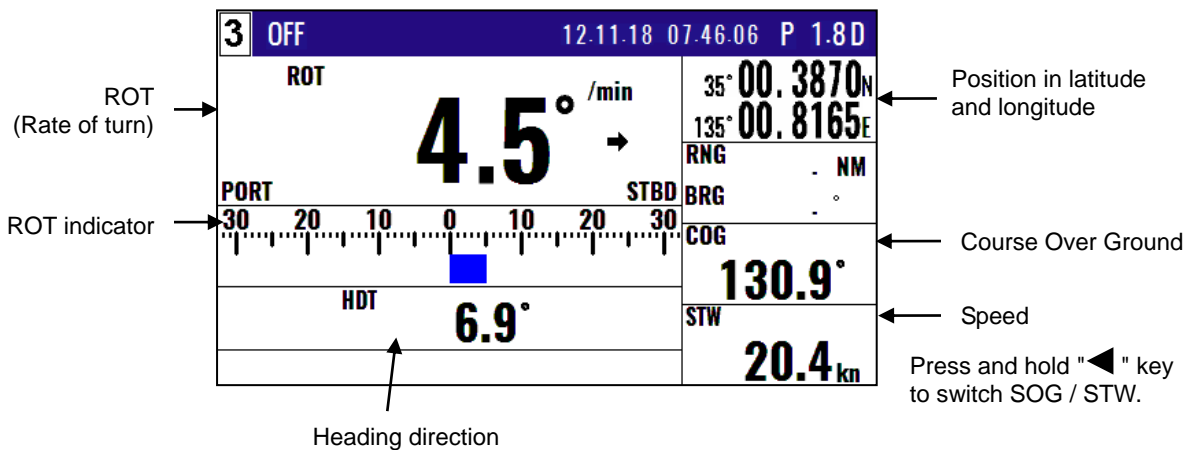
1.4.8 Compass2 display screen (NAVIGATION INFO)



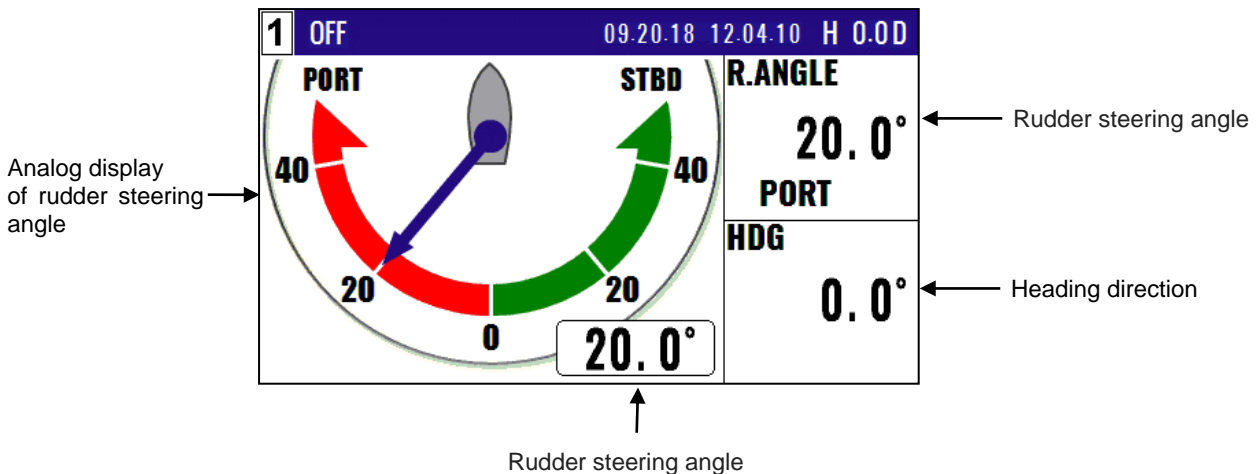
1.4.9 Nav data display1 screen (HULL INFO)



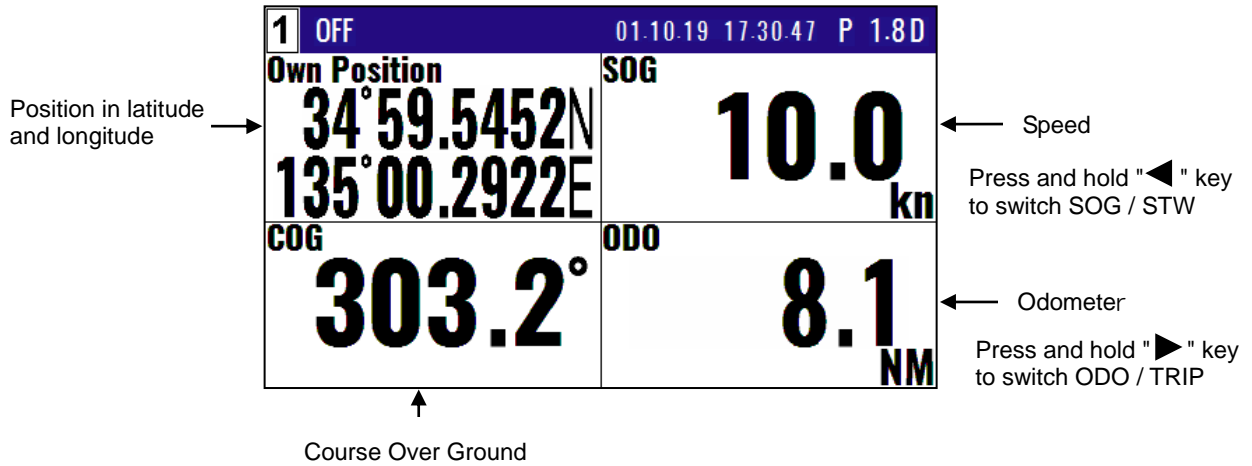
1.4.10 Rate of turn display (ROT) screen (HULL INFO)



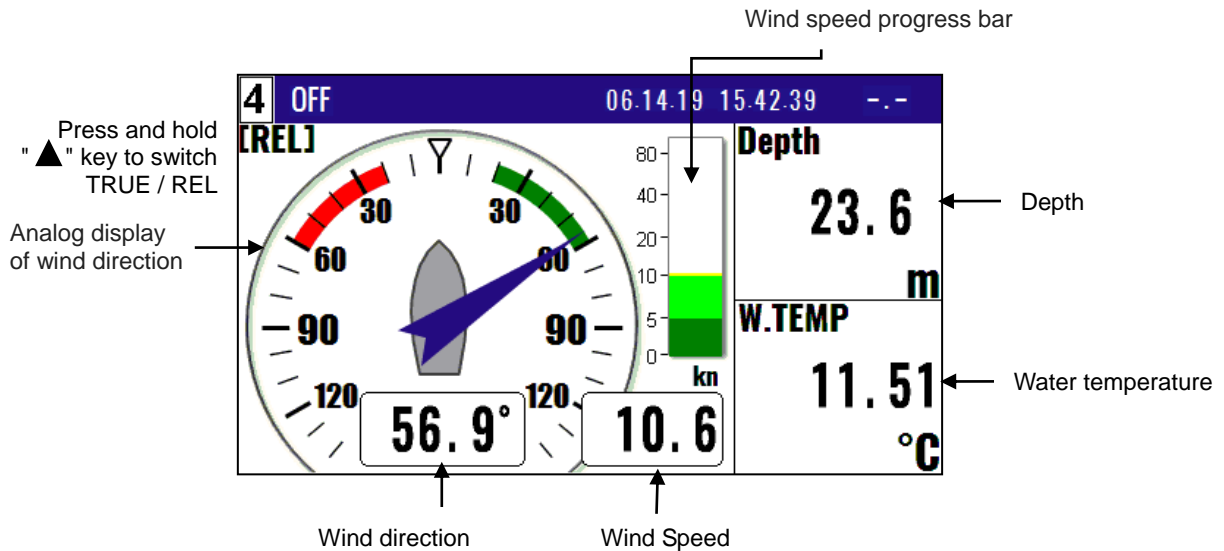
1.4.11 Rudder angle display screen (HULL INFO)



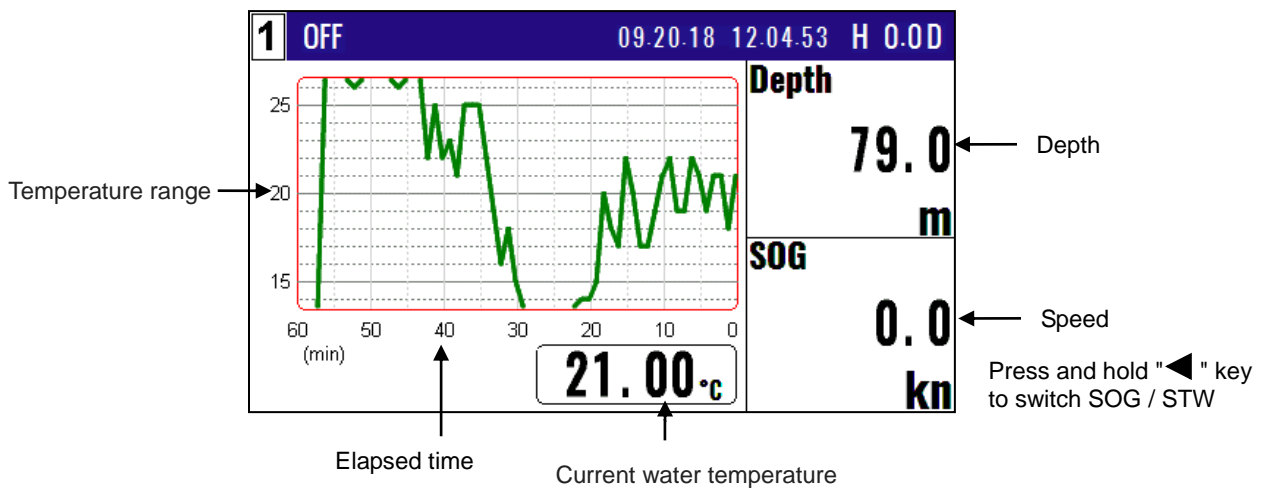
1.4.12 Distance info display screen (HULL INFO)



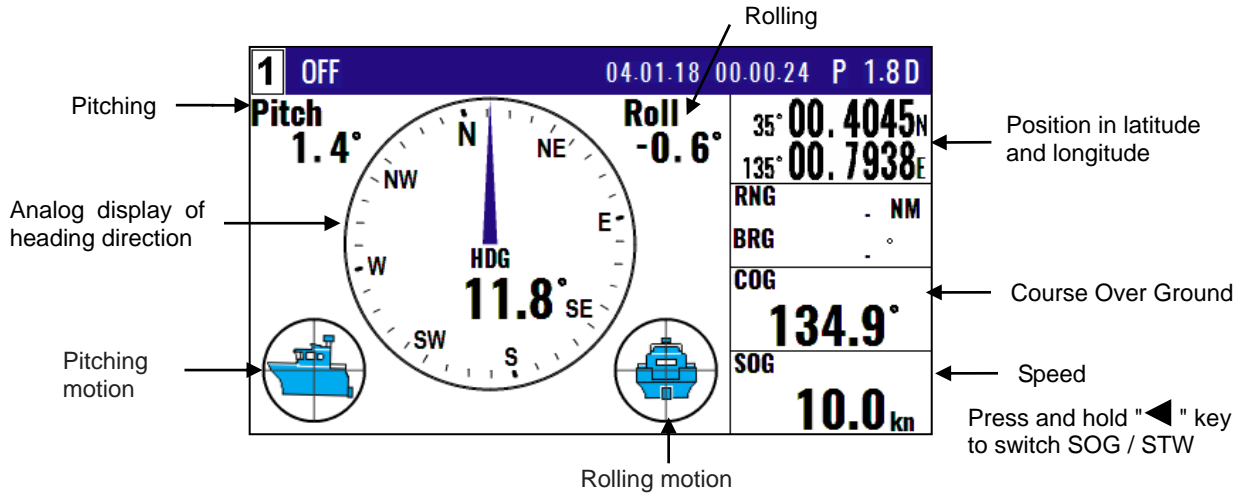
1.4.13 Wind direction / Wind Speed display screen (OUTBOARD INFO)



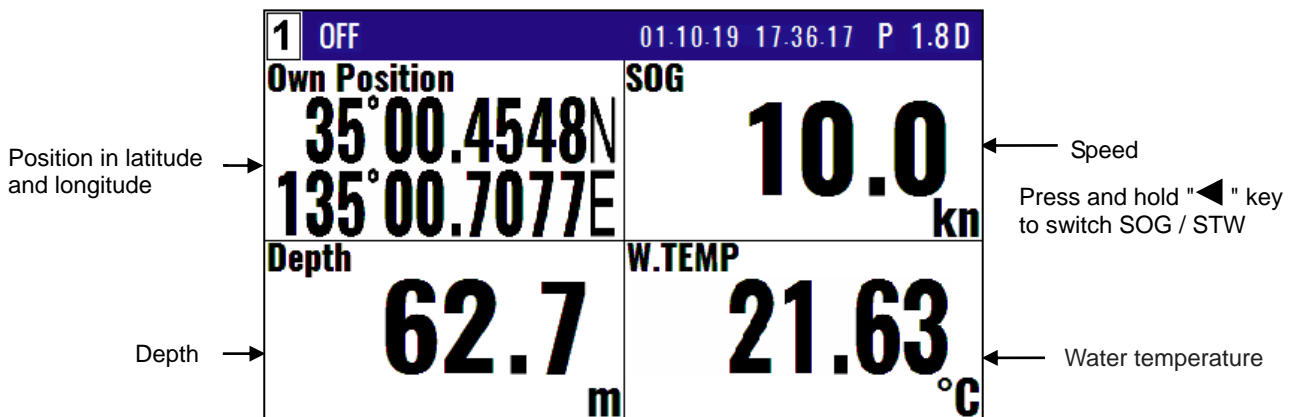
1.4.14 Water temperature graph screen (OUTBOARD INFO)



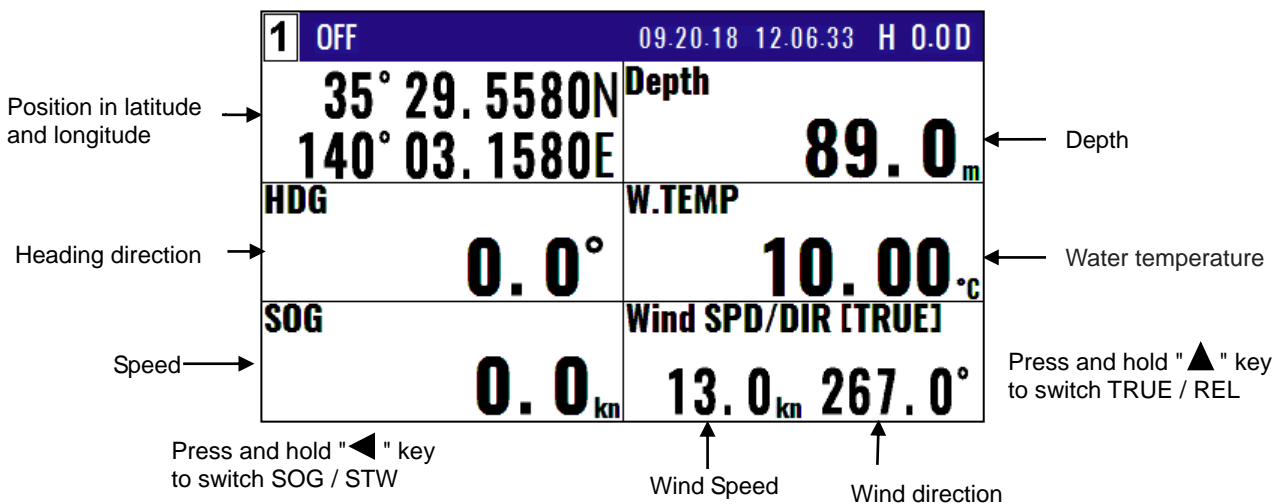
1.4.15 Compass1 display screen (GENERAL INFO)



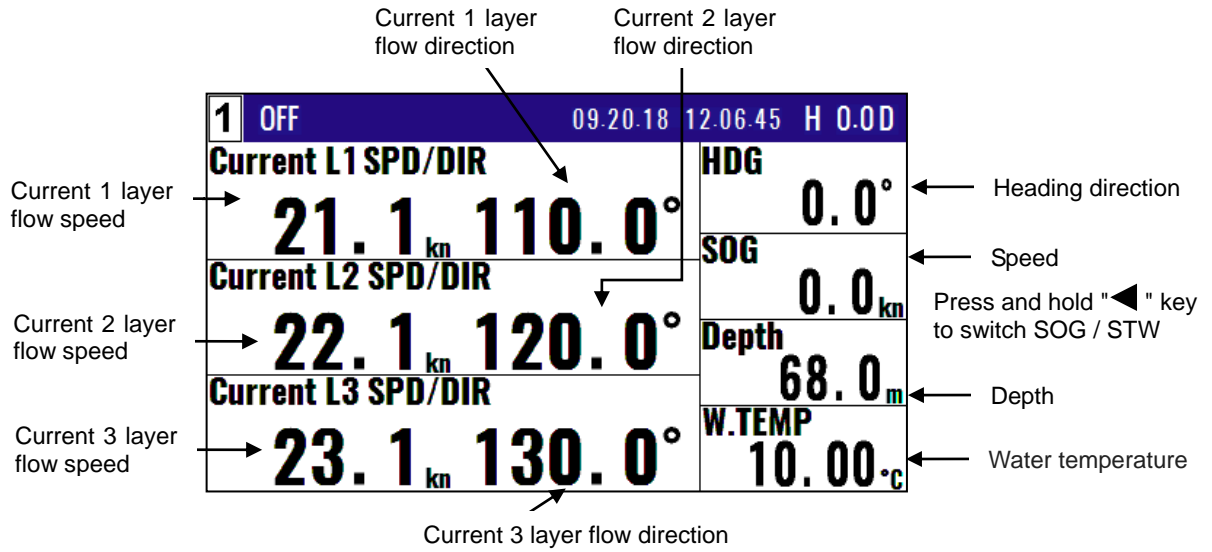
1.4.16 General1 display screen (GENERAL INFO)



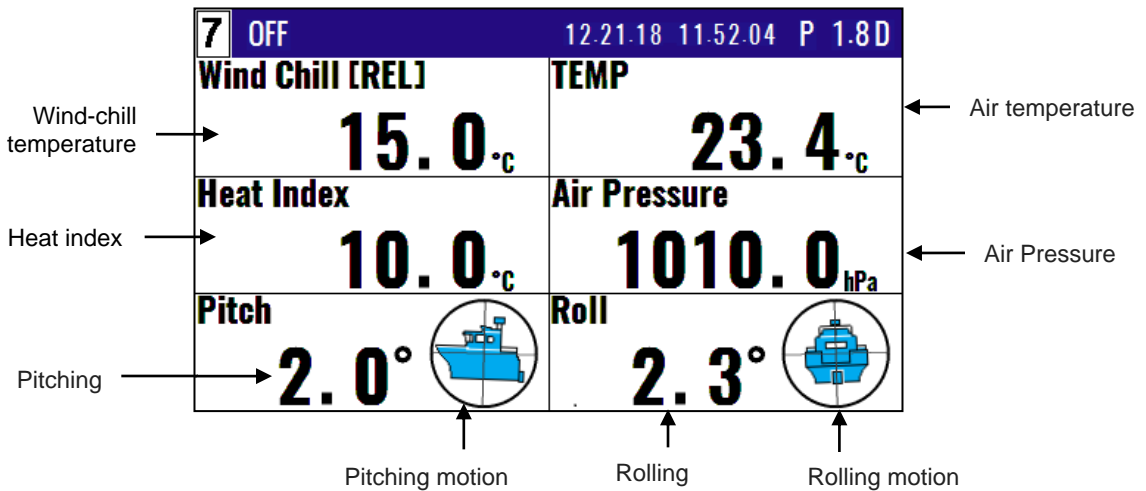
1.4.17 General2 display screen (GENERAL INFO)



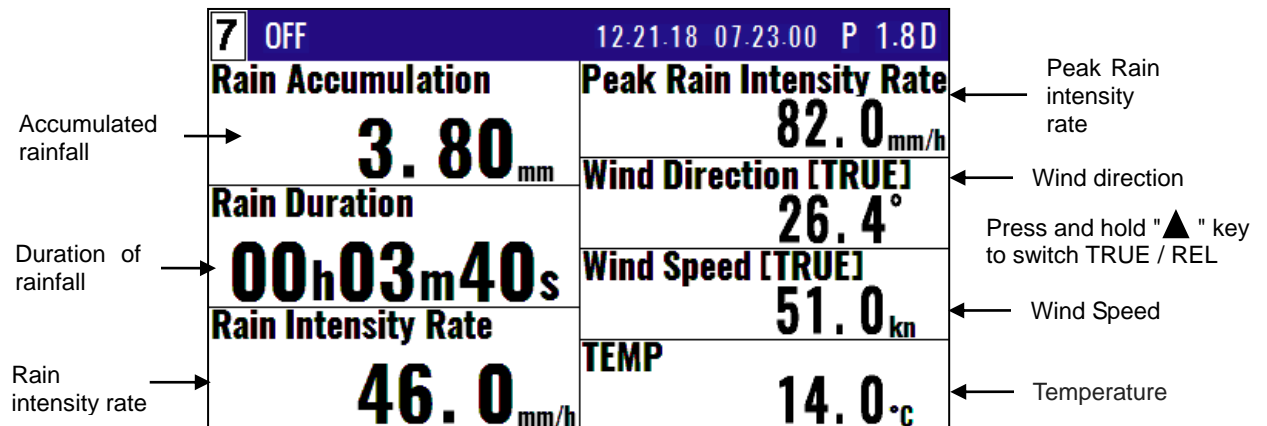
1.4.18 Tide current display screen (GENERAL INFO)



1.4.19 Weather info display screen (GENERAL INFO)



1.4.20 Rain gauge display screen (GENERAL INFO)



1.5 Storing present position (EVENT)

You can store up to 999 present positions with numbers 0001 to 0999. When you store additional positions, the oldest position is deleted and the newest position is stored in its place.

- The storage date, hours and minutes, position data, and symbols (selectable in “9: PLOTTER”) can be stored.
- It is convenient to store the present position for use later in route navigation.
- These positions can be used as targets or waypoints.





CAUTION

EVT key does not function when positioning is invalid

- **Event numbering is available both in the automatic or manual mode. Auto or Manual selection is made at the “6.2.4 Changing a storing method for present position (Event)” (Refer Page 6-5)**

1.5.1 AUTO



- (1) Press  key to appear the pop-up.
- (2) Press  key to store your present position.
- (3) You can store up to 999 present positions by pressing this key. They have storage numbers 0001 to 0999. It is store in order from the vacant location in the WPT list.




Goto POB :[POB]
 Goto Event:[ENT]
 Cancel :[CLR]

EVT=W0001 — Increment Waypoint
 15 15:37 — Storage date (Day, Hour, Minute)
 35°38.184N — Storage position (Lat, Long)
 139°42.997E

NOTE: *Auto or Manual selection is made at the “6.2.4 Changing a storing method for present position (Event)”*

1.5.2 MANUAL



- (1) Press  key to appear the pop-up.
- (2) Press  key to store your present position.
- (3) Specify a desired EVENT number by numeric keys.
- (4) Press  key. The event will be registered to the number specified.

Goto POB :[POB]
 Goto Event:[ENT]
 Cancel :[CLR]

Blinks for 10 seconds

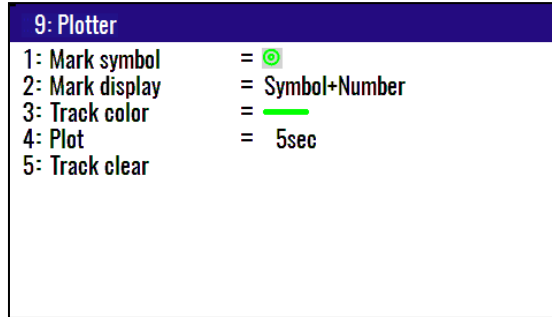
EVT=W0001 — The latest event number
 15 04 : 59 — Storage date (Day, Hour, Minute)
 35°38 . 180N — Storage position (Lat, Long)
 139°42 . 990E

NOTE: *Auto or Manual selection is made at the “6.2.4 Changing a storing method for present position (Event)”*

1.5.3 Changing the setup contents

(1) Press **MENU** key until Menu options 1 to 9 appears.

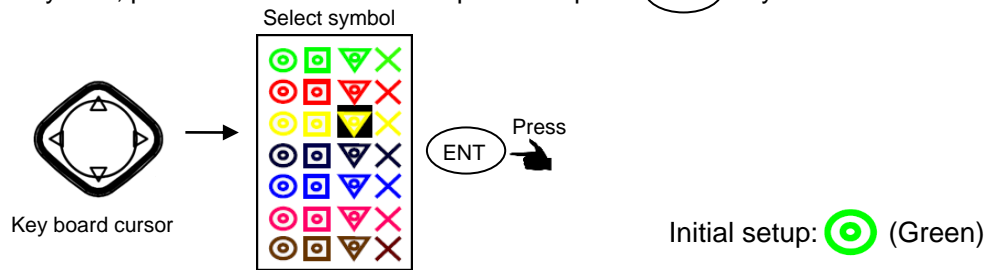
(2) Press **9** key to select “9: Plotter”.



(3) Various settings

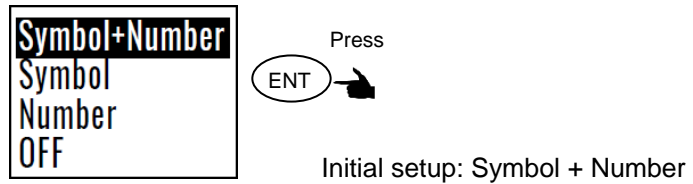
1) 1: Mark symbol (Press **1 key)**

To change the Mark symbol, place cursor on **SYMBOL** option and press **ENT** key.



2) 2: Mark display (Press **2/N key)**

You can select whether or not to display the mark.



1.6 Using POB (People over-board)

POB function is provided for an emergency situation (if a person falls into the water) to make it easier to return to POB point.

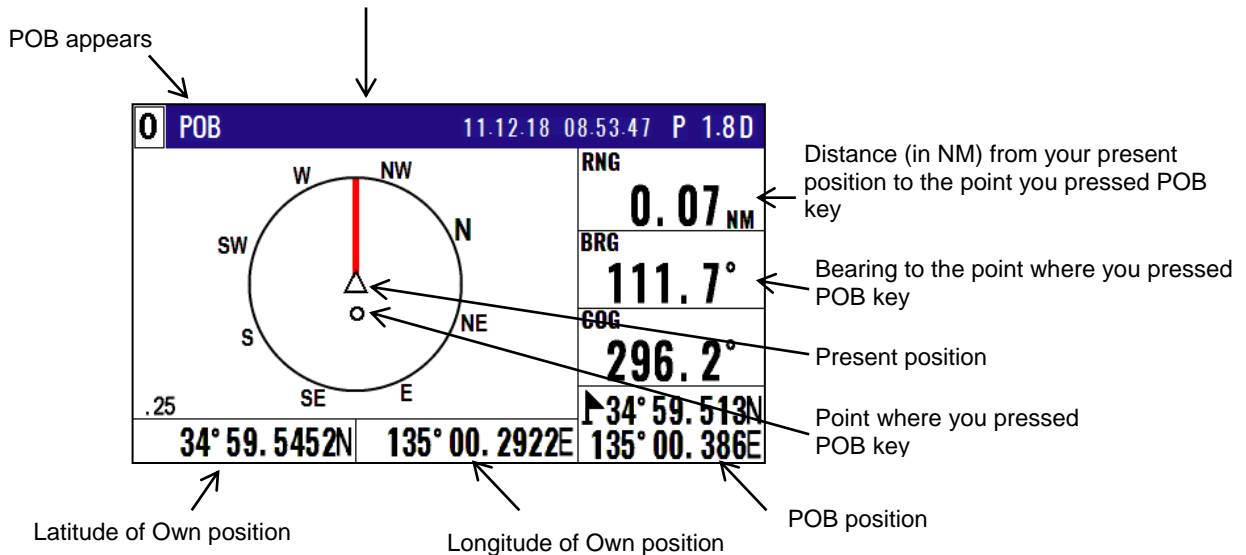
CAUTION
 *POB key does not function when positioning is invalid*

POB
EVT

- (1) Press **POB** key to appear the pop-up.
- (2) Press **POB** key to store POB position.

Goto POB :[POB]
Goto Event:[ENT]
Cancel :[CLR]

Proximity alarm (blinking)
 Alarm sounds when you approached 0.1 NM from the point you pressed POB key.



CLR

Clears the POB mode, and returns to the previous screen when you pressed POB key. When alarm sounds, press CLR key to stop it. Press it again to return to the screen you were at before you pressed POB key.

1.7 Recalling Event and POB position

- (1) Press **MENU** key until menu options 1 to 9 appears.
- (2) Press **1** key to select "1: Waypoints".
- (3) Enter a storage number P0000 and W0001 to W0999 is POB and Event position data.

NOTE: 0000 : Position data where you pressed POB key
 0001 to 0999 : Position data that contains events

| 1:Waypoints | | | | |
|-------------|----|------------------------|----------|---------------------------------------|
| P0000 | 📍 | 35°38.209N 139°06.749E | 15 06:38 | P0000 is POB position data |
| W0001 | 📍 | 35°38.337N 139°06.035E | 18 13:56 | W0001~W0999 is Event position data |
| W0002 | ⚠️ | 35°38.052N 139°06.977E | 16 11:23 | |
| W0003 | 📍 | 35°38.229N 139°06.428E | 03 23:37 | |
| W0004 | ⚠️ | 35°37.810N 139°06.385E | 21 17:29 | |
| W0005 | 📍 | 35°37.727N 139°06.549E | 15 14:58 | |
| W0006 | 📍 | 35°36.245N 139°05.448E | 15 19:47 | |
| W0007 | 📍 | 35°38.222N 139°06.339E | 22 19:53 | |
| W0008 | 📍 | 35°38.092N 139°06.165E | 16 04:52 | |
| W0009 | 📍 | 35°38.706N 139°06.015E | 16 04:59 | |
| ⋮ | | | | |
| ⋮ | | | | |
| ⋮ | | | | |
| W0999 | | | | |

1.8 Copying Event and POB position

- Press **(MENU)** key until Menu options 1 to 9 appears.
- Press **(1)** key to select **"1: Waypoints"**
- Enter storage number (0000 to 0999) by numeric keys and press **(ENT)** key.
- Press **(ENT)** key to display the pop-up.
- Select **[Copy]** in the pop-up and press **(ENT)** key.
- Enter a source point number (0000 to 0999) by numeric keys.
- Press **(ENT)** key to copy the storage data.

Set
Reset
Edit
Copy
Delete

Press **(ENT)**

1:Waypoints

| | | | |
|--------------|----|------------------------|----------|
| P 0000 | 📍 | 35°38.209N 139°06.749E | 15 06:38 |
| W0001 | 📍 | 35°38.337N 139°06.035E | 18 13:56 |
| W0002 | ⚠️ | 35°38.052N 139°06.977E | 16 11:23 |
| W0003 | 📍 | 35°38.229N 139°06.428E | 03 23:37 |
| W0004 | ⚠️ | 35°37.810N 139°06.385E | 21 17:29 |
| W0005 | 📍 | 35°37.727N 139°06.549E | 15 14:58 |
| W0006 | 📍 | 35°36.245N 139°05.448E | 15 19:47 |
| W0007 | 📍 | 35°38.222N 139°06.339E | 22 19:53 |
| W0008 | 📍 | 35°38.092N 139°06.165E | 16 04:52 |
| W0009 | 📍 | 35°38.706N 139°06.015E | 16 04:59 |

Copy

W0002 → 0000

W0000

15 06:38

35°38.209N

139°06.749E

- If OK, select **[Yes]** in the pop-up and press **(ENT)** key.
If cancel overwriting, select **[No]** in the pop-up and press **(ENT)** key.

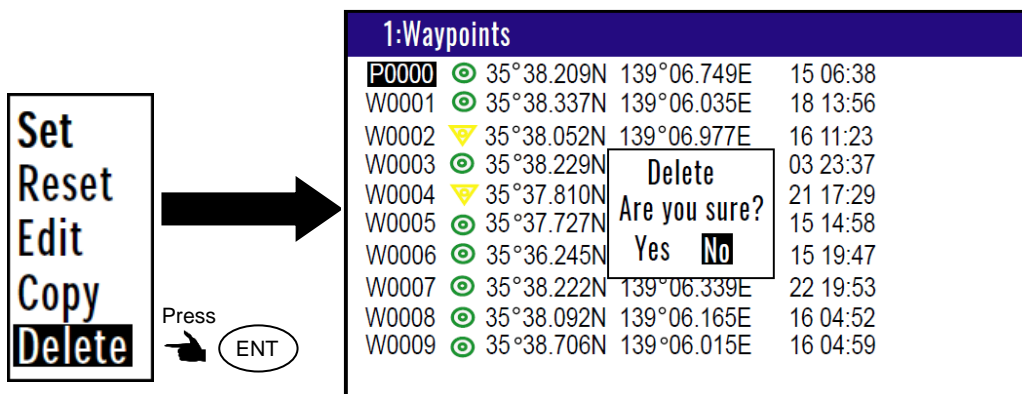
Overwrite

Are you sure?

Yes **No**


1.8.1 Erasing Event and POB position


- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **1** key to select "1: Waypoints".
- (3) Enter storage number (0000 to 0999) by numeric keys and press **ENT** key.
- (4) Press **ENT** key to display the pop-up.
- (5) Select **[Delete]** in the pop-up and press **ENT** key.
- (6) If OK, select **[Yes]** in the pop-up and press **ENT** key.
 If cancel erasing, select **[No]** in the pop-up and press **ENT** key.



Chapter 2 Various Navigation

2.1 Storing waypoints (LAT/LONG) data

NOTE: Press  to backspace the cursor to correct an input error.

NOTE: Press  to clear incorrect input. You can reenter Numeric data.

2.1.1 Storing a new waypoint or updating an existing a waypoint

Up to 10000 waypoints can be stored in memory. As 1000 points (numbers 0000 and 0999) are reserved for POB and event registration, you can use 1000 to 9999 (total of 9000 points) to store waypoints.

LAT/LONG mode (Example)

MENU

1: Waypoints

2: Routes

3: GNSS

4: Compensation


5: Alarms


6: Calculation







7: Initial setup

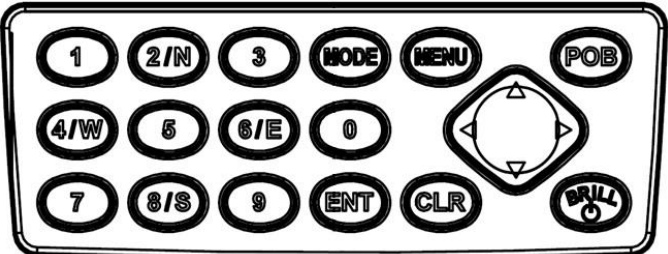
8: Interface




9: Plotter

Press  key




| Number | Mark | Latitude | Longitude | Comment |
|--------------------|---|------------|-------------|----------------|
| 1:Waypoints | | | | |
| W1000 | X | 35°38.209N | 139°06.749E | 03.07.15 06:38 |
| W1001 |  | 35°38.337N | 139°06.035E | |
| W1002 |  | 35°38.052N | 139°06.977E | YOKOHAMA 1 |
| W1003 |  | 35°38.229N | 139°06.428E | 04.19.15 13:38 |
| W1004 |  | 35°37.810N | 139°06.385E | YOKOHAMA 2 |
| W1005 | X | 35°37.727N | 139°06.549E | 04.19.15 14:58 |
| W1006 | X | 35°36.245N | 139°05.448E | |
| W1007 |  | 35°38.222N | 139°06.339E | URAYASU |
| W1008 |  | 35°38.092N | 139°06.165E | ODAIBA |
| W1009 | X | 35°38.706N | 139°06.015E | 05.11.15 14:18 |





- (1) Press  key until Menu options 1 to 9 appears.
- (2) Press  key to select "1: Waypoints".
- (3) Enter storage number (0000 to 9999) by numeric keys and press  key.


1:Waypoints

W1000 X 35°38.209N 139°06.749E

W1001  35°38.337N 139°06.035E

W1002  35°38.052N 139°06.977E





W1003  35°38.229N 139°06.428E




W1004  35°37.810N 139°06.385E


W1005 X 35°37.727N 139°06.549E

W1006 X 35°36.245N 139°05.448E


Press


   


  



1:Waypoints


W3622  35°38.052N 139°06.977E


W3623  35°38.229N 139°06.428E



W3624  35°37.810N 139°06.385E

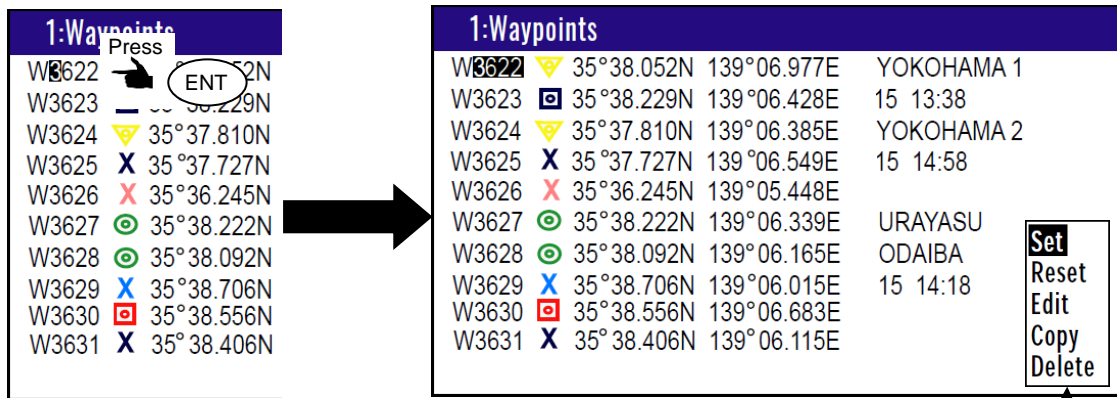
W3625 X 35°37.727N 139°06.549E

W3626 X 35°36.245N 139°05.448E

W3627  35°38.222N 139°06.339E

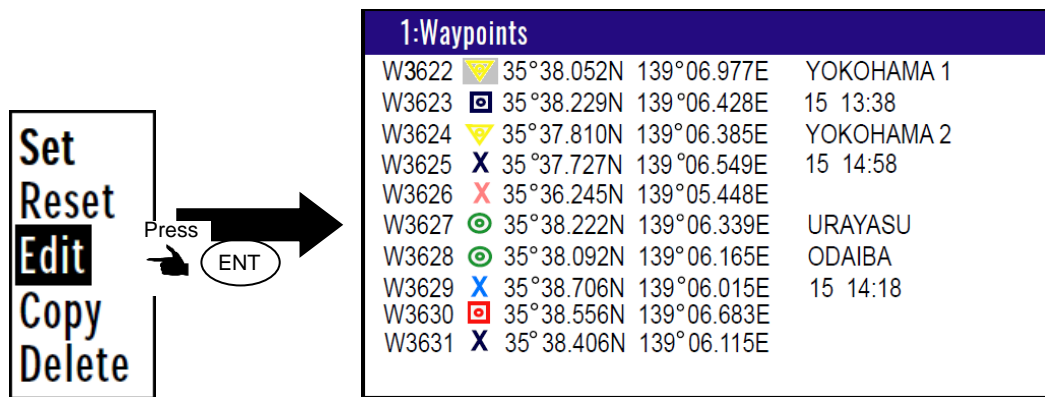
W3628  35°38.092N 139°06.165E

- (4) Press  key to display the pop-up.
- (5) Select [Edit] in the pop-up and press  key.



Pop-up appear

(6) Press [▶] [◀] key to move the cursor to select [Mark], [Latitude], [Longitude] or [Comment].



(7) [Mark] settings:

- 1) Press **ENT** key to select the [Mark].
- 2) Press [◉] key to select the shape of the mark.
- 3) Press **ENT** key.



(8) [Latitude] and [Longitude] settings:

Example: The position “N35°38.180 / E139°42.990” is entered by pressing the following keys in exact order given below. [3],[5],[3],[8],[1],[8],[0],[N],[1],[3],[9],[4],[2],[9],[9],[0],[E].

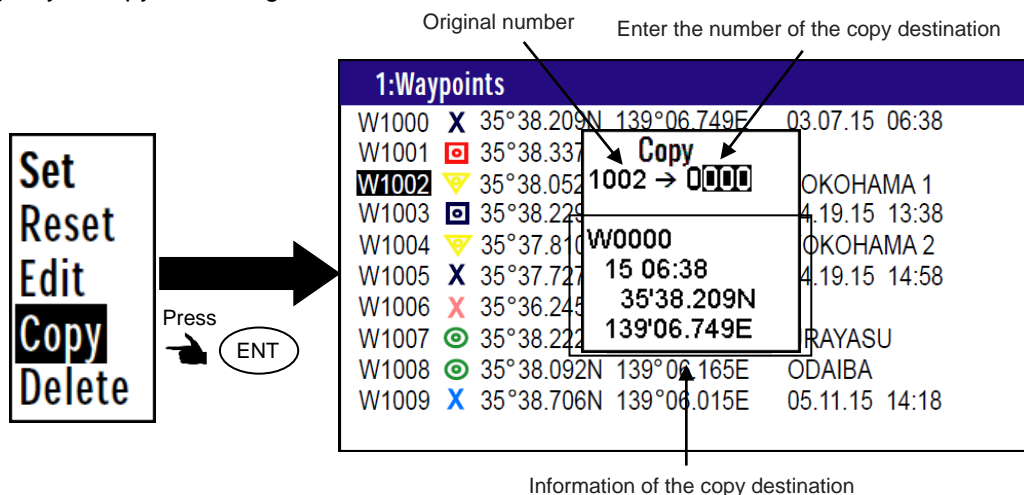
(9) [Comment] settings:

- 1) Press **ENT** key to select of the [Comment].
- 2) Press [◉] key to select a comment letter in the pop-up.
- 3) Finally press **ENT** key after moved a cursor to the [APPLY] in the pop-up.
- 4) Press [▲] or [▼] key when the work has been completed.

2.1.2 Copying a position

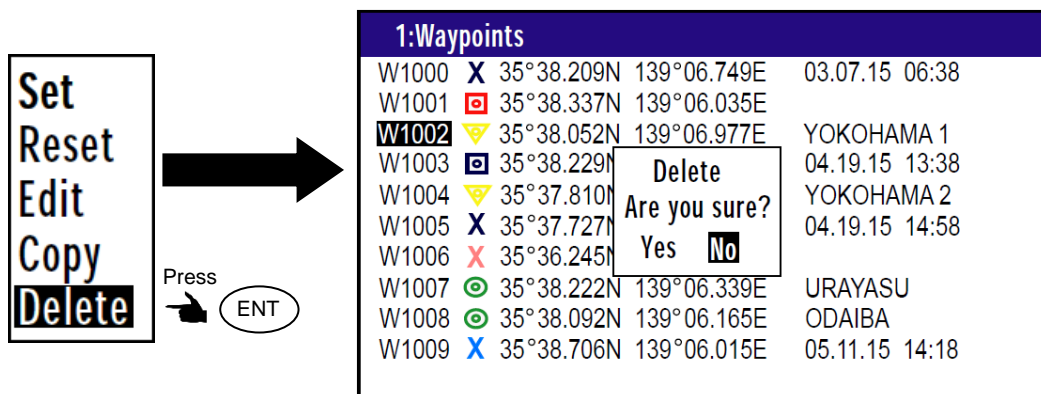
You can copy the position data (stored with numbers 0000 to 9999) to the waypoint data (having numbers 1000 to 9999).

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(1)** key to select "1: Waypoints".
- (3) Enter storage number (0000 to 9999) by numeric keys and press **(ENT)** key.
- (4) Press **(ENT)** key to display the pop-up.
- (5) Select **[Copy]** in the pop-up and press **(ENT)** key.
- (6) Enter a source point number (1000 to 9999) by numeric keys.
- (7) Press **(ENT)** key to copy the storage data.




2.1.3 Erasing a single waypoint


- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
 - (2) Press **(1)** key to select "1: Waypoints".
 - (3) Enter storage number (0001 to 9999) by numeric keys and press **(ENT)** key.
 - (4) Press **(ENT)** key to display the pop-up.
 - (5) Select **[Delete]** in the pop-up and press **(ENT)** key.
 - (6) If OK, select **[Yes]** in the pop-up and press **(ENT)** key.
- If cancel erasing, select **[No]** in the pop-up and press **(ENT)** key.



NOTE: To erase an entire data from memory simultaneously, see "WPT. / Route clear" (page 6-5).

2.2 Setup of waypoint navigation

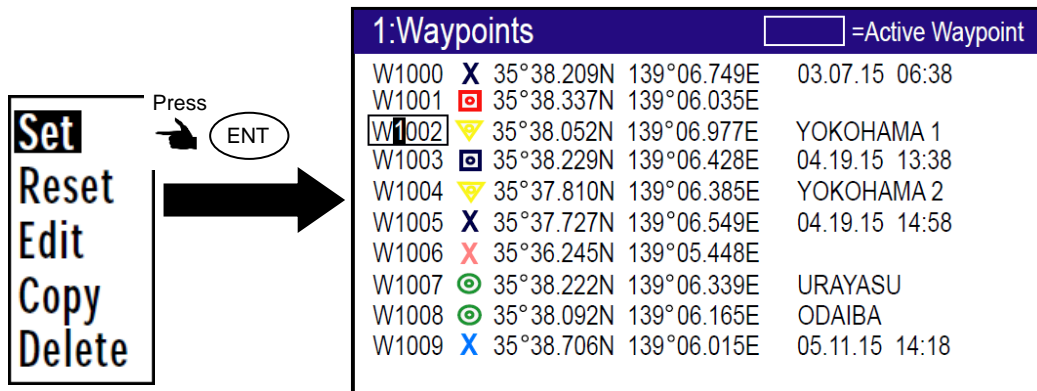
 **NOTE:** Press to backspace the cursor to correct an input error.








 **NOTE:** Press to clear incorrect Input. You can reenter Numeric data.

2.2.1 Setting waypoint navigation

The position data for each waypoint must be set prior to navigating to waypoints. You can use the data already stored from Menu, or you can set the waypoints on screen 1 to screen 9 (called the quick waypoint navigation).

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **1** key to select “1: Waypoints”.
- (3) Enter storage number (0000 to 9999) by numeric keys and press **ENT** key.
- (4) Press **ENT** key to display the pop-up.
- (5) Select **[Set]** in the pop-up and press **ENT** key.
- (6) Number is surrounded by square.



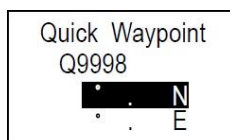
| 1:Waypoints | | | |  =Active Waypoint |
|--------------|---|------------|-------------|---|
| W1000 | X | 35°38.209N | 139°06.749E | 03.07.15 06:38 |
| W1001 |  | 35°38.337N | 139°06.035E | |
| W1002 |  | 35°38.052N | 139°06.977E | YOKOHAMA 1 |
| W1003 |  | 35°38.229N | 139°06.428E | 04.19.15 13:38 |
| W1004 |  | 35°37.810N | 139°06.385E | YOKOHAMA 2 |
| W1005 | X | 35°37.727N | 139°06.549E | 04.19.15 14:58 |
| W1006 | X | 35°36.245N | 139°05.448E | |
| W1007 |  | 35°38.222N | 139°06.339E | URAYASU |
| W1008 |  | 35°38.092N | 139°06.165E | ODAIBA |
| W1009 | X | 35°38.706N | 139°06.015E | 05.11.15 14:18 |

2.2.2 Quick waypoint setup

Quick WPT (first priority waypoint) can be set by specifying it directly either from the screen 1 to screen 9. When the new waypoint is selected, the waypoint navigation to it will commence and the specified position, along with the comment (**QUICK**), will be assigned to the position number 9998. Old data is replaced with a new during quick WPT setup.

While the pages of either the screen 1 to screen 9 are displayed.

- (1) Press **0** key to display “QUICK” pop-up menu.

Quick Waypoint
Q9998


(2) Enter latitude and longitude.

For example, if “N35°38.180 / E139°42.990” is inputted, a key will be pressed in order of [3],[5],[3],[8],[1],[8],[0],[N], [1],[3],[9],[4],[2],[9],[9],[0],[E].

(3) The waypoint is set and the point data is stored in number 9998.

2.2.3 Canceling waypoint navigation

To cancel waypoint navigation, turn WPT to reset on screen 1 to screen 9. There are two ways.

- Cancel from [MENU].

- Cancel from screen 1 to screen 9.

1) When reset from [MENU].

(1) Press **MENU** key until Menu options 1 to 9 appears.

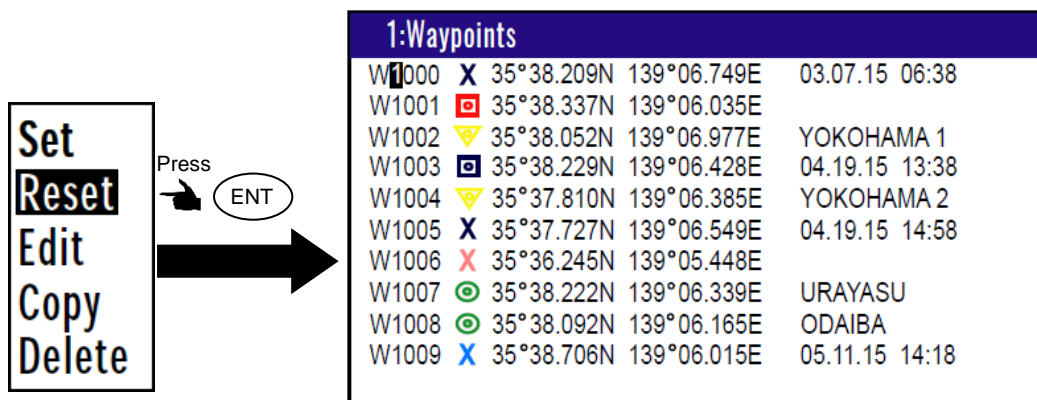
(2) Press **1** key to select “1: Waypoints”.

(3) Enter storage number (0000 to 9999) by numeric keys and press **ENT** key.

(4) Press **ENT** key to display the pop-up.

(5) Select **Reset** in the pop-up and press **ENT** key.

(6) No square from Number.

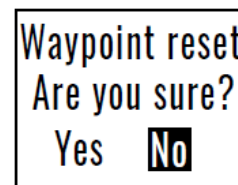


2) When reset from screen 1 to screen 9.

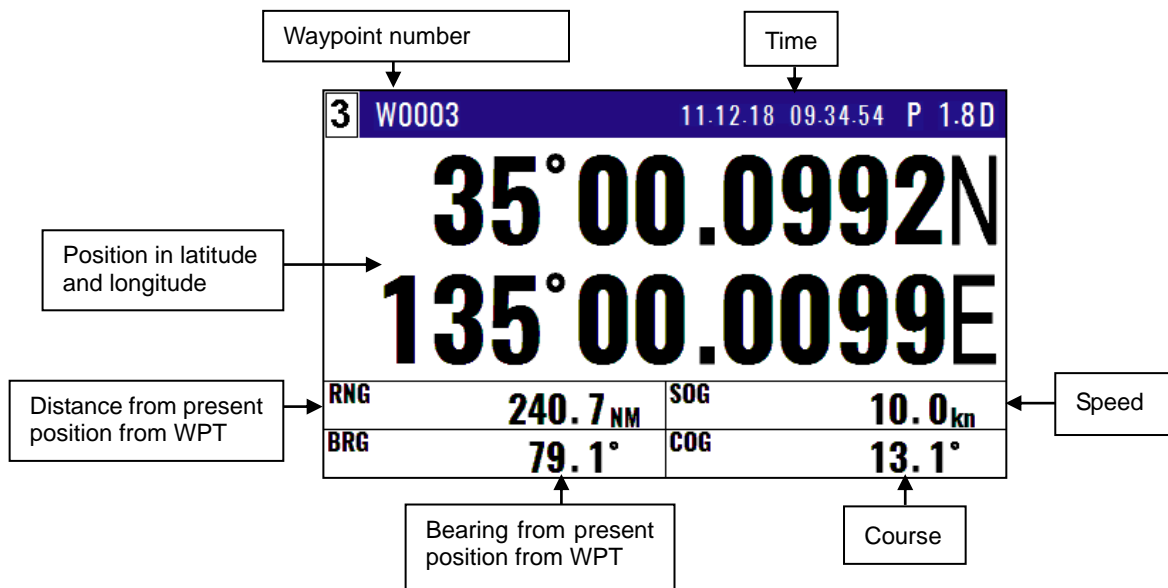
(1) Press **CLR** key.

(2) If OK, select **Yes** in the pop-up and press **ENT** key.

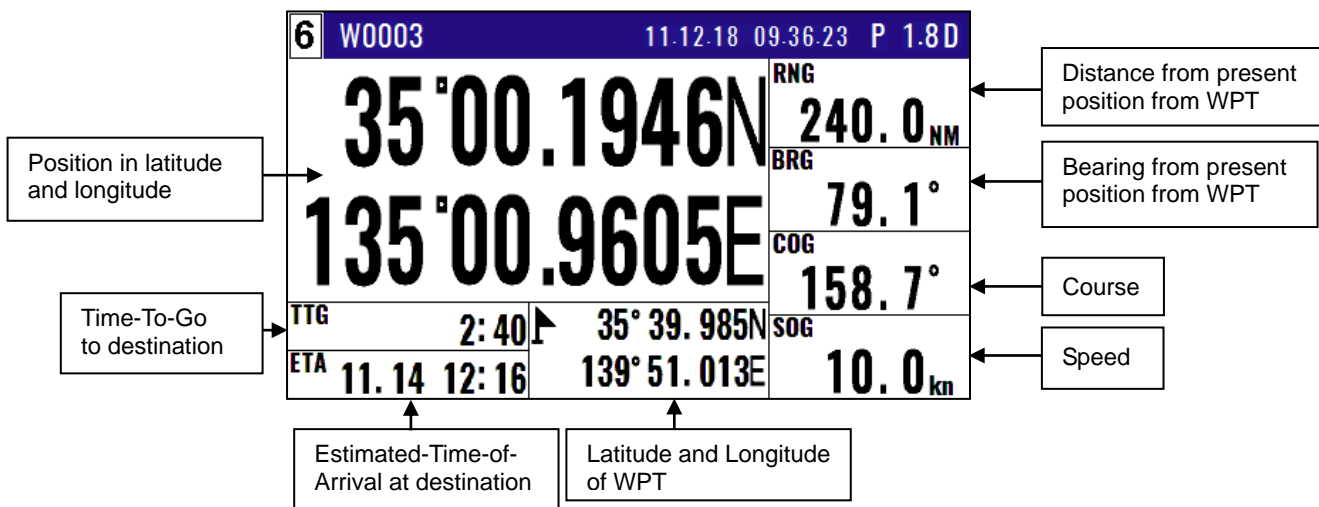
If cancel erasing, select **No** in the pop-up and press **ENT** key.



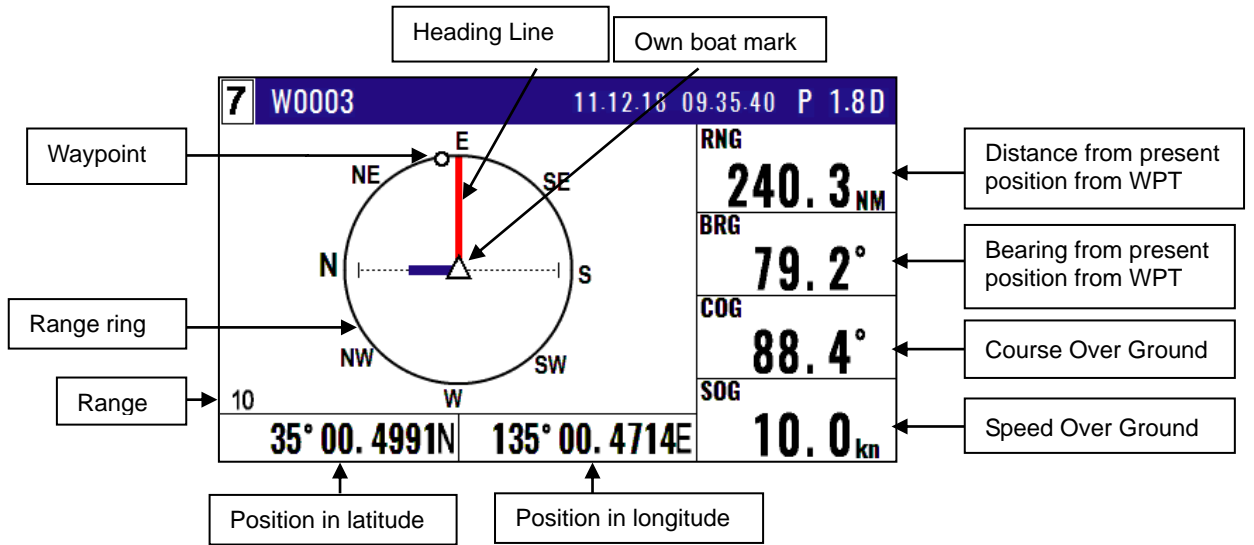
2.2.4 NAV2 screen during waypoint navigation



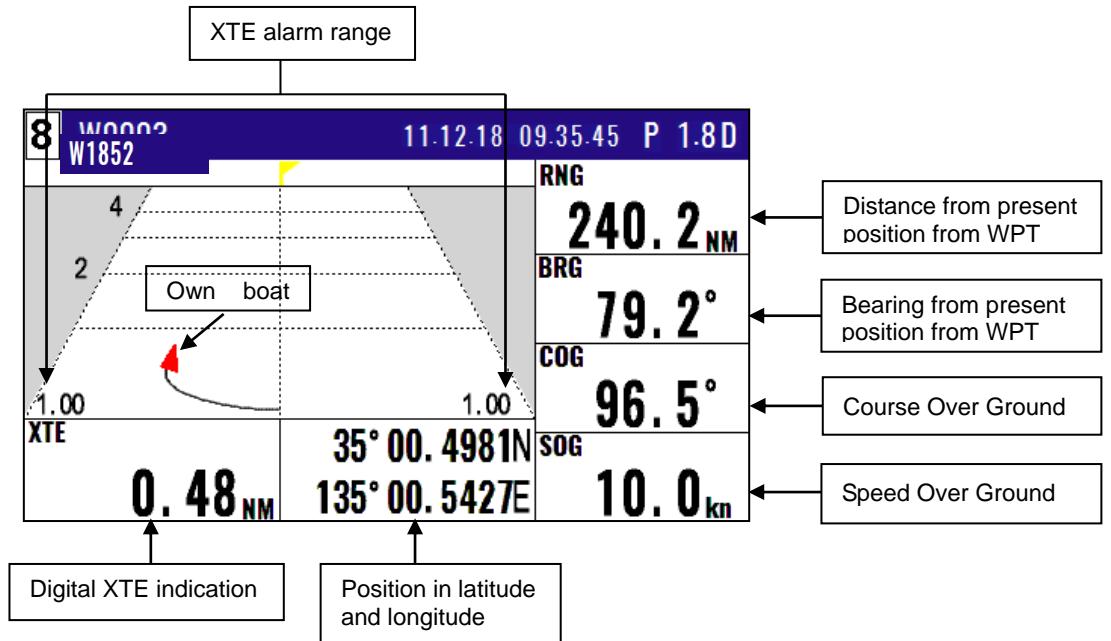
2.2.5 NAV3 screen during waypoint navigation



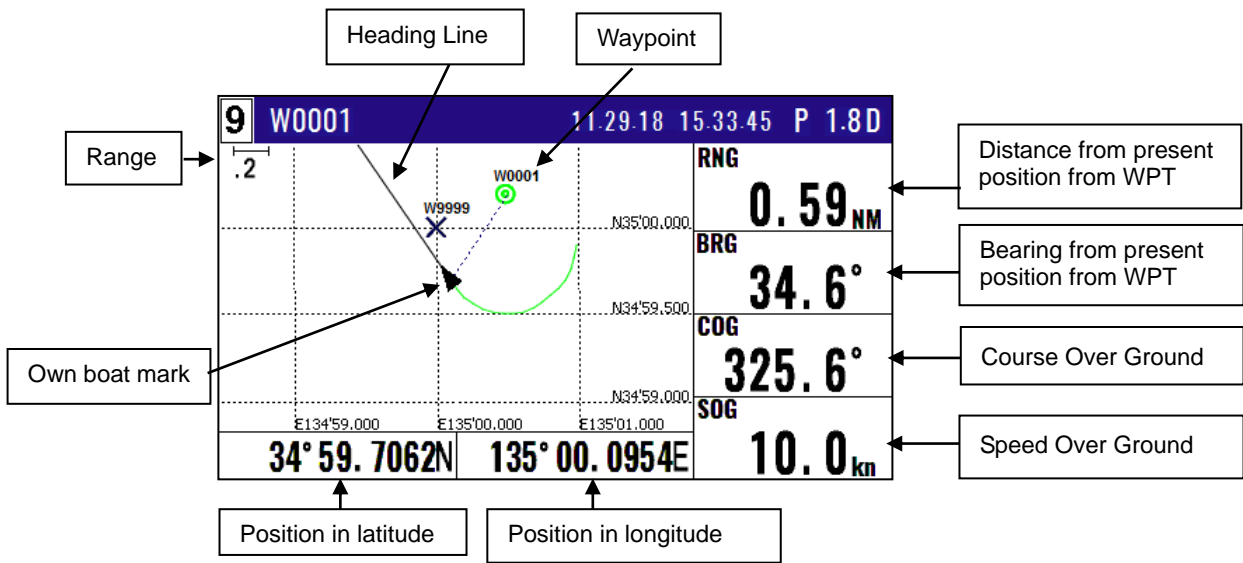
2.2.6 NAV4 screen during waypoint navigation



2.2.7 NAV5 screen during waypoint navigation



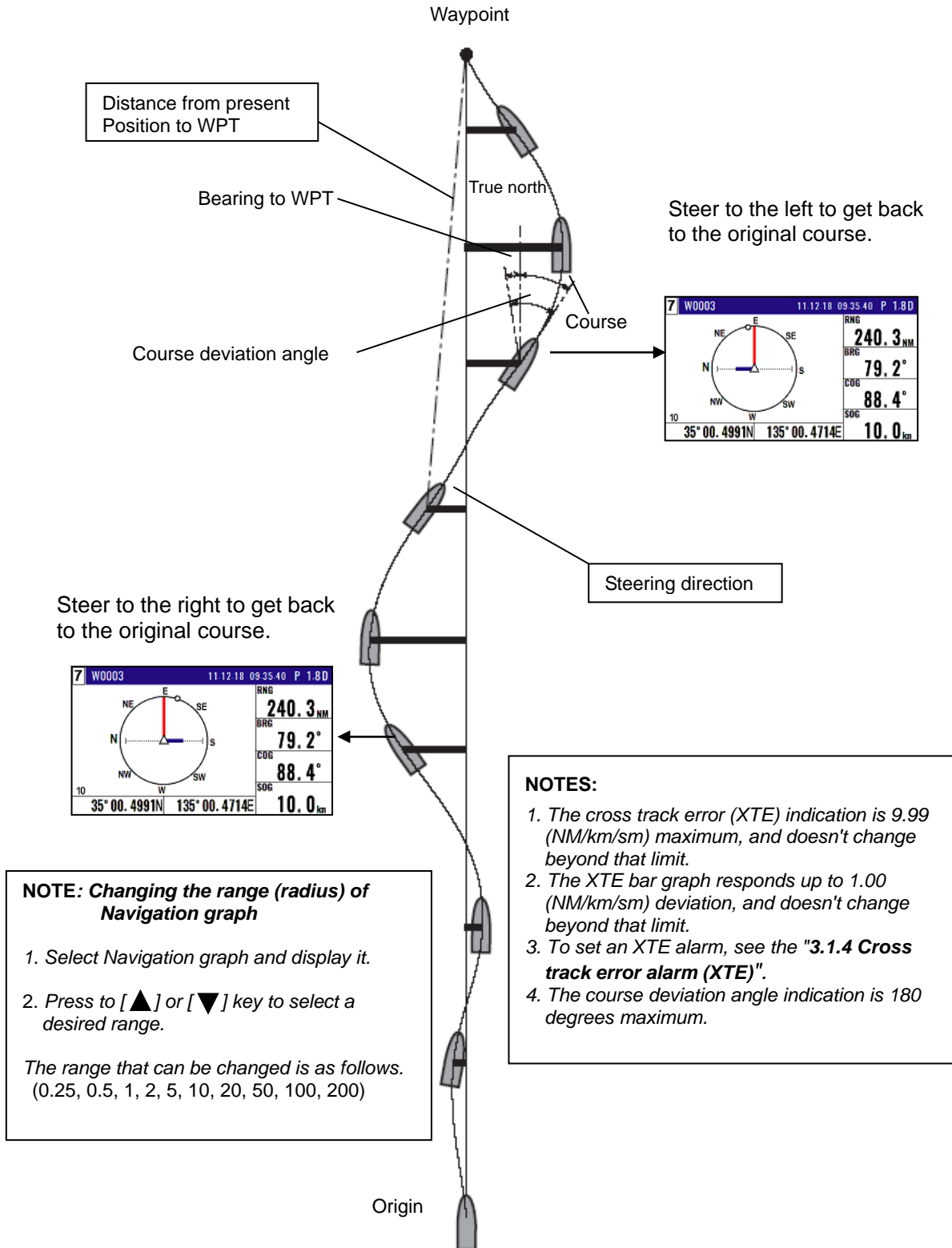
2.2.8 NAV6 screen during waypoint navigation



2.3 Cross track error and course deviation angle

2.3.1 Navigation graph screen

Use the navigation graph to check the distance and bearing to the waypoint. When the distance to WPT is further than the range (radius) of navigation graph, the WPT locates on the circle of navigation graph. When the distance is closer than the graph range, the WPT marking is shown in the circle. The XTE bar graph and course deviation angle bar graphs appear only when the WPT is on the circle (these graphs are cleared in the short distance).

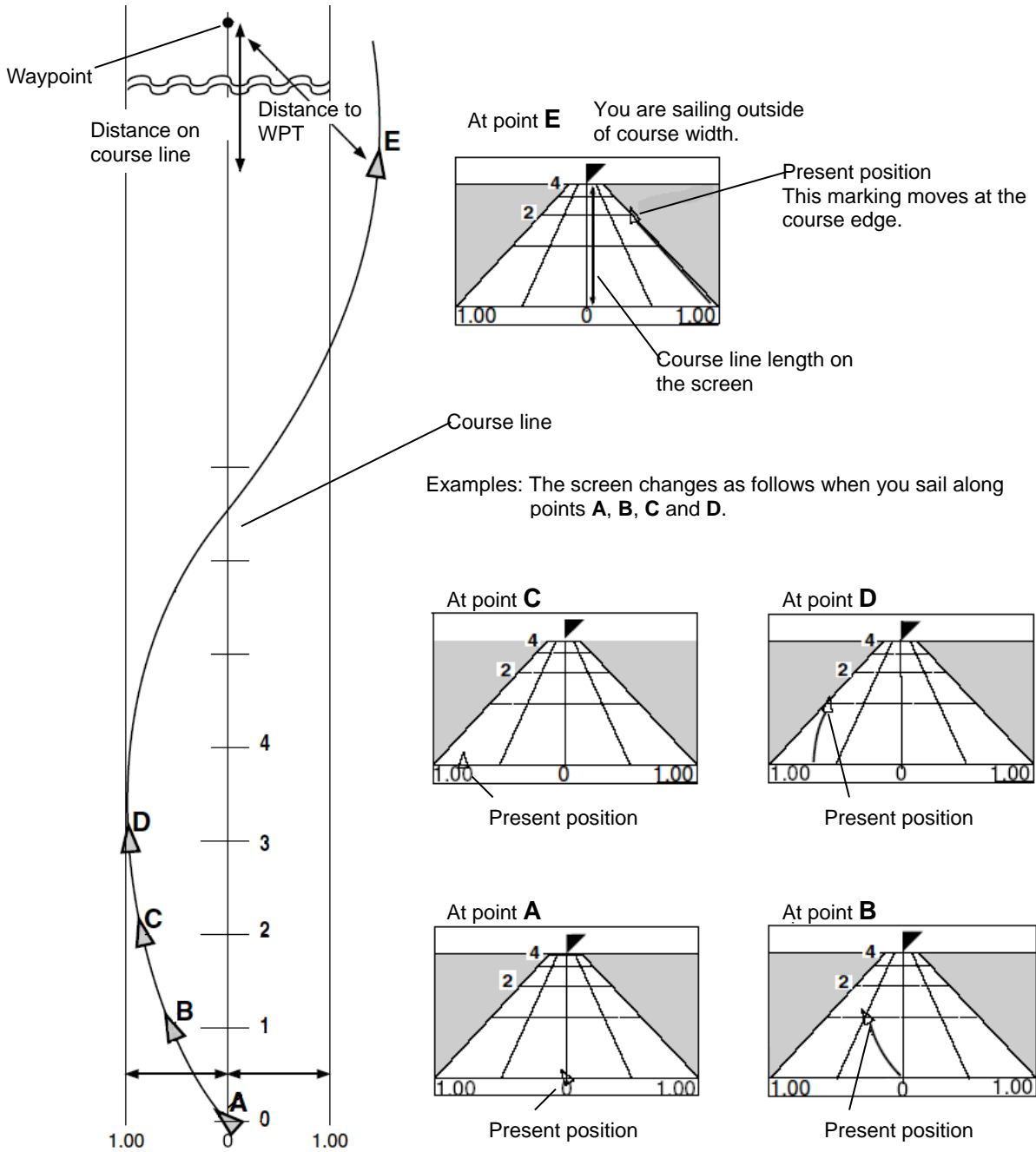


2.3.2 Highway display (NAV5) screen

Use the three-dimensional chart for navigation on the course line. You can set a course width from Menu (5: Alarm). Symbol “▲” shows the waypoint, and your ship and track are shown along the course line.

(When waypoint is distance)

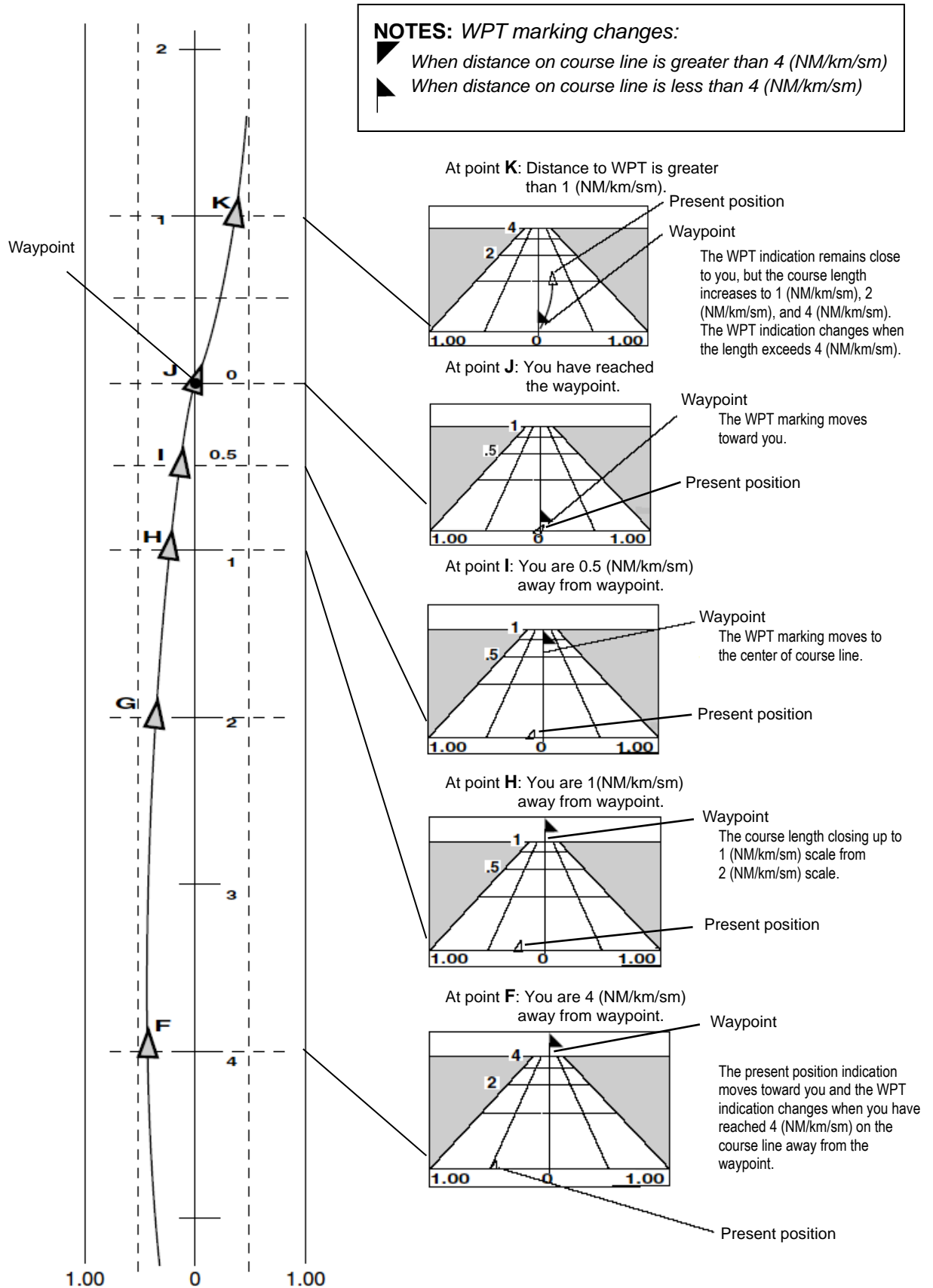
When the distance is greater than 4 (NM/km/sm), the 4 (NM/km/sm) course line is shown on the screen. When you have sailed 2 (NM/km/sm), the present position indication moves toward you and the next 4 (NM/km/sm) are shown.




XTE alarm range
 To set an XTE alarm, see the "3.1.4 Cross track error alarm (XTE)".


(Nearing to the WPT)

When you are close to the waypoint, the course line length decreases to 4 (NM/km/sm), 2 (NM/km/sm) and 1 (NM/km/sm). Then, the WPT marking closes to your ship.









2.4 Storing and erasing routes


 **NOTE:** Press to backspace the cursor to correct an input error.

 **NOTE:** Press to clear incorrect Input. You can reenter Numeric data.

2.4.1 Storing your route

Up to 100 routes and 50 waypoints can be registered for one route.

- (1) Press  key until Menu options 1 to 9 appears.
- (2) Press  key to select "2: Route".
- (3) Press  key to select "1: Route Set / Edit". Route Input screen is displayed.
- (4) Enter a route number (001 to 100) by numeric keys and press  key.
- (5) Press  key to display the pop-up.
- (6) Select [Edit] in pop-up and press  key.

| 2-1:Route Set / Edit | | | |
|----------------------|---|---------------|--|
| | 1st WP | last WP | |
| R001: | SURUGAWAN | W1000 - W1010 | |
| R002: | YOKOHAMA3 | W0020 - W0025 | |
| R003: | SURUGAWAN2 | W1011 - W1054 | |
| R004: | Press | W2022 - W2075 | |
| R005: |  | W0003 - W0010 | |
| R006: | | W0004 - W0018 | |
| R007: | ODAIBA | W3000 - W3040 | |
| R008: | | W3041 - W3049 | |
| R009: | | W3050 - W3065 | |
| R010: | | W - W | |

➔

| 2-1:Route Set / Edit | | | |
|----------------------|------------|---------------|--------|
| | 1st WP | last WP | T.RNG |
| R001: | SURUGAWAN | W1000 - W1010 | 256.80 |
| R002: | YOKOHAMA3 | W0020 - W0025 | 21.74 |
| R003: | SURUGAWAN2 | W1011 - W1054 | 9.98 |
| R004: | | W2022 - W2075 | 198.80 |
| R005: | ODAWARA2 | W0003 - W0010 | 224.50 |
| R006: | ODAWARA3 | W0004 - W0018 | 48.29 |
| R007: | ODAIBA | W3000 - W3040 | 27.13 |
| R008: | | W3041 - W3049 | 6.74 |
| R009: | | W3050 - W3065 | 187.50 |
| R010: | | W - W | . |

Set
Reset
Edit
Copy
Delete

- (7) Press [▲] or [▼] key to move the cursor to select [Comment] or [Waypoint].

Input of Comment





2-1: Route Set / Edit

R005: (Total :00)

| | | | | | | |
|----------|---|---|---|---|---|---|
| 01:W---- | . | . | N | . | . | W |
| 02:W---- | . | . | N | . | . | W |
| 03:W---- | . | . | N | . | . | W |
| 04:W---- | . | . | N | . | . | W |
| 05:W---- | . | . | N | . | . | W |
| 06:W---- | . | . | N | . | . | W |
| 07:W---- | . | . | N | . | . | W |
| 08:W---- | . | . | N | . | . | W |
| 09:W---- | . | . | N | . | . | W |
| 10:W---- | . | . | N | . | . | W |

Input location of Waypoint

- (8) [Comment] settings:

- 1) Press  key to select of the [Comment].
- 2) Press  key to select a comment letter in pop-up. Press  key to input.
- 3) Press  key to after moved a cursor to the [APPLY] in the pop-up.

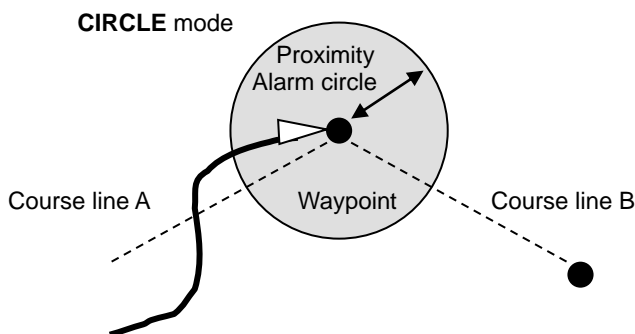
(9) [Waypoint] settings:

- 1) Press **ENT** key to select of the Input location of Waypoint.
- 2) Enter a waypoint number (0000 to 9999) of the route by numeric keys. (You can check its memory data on the screen.)
- 3) Press **ENT** key to store the waypoint number.

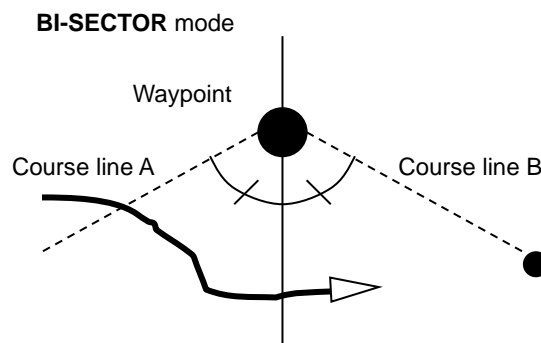
(10) Repeat (9) steps to set another waypoint in the route.

2.4.2 Automatic switching of waypoints

Route navigation can switch the current waypoint in two ways: switching in CIRCLE mode and switching in BI-SECTOR mode. In CIRCLE mode, the next waypoint is shown when you reach the proximity alarm circle. In BI-SECTOR mode, the next waypoint is shown when you cross a half-angle line.

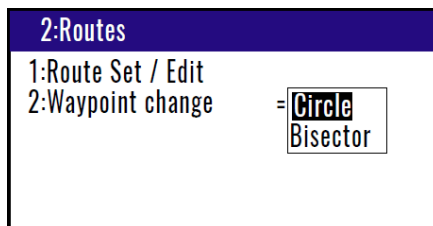


When you reach the proximity alarm circle, the course line is switched from A to B. To change the proximity alarm range, see "Setting and canceling" (page 3-5).



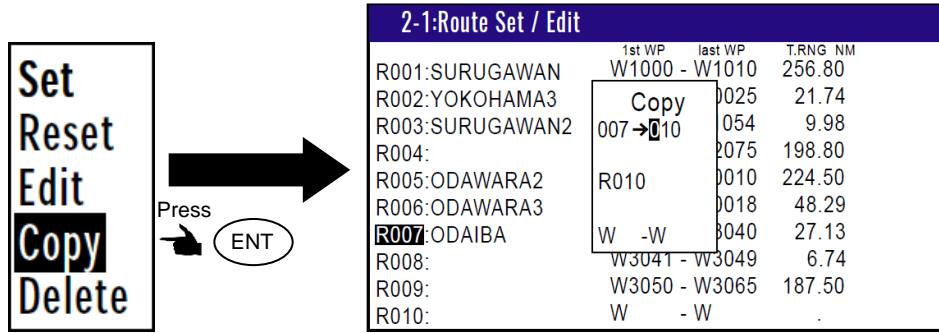
When you cross a half-angle line, the course line is switched from A to B.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **2/N** key to select "2: Route".
- (3) Press **2/N** key to select "2: Waypoint change".
- (4) Press **[▲]** or **[▼]** key to locate cursor to select a mode.
- (5) Press **ENT** key. The selected mode will be shown.



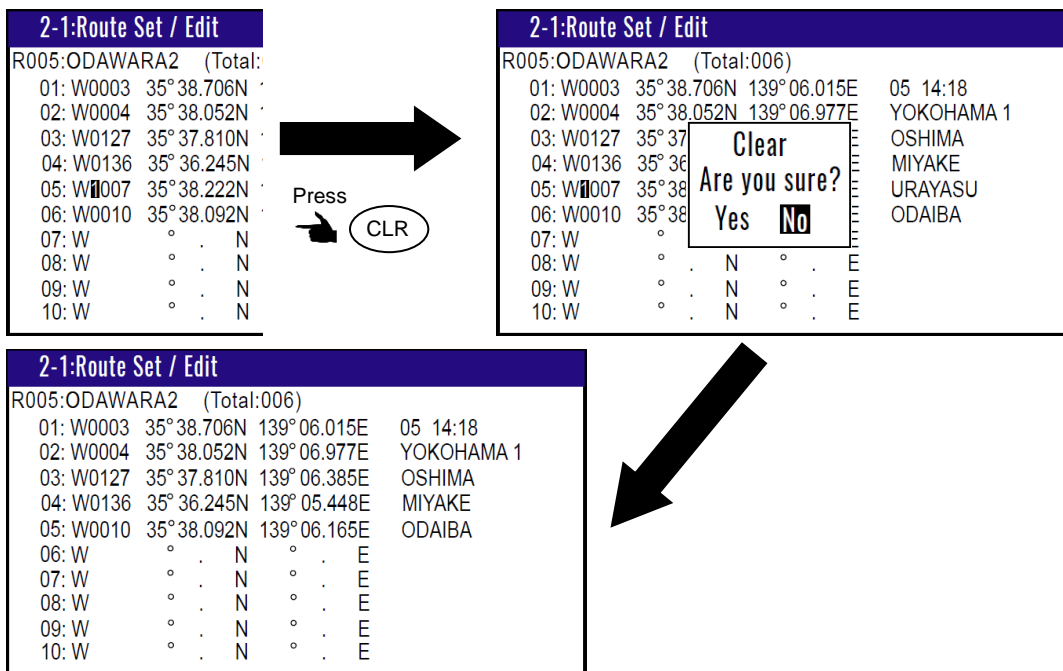
2.4.3 Copying a single route

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **2/N** key to select "2: Route".
- (3) Press **1** key to select "1: Route Set / Edit". Route Input screen is displayed.
- (4) Enter a route number (001 to 100) using numeric keys and press **ENT** key.
- (5) Press **ENT** key to display the pop-up.
- (6) Select **[Copy]** in the pop-up and press **ENT** key.
- (7) Enter a source point number (001 to 100) by numeric keys.
- (8) Press **ENT** key to copy the route data.



2.4.4 Erasing point data

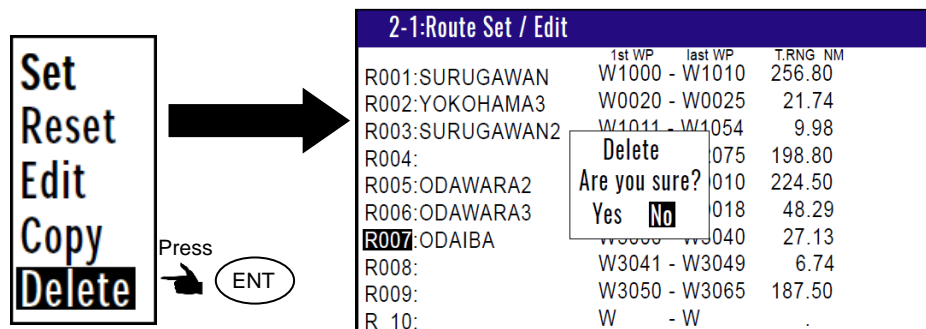
- Press **MENU** key until Menu options 1 to 9 appears.
- Press **2/N** key to select **"2: Route"**.
- Press **1** key to select **"1: Route Set / Edit"**. Route Input screen is displayed.
- Enter a route number (001 to 100) by numeric keys and press **ENT** key.
- Press **ENT** key to display the pop-up.
- Select **[Edit]** in the pop-up and press **ENT** key.
- To delete any Waypoint, press **CLR** key in a place that is registered
- If OK, select **[Yes]** in the pop-up and press **ENT** key.
If Cancel, select **[No]** in the pop-up and press **ENT** key.



2.4.5 Erasing a single route

- Press **MENU** key until Menu options 1 to 9 appears.
- Press **2/N** key to select **"2: Route"**.
- Press **1** key to select **"1: Route Set / Edit"**. Route Input screen is displayed.
- Enter a route number (01 to 100) by numeric keys and press **ENT** key.

- (5) Press **ENT** key to display the pop-up.
- (6) Select **[Delete]** in the pop-up and press **ENT** key to display the pop-up.
- (7) If OK, select **[Yes]** in the pop-up and press **ENT** key.
If Cancel, select **[No]** in the pop-up and press **ENT** key.



NOTE: To erase all stored data from memory, see **“WPT. / Route clear”** (page 6-5).

2.5 Route setup

You can use up to 50 points to go to a final destination using route navigation. You can also reverse the navigation route to return to the start point. To do so, you must first store the waypoints and route from MENU 1. See **“2.4.1 Storing your route”** (page 2-12).

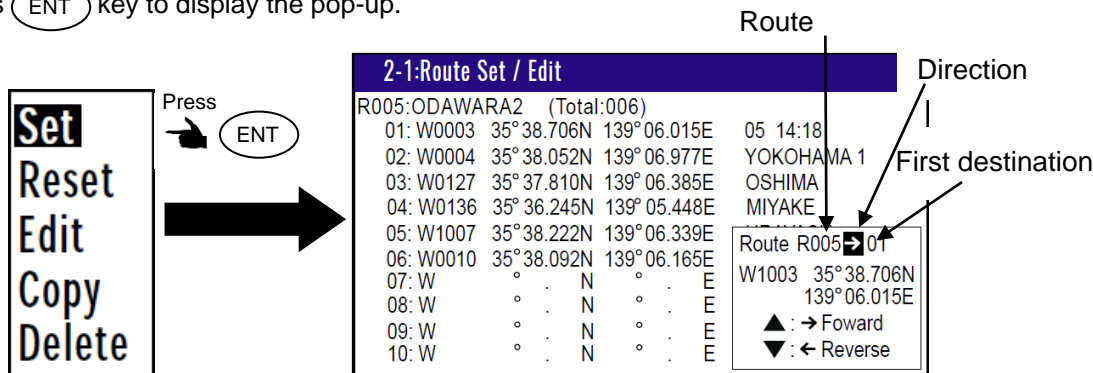
You can set the route by entering a route number, forward/backward navigation, and start waypoint number of the route.

2.5.1 Selecting route navigation

You navigate on a route, following the course line, which is automatically updated as you reach each waypoint. Use the following steps to start route navigation.

Select the reverse navigation only after you have reached the final destination, or the route navigation may not work properly.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **2/N** key to select **“2: Route”**.
- (3) Press **1** key to select **“1: Route Set / Edit”**. Route Input screen is displayed.
- (4) Enter a route number (001 to 100) by numeric keys and press **ENT** key.
- (5) Press **ENT** key to display the pop-up.



- (6) Select [Set] in the pop-up and press (ENT) key.
- (7) You can select the first destination. In addition, you can be selected to Forward and Reverse.
 - 1) Press [▲] key if you go Forward.
Press [▼] key if you go Reverse.
 - 2) Select the first destination.
 - 3) Press (ENT) key.
- (8) Number is surrounded by square.

| 2-1:Route Set / Edit | | | | []:Active Route |
|----------------------|-----------------|---------------|--------|------------------|
| | 1st WP | last WP | T.RNG | NM |
| R001: | SURUGAWAN | W1000 - W1010 | 256.80 | |
| R002: | YOKOHAMA3 | W0020 - W0025 | 21.74 | |
| R003: | SURUGAWAN2 | W1011 - W1054 | 9.98 | |
| R004: | | W2022 - W2075 | 198.80 | |
| R005: | ODAWARA2 | W0003 - W0010 | 224.50 | |
| R006: | ODAWARA3 | W0004 - W0018 | 48.29 | |
| R007: | ODAIBA | W3000 - W3040 | 27.13 | |
| R008: | | W3041 - W3049 | 6.74 | |
| R009: | | W3050 - W3065 | 187.50 | |
| R010: | | W - W | . | |

2.5.2 Checking a route point position

You can check the waypoints on a route from the Menu.

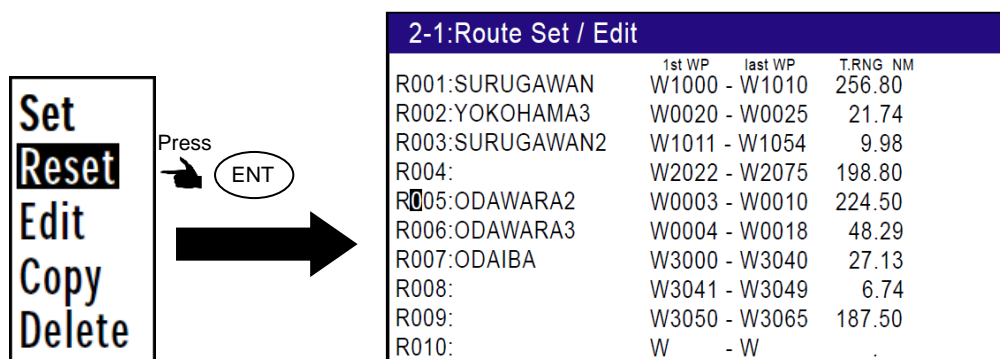
- (1) Press (MENU) key until Menu options 1 to 9 appears.
- (2) Press (2/N) key to select "2: Route".
- (3) Press (1) key to select "1: Route Set / Edit". Route Input screen is displayed.
- (4) Enter a route number (001 to 100) by numeric keys and press (ENT) key.
- (5) Press (ENT) key to display the pop-up.
- (6) Select [Edit] in the pop-up and press (ENT) key.

| 2-1:Route Set / Edit | | | | |
|----------------------|-----------------|-------------|-------------|------------|
| R005: | ODAWARA2 | (Total:006) | | |
| 01: | W0003 | 35°38.706N | 139°06.015E | 05 14:18 |
| 02: | W0004 | 35°38.052N | 139°06.977E | YOKOHAMA 1 |
| 03: | W0127 | 35°37.810N | 139°06.385E | OSHIMA |
| 04: | W0136 | 35°36.245N | 139°05.448E | MIYAKE |
| 05: | W1007 | 35°38.222N | 139°06.339E | URAYASU |
| 06: | W0010 | 35°38.092N | 139°06.165E | ODAIBA |
| 07: | W | ° . N | ° . E | |
| 08: | W | ° . N | ° . E | |
| 09: | W | ° . N | ° . E | |
| 10: | W | ° . N | ° . E | |

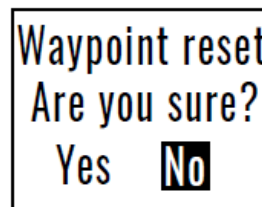
2.5.3 Canceling route navigation

To cancel waypoint navigation, turn Route to OFF on screen 1 to screen 9.

- Cancel from [MENU]
 - Cancel from screen 1 to screen 9.
- 1) Cancel from [MENU]
 - (1) Press **MENU** key until Menu options 1 to 9 appears.
 - (2) Press **2/N** key to select **"2: Route"**.
 - (3) Press **1** key to select **"1: Route Set / Edit"**. Route Input screen is displayed.
 - (4) Enter a route number (001 to 100) by numeric keys and press **ENT** key.
 - (5) Press **ENT** key to display the pop-up.
 - (6) Select [Reset] in the pop-up and press **ENT** key.



- 2) Cancel from screen 1 to screen 9.
 - (1) Press **CLR** key.
 - (2) If OK, select [Yes] in the pop-up and press **ENT** key.
If Cancel, select [No] in the pop-up and press **ENT** key.

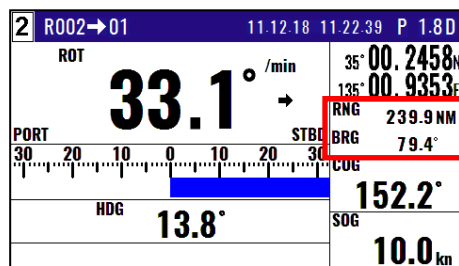
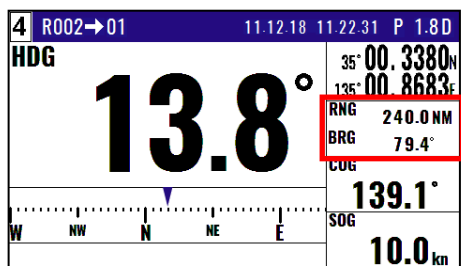
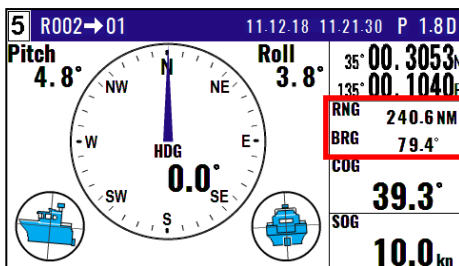
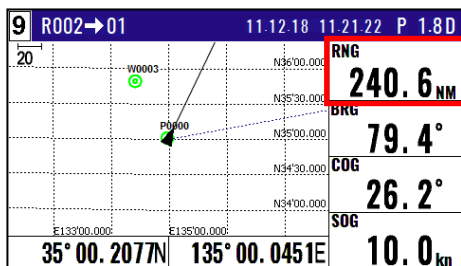
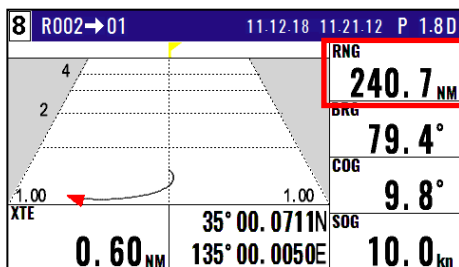
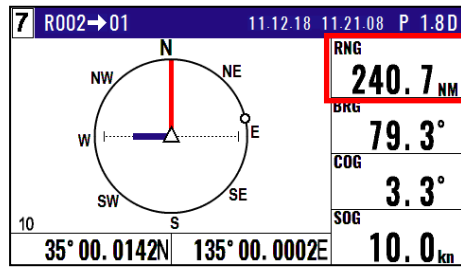
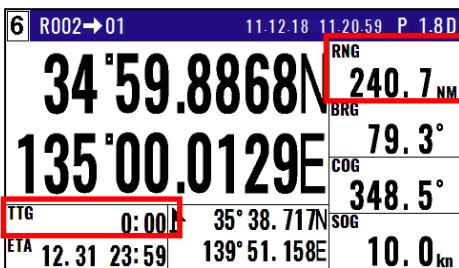
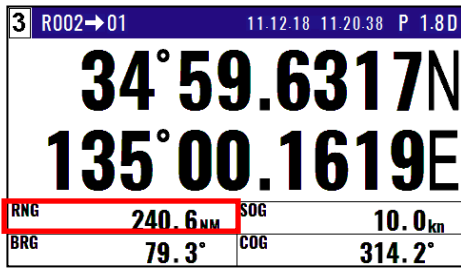


2.5.4 Switching between distance and time to go

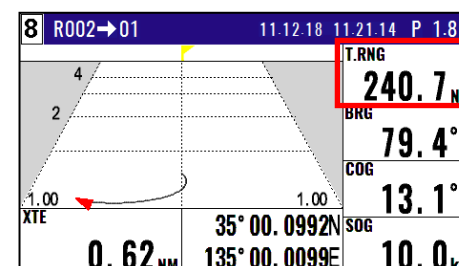
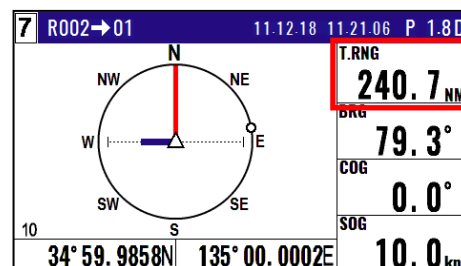
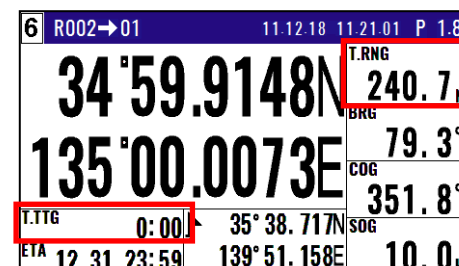
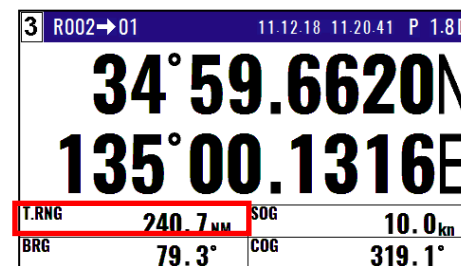
When you select the "RNG" (Distance to WPT) or "T.RNG" (Total distance) on screen 1 to screen 9 in route navigation, the respective "TTG" (Time to go to WPT) or "T.TTG" (Total time to go) is shown.

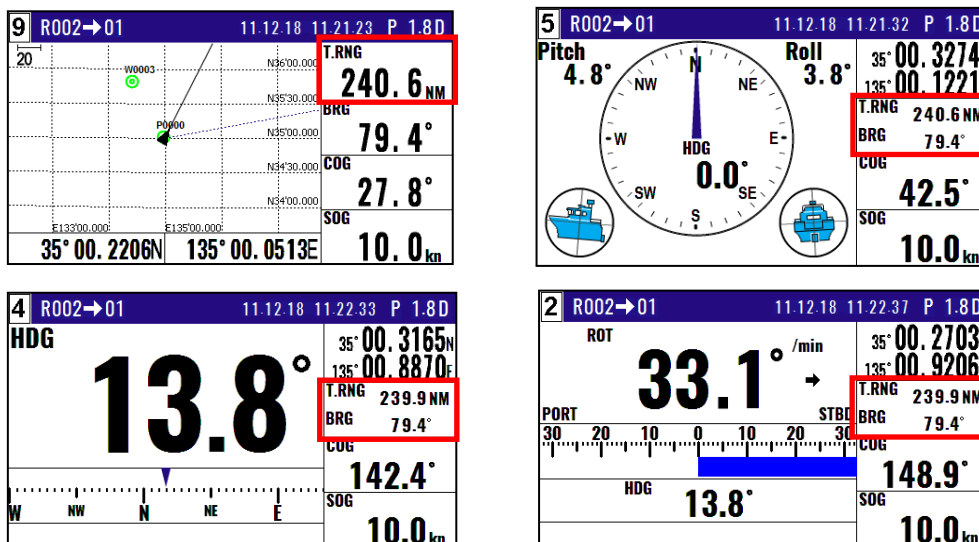
NOTE: "RNG" shows the distance to the next waypoint.
 "T.RNG" shows the total distance to the final destination.
 "TTG" shows the time to the next waypoint.
 "T.TTG" shows the total time to the final destination.

- (1) When the screen of the destination distance or the required time to the destination is selected, Press **MODE** key until screen 1 to screen 9 appears.
- (2) Press [**◀**] key to display "RNG" and "TTG".



(3) Press [►] key to display "T.RNG" and "T.TTG".





(4) Press [◀] key to display “RNG” and “TTG”.

2.6 Setting an anchor position

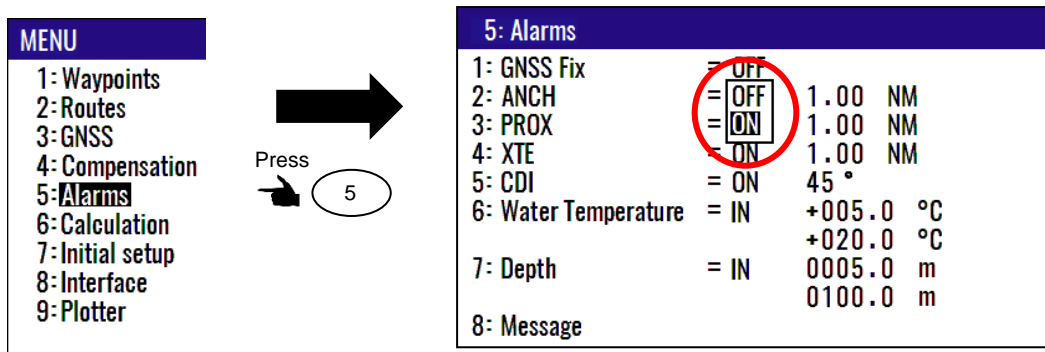
After arriving at your destination, it is possible to drift from the anchor position due to a tide or wind. Once the anchor position is stored in memory, it is easy to check the distance and bearing moved from the anchor position.

2.6.1 Storing an anchor position

When the current position information is input from the outside, you can set the anchor position from the screen 1 to screen 9.

The following operations allow you to store and specify the current position as the anchor position. The anchor position is registered to memory number A9997 along with the comment.

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(5)** key to select “5: Alarms”.
- (3) Press **(2/N)** key to select “2: ANCH”.
- (6) Select **[ON]** in the pop-up and press **(ENT)** key.



(5) When either the destination distance or the destination position screen is selected,

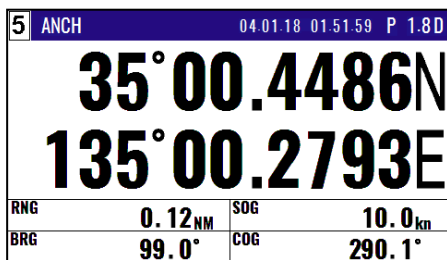
Press **MODE** key until screen 1 to screen 9 appears.

(6) Press **POB** key.

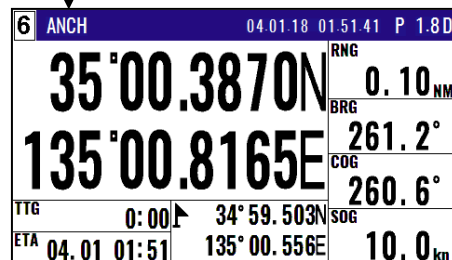
(7) Press **6/E** key. (Goto ANCH)

⇒ Goto POB :[POB]
 Goto Event :[ENT]
 Goto ANCH:[6/E]
 Cancel :[CLR]

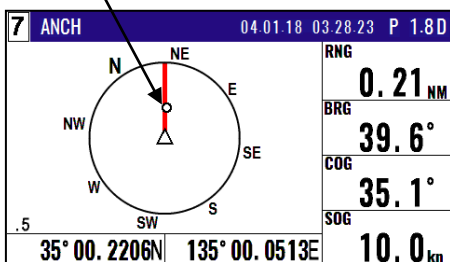
RNG: Distance from anchor position.
BRG: Bearing from anchor position.



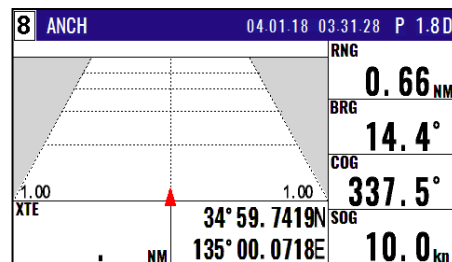
Anchor setting mark



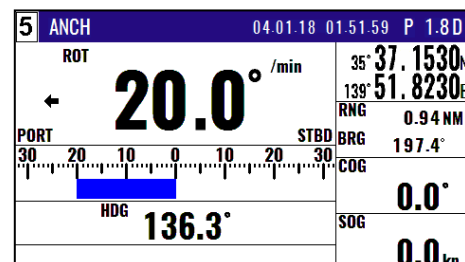
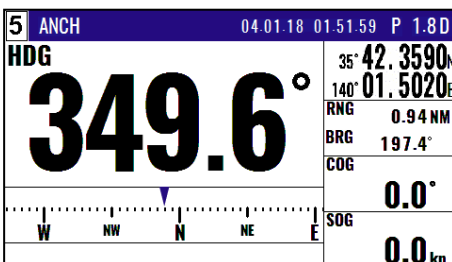
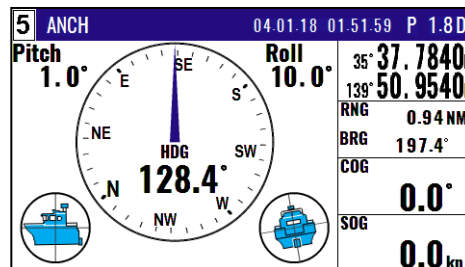
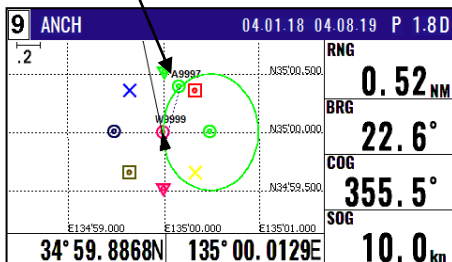
Anchor position



Anchor position

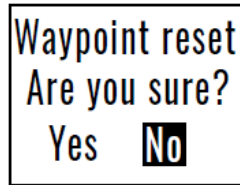


Anchor mark



2.6.2 Canceling anchor position

- (1) Press **(MODE)** key until screen 1 to screen 9 appears.
- (2) Press **(CLR)** key.
- (3) If OK, select **[Yes]** in the pop-up and press **(ENT)** key.
If Cancel, select **[No]** in the pop-up and press **(ENT)** key.





2.7 Track display

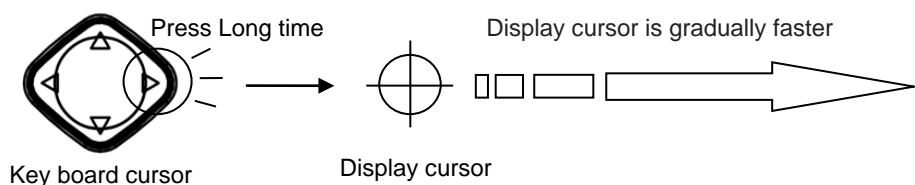
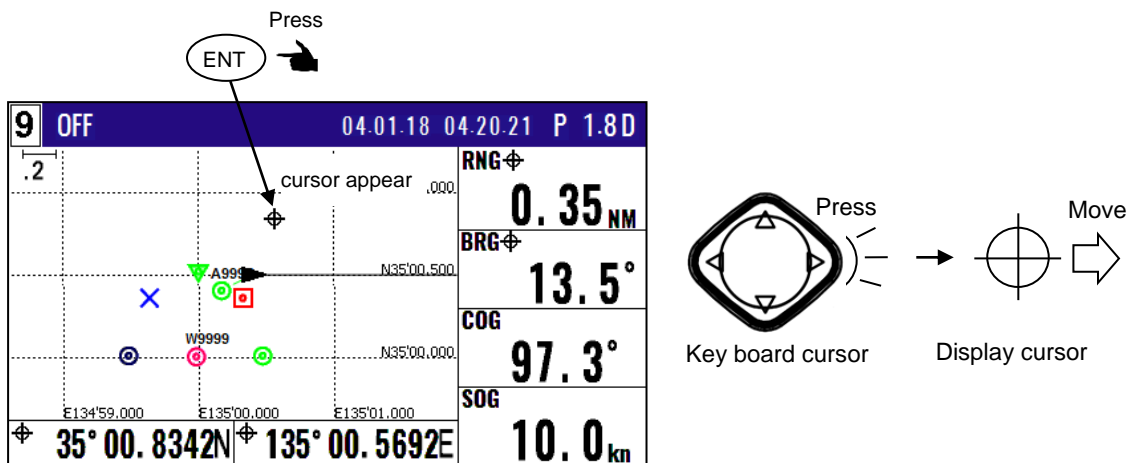
You can display track, the waypoint, course line, and cross cursor on the NAV6 screen.

2.7.1 Display a cross cursor on Plotter screen

You can display a cursor and position it on the screen.

(How to use cross cursor)

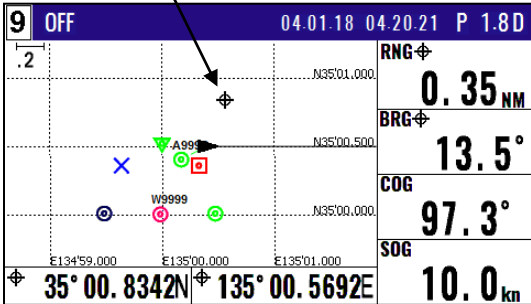
- (1) When the plotter screen is selected, press **(MODE)** key until Plotter screen appears.
- (2) Press **(ENT)** key, cursor appears.
- (3) Press [] key to move display cursor.
Move quickly display cursor by pressing a long time [] key
- (4) Press **(CLR)** key, cursor disappears.



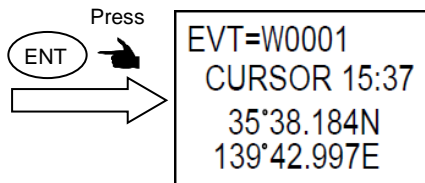
(How to store display cursor position)

(1) With the display cursor activated, press **ENT** key to store the display cursor position. (Note: not the present ship's position).

Move the cursor to any point on the screen



Appears EVT mark the position of the cursor



2.7.2 Screen scrolling

You can scroll the Plotter screen in any direction so that your ship is always shown on the screen. If your ship moves off the screen, it will automatically return to the center of the display.

Press [] key while pressing the left upper number of selected screen.

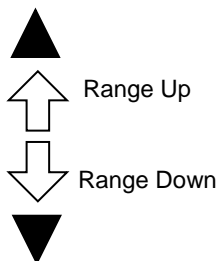
2.7.3 Scaling the Plotter screen

You can select a display scale of Plotter screen.

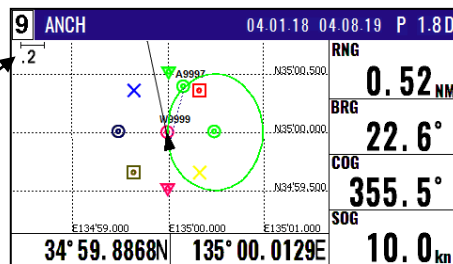
(1) Press to [▲] or [▼] key to select a desired range.

The range that can be changed is as follows.

(0.025, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20)



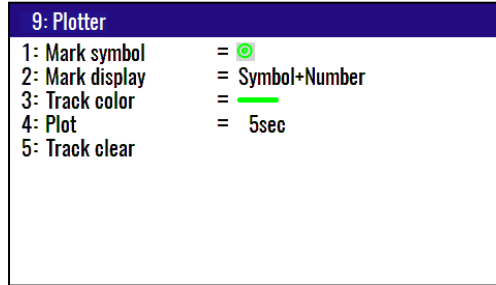
Scale indication fields
Initial scale: 0.025



NOTE: You can change the scale unit from Menu 2: UNIT of 7: INITIAL options.

2.7.4 Changing the setup contents

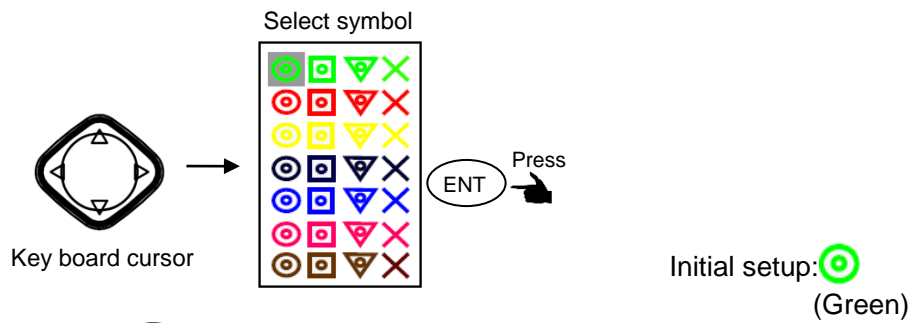
- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **9** key to select **“9: Plotter”**.



(3) Various settings

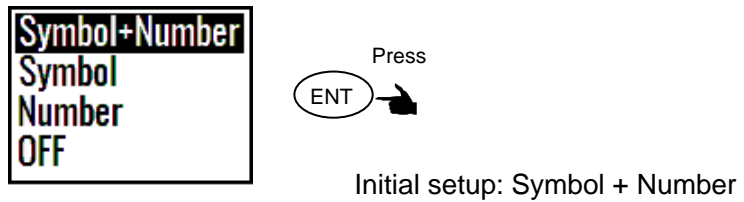
1) 1: Mark symbol (Press **1** key)

To change the Mark symbol, place cursor on **SYMBOL** option and press **ENT** key.



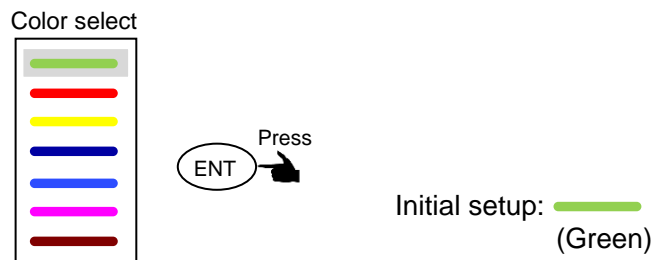
2) 2: Mark display (Press **2/N** key)

You can select whether or not to display the Event mark information.



3) 3: Track color (Press **3** key)

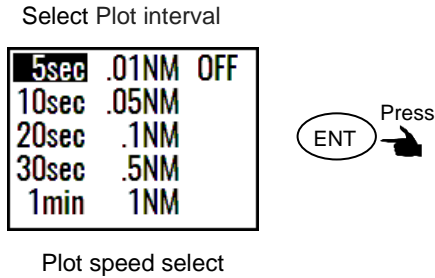
You can select the color of the future Track.



4) 4: Plot (Press 4/W key)

To adjust the track recording interval (time or distance interval), locate cursor on **Plotter** option, and press ENT key.

You can set the unit of track distance interval from the Menu **7-2: Units**



Initial setup: 5sec.

5) 5: Track clear (Press 5 key)

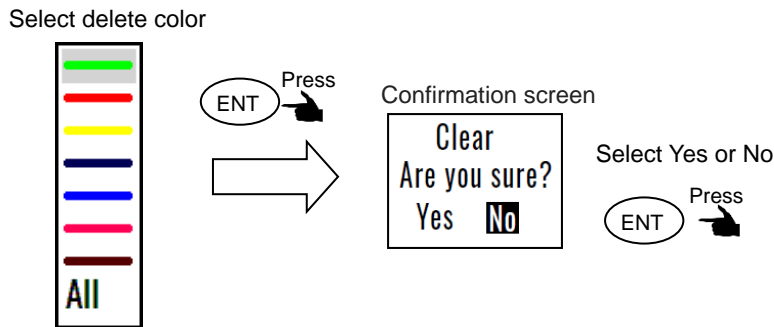
To delete the track according to color or all color, press 5 key.

The pop-up of select color will appear.

Select Track color to delete in the pop-up and press ENT key.

If OK, select [Yes] in the pop-up and press ENT key.

If Cancel, select [No] in the pop-up and press ENT key.



Chapter 3 Alarms

3.1 Kinds of alarms

There are seven kinds of alarms, **GNSS Fix**, anchor watch (**ANCH**), proximity (**PROX**), cross track error (**XTE**), course deviation angle (**CDI**), Water temperature (**W.Temp**) and Depth (**Depth**).

| 5: Alarms | | | |
|----------------------|---|-----|-----------|
| 1: GNSS Fix | = | OFF | |
| 2: ANCH | = | OFF | 1.00 NM |
| 3: PROX | = | ON | 1.00 NM |
| 4: XTE | = | ON | 1.00 NM |
| 5: CDI | = | ON | 45 ° |
| 6: Water Temperature | = | OFF | +015.0 °C |
| | | | +020.0 °C |
| 7: Depth | = | OFF | 0005.0 m |
| | | | 0050.0 m |
| 8: Message | | | |

3.1.1 GNSS Fix

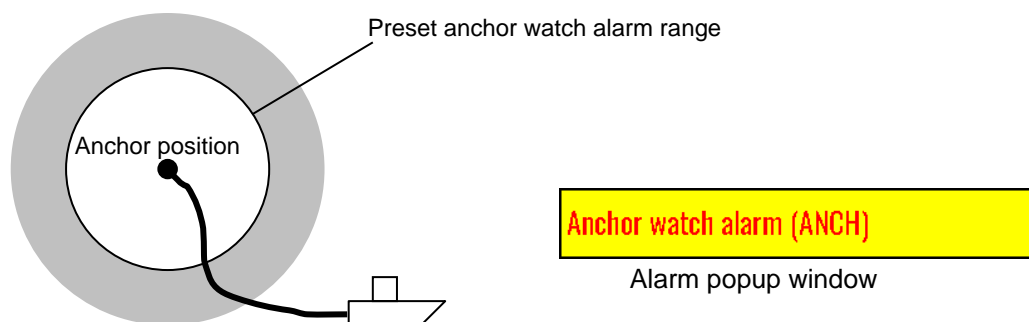
If you set ON of GNSS Fix alarm, alarm warns by short beep once when position is lost. And alarm warns again after position fix.

3.1.2 Anchor watch alarm (ANCH)

An anchor watch alarm can alert you if your boat drifts a set distance from where it is activated. This alarm function will not work if the alarm range is set to "0.00". "**Anchor watch alarm (ANCH)**" appears in the popup window and buzzer (short beep) sounds when outside of alarm range.

Please refer **2.6.1 Storing an anchor position**.

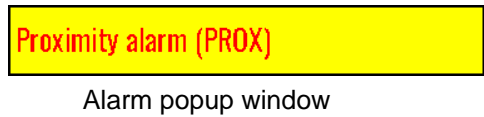
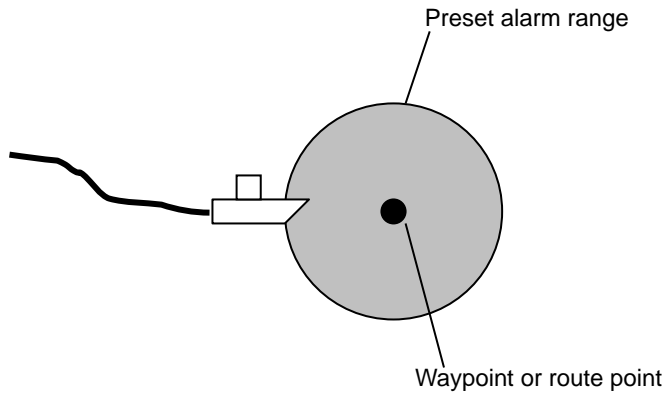
Press **CLR** key to turn off buzzer. And the alarm popup window is also hidden.



Initial setup: OFF, 1.00NM
 Enter an alarm range: 0.00 to 9.99

3.1.3 Proximity alarm (PROX)

A proximity alarm alerts you when you arrive to within a preset distance to a waypoint. The proximity alarm will not work if the alarm range is set to "0.00". Note: you will automatically advance to the next waypoint at the alarm range if you have selected the CIRCLE mode of route navigation by "Automatic switching of waypoints" (page 2-13). "**Proximity alarm (PROX)**" appears in the popup window and buzzer (short beep) sounds when I arrive. Press (CLR) key to turn off buzzer. And the alarm popup window is also hidden.

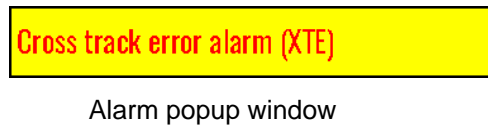
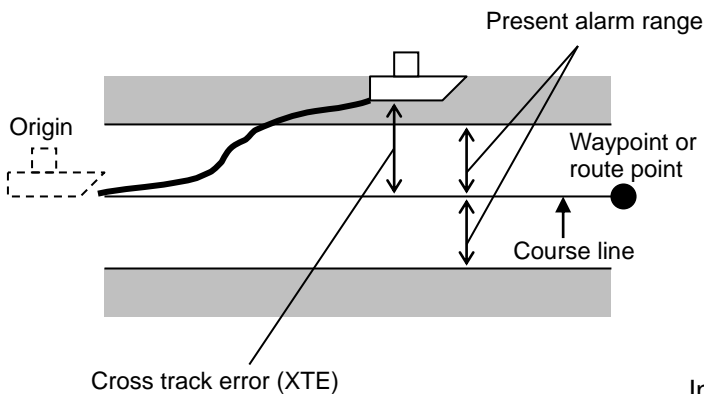


Initial setup: ON, 1.00
Enter an alarm range: 0.00 to 9.99

3.1.4 Cross track error alarm (XTE)

The cross track error (XTE) alarm alerts you when you have deviated from your course line by a predetermined distance. The alarm function does not work if the alarm range is set to '0.00'. The course width shown on "Highway display" screen is the same as the XTE alarm value you have set. "**Cross track error alarm (XTE)**" appears in the popup window and buzzer (long beep) sounds when I'm away from XTE range.

Press (CLR) key to turn off buzzer. And the alarm popup window is also hidden.



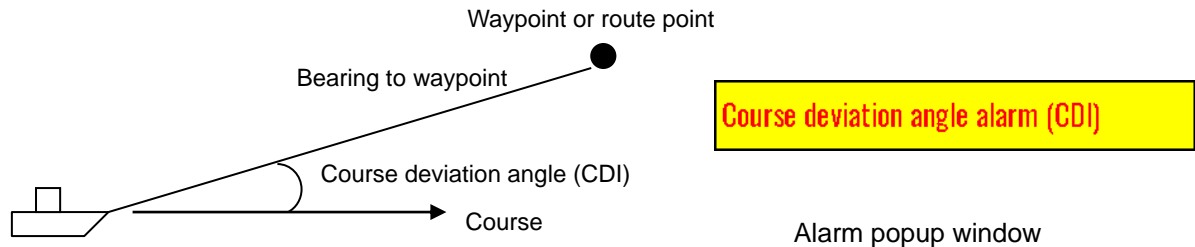
Initial setup: ON, 1.00
Enter an alarm range: 0.00 to 9.99

3.1.5 Course deviation angle alarm (CDI)

The CDI alarm alerts you when you deviate from your course to steer by a predetermined margin.

The alarm function does not work if the alarm range is set to "00". "**Course deviation angle alarm (CDI)**" appears in the popup window and buzzer (long beep) sounds when I'm away from CDI range.

Press **CLR** key to turn off buzzer. And the alarm popup window is also hidden.



Course deviation angle alarm (CDI)

Alarm popup window

Initial setup: ON, 45 degrees

Enter an alarm range: 00 to 99 degrees

3.1.6 Water Temperature alarm (IN, OUT)

Water temperature alarm can be used when inputting water temperature data. The water temperature alarm alerts when the set water temperature falls within the range or outside the range.

The upper alarm range and lower alarm range can not be the same.

"**Water Temperature alarm (IN)**" and "**Water Temperature alarm (OUT)**" appears in the popup window and buzzer (long beep) sounds when it falls within the alarm range or outside the alarm range.

Press **CLR** key to turn off buzzer. And the alarm popup window is also hidden.

Water Temperature alarm (In)

Water Temperature alarm (Out)

Alarm popup window

Initial setup: OFF, the lower temperature 15.0°C, the upper temperature 20.0°C

Setting the lower alarm range: -5.0 to 44.9°C

Setting the upper alarm range: -4.9 to 45.0°C

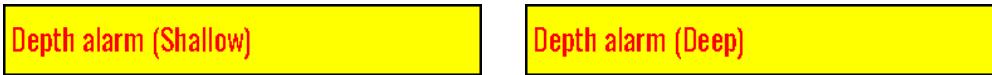
3.1.7 Depth alarm (Shallow, Deep)

Depth alarm can be used when inputting sounding data. The depth alarm alerts when the set depth falls within the range or outside the range.

The Deep alarm range and Shallow alarm range can not be the same.

"**Depth alarm (Shallow)**" and "**Depth alarm (Deep)**" appears in the popup window and buzzer (long beep) sounds when it falls within the alarm range or outside the alarm range.

Press **CLR** key to turn off buzzer. And the alarm popup window is also hidden.



Alarm popup window

Initial setup: OFF, the shallow depth 5.0m, the deep depth 50.0m
 Setting the shallow alarm range: 1.0 to 999m
 Setting the deep alarm range: 1.1 to 1000m

When the alarm menu is set to "IN" (within range),
 "Depth alarm (Deep)" is issued when entering the alarm range from the shallow side, "Deep alarm (Shallow)" is issued when entering the alarm range from the deep side.

When the alarm menu is set to "OUT" (outside range),
 "Depth alarm (Shallow)" is issued when falls outside the alarm range to the shallow side, "Deep alarm (Deep)" is issued when falls outside the alarm range to the deep side.

3.1.8 About alarm display in the menu

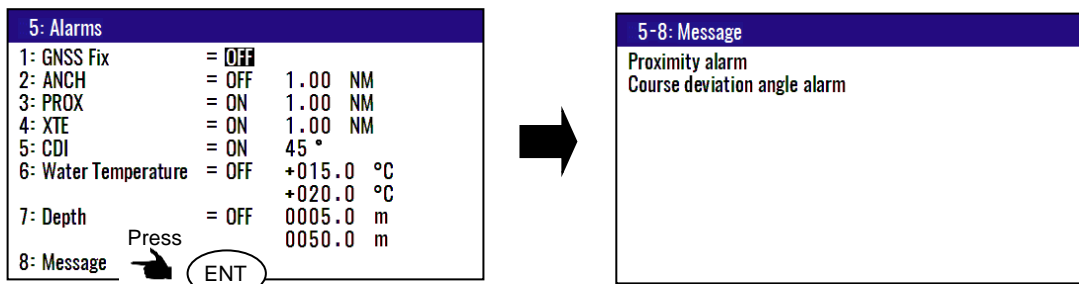
In the menu, even if all alarm display states disappear, only the blank alarm display frame remains displayed.

Press (CLR) key, the alarm popup window is hidden.

3.2 Alarm explanation

The reason of an alarm can be seen in the following ways.

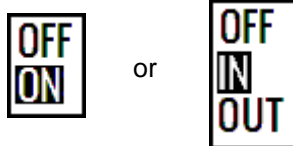
- (1) Press (MENU) key until Menu options 1 to 9 appears.
- (2) Press (5) key to select "5: Alarms".
- (3) Press (8/S) key to select "8: Message". Reason for alarm notification is displayed.



3.3 Setting and canceling

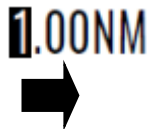
(Setting alarm)

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **5** key to select "**5: Alarms**".
- (3) Select item number of the alarm to be set by numeric keys.
- (4) Press [**▲**] or [**▼**] key to move cursor to setting item.
- (5) Press **ENT** key.



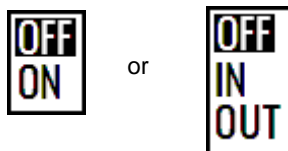
(Changing alarm range)

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **5** key to select "**5: Alarms**".
- (3) Select item number of the alarm to be set by numeric keys.
- (4) Press [**▶**] key to move cursor to alarm range field.
- (5) Enter an alarm range by numeric keys.
- (6) To correct to (-), move the cursor to the "+/-" place and press the "**▼**" key.
- (7) Press **ENT** key.



(Canceling alarm)

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **5** key to select "**5: Alarms**".
- (3) Select desired alarm number by numeric keys.
- (4) Press [**▲**] or [**▼**] key to move cursor to [OFF].
- (5) Press **ENT** key.



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Chapter 4 Setup Procedure

4.1 Menu options

| MENU | |
|------|---------------|
| 1: | Waypoints |
| 2: | Routes |
| 3: | GNSS |
| 4: | Compensation |
| 5: | Alarms |
| 6: | Calculation |
| 7: | Initial setup |
| 8: | Interface |
| 9: | Plotter |

NOTE: You can select an option from Menu in two ways: by direct numeric key entry or by cursor shifting. This manual explains how to enter numeric values for easy understanding, but you can also use the cursor for option selection.

(1) Waypoints

Store, edit, copy and delete waypoints. (See pages 2-1 to 2-5)

| 1:Waypoints | | | | |
|-------------|---|------------|-------------|----------------|
| W1000 | X | 35°38.209N | 139°06.749E | 03.07.15 06:38 |
| W1001 | □ | 35°38.337N | 139°06.035E | |
| W1002 | ▽ | 35°38.052N | 139°06.977E | YOKOHAMA 1 |
| W1003 | □ | 35°38.229N | 139°06.428E | 04.19.15 13:38 |
| W1004 | ▽ | 35°37.810N | 139°06.385E | YOKOHAMA 2 |
| W1005 | X | 35°37.727N | 139°06.549E | 04.19.15 14:58 |
| W1006 | X | 35°36.245N | 139°05.448E | |
| W1007 | ○ | 35°38.222N | 139°06.339E | URAYASU |
| W1008 | ○ | 35°38.092N | 139°06.165E | ODAIBA |
| W1009 | X | 35°38.706N | 139°06.015E | 05.11.15 14:18 |

(2) Routes

Store and delete a route. Forward/backward navigation Selection. Automatic route switching. Waypoint data switching. (See pages 2-12 to 2-19).

| 2: Routes | |
|-----------|--------------------------|
| 1: | Route Set / Edit |
| 2: | Waypoint change = Circle |

(3) GNSS

Display GNSS satellite status. Switch (2- and 3-dimensional) positioning modes. See DOP value to limit fix data Set satellite elevation angle limit.

| 3: GNSS | |
|---------|-------------------------|
| 1: | GNSS monitor |
| 2: | GNSS mode = GPS+GLONASS |
| 3: | Elevation mask = 5 ° |

(4) Compensation

Heading correction. Position correction (LAT/LONG, LOP). Compass correction. Time difference. Water temperature correction. Pitching correction. Rolling correction.

| 4: Compensation | |
|-------------------------|----------------------|
| 1: Heading | = 000.0 ° |
| 2: Latitude / Longitude | |
| 3: LOP | |
| 4: Magnetic variation | = Auto = +007.3 ° |
| 5: Time difference | = +00:00 |
| 6: Water Temperature | = +00.0 °C |
| 7: Pitching | = +00.0 ° |
| 8: Rolling | = OFF |

(5) Alarms (See pages 3-1 to 3-4)

GNSS Fix alarm. Anchor watch alarm. Proximity alarm. XTE alarm. CDI alarm. Water Temperature alarm. Depth alarm. Alarm message.

| 5: Alarms | |
|----------------------|------------------------------|
| 1: GNSS Fix | = OFF |
| 2: ANCH | = OFF 1.00 NM |
| 3: PROX | = ON 1.00 NM |
| 4: XTE | = ON 1.00 NM |
| 5: CDI | = ON 45 ° |
| 6: Water Temperature | = OFF +015.0 °C +020.0 °C |
| 7: Depth | = OFF 0005.0 m 0050.0 m |
| 8: Message | |

(6) Calculation

Distance and bearing between two points LAT/LONG into LOP data conversion Calculation of estimated time length from the current position to the destination, or required speed.

| 6: Calculation | |
|------------------------|--|
| 1: 2 Points | |
| 2: L/L→LOP | |
| 3: Navigation plan | |

(7) Initial setup

Set average constants. Set units. Select navigation mode. Select position display mode (LAT/ LONG, LOP). Select LAT/LONG display digit. Select language. Set chain.

| 7: Initial setup | |
|------------------|----------------|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | = L/L |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = LoranC |
| 9: Chain | = 0000-0-0 |



(8) Interface

Select output format. Edit the output format (IEC 61162-1). Select ACK/ALARM output

| 8: Interface | |
|-------------------|---------------------|
| 1: Connector | = DATA |
| 2: Initialize | = Standard |
| 3: Format | = NMEA 0183 Ver.2.0 |
| 4: Baud rate | = 4800 |
| 5: Main Talker ID | = System dependent |
| 6: Sentence edit | |

(9) Plotter

You can change the settings of [Plotter] screen.

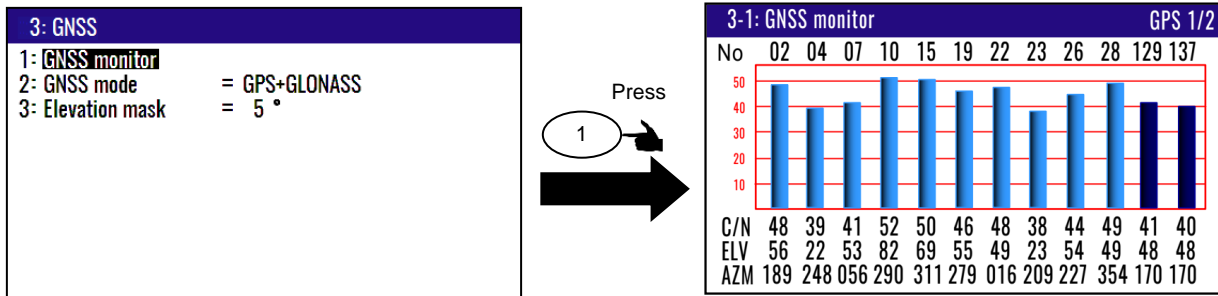
| 9: Plotter | |
|-----------------|---|
| 1: Mark symbol | =  |
| 2: Mark display | = Symbol+Number |
| 3: Track color | =  |
| 4: Plot | = 5sec |
| 5: Track clear | |

4.2 Menu 3: GNSS

4.2.1 Monitoring GNSS satellite signal reception

You can monitor the signal status from GNSS (SBAS) satellites. The signals from 3 satellites are used for two-dimensional positioning, but signals from 4 or more satellites are required for three-dimensional positioning.

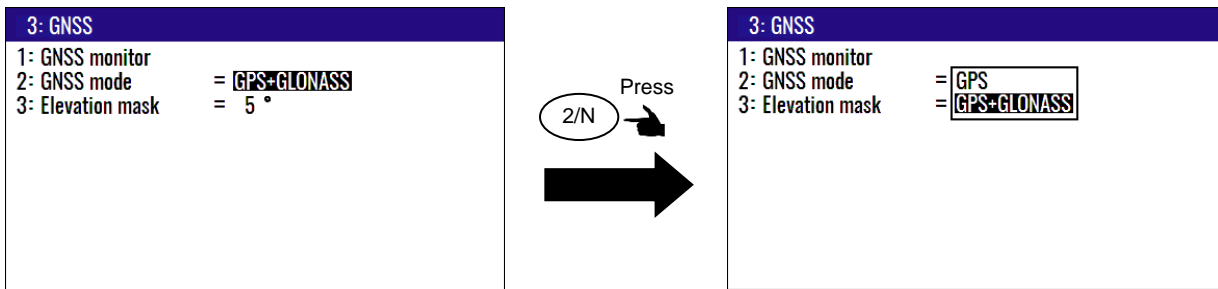
- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **3** key to select “**3: GNSS**”.
- (3) Press **1** key to select “**1: GNSS monitor**”. Reason for alarm notification is displayed



4.2.2 Selecting a GNSS mode

There are the three modes, GPS, GPS+GLONASS. Usually, it is used in GPS+GLONASS mode.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **3** key to select “**3: GNSS**”.
- (3) Press **2/N** key to select “**2: GNSS mode**”.
- (4) Press [▲] or [▼] key to select desired measuring system mode.
- (5) Press **ENT** key.

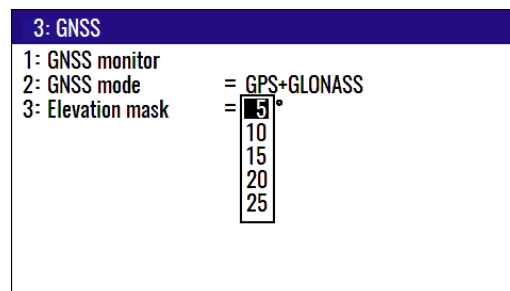
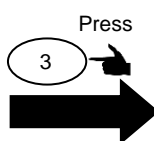
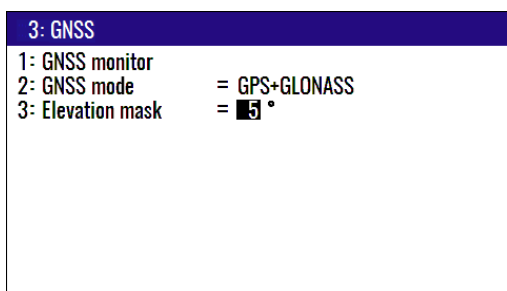


Initial setup: GPS+GLONASS

4.2.3 Masking satellite elevation angle

When the satellite is below 5 degrees above the horizon, signal reflection and interference can cause erroneous positioning. You can improve the positioning accuracy by masking the elevation angle. However, a large mask value shortens the signal receive time and most satellite combinations are rejected.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **3** key to select "**3: GNSS**".
- (3) Press **3** key to select "**3: Elevation mask**".
- (4) Press [**▲**] or [**▼**] key to move cursor onto elevation angle masking.
- (5) Press **ENT** key.



Initial setup: 5°

4.3 Menu 4: Compensation

4.3.1 Correcting ship heading

The ship heading is received from the GPS compass and displayed. You can correct the deviation of the actual ship heading azimuth by the following operation:

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(4/W)** key to select "**4: Compensation**".
- (3) Press **(1)** key to select "**1: Heading**".
- (4) Enter a (4-digit) compensation offset by numeric keys.
- (5) To correct to (-), move the cursor to the "+/-" place and press the "▼" key.
- (6) Press **(ENT)** key.

| 4: Compensation | |
|-------------------------|------------------|
| 1: Heading | = ±000.0° |
| 2: Latitude / Longitude | |
| 3: LOP | |
| 4: Magnetic variation | = Auto |
| | = +007.3° |
| 5: Time difference | = +00:00 |
| 6: Water Temperature | = +00.0 °C |
| 7: Pitching | = +00.0 ° |
| 8: Rolling | = OFF |

Initial setup: +000.0°

4.3.2 Correcting your position

You can compensate your GNSS present position given by GNSS in the following two ways:

- Enter the latitude and longitude of your actual position by numeric keys.
- Enter the correction offset to use.

| 4: Compensation | |
|--------------------------------|------------|
| 1: Heading | = +000.0° |
| 2: Latitude / Longitude | |
| 3: LOP | |
| 4: Magnetic variation | = Auto |
| | = +006.7° |
| 5: Time difference | = +00:00 |
| 6: Water Temperature | = +00.0 °C |
| 7: Pitching | = +00.0 ° |
| 8: Rolling | = OFF |

(Direct entry of actual position data)

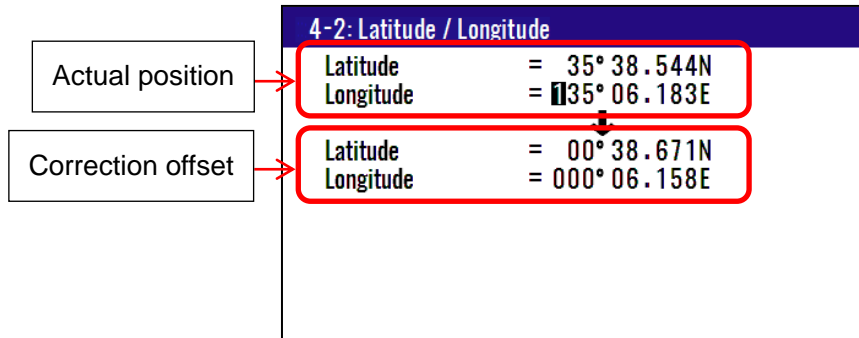
When your present position is displayed in Latitude / Longitude mode, you can correct it by entering the known Latitude/Longitude data.

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(4/W)** key to select "**4: Compensation**".
- (3) Press **(2/N)** key to select "**2: Latitude / Longitude**".

(4) Enter the correct latitude and longitude value.

Example: The position “N35°38.544 / E135°06.183” is entered by pressing the following keys in exact order given below.

[3], [5], [3], [8], [5], [4], [4], [N], [ENT], [▼]
 [1], [3], [5], [0], [6], [1], [8], [3], [E], [ENT]



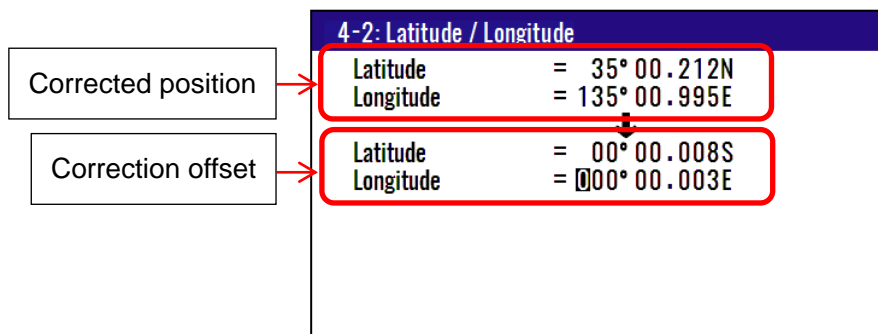
(Entry of correction offset)

When your present position is displayed in Latitude / Longitude mode, you can correct it by entering the Latitude/Longitude correction data.

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(4/W)** key to select “4: Compensation”.
- (3) Press **(2/N)** key to select “2: Latitude / Longitude”.
- (4) Press [▲] or [▼] key to move cursor onto correction offset field of latitude.
- (5) Enter the latitude and longitude correction offset.

Example: The position “S0°00.008 / E0°00.003” is entered by pressing the following keys in exact order given below.

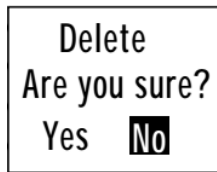
[0], [0], [0], [0], [0], [0], [8], [S], [ENT], [▼]
 [0], [0], [0], [0], [0], [0], [0], [3], [E], [ENT]



4.3.3 Disable position correction

To delete and disable the correction offset follow these steps:

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **4/W** key to select **"4: Compensation"**.
- (3) Press **2/N** key to select **"2: Latitude / Longitude"**.
- (4) Press **CLR** key to set 0 of offset corrections.
- (5) If OK, select **[Yes]** in the pop-up and press **ENT** key.
If Cancel, select **[No]** in the pop-up and press **ENT** key.



4.3.4 Compensating the LOP

KRD-10 is converted from Latitude and Longitude to LoranC, LoranA and Decca. It can be corrected in the converted data. (Caution: Can not convert Decca LOP.)

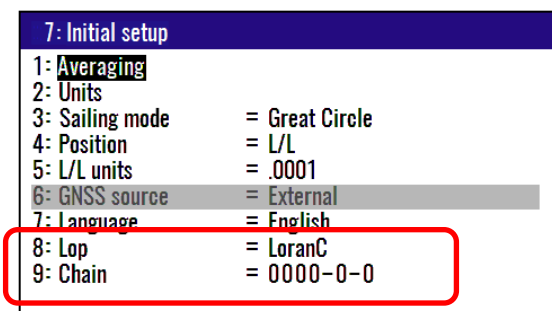
To change the "3: LOP", the following settings are required

You can set of LoranA, LoranC or Decca of **"3: LOP"** change when you changed **8: Lop** and **9: Chain** in the **Menu7: Initial setup**.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **7** key to select **"7: Initial setup"**.
- (3) Press **8/S** key to select **"8: Lop"**.
- (4) Setting "LoranA" or "LoranC" or "Decca"
- (5) Press **ENT** key.
- (6) Press [▼] key to input Chain number.

Select Loran C: Set the (4-digit) chain number, and the first digit of two slave stations by numeric keys.

Select Loran A / Decca: Select the chain number and the slave stations in the pop-up.



To change the “3: LOP”

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(4/W)** key to select “4: Compensation”.
- (3) Press **(3)** key to select “3: LOP”.

(4) Enter the correct S1 and S2 value. The difference between the GNSS position is reflected in the Correction offset when you enter the Actual position.

In the case of LoranC

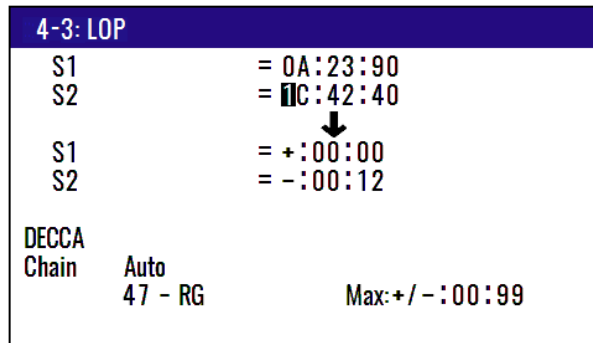
| Actual position | → | <table border="1"> <tr><th colspan="2">4-3: LOP</th></tr> <tr><td>S1</td><td>= 36211.1</td></tr> <tr><td>S2</td><td>= 58977.6</td></tr> </table> | 4-3: LOP | | S1 | = 36211.1 | S2 | = 58977.6 |
|---|-----------|--|----------|-----------|----|-----------|----------|-----------------|
| 4-3: LOP | | | | | | | | |
| S1 | = 36211.1 | | | | | | | |
| S2 | = 58977.6 | | | | | | | |
| Correction offset | → | <table border="1"> <tr><td>S1</td><td>= -0007.3</td></tr> <tr><td>S2</td><td>= +0000.1</td></tr> </table> | S1 | = -0007.3 | S2 | = +0000.1 | | |
| S1 | = -0007.3 | | | | | | | |
| S2 | = +0000.1 | | | | | | | |
| <table border="1"> <tr><td>LoranC</td><td></td><td></td></tr> <tr><td>Chain</td><td>9970-3-5</td><td>Max: +/- 9999.9</td></tr> </table> | | | LoranC | | | Chain | 9970-3-5 | Max: +/- 9999.9 |
| LoranC | | | | | | | | |
| Chain | 9970-3-5 | Max: +/- 9999.9 | | | | | | |

| Corrected position | → | <table border="1"> <tr><th colspan="2">4-3: LOP</th></tr> <tr><td>S1</td><td>= 36212.6</td></tr> <tr><td>S2</td><td>= 58975.6</td></tr> </table> | 4-3: LOP | | S1 | = 36212.6 | S2 | = 58975.6 |
|---|-----------|--|----------|-----------|----|-----------|----------|-----------------|
| 4-3: LOP | | | | | | | | |
| S1 | = 36212.6 | | | | | | | |
| S2 | = 58975.6 | | | | | | | |
| Correction offset | → | <table border="1"> <tr><td>S1</td><td>= +0001.0</td></tr> <tr><td>S2</td><td>= 0000.1</td></tr> </table> | S1 | = +0001.0 | S2 | = 0000.1 | | |
| S1 | = +0001.0 | | | | | | | |
| S2 | = 0000.1 | | | | | | | |
| <table border="1"> <tr><td>LoranC</td><td></td><td></td></tr> <tr><td>Chain</td><td>9970-3-5</td><td>Max: +/- 9999.9</td></tr> </table> | | | LoranC | | | Chain | 9970-3-5 | Max: +/- 9999.9 |
| LoranC | | | | | | | | |
| Chain | 9970-3-5 | Max: +/- 9999.9 | | | | | | |

In the case of LoranA

| 4-3: LOP | |
|----------|-------------------------------|
| S1 | = 4333.3 |
| S2 | = 1517.3 |
| ↓ | |
| S1 | = -000.7 |
| S2 | = -001.3 |
| LoranA | |
| Chain | 2S1 - 2S2 Max: +/- 999.9 |

In the case of DECCA



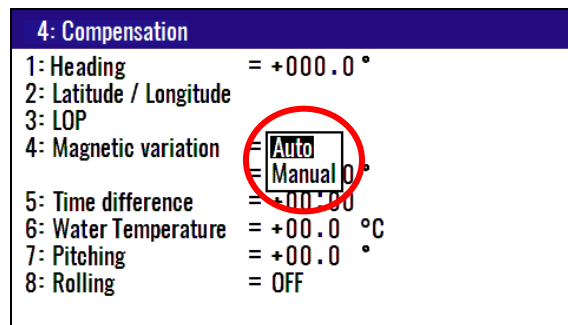
4.3.5 Compensating the compass

The course and bearing to waypoint is shown in true bearing. You can adjust the GNSS true bearing to the magnetic compass bearing.

(Automatic compensation)

In the Auto mode, the magnetic compass is compensated based on the built-in global magnetic variation maps. However, avoid using this mode if you are higher than 75 degrees North or South latitude. The compass may have a small error because the system contains world maps. Manual correction is recommended. For areas that do not allow exact translation of a true bearing to a magnetic bearing, despite the map covering the whole world, the resulting value may differ from the actual deviation.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **4/W** key to select "4: Compensation".
- (3) Press **4/W** key to select "4: Magnetic variation".
- (4) Press [**▲**] or [**▼**] key to move cursor onto "Auto".
- (5) Press **ENT** key.



Initial setup: AUTO

(Manual compensation)

- (4) Press [**▲**] or [**▼**] key to move cursor onto "Manual".
- (5) Press **ENT** key.
- (6) Press **ENT** key to change the correction offset.
- (7) Enter a (4-digit) compensation offset by numeric keys.
- (8) To correct to (-), move the cursor to the "+/-" place and press the "**▼**" key.

(9) Press **ENT** key.

| 4: Compensation | |
|-------------------------|------------------------------|
| 1: Heading | = +000.0 ° |
| 2: Latitude / Longitude | |
| 3: LOP | |
| 4: Magnetic variation | = Manual = 000.0 ° |
| 5: Time difference | = 00:00 |
| 6: Water Temperature | = +00.0 °C |
| 7: Pitching | = +00.0 ° |
| 8: Rolling | = OFF |

Initial setup: 0.0°
Setup range: -180.0° to +180.0°

4.3.6 Displaying local time

You can display your local time by entering a time difference from the Greenwich Mean Time (GMT). See the following figure 4.1 to determine zone time difference.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **4/W** key to select "4: Compensation".
- (3) Press **5** key to select "5: Time difference".
- (4) Enter a (4-digit) time difference by numeric keys.
- (5) To correct to (-), move the cursor to the "+/-" place and press the "▼" key.
- (6) Press **ENT** key.

CLR **NOTE:** Press to clear incorrect input. You can reenter a "+" or "-" sign and numeric data.

| 4: Compensation | |
|-------------------------|------------------------|
| 1: Heading | = +000.0 ° |
| 2: Latitude / Longitude | |
| 3: LOP | |
| 4: Magnetic variation | = Manual = +000.0 ° |
| 5: Time difference | = 00:00 |
| 6: Water Temperature | = +00.0 °C |
| 7: Pitching | = +00.0 ° |
| 8: Rolling | = OFF |

Initial setup: 00:00 hour

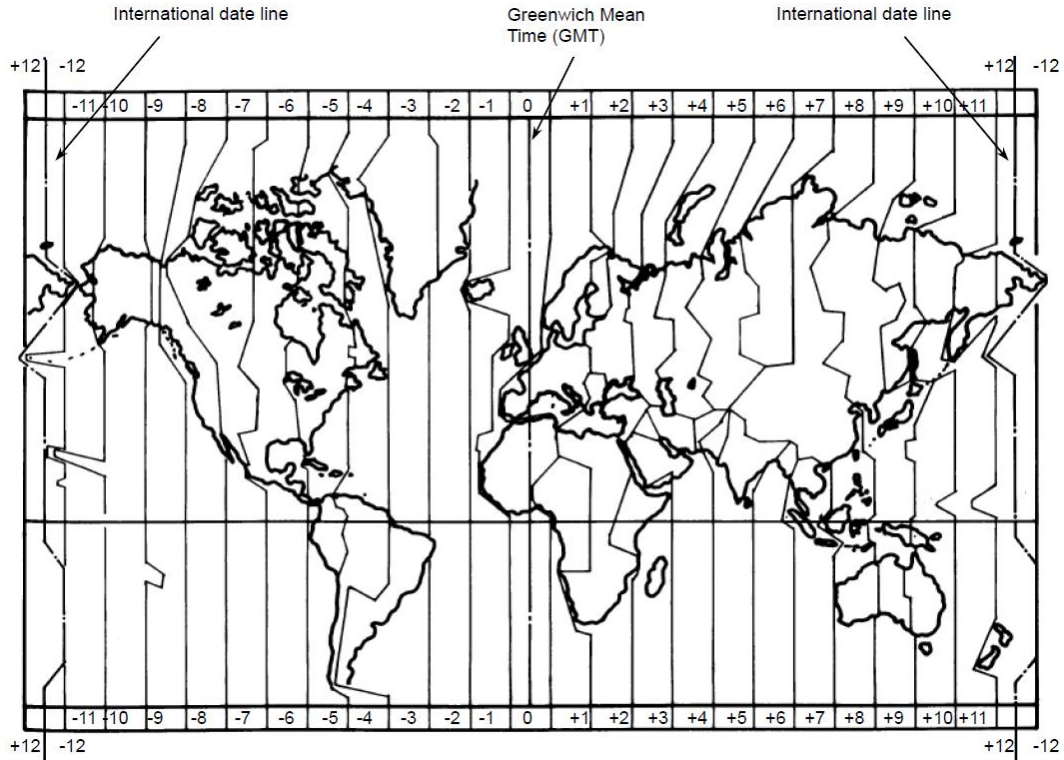


Figure 4.1 Time difference chart

4.3.7 Correcting water temperature

The water temperature value input from the water temperature sensor can be corrected and displayed.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **4/W** key to select "4: Compensation".
- (3) Press **6/E** key to select "6: Water Temperature".
- (4) Enter a (3-digit) compensation offset by numeric keys.
- (5) To correct to (-), move the cursor to the "+/-" place and press the "▼" key.
- (6) Press **ENT** key.

NOTE: Press **CLR** to clear incorrect input. You can reenter a "+" or "-" sign and numeric data.

| 4: Compensation | |
|-------------------------|------------------|
| 1: Heading | = +000.0 ° |
| 2: Latitude / Longitude | |
| 3: LOP | |
| 4: Magnetic variation | = Auto |
| | = +007.0 ° |
| 5: Time difference | = +00:00 |
| 6: Water Temperature | = 00.0 °C |
| 7: Pitching | = +00.0 |
| 8: Rolling | = OFF |

Initial setup: +00.0

4.3.8 Correcting pitching

You can correct the pitching value input from the fluctuation sensor. (GPS compass V104S)

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **4/W** key to select "**4: Compensation**".
- (3) Press **7** key to select "**7: Pitching**".
- (4) Enter a (3-digit) compensation offset by numeric keys.
- (5) To correct to (-), move the cursor to the "+/-" place and press the "▼" key.
- (6) Press **ENT** key.

CLR

NOTE: Press to clear incorrect input. You can reenter a "+" or "-" sign and numeric data.

| 4: Compensation | |
|-------------------------|------------------|
| 1: Heading | = +000.0 ° |
| 2: Latitude / Longitude | |
| 3: LOP | |
| 4: Magnetic variation | = Auto |
| | = +007.0 ° |
| 5: Time difference | = +00:00 |
| 6: Water Temperature | = +00.0 °C |
| 7: Pitching | = -00.0 ° |
| 8: Rolling | = OFF |

Initial setup: +00.0

4.3.9 Correcting rolling

If GPS compass V104S can not be installed parallel to the ship's axis (when it is installed at right angles to the ship's axis), pitch and roll information can also be corrected by initial setting of the tilt angle.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **4/W** key to select "**4: Compensation**".
- (3) Press **8/S** key to select "**8: Rolling**".
- (4) Press [**▲**] or [**▼**] key to move cursor onto "**ON**".
- (5) Press **ENT** key.

| 4: Compensation | |
|-------------------------|-------------|
| 1: Heading | = +000.0 ° |
| 2: Latitude / Longitude | |
| 3: LOP | |
| 4: Magnetic variation | = Auto |
| | = +007.0 ° |
| 5: Time difference | = +00:00 |
| 6: Water Temperature | = +00.0 °C |
| 7: Pitching | = +00.0 ° |
| 8: Rolling | = ON |

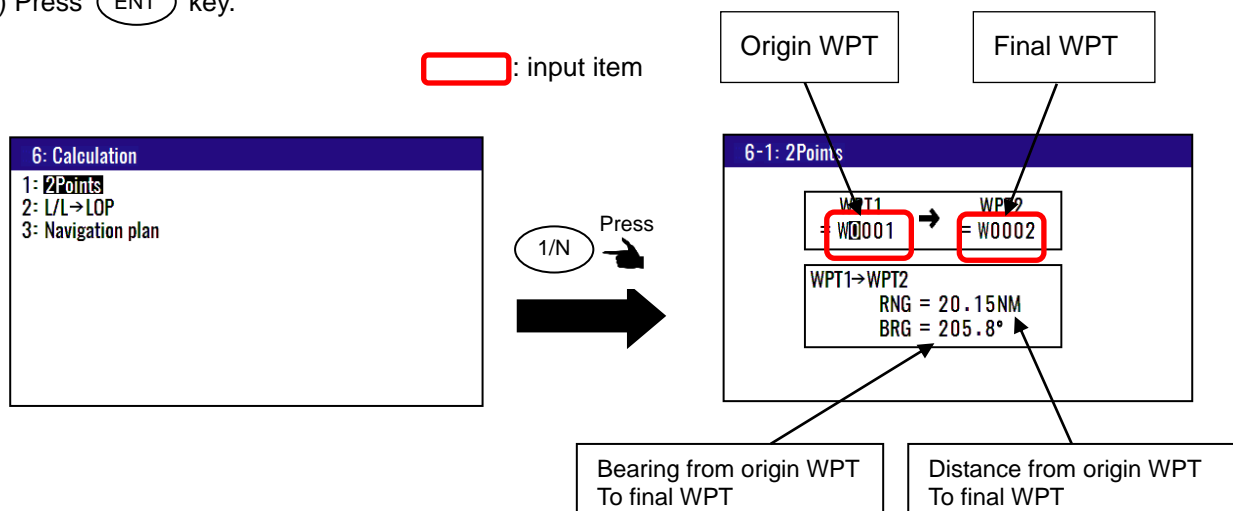
Initial setup: OFF

4.4 Menu 6: Calculation

4.4.1 Calculating the distance and bearing between two points

You can calculate the distance and bearing between two points stored in memory.

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(6/E)** key to select "6: Calculation".
- (3) Press **(1)** key to select "1: 2Points".
- (4) Enter a (4-digit) origin WPT number (0000 to 9999).
- (6) Press **(ENT)** key.
- (7) Press [**▶**] key.
- (7) Enter a (4-digit) final WPT number (0000 to 9999).
- (8) Enter "N" for north or "S" for south latitude.
- (9) Press **(ENT)** key.



4.4.2 Calculating LOP based on LAT/LONG data

You can enter a Loran C or Loran A or DECCA chain number and two secondary stations, NAVIGATOR calculates the LOPs based on the specified LAT/LONG data and displays the LOP values.

To change the "2: LOP", the following settings are required

You can set of LoranA, LoranC or Decca of "2: LOP" change when you changed **8:Lop** and **9:Chain** in the **Menu7: Initial setup**.

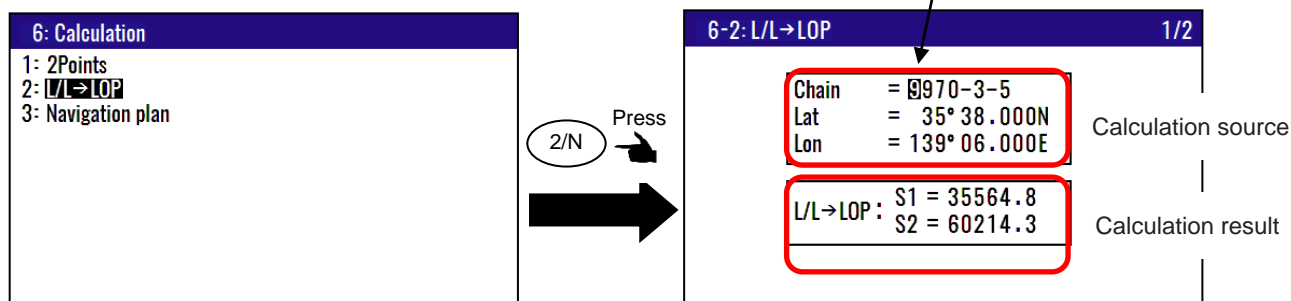
- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(7)** key to select "7: Initial setup".
- (3) Press **(8/S)** key to select "8: Lop".
- (4) Setting "LoranA" or "LoranC" or "Decca"
- (5) Press **(ENT)** key.
- (6) Press [**▼**] key to input Chain number.

Select Loran C: Set the (4-digit) chain number, and the first digit of two slave stations by numeric keys.
 Select Loran A / Decca: Select the chain number and the slave stations in the pop-up.

In the case of Loran C

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(6/E)** key to select “**6: Calculation**”.
- (3) Press **(2/N)** key to select “**2: L/L→LOP**”.
- (4) Enter (4-digit) Loran C chain number.
- (5) Enter the first digit of two Loran C slave stations.
- (6) Press **(ENT)** key.
- (7) Enter (7-digit) latitude using numeric keys.
- (8) Enter “N” for north or “S” for south latitude.
- (9) Press **(ENT)** key.
- (10) Enter (8-digit) longitude using numeric keys.
- (11) Enter “E” for east or “W” for west latitude.
- (12) Press **(ENT)** key.

Input Loran C station and calculate latitude and longitude.



If you store the calculation result

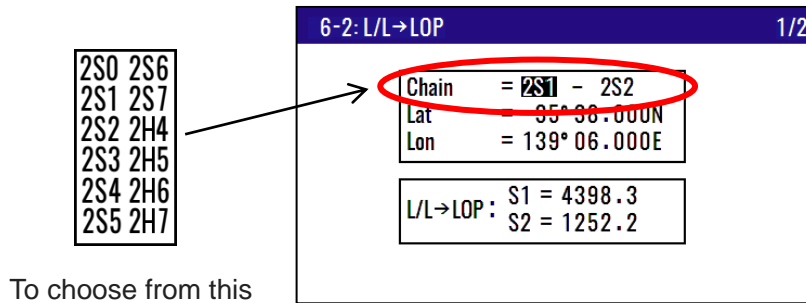
- (1) Press [**▼**] key to display page 2/2.
- (2) Enter a data number (1000 to 9999) using numeric keys.
- (3) The existing data, if any, is displayed for your checkout.
- (4) Press **(ENT)** key.

In the case of Loran A

When you enter a combination of two slave stations of Loran A, NAVIGATOR calculates the Loran A LOPs based on the specified LAT/LONG data and displays the LOP values.

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(6/E)** key to select “**6: Calculation**”.
- (3) Press **(2/N)** key to select “**2: L/L→LOP**”.
- (4) Press **(ENT)** key.
- (5) Press [**▲**] or [**▼**], [**▶**] or [**◀**] key to select the slave station 1.
- (6) Press **(ENT)** key.
- (7) Press [**▶**] key to move the cursor to slave station 2 field.
- (8) Press **(ENT)** key.
- (9) Press [**▲**] or [**▼**] key to select the slave station 2.
- (10) Press **(ENT)** key.
- (11) Press [**▼**] key to move the cursor to latitude field.

- (12) Enter a (7-digit) latitude using numeric keys.
- (13) Enter "N" for north or "S" for south latitude.
- (14) Press **ENT** key.
- (15) Enter (8-digit) longitude using numeric keys.
- (16) Enter "E" for east or "W" for west latitude.
- (17) Press **ENT** key.

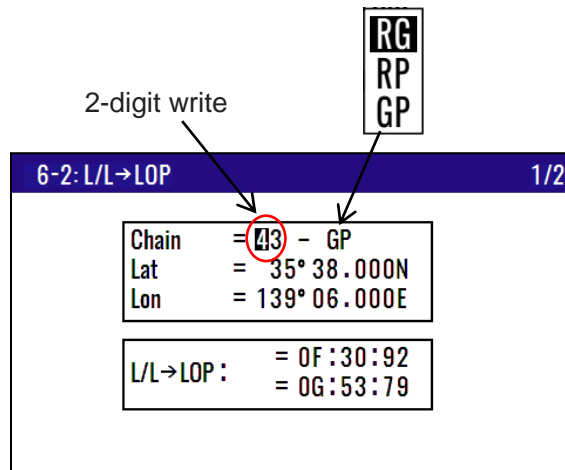


If you store the calculation result

- (1) Press [▼] key to display page 2/2.
- (2) Enter a data number (1000 to 9999) using numeric keys.
- (3) The existing data, if any, is displayed for your checkout.
- (4) Press **ENT** key.

In the case of DECCA

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **6/E** key to select "6: Calculation".
- (3) Press **2/N** key to select "2: L/L->LOP".
- (4) Press **ENT** key.
- (4) Enter (2-digit) Decca chain number.
- (5) Press **ENT** key.
- (6) Press [►] key to move the cursor to combination field of slave stations.
- (7) Press **ENT** key.
- (8) Press [▲] or [▼] key to select a combination of slave stations.
- (9) Press **ENT** key.
- (10) Press [▼] key to move the cursor to latitude field.
- (11) Enter (7-digit) latitude using numeric keys.
- (12) Enter "N" for north or "S" for south latitude.
- (13) Press **ENT** key.
- (14) Enter (8-digit) longitude using numeric keys.
- (15) Enter "E" for east or "W" for west latitude.
- (16) Press **ENT** key.



Store the calculation result.

- (1) Press [▼] key to display page 2/2.
- (2) Enter a data number (1000 to 9999) using numeric keys.
- (3) The existing data, if any, is displayed for your checkout.
- (4) Press (ENT) key.

4.4.3 Calculating navigation plan

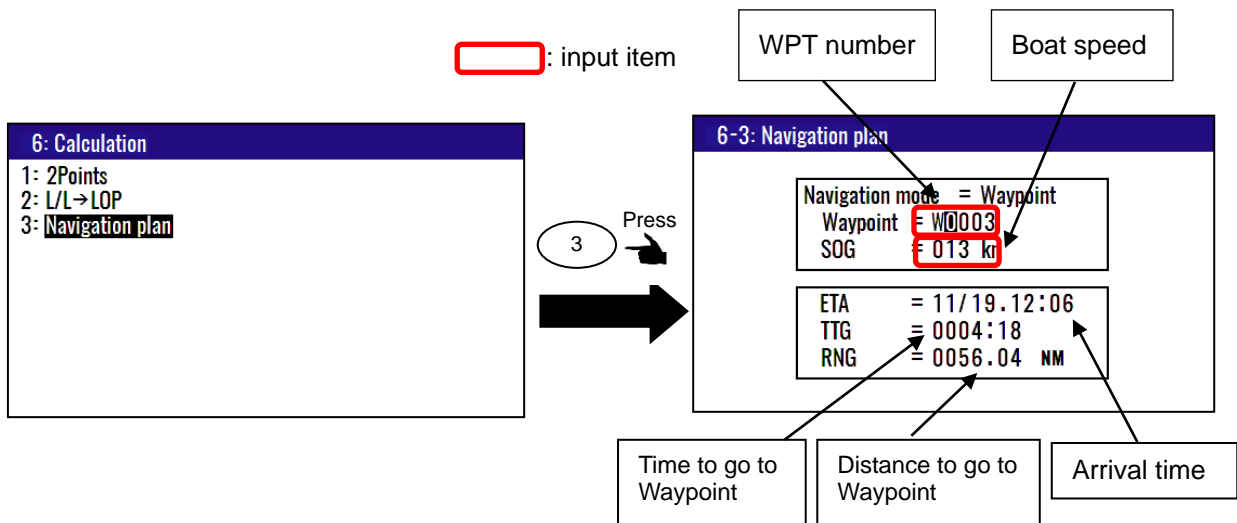
You can calculate the following various navigation plan.

Navigation mode = **Waypoint**: Boat speed, Arrival time, Time to go to waypoint.

Navigation mode = **Route** : Boat speed, Final arrives time, Total navigation time.

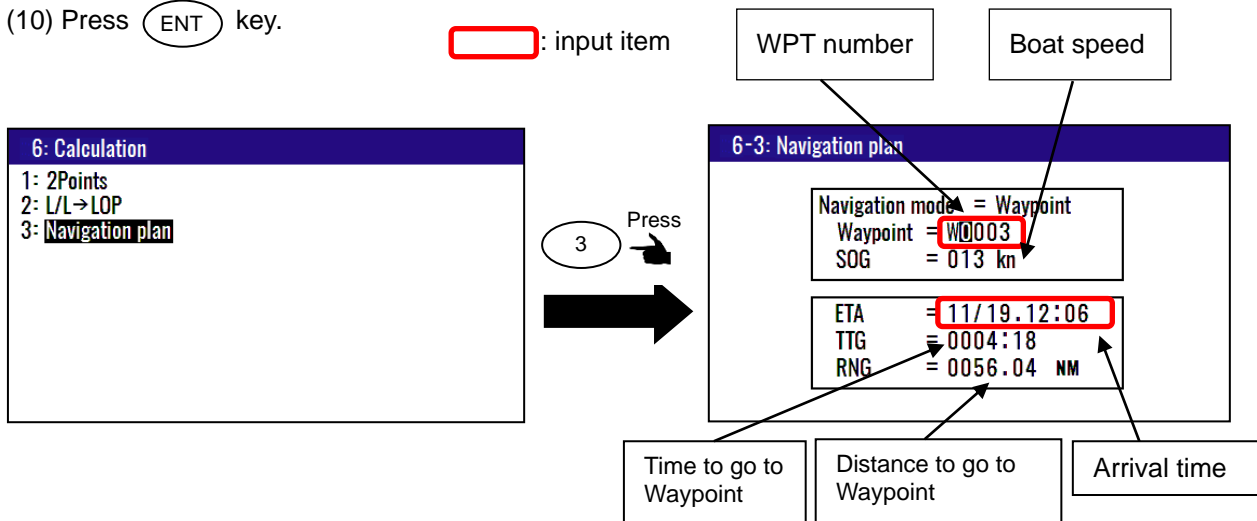
Calculating arrival time and time to go to waypoint from WPT number and boat speed

- (1) Press (MENU) key until Menu options 1 to 9 appears.
- (2) Press (6/E) key to select "6: Calculation".
- (3) Press (3) key to select "3: Navigation plan".
- (4) Press (ENT) key and select "Waypoint" in the pop-up.
- (5) Press (ENT) key.
- (6) Press [▼] key and enter an (4-digit) origin WPT number (0000 to 9999).
- (7) Press (ENT) key.
- (8) Press [▼] key and enter a (3-digit) boat speed.
- (9) Press (ENT) key.



Calculating boat speed and time to go to waypoint from WPT number and arrival time.

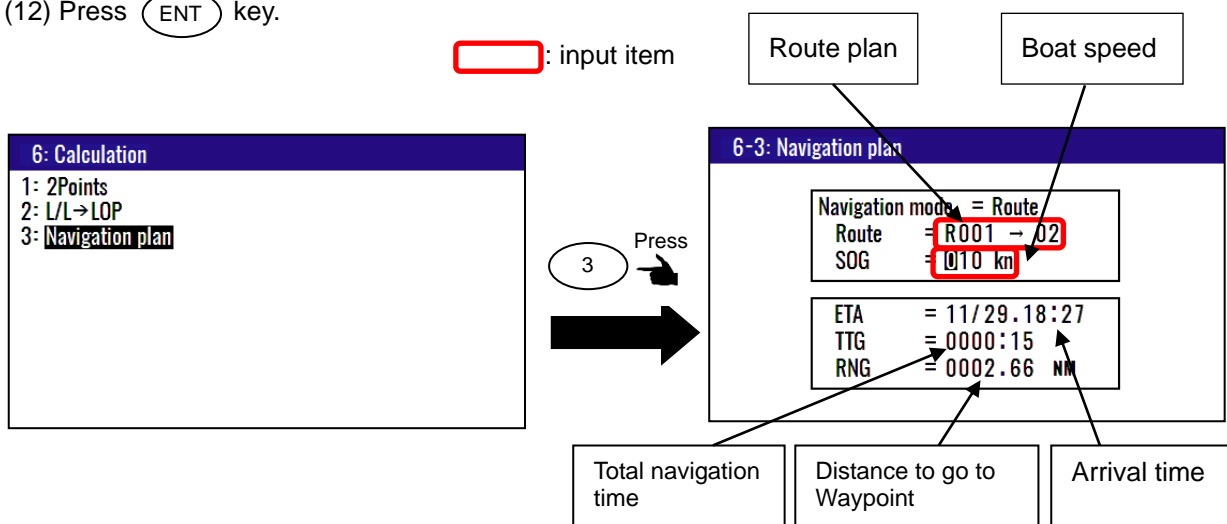
- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(6/E)** key to select "6: Calculation".
- (3) Press **(3)** key to select "3: Navigation plan".
- (4) Press **(ENT)** key and select "Waypoint" in the pop-up.
- (5) Press **(ENT)** key.
- (6) Press [**▼**] key and enter an (4-digit) origin WPT number (0000 to 9999).
- (7) Press **(ENT)** key.
- (8) Press [**▼**] key two times.
- (9) Enter arrival time by numeric keys.
- (10) Press **(ENT)** key.



Calculating arrival time and total navigation time from route plan and boat speed

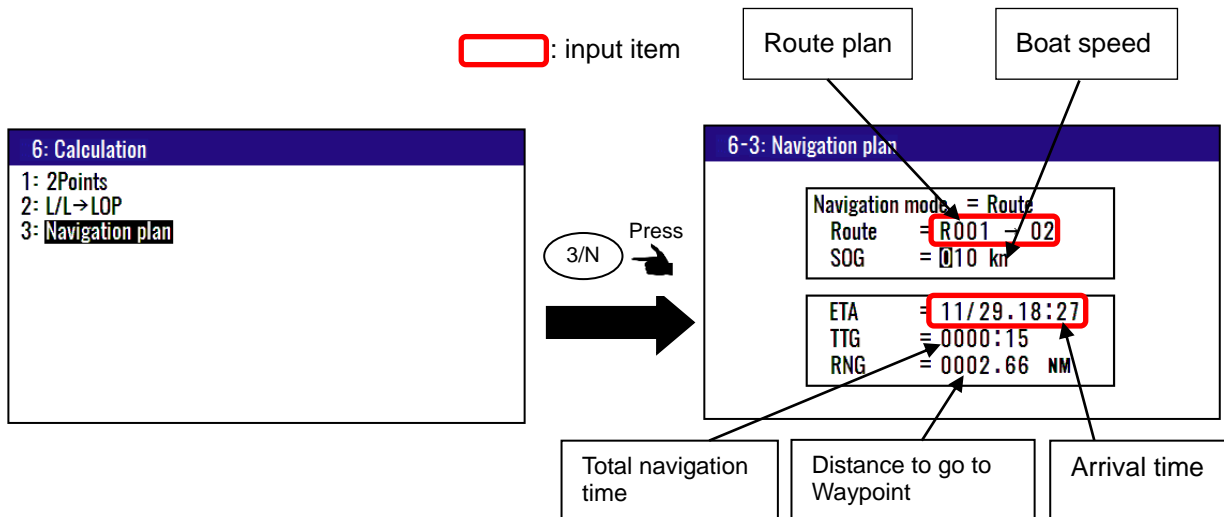
- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(6/E)** key to select "6 Calculation".
- (3) Press **(3)** key to select "3: Navigation plan".
- (4) Press **(ENT)** key and select "Route" in the pop-up.
- (5) Press **(ENT)** key.

- (6) Press [▼] key and enter a (3-digit) route number (001 to 100).
- (7) Press (ENT) key.
- (8) Press [►] key and press (ENT) key to select Forward or Revers.
- (9) Press [►] key and enter an (2-digit) origin waypoint number (01 to 50).
- (10) Press (ENT) key.
- (11) Press [▼] key and enter a (3-digit) boat speed.
- (12) Press (ENT) key.



Calculating boat speed and time to go to waypoint from route number and arrival time.

- (1) Press (MENU) key until Menu options 1 to 9 appears.
- (2) Press (6/E) key to select "6: Calculation".
- (3) Press (3) key to select "3: Navigation plan".
- (4) Press (ENT) key and select "Route" in the pop-up.
- (5) Press (ENT) key.
- (6) Press [▼] key and enter an (3-digit) route number (001 to 100).
- (7) Press (ENT) key.
- (8) Press [►] key and press (ENT) key to select Forward or Revers.
- (9) Press [►] key and enter an (2-digit) origin waypoint number (01 to 50).
- (10) Press (ENT) key.
- (11) Press [▼] key two times.
- (12) Enter arrival time by numeric keys.
- (13) Press (ENT) key.

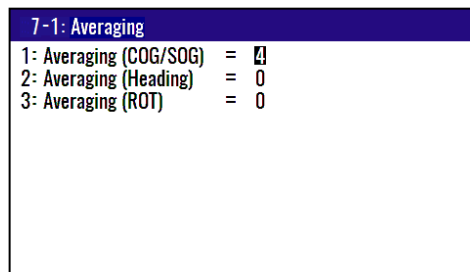
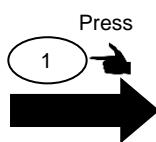
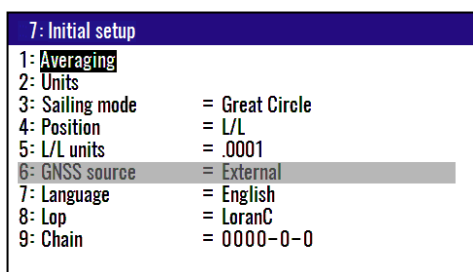


4.5 Menu 7: Initial setup

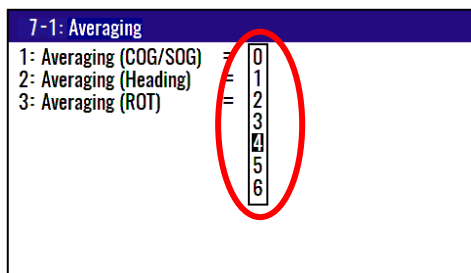
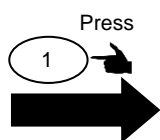
4.5.1 Setting average constants (measuring position, speed and course)

Use the averaging function to compare GNSS sensor signals several times and get their average. This stabilizes the GNSS position (latitude and longitude), speed and course data. The maximum averaging rate is “6” and the minimum averaging rate is “0”. When you select “6” value, data is averaged more often and the display data has smaller variations. However, delays for updating occur. When you select a “0” value, data is averaged less but the display data responds quicker. Selecting a constant (averaging constant) suitable for your boat speed will provide you with smoother data of the boat position, course and speed.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **7** key to select “7: Initial setup”.
- (3) Press **1** key to select “1: Averaging”.



- (4) Press **1** key to select “1: Averaging (COG/SOG)”.
- (5) Press [▲] or [▼] key to move cursor onto the average constants to select “0 to 6”.
- (6) Press **ENT** key.



Initial setup: 4

Average constants

0: OFF, 1: 3 times average, 2: 6 times average, 3: 12 times average, 4: 18 times average, 5: 24 times average, 6: 30 times average

4.5.2 Setting average constants (Ship heading)

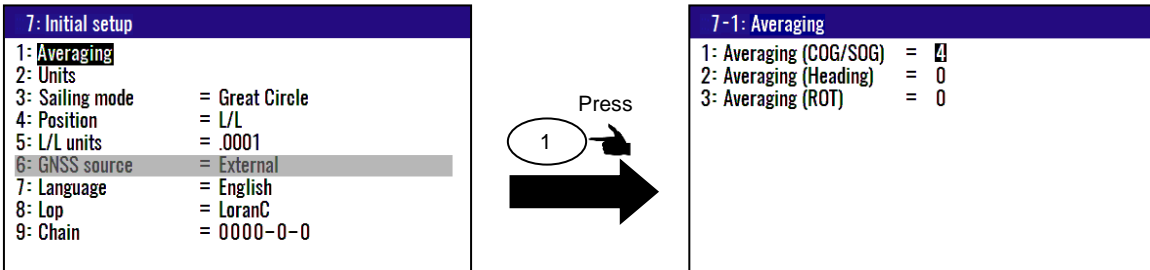
Use the averaging function to compare GPS compass sensor signals several times and get their average.

This stabilizes the ship heading data from GPS compass. The maximum averaging rate is “6” and the minimum averaging rate is “0”. When you select “6” value, data is averaged more often and the display

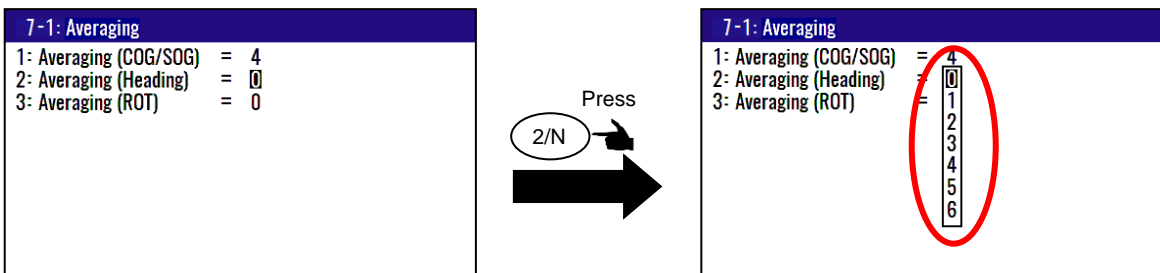
data has smaller variations. However, delays for updating occur. When you select a “0” value, data is averaged less but the display data responds quicker.

Selecting a constant (averaging constant) suitable for your boat will provide you with smoother data of ship heading.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **7** key to select “7: Initial setup”.
- (3) Press **1** key to select “1: Averaging”.



- (4) Press **2/N** key to select “2: Averaging (Heading)”.
- (5) Press [**▲**] or [**▼**] key to move cursor onto the average constants to select “0 to 6”.
- (6) Press **ENT** key.



Initial setup: 0

Average constants

0: OFF, 1: 3 times average, 2: 6 times average, 3: 12 times average, 4: 18 times average, 5: 24 times average, 6: 30 times average

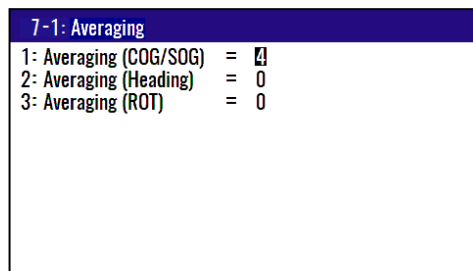
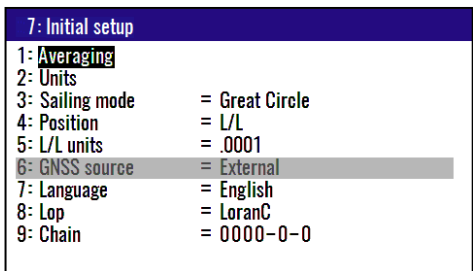
4.5.3 Setting average constants (Rotation angular velocity)

Use the averaging function to compare GPS compass sensor signals several times and get their average.

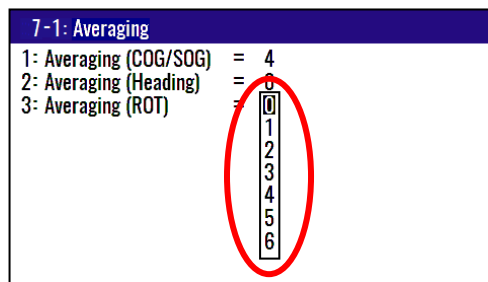
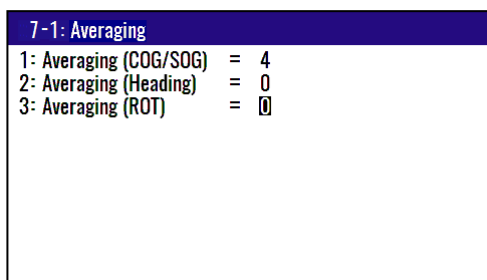
This stabilizes the rotation angular velocity data from GPS compass. The maximum averaging rate is “6” and the minimum averaging rate is “0”. When you select “6” value, data is averaged more often and the display data has smaller variations. However, delays for updating occur. When you select a “0” value, data is averaged less but the display data responds quicker.

Selecting a constant (averaging constant) suitable for your boat will provide you with smoother data of rotation angular velocity.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **7** key to select “7: Initial setup”.
- (3) Press **1** key to select “1: Averaging”.



- (4) Press (3) key to select “3: Averaging (ROT)”.
- (5) Press [▲] or [▼] key to move cursor onto the average constants to select “0 to 6”.
- (6) Press (ENT) key.



Initial setup: 0

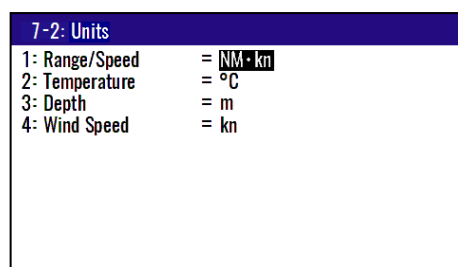
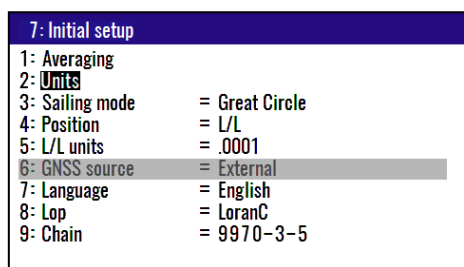
Average constants

- 0: OFF, 1: 3 times average, 2: 6 times average, 3: 12 times average, 4: 18 times average,
- 5: 24 times average, 6: 30 times average

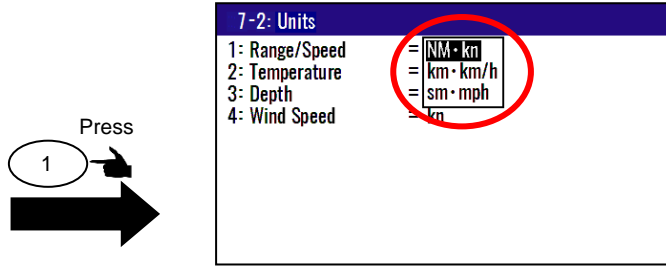
4.5.4 Changing the distance or speed unit

You can change the measuring unit of distance (to WPT or final destination) and speed.

- (1) Press (MENU) key until Menu options 1 to 9 appears.
- (2) Press (7) key to select “7: Initial setup”.
- (3) Press (2/N) key to select “2: Units”.



- (4) Press (1) key to select “1: Range/Speed”.
- (5) Press [▲] or [▼] key to move cursor onto the distance and speed unit “NM·kn”, “km·km/h”, “sm·mph”.
- (6) Press (ENT) key.

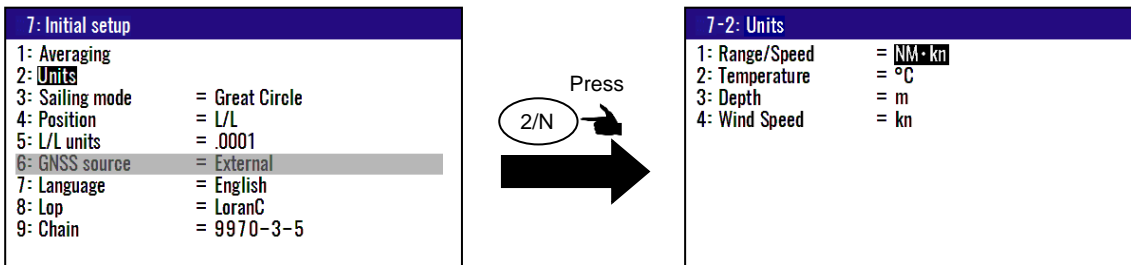


Initial setup: NM·kn

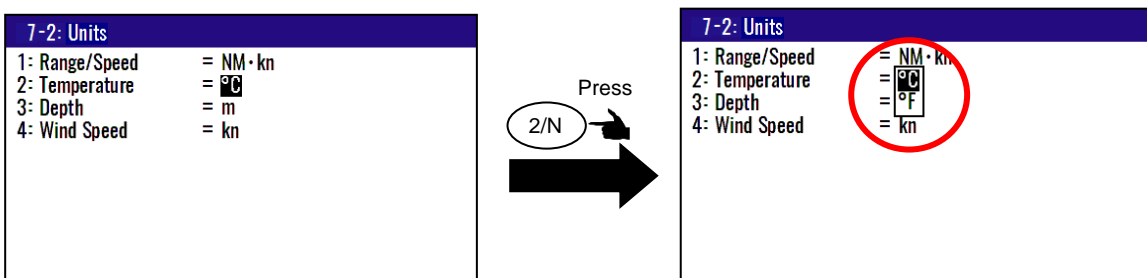
4.5.5 Changing the temperature unit

You can change the measuring unit of water temperature and temperature.

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(7)** key to select **“7: Initial setup”**.
- (3) Press **(2/N)** key to select **“2: Units”**.



- (4) Press **(2/N)** key to select **“2: Temperature”**.
- (5) Press **[▲]** or **[▼]** key to move cursor onto the distance and speed unit **“°C”**, **“°F”**.
- (6) Press **(ENT)** key.



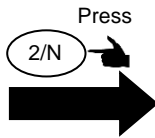
Initial setup: °C

4.5.6 Changing the depth unit

You can change the measuring unit of depth.

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(7)** key to select **“7: Initial setup”**.
- (3) Press **(2/N)** key to select **“2: Units”**.

| 7: Initial setup | |
|------------------|----------------|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | = L/L |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = LoranC |
| 9: Chain | = 9970-3-5 |



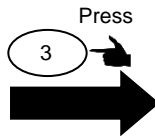
| 7-2: Units | |
|----------------|----------------|
| 1: Range/Speed | = NM·kn |
| 2: Temperature | = °C |
| 3: Depth | = m |
| 4: Wind Speed | = kn |

(4) Press **3** key to select “3: Depth”.

(5) Press [▲] or [▼] key to move cursor onto the distance and speed unit “m”, “fm”, “l.fm”, “ft”, “J.fm”.

(6) Press **ENT** key.

| 7-2: Units | |
|----------------|------------|
| 1: Range/Speed | = NM·kn |
| 2: Temperature | = °C |
| 3: Depth | = m |
| 4: Wind Speed | = kn |



| 7-2: Units | |
|----------------|------------|
| 1: Range/Speed | = NM·kn |
| 2: Temperater | = °C |
| 3: Depth | = m |
| 4: Wind Speed | = kn |

Initial setup: m

4.5.7 Changing the wind speed unit

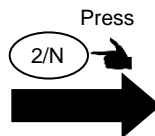
You can change the measuring unit of wind speed.

(1) Press **MENU** key until Menu options 1 to 9 appears.

(2) Press **7** key to select “7: Initial setup”.

(3) Press **2/N** key to select “2: Units”.

| 7: Initial setup | |
|------------------|----------------|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | = L/L |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = LoranC |
| 9: Chain | = 9970-3-5 |



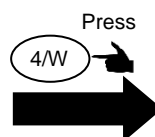
| 7-2: Units | |
|----------------|----------------|
| 1: Range/Speed | = NM·kn |
| 2: Temperature | = °C |
| 3: Depth | = m |
| 4: Wind Speed | = kn |

(4) Press **4/W** key to select “4: Wind Speed”.

(5) Press [▲] or [▼] key to move cursor onto the distance and speed unit “kn”, “m/s”, “mph”.

(6) Press **ENT** key.

| 7-2: Units | |
|----------------|-------------|
| 1: Range/Speed | = NM·kn |
| 2: Temperature | = °C |
| 3: Depth | = m |
| 4: Wind Speed | = kn |



| 7-2: Units | |
|----------------|-------------|
| 1: Range/Speed | = NM·kn |
| 2: Temperature | = °C |
| 3: Depth | = m |
| 4: Wind Speed | = kn |

Initial setup: kn

4.5.8 Changing sail mode

You can change the navigation mode. There are two navigation modes.

Great Circle course: The shortest course on a sphere.

Rhumb Line course: Straight course on a Mercator chart.

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(7)** key to select “7: Initial setup”.
- (3) Press **(3)** key to select “3: Sailing mode”.
- (4) Press [**▲**] or [**▼**] key to move cursor onto the sail mode to “Great circle”, “Rhumb Line”.
- (5) Press **(ENT)** key.

Initial setup: Great circle

4.5.9 Displaying position data in LAT/LONG mode

You can change the displaying position data, “LAT/LONG” or “Lop”.

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(7)** key to select “7: Initial setup”.
- (3) Press **(4/W)** key to select “4: Position”.
- (4) Press [**▲**] or [**▼**] key to move cursor to “L/L”, “Lop”.
- (5) Press **(ENT)** key.

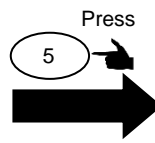
Initial setup: L/L

4.5.10 Changing the latitude and longitudinal display digits

The following operations enable to display the latitude and longitude of present position 0.0001 or 0.001minute.

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(7)** key to select “7: Initial setup”.
- (3) Press **(5)** key to select “5: L/L units”.
- (4) Press [**▲**] or [**▼**] key to move cursor to “.001”, “.0001”.
- (5) Press **(ENT)** key.

| 7: Initial setup | |
|------------------|----------------|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | = L/L |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = LoranC |
| 9: Chain | = 9970-3-5 |



| 7: Initial setup | |
|------------------|----------------|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | = L/L |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = LoranC |
| 9: Chain | = 9970-3-5 |

Initial setup: .0001'

4.5.11 Selecting GNSS source

This menu is externally fixed. By inputting NMEA data from DATA 2, it can be used as a display monitor for external equipment.

Initial setup: External'

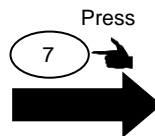
4.5.12 Selecting a Language

You can select the language from the pop-up.

The procedure is as follows:

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(7)** key to select "7: Initial setup".
- (3) Press **(7)** key to select "7: Language".
- (4) Press [**▲**] or [**▼**] key to move cursor onto the language.
- (5) Press **(ENT)** key.

| 7: Initial setup | |
|------------------|----------------|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | = L/L |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = LoranC |
| 9: Chain | = 9970-3-5 |



| 7: Initial setup | |
|------------------|----------------|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | = L/L |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = LoranC |
| 9: Chain | = 9970-3-5 |

Initial setup: English

4.5.13 Specifying the chain and secondary stations for Loran C, Loran A or Decca

For the operating procedure, refer to 5.1 "Initial setup for LOP display".

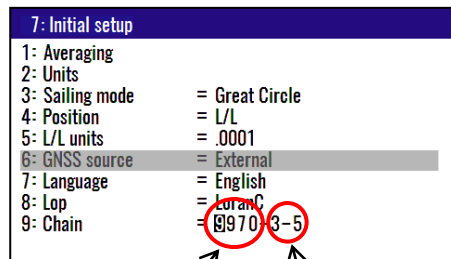
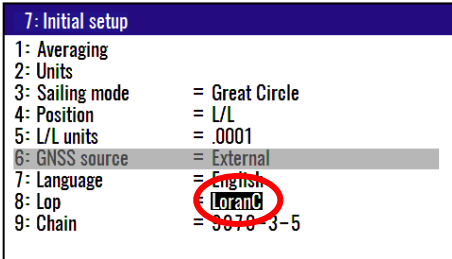
The procedure is as follows:

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(7)** key to select "7: Initial setup".
- (3) Press **(8/S)** key to select "8: Lop".

In the case "LoranC"

- (4) Press [**▲**] or [**▼**] key to move cursor onto the "LoranC".
- (5) Press **(ENT)** key.

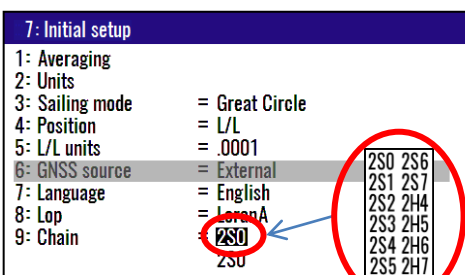
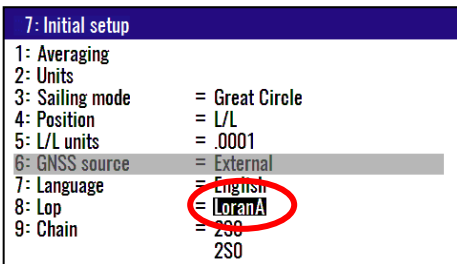
- (6) Press [▼] key to move cursor onto the “9: Chain”.
- (7) Input chain number and first digit of two secondary stations of LoranC by numeric keys.
- (8) Press (ENT) key.



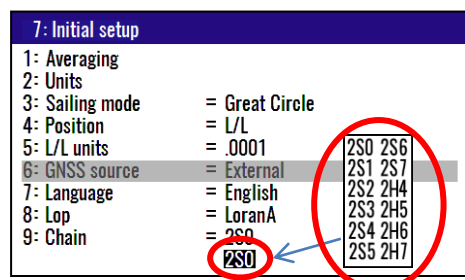
Chain number Secondary station

In the case “LoranA”

- (4) Press [▲] or [▼] key to move cursor onto the “LoranA”.
- (5) Press (ENT) key.
- (6) Press [▼] key to move cursor onto the “9: Chain” and press (ENT) key.
- (7) Select two stations of LoranA by a [▲] or [▼], [►] or [◀] key and press (ENT) key.



Station 1



Station 2

In the case “DECCA”

- (4) Press [▲] or [▼] key to move cursor onto the “DECCA”.
- (5) Press (ENT) key.
- (6) Press [▼] key to move cursor onto the “9: Chain” and press (ENT) key.
- (7) Press [▲] or [▼] key to move cursor onto the “Auto” or “Manual”.
- (8) Press (ENT) key.

Select “Manual”

- (4) Press [▼] key to move cursor onto cursor chain number.
- (5) Input chain number of DECCA by numeric keys and press ENT key.
- (6) Press [►] key to move cursor onto secondary station and press ENT key.
- (7) Select combination of two secondary station of DECCA by [▲] or [▼] key.
- (8) Press ENT key.

| 7: Initial setup | |
|------------------|----------------|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | = L/L |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = DECCA |
| 9: Chain | = Manual |
| Chain | = 00 RG |

Chain number

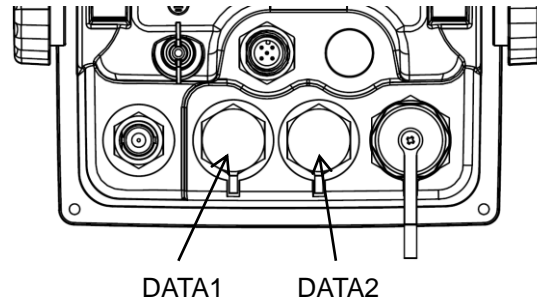
| 7: Initial setup | |
|------------------|----------------|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | = L/L |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = DECCA |
| 9: Chain | = Manual |
| Chain | = 00 |

Combination of two secondary station

Initial setup: LoranC

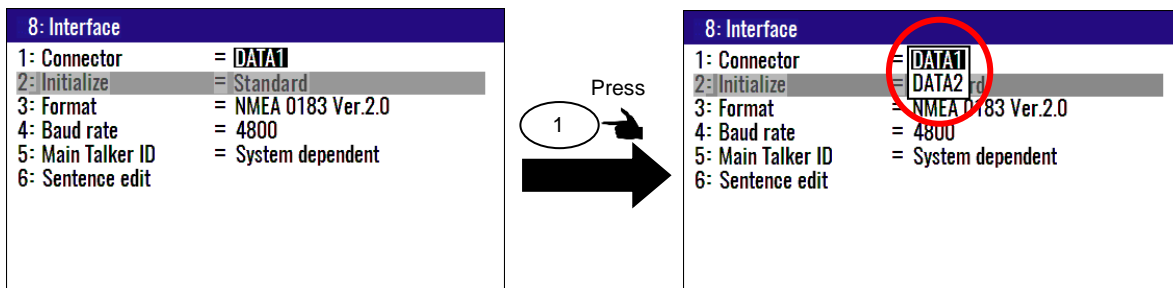
4.6 Menu 8: Interface

4.6.1 Selecting a DATA port to setting.



You can select the format of output data.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **8/S** key to select **“8: Interface”**.
- (3) Press **1** key to select **“1: Connector”**.
- (4) Press **[▲]** or **[▼]** key to move cursor onto the data port to select **“DATA1”** or **“DATA2”**.
- (5) Press **ENT** key.



Note: When JB-35 is connected, DATA3 and DATA4 are added as selection items.
After selecting DATA3 and DATA4, you can set each item using the same procedure as DATA1.
Also, if the power is turned off when the “Connector” selection position in the menu is DATA3 or DATA4, it will be returned to the DATA1 selection position when the power is turned on.

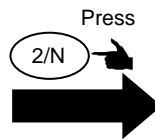
4.6.2 When initializing the device connected to DATA2 port

After selecting the DATA2 connector by the above operation, you can initialize the GPS compass to be connected by the following operation. Also, if you do not need initialization, please select the "standard".

When DATA 1 is selected, this function is invalid and operation is impossible.

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(8/S)** key to select "**8: Interface**".
- (3) Press **(2/N)** key to select "**2: Initialize**".
- (4) Press [**▲**] or [**▼**] key to move cursor onto the initialize to select "Standard", "Compass V140s".
- (5) Press **(ENT)** key.

| 8: Interface | |
|-------------------|---------------------|
| 1: Connector | = DATA2 |
| 2: Initialize | = Standard |
| 3: Format | = NMEA 0183 Ver.2.0 |
| 4: Baud rate | = 4800 |
| 5: Main Talker ID | = System dependent |
| 6: Sentence edit | |



| 8: Interface | |
|-------------------|----------------------------|
| 1: Connector | = DATA2 |
| 2: Initialize | = Standard |
| 3: Format | = Compass V104s 2.0 |
| 4: Baud rate | = 4800 |
| 5: Main Talker ID | = System dependent |
| 6: Sentence edit | |

Initial setup: Standard

4.6.3 Selecting an output data format of DATA1 and DATA2 port

You can select the format of output data format.



CAUTION

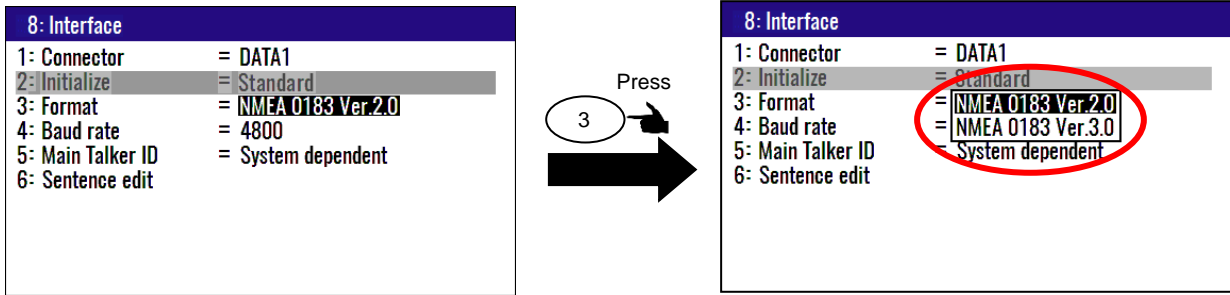
When initializing GPS compass V104S,
The format menu of the DATA 2 connector is
It becomes invalid.

| 8: Interface | |
|-------------------|------------------------|
| 1: Connector | = DATA2 |
| 2: Initialize | = Compass V104s |
| 3: Format | = NMEA 0183 Ver.2.0 |
| 4: Baud rate | = 38400 |
| 5: Main Talker ID | = System dependent |
| 6: Sentence edit | |

- (1) Press **(MENU)** key until Menu options 1 to 9 appears.
- (2) Press **(8/S)** key to select "**8: Interface**".
- (3) Press **(3)** key to select "**3: Format**".

In the case "DATA1" of "1: Connector"

- (4) Press [**▲**] or [**▼**] key to move cursor onto the output data format to select "DATA1".
- (5) Press **(ENT)** key.



Initial setup: NMEA 0183 Ver.2.0

The following formats can be selected.

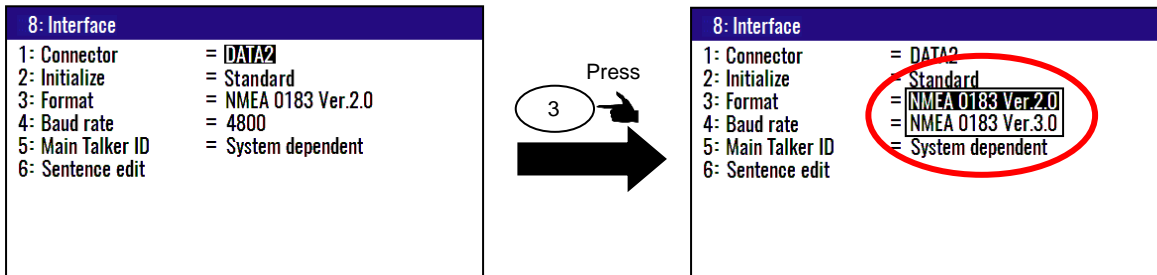
- 1) NMEA0183 Ver2.0
- 2) NMEA0183 Ver3.0

* Input data will be used as output as is except for data created by this Display unit.

In the case “DATA2” of “1: Connector”

(4) Press [▲] or [▼] key to move cursor onto the output data format to select “DATA2”.

(5) Press **ENT** key.



Initial setup: NMEA 0183 Ver.2.0


The following formats can be selected.

- 1) NMEA0183 Ver2.0
- 2) NMEA0183 Ver3.0

4.6.4 Setting the Baud rate

You can change the Baud rate of DATA1 and DATA2.

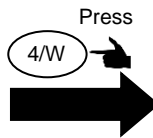
CAUTION

 When initializing GPS compass V104S, The baud rate menu of the DATA 2 connector automatically becomes 38400 and it becomes invalid.

| 8: Interface | |
|-------------------|---------------------|
| 1: Connector | = DATA2 |
| 2: Initialize | = Compass V104s |
| 3: Format | = NMEA 0183 Ver.2.0 |
| 4: Baud rate | = 38400 |
| 5: Main Talker ID | = System dependent |
| 6: Sentence edit | |

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **8/S** key to select “8: Interface”.
- (3) Press **4/W** key to select “4: Baud rate”.
- (4) Press [**▲**] or [**▼**] key to move cursor onto the baud rate “4800”, “9600”, “19200”, “38400”.
- (5) Press **ENT** key.

| 8: Interface | |
|-------------------|---------------------|
| 1: Connector | = DATA1 |
| 2: Initialize | = Standard |
| 3: Format | = NMEA 0183 Ver.2.0 |
| 4: Baud rate | = 4800 |
| 5: Main Talker ID | = System dependent |
| 6: Sentence edit | |




| 8: Interface | |
|-------------------|---------------------|
| 1: Connector | = DATA1 |
| 2: Initialize | = Standard |
| 3: Format | = NMEA 0183 Ver.2.0 |
| 4: Baud rate | = 4800 |
| 5: Main Talker ID | = System dependent |
| 6: Sentence edit | |

Initial setup: 4800

4.6.5 Setting the output Talker ID

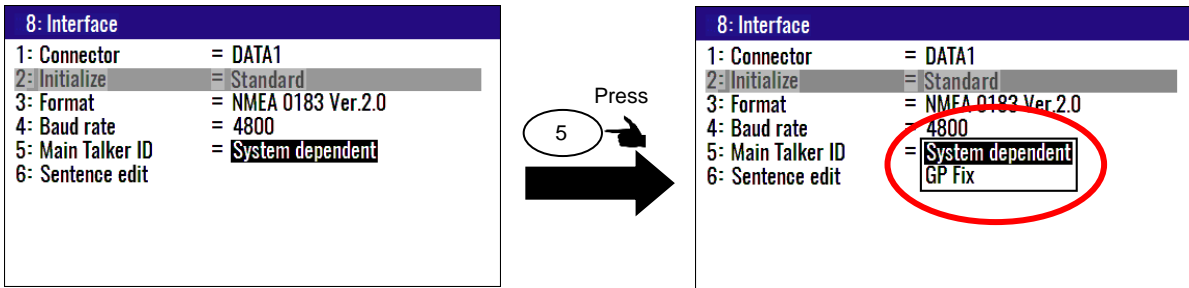
You can change the Talker ID “GP” only or System dependent (“GP”, “GL” and “GN”)

CAUTION

 When initializing GPS compass V104S, The main talker ID menu of the DATA 2 connector it becomes invalid.

| 8: Interface | |
|-------------------|---------------------|
| 1: Connector | = DATA2 |
| 2: Initialize | = Compass V104s |
| 3: Format | = NMEA 0183 Ver.2.0 |
| 4: Baud rate | = 38400 |
| 5: Main Talker ID | = System dependent |
| 6: Sentence edit | |

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **8/S** key to select **“8: Interface”**.
- (3) Press **5** key to select **“5: Main Talker ID”**.
- (4) Press [**▲**] or [**▼**] key to move cursor onto the baud rate “GP Fix” or “System dependent”.
- (5) Press **ENT** key.



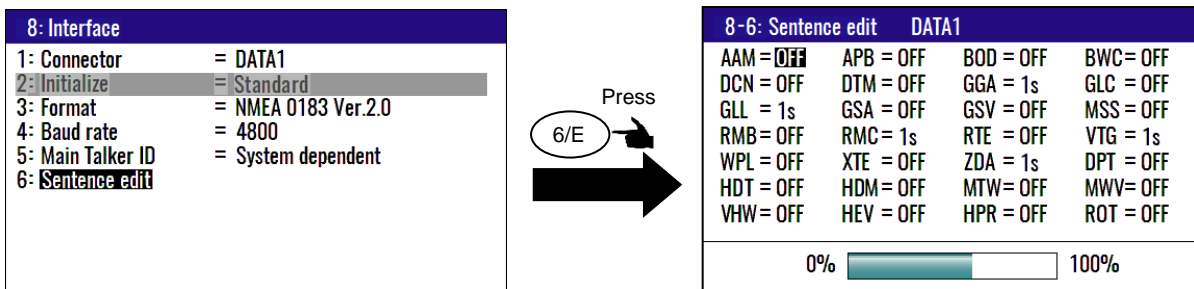
Initial setup: System dependent

4.6.6 Selecting an output sentence

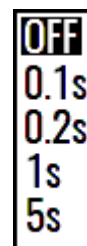
Determine the sentence to be output from the NMEA0183 or CIF.

Output interval can sets “OFF”, “5S”, “1S”, “0.2S” or “0.1S”. Sentence does not output when output interval sets “OFF”.

- (1) Press **MENU** key until Menu options 1 to 9 appears.
- (2) Press **8/S** key to select **“8: Interface”**.
- (3) Press **6/E** key to select **“6: Sentence edit”**.



- (4) Press [**▲**] or [**▼**], [**▶**] or [**◀**] key to select the output sentence.
- (5) Press **ENT** key to display the output period selection popup.
- (6) Press [**▲**] or [**▼**] key to move cursor onto the output interval “OFF”, “0.1S”, “0.2S”, “1S” or “5S”.
Sentence does not output when output interval sets “OFF”.
- (7) Press **ENT** key.



* Bar meter at the bottom of screen is the occupancy rate of the NMEA. Please set to be 100% or less.





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Chapter 5 How to use LOP

5.1 Initial setup for LOP display

Measured longitude and latitude can be translated into loran C, loran A or DECCA. To turn on the LOP mode, the following initial setup is required.







 **NOTE:** Press to backspace the cursor to correct an input error.


 **NOTE:** Press to clear incorrect Input. You can reenter Numeric data.

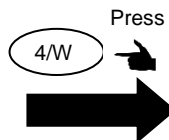
5.1.1 Selecting LOP (Loran C, Loran A or DECCA)


Select the type to translate from longitude and latitude.

The procedure is as follows:






- (1) Press  key until Menu options 1 to 9 appears.
- (2) Press  key to select “7: Initial setup”.
- (3) Press  key to select “4: Position”.
- (4) Press [] or [] key to move cursor onto the “Lop”.
- (5) Press  key.


| 7: Initial setup | |
|------------------|---|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | =  |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = LoranC |
| 9: Chain | = 9970-3-5 |

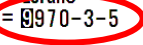


| 7: Initial setup | |
|------------------|---|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | =  |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = LoranC |
| 9: Chain | = 9970-3-5 |

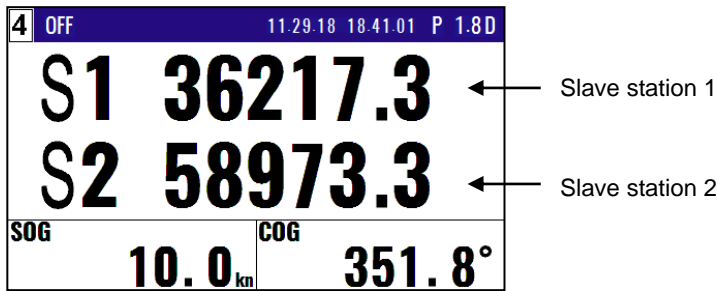
In the case “LoranC”

- (6) Press  key to select “8: LOP”.
- (7) Press [] or [] key to move cursor onto the “LoranC”.
- (8) Press  key.
- (9) Press [] key to move cursor onto the “9: Chain”.
- (10) Input the station of LoranC by numeric keys.

| 7: Initial setup | |
|------------------|---|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | = L/L |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | =  |
| 9: Chain | = 9970-3-5 |

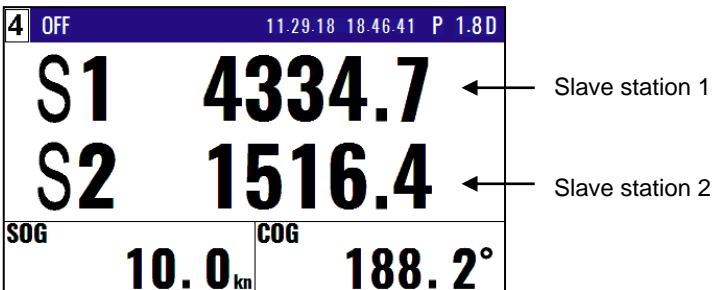
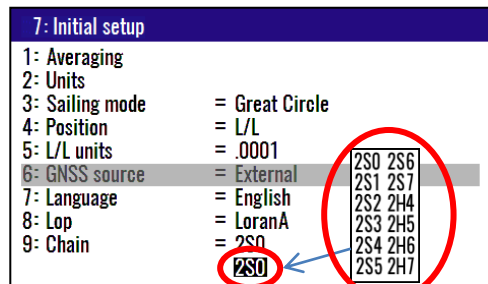
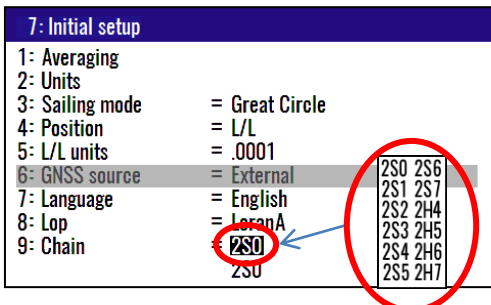
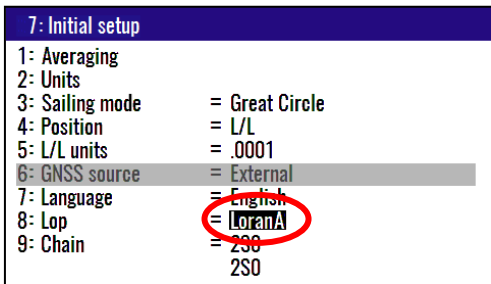
| 7: Initial setup | |
|------------------|---|
| 1: Averaging | |
| 2: Units | |
| 3: Sailing mode | = Great Circle |
| 4: Position | = L/L |
| 5: L/L units | = .0001 |
| 6: GNSS source | = External |
| 7: Language | = English |
| 8: Lop | = LoranC |
| 9: Chain | =  |

When select Loran C, you must select station



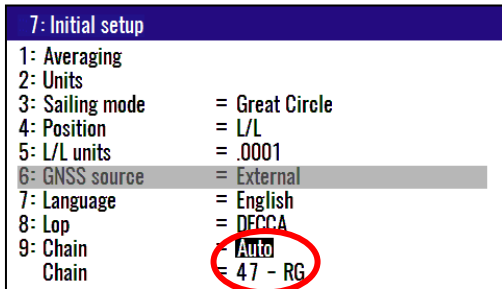
In the case “LoranA”

- (6) Press **8/S** key to select “8: LOP”.
- (7) Press [▲] or [▼] key to move cursor onto the “LoranA”.
- (8) Press **ENT** key.
- (9) Press [▼] key to move cursor onto the “9: Chain”.
- (10) Input the station of LoranA use to [▲], [▼], [▶] or [◀] key.



In the case “DECCA”

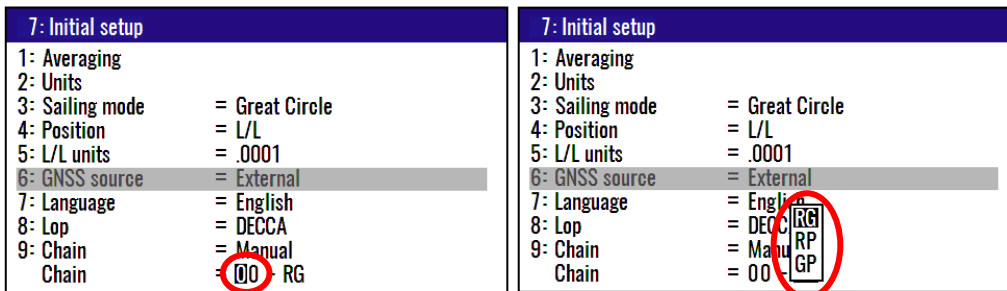
- (6) Press **8/S** key to select “8: LOP”.
- (7) Press [▲] or [▼] key to move cursor onto the “DECCA”.
- (8) Press **ENT** key.
- (9) Press [▼] key to move cursor onto the “9: Chain”.
- (10) Press [▲] or [▼] key to move cursor onto the “Auto” or “Manual”.
- (11) Press **ENT** key.



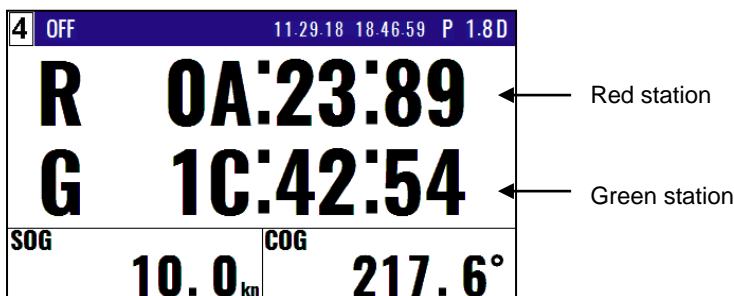
When select auto mode, KRD-10 finds the optimal station

Select “Manual”


- (12) Press [▼] key to move cursor onto the station of DECCA.
- (13) Input the station of DECCA by numeric keys.
- (14) Press [▶] key and press **ENT** key.
- (15) Input the station of DECCA use to [▲] or [▼] key. You can select “RG”, “RP” or “GP”.
- (16) Press **ENT** key.




When select manual mode, you must select station







5.2 Storing waypoints (LOPs data)

 **NOTE:** Press to backspace the cursor to correct an input error.

 **NOTE:** Press to clear incorrect Input. You can reenter Numeric data.


5.2.1 Storing a new position or updating an existing one

Up to 10000 waypoints can be stored in memory. As 1000 points (numbers 0000 to 0999) are reserved for POB and event registration, you can use 1000 to 9999 (total of 9000 points) to store waypoints.

- (1) Press  key until Menu options 1 to 9 appears.
- (2) Press  key to select "1: Waypoints".
- (3) Enter storage number (0000 to 9999) by numeric keys and  key.
- (4) Select "Set" in the pop-up and press  key.







LOP mode (Example)

| MENU |
|-----------------|
| 1:Waypoints |
| 2:Routes |
| 3:GNSS |
| 4:Compensation |
| 5:Alarms |
| 6:Calculation |
| 7:Initial setup |
| 8:Interface |
| 9:Plotter |







Press  Key



Storage position: **LoranC**

| Number | Mark | S1 | S2 | Comment |
|--------------------|---|---------|---------|-----------|
| 1:Waypoints | | | | |
| W1000 | X | 30013.6 | 58330.4 | 07 06:38 |
| W1001 |  | 30016.7 | 58370.5 | |
| W1002 |  | 30029.1 | 58486.0 | YOKOHAMA1 |
| W1003 |  | 30037.5 | 58548.1 | 19 13:38 |
| W1004 |  | 30035.0 | 58512.9 | YOKOHAMA2 |
| W1005 | X | 30034.1 | 58494.2 | 19 14:58 |
| W1006 | X | 30028.7 | 58444.5 | |
| W1007 |  | 30018.0 | 58351.3 | URAYASU |
| W1008 |  | 30011.5 | 58270.1 | ODAIBA |
| W1009 | X | 30008.1 | 58224.2 | 15 14:18 |

Storage position: **LoranA**

| Number | Mark | S1 | S2 | Comment |
|--------------------|---|--------|--------|-----------|
| 1:Waypoints | | | | |
| W1000 | X | 1155.2 | 3765.1 | 07 06:38 |
| W1001 |  | 1151.4 | 3766.3 | |
| W1002 |  | 1139.1 | 3769.8 | YOKOHAMA1 |
| W1003 |  | 1132.5 | 3771.5 | 19 13:38 |
| W1004 |  | 1134.6 | 3770.9 | YOKOHAMA2 |
| W1005 | X | 1135.4 | 3770.6 | 19 14:58 |
| W1006 | X | 1139.8 | 3769.4 | |
| W1007 |  | 1150.2 | 3766.5 | URAYASU |
| W1008 |  | 1158.2 | 3764.0 | ODAIBA |
| W1009 | X | 1163.5 | 3762.3 | 15 14:18 |

Storage position: **DECCA**

| Number | Mark | S1 | S2 | Comment |
|--------------------|------|----------|----------|-----------|
| 1:Waypoints | | | | |
| W1000 | X | 51:47:19 | 6F:79:06 | 07 06:38 |
| W1001 | □ | 01:32:04 | 0J:77:46 | |
| W1002 | ▽ | 01:33:44 | 0J:73:96 | YOKOHAMA1 |
| W1003 | □ | 01:34:24 | 0J:71:97 | 19 13:38 |
| W1004 | ▽ | 01:34:14 | 0J:72:27 | YOKOHAMA2 |
| W1005 | X | 01:34:15 | 0J:72:29 | 19 14:58 |
| W1006 | X | 01:33:70 | 0J:73:34 | |
| W1007 | ◎ | 01:32:51 | 0J:76:40 | URAYASU |
| W1008 | ◎ | 01:31:72 | 0J:78:38 | ODAIBA |
| W1009 | X | 01:31:15 | 0J:79:78 | 15 14:18 |

For the following operations, refer to 2.1 "Storing waypoints (LAT/LONG) data"

- "Writing or changing comment" (See page 2-1/2)
- "Copying a position" (See page 2-3)
- "Erasing a single waypoint" (See page 2-3)

5.3 Compensating the LOP

KRD-10 can be converted from Latitude and Longitude to LoranC, LoranA and DECCA. It can be corrected in the converted data.

For the following operations, refer to 4.3.4 "Compensating the LOP"

- "In the case of LoranC" (See page 4-9)
- "In the case of LoranA" (See page 4-9)
- "In the case of DECCA" (See page 4-10)

5.4 Calculating LOPs based on LAT/LONG data

KRD-10 can calculate the LOPs based on the specified LAT/LONG data and displays the LOP values.

- "In the case of LoranC" (See page 4-15)
- "In the case of LoranA" (See page 4-15/16)
- "In the case of DECCA" (See page 4-16/17)

Chapter 6 Data backup, initialization and NMEA monitor

6.1 Data backup

You can back up the waypoint/route data and setting values by USB memory.

6.1.1 Displaying the “Data backup” menu

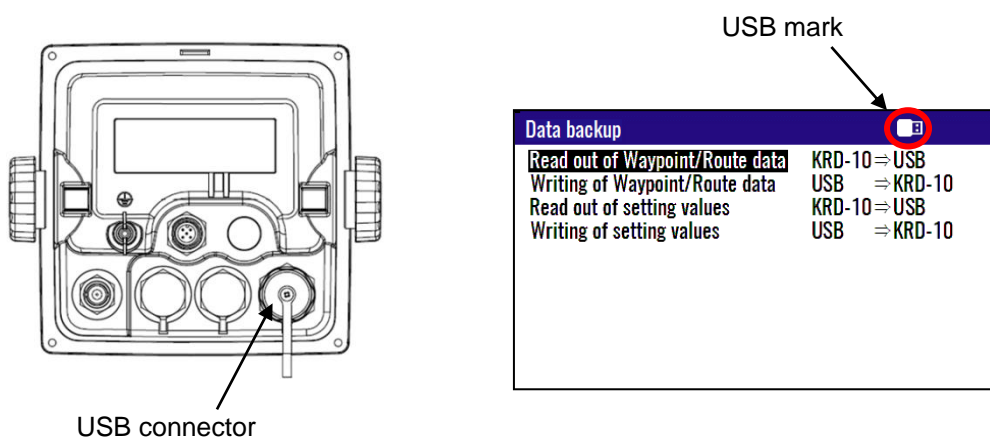
The procedure is as follows:

- (1) Press (7) key and Power ON.
- (2) Release your finger from (7) key when appear opening screen.

| Data backup | |
|---------------------------------|--------------|
| Read out of Waypoint/Route data | KRD-10 ⇒ USB |
| Writing of Waypoint/Route data | USB ⇒ KRD-10 |
| Read out of setting values | KRD-10 ⇒ USB |
| Writing of setting values | USB ⇒ KRD-10 |

6.1.2 Insert USB memory

Insert USB memory in the USB connector of the rear panel, and confirm USB mark on the display.



NOTE: If USB mark is not appear,
Change USB memory for new one.

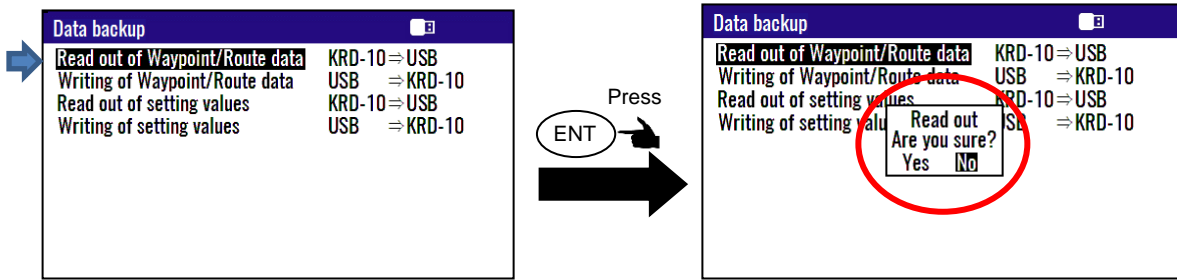
6.1.3 Read out of data

In the case “Read out of Waypoint / Route data”

- (1) Press [▲] or [▼] key to move cursor onto the “Read out of Waypoint / Route data”.
- (2) Press (ENT) key.
- (3) Select “Yes” in the pop-up and press (ENT) key.
- (4) If a message of “Read out complete” appears, it is completed.

*The name of data file is “KM-F83_WPT_RTE.dat”.

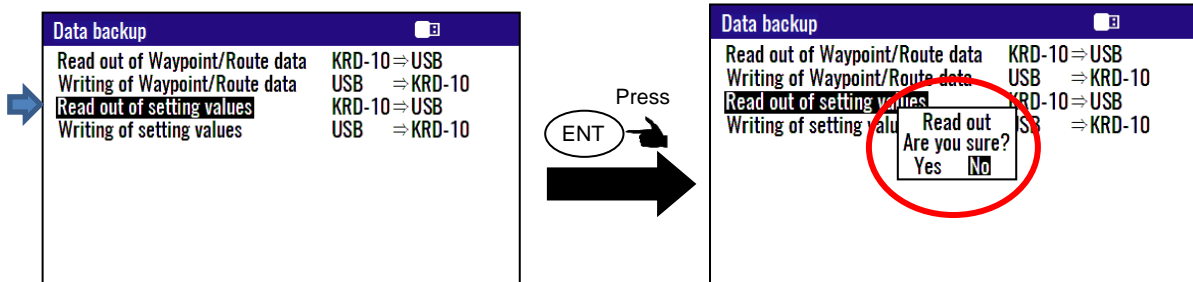
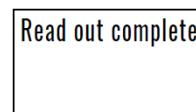
Read out complete



In the case “Read out of setting values”

- (1) Press [▲] or [▼] key to move cursor onto the “Read out of setting values”.
- (2) Press **ENT** key.
- (3) Select “Yes” in the pop-up and press **ENT** key.
- (4) If a message of “Read out complete” appears, it is completed.

*The name of data file is “KM-F83_SETUP.dat”.

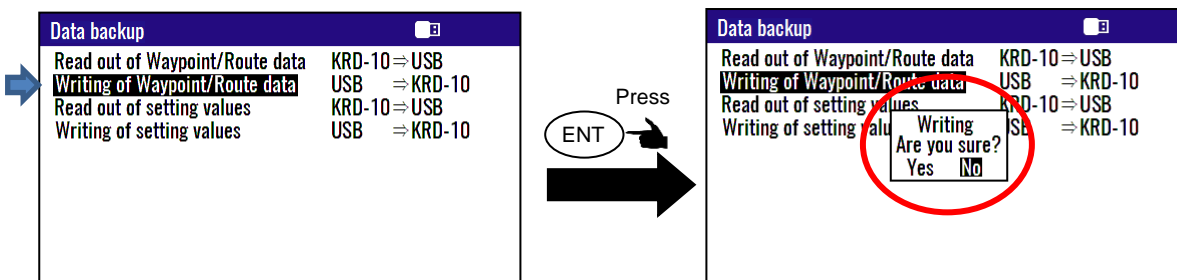
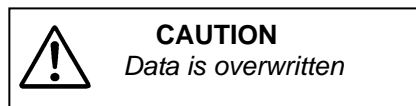
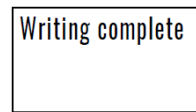


6.1.4 Writing of data

In the case “Writing of Waypoint / Route data”

*The data file is necessary in USB memory named “KM-F83_WPT_RTE.dat”.

- (1) Press [▲] or [▼] key to move cursor onto the “Writing of Waypoint / Route data”.
- (2) Press **ENT** key.
- (3) Select “Yes” in the pop-up and press **ENT** key.
- (4) If a message of “Writing complete” appears, it is completed.




In the case “Writing of setting value”

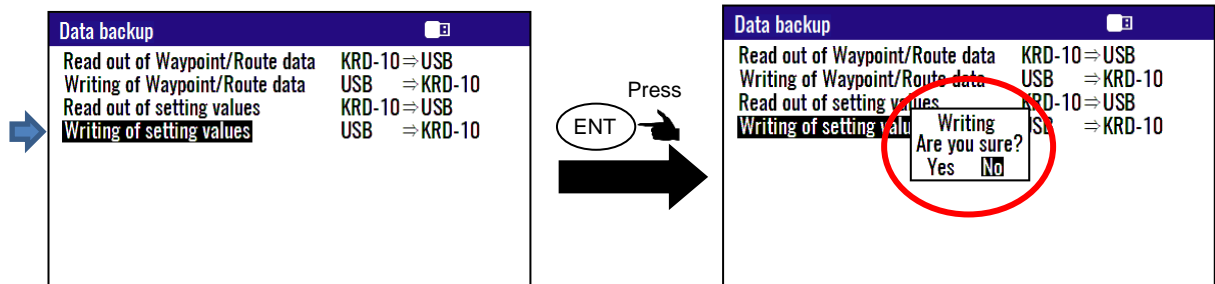
*The data file is necessary in USB memory named “KM-F83_SETUP.dat”.

- (1) Press [▲] or [▼] key to move cursor onto the “Writing of setting value”.
- (2) Press **ENT** key.
- (3) Select “Yes” in the pop-up and press **ENT** key.
- (4) If a message of “Writing complete” appears, it is completed.

Writing complete



CAUTION
Data is overwritten



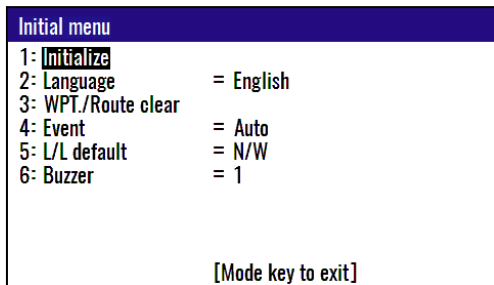
6.2 Initialization

When some malfunction of Display unit is found, following initialization procedure may be required. It returns all the settings in the menu to the factory settings.

6.2.1 Displaying the “Initial menu”

The procedure is as follows:

- (1) Press (MENU) key and (ENT) key, and Power ON.
- (2) Release your finger from (MENU) key and (ENT) key when opening screen appears.



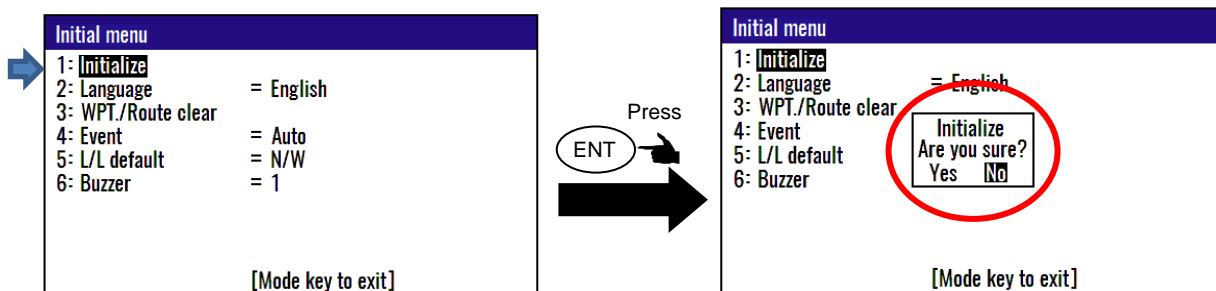
6.2.2 Initialize

When initializing, please note all system parameters beforehand, or use USB memory to back up.

And reset after initialization. (Refer to 6.1 "Data backup")

- (1) Press [▲] or [▼] key to move cursor onto the “1: Initialize”.
- (2) Press (ENT) key.
- (3) Select “Yes” in the pop-up and press (ENT) key.
- (4) Select language in the pop-up and press (ENT) key.
- (5) Press (MODE) key to exit initial menu.

NOTE: Already registered data on the waypoints, events, POBs and routes remain unchanged.

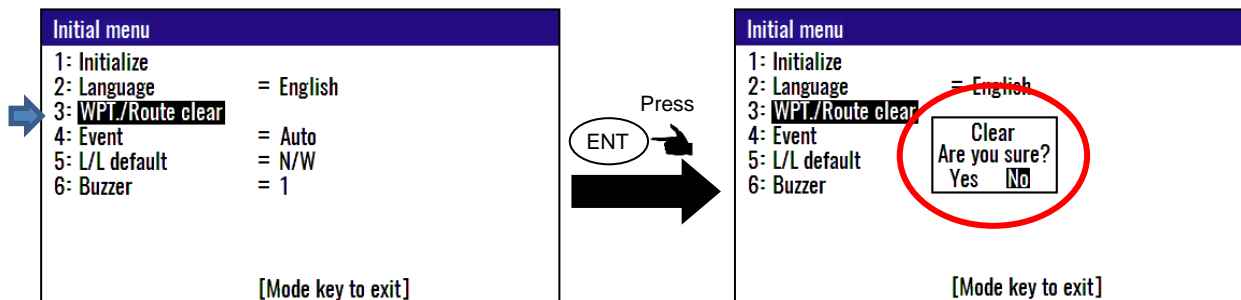


NOTE: If you want to go back up for before initialize, Please write setting values data to USB memory. See page 6-1 to 6-3

6.2.3 WPT. / Route clear

You can erase the entire data such as waypoints, events, POB, and routes from internal memory.

- (1) Press [▲] or [▼] key to move cursor onto the “WPT. / Route clear”.
- (2) Press **ENT** key.
- (3) Select “Yes” in the pop-up and press **ENT** key.
- (4) Press **MODE** key to exit initial menu.



Note: If you want to go back up for before clear data, Please write Waypoint/Route data to USB memory. Refer page 6-1/2

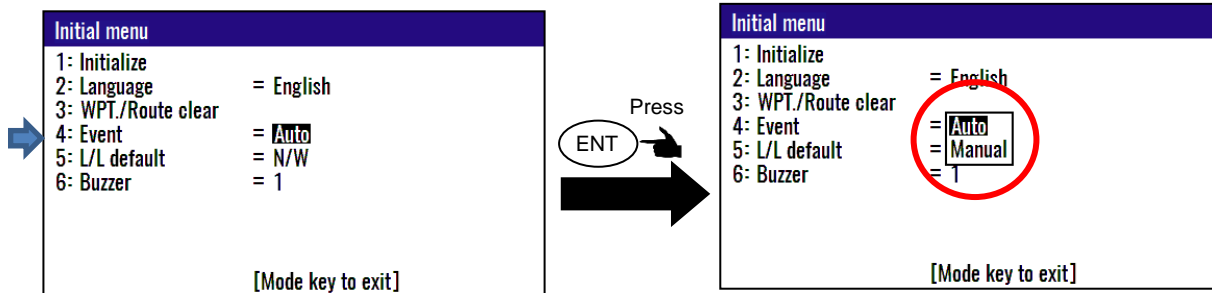
6.2.4 Changing a storing method for present position (Event)

You can use either of the following two procedures for registering your current position (Event).

- (1) Press [▲] or [▼] key to move cursor onto the “Event”.
- (2) Press **ENT** key.
- (3) Select “Auto” or “Manual” in the pop-up and press **ENT** key.
- (4) Press **MODE** key to exit initial menu.

AUTO: Pressing the **EVT** key automatically registers the points starting from No. 0001 to 0999. When the 1000th point is reached, the number is returned to 0001 again and the older data is sequentially replaced by the newer one.

MANUAL: Press the **EVT** key, then specify desired registration numbers (in the range of 0001 to 0999) by numeric keys.



initial setup: AUTO

6.2.5 Selecting an initial value (North, South, East, West) of latitude/longitude.

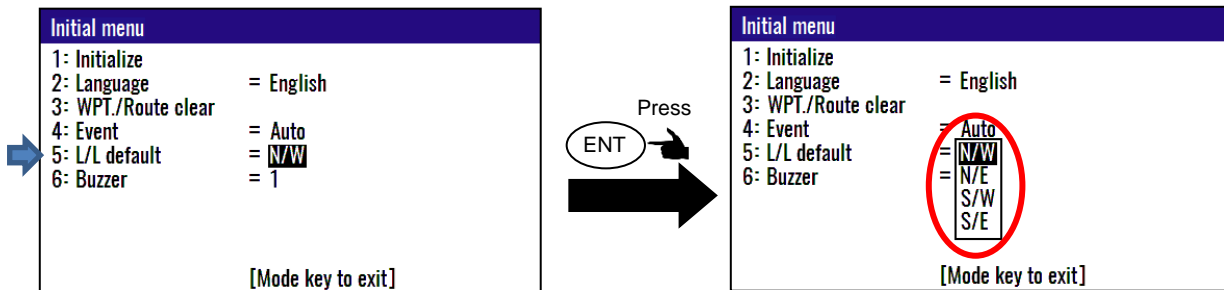
Entry / edit operation can be performed easily by inputting deciding the initial value of (Northern latitude / Southern longitude / East longitude / West longitude).

N/W (N. Lat. / W. Long.): When editing a waypoint, position is started using the north latitude/west longitude region as the initial value.

N/E (N. Lat. / E. Long.): When editing a waypoint, position is started using the north latitude/east longitude region as the initial value.

S/W (S. Lat. / W. Long.): When editing a waypoint, position is started using the south latitude/west longitude region as the initial value.

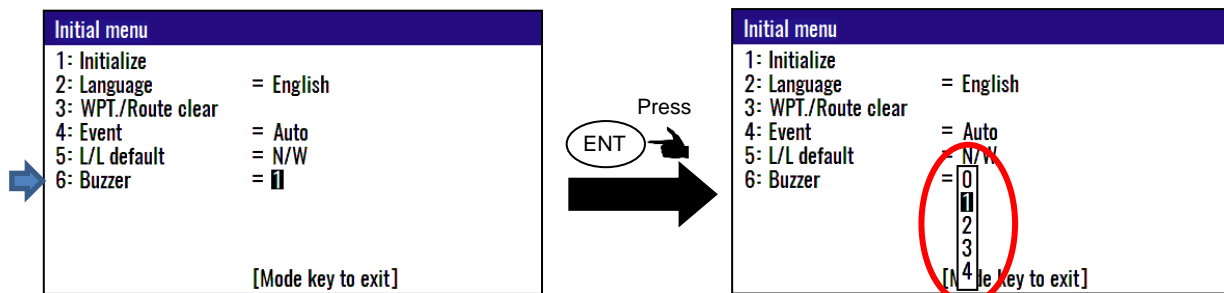
S/E (S. Lat. / E. Long.): When editing a waypoint, position is started using the south latitude/east longitude region as the initial value.



Initial setup: N/W

6.2.6 Frequency adjustment of the buzzer

You can change the frequency of the buzzer. You can select the five frequencies. “0” is the lowest sound. “4” is the highest sound.



Initial setup: 1

6.3 NMEA monitor

The data input to KRD-10 can be checked for each port.

6.3.1 Displaying the “NMEA monitor”

The procedure is as follows:

- (1) Press **8/S** key and Power ON.
- (2) Release your finger from **8/S** key when appear NMEA monitor screen.



If the NMEA monitor screen shown on the left is not displayed, turn off the power once and repeat the operation from (1).

The NMEA monitor is started from the DATA2 port at startup. For each port, the currently set baud rate is specified first.

6.3.2 When switching the baud rate

Four baud rates can be selected. The following baud rates can be selected.

"4800bps, 9600bps, 19200bps, 38400bps"

The procedure is as follows:

- (1) Press [▲] or [▼] key to switch the baud rate.
- (2) Select the baud rate. And check the screen when the sentence is displayed correctly.

Displayed correctly when the baud rate on the NMEA monitor screen matches the baud rate of the connected device.
 In the sentence display, black text and red text are displayed alternately. When the last line of the monitor screen is displayed, the continuation from the first line of the monitor screen is overwritten.
 If it is not matches, “?” Or garbled characters are displayed.



CAUTION

Even if the baud rate is changed on the NMEA monitor, the baud rate of each port of this unit at the time of restart is not changed.

6.3.3 When performing “Pause” and “Resume” on the NMEA monitor screen

Since the NMEA monitor checks the sentence displayed on the screen, the screen can be set to “Pause”. In the paused state, check the detailed input sentence from the displayed sentence.

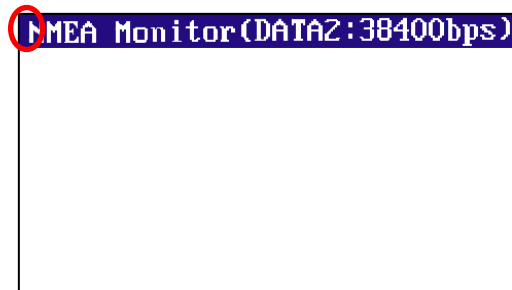
In addition, resume from the “Pause” state.

The procedure is as follows:

- (1) When **ENT** key is pressed, "*" is displayed on the upper left of the screen, and "Pause" status is entered.
- (2) When **ENT** key is pressed in the "Pause" state, "*" is hidden and "Normal" state is entered. The display update will resume.



"Pause" state



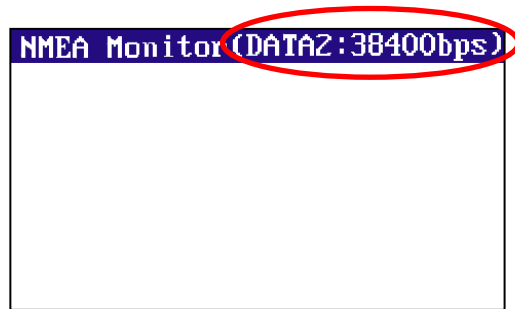
"Normal" state

6.3.4 When switching the port of the NMEA monitor screen

The NMEA monitor can check the input sentence by switching each port.

The procedure is as follows:

- (1) Press "▶" or "◀" key to switch between "DATA1 port" or "DATA2 port".
 (When JB-35 is connected, it is possible to switch to "DATA3 port" and "DATA4 port".)
 The currently checked "DATA Port" and "Baud Rate" are displayed on the right side of the header of the screen.
- (2) When changing the baud rate,
 Refer to "6.3.2 When switching the baud rate".
- (3) When performing "Pause" and "Resume" on the screen,
 Refer to "6.3.3 When performing "Pause" and "Resume" on the NMEA monitor screen".



Display current Port and Baud rate

CAUTION
*To exit the NMEA monitor, press the power key until the screen disappears.
 The countdown is not displayed.*

Chapter 7 Installation






7.1 Installation consideration

Qualified service technicians should perform the installation of the KRD-10 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

7.2 Unpacking of the goods

Unpack your package and check if all of the items stated in the packing list are contained in the package. If there is any trouble in the contents, please contact your dealer or our office.

| No. | Name of item | Type | Remark | Qty |
|-----|--|-------------|--|-----|
| 1 | Display unit  | KRD-10.MU | With mounting bracket, hard cover and BNC connector cap | 1 |
| 2 | DC power cable  | CW-276-2M | With a 5-pin connector and one end plain | 1 |
| 3 | Connecting cable  | CW-376-1-5M | With a 6-pin connector and one end plain (with ferrite core) | 1 |
| 4 | Installation material  | TPT5X20U | Truss tapping screw | 4 |
| 5 | Operation Manual  | KRD-10.OM.E | English | 1 |

Note: Option of equipment is not included.

7.2.1 Inspection of the 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.

7.3 Siting the units

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

- (1) The Display unit should be positioned in the location where the external situation can be viewed.
- (2) Locate the display so that it provides easy viewing from all likely operator's positions.
- (3) Select a position safe and free from dampness, water spray, rain and direct sunlight.
- (4) Provide enough space for servicing. Consider access to the rear panel for connecting cables.
- (5) Position the Display unit as possible away from other radio equipment.

7.4 Display unit installation

The Display unit is designed for table mount and flush mount. Refer to Figure 7.1, 7.2 or 7.3 for installation.

7.4.1 Table mounting

- (1) Remove the two knurled 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 tapping screws.
- (4) Reset the Display unit on to the bracket and fix it using the two knurled fixing knobs that were removed in step (1). Refer to Figure 7.1 for detail.

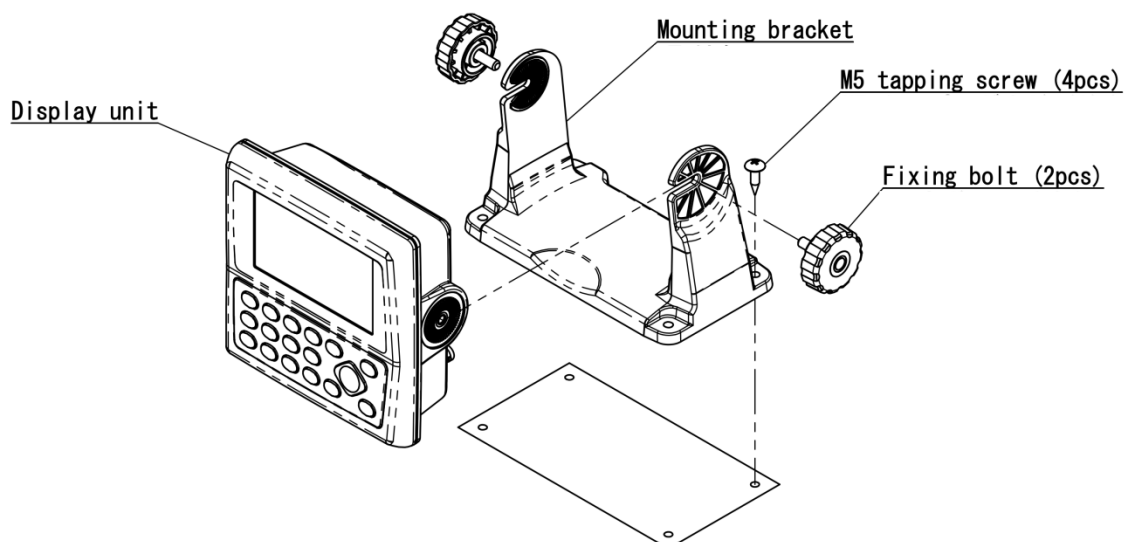


Figure 7.1 Fitting detail of KRD-10 in table mounting mode

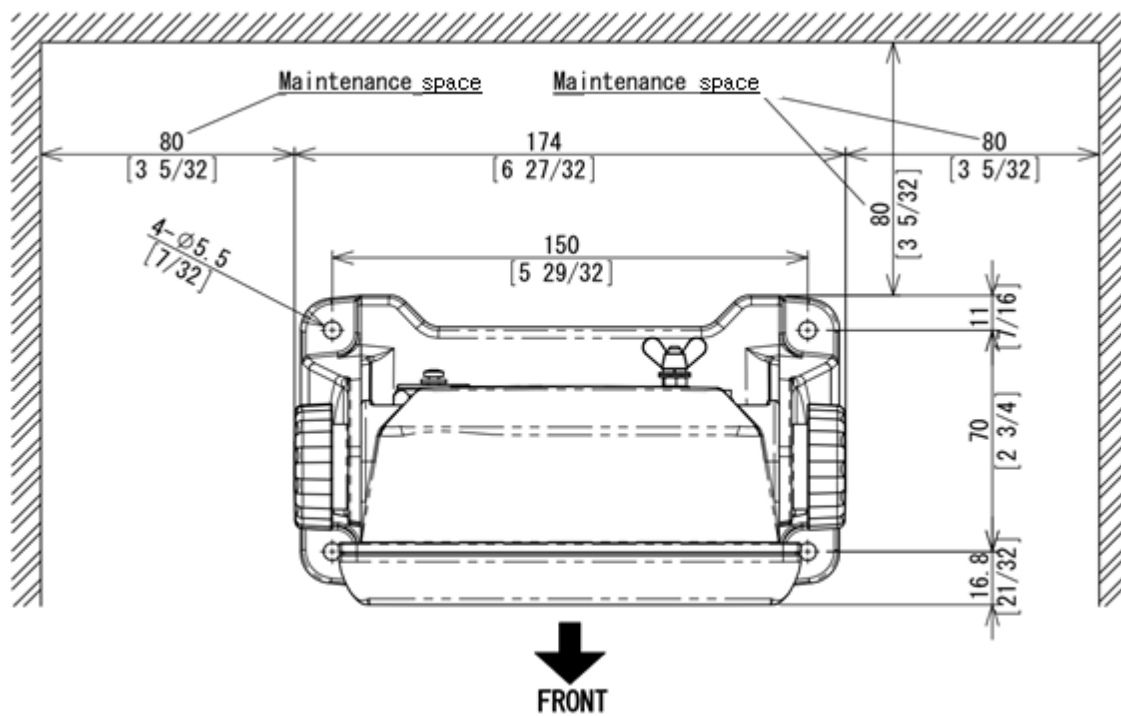


Figure 7.2 Maintenance space required for KRD-10

Unit: mm (inch)

7.4.2 Flush mounting

- (1) Cut a rectangle opening as shown in a figure 7.3.
- (2) Loosen two fixing knobs that fasten the Display unit onto the mounting bracket.
- (3) Insert a coin in the two gaps at the lower part of the Display unit and remove the front frame.
- (4) Connect the connectors for power, data and others to the Display unit respectively.
- (5) Put the display on the opening and fix with four tapping screws. In case you use M3 screws to fix the display, select an appropriate screw length that best suits fixing the unit to the panel thickness.
- (6) Install the front frame removed in step (3).

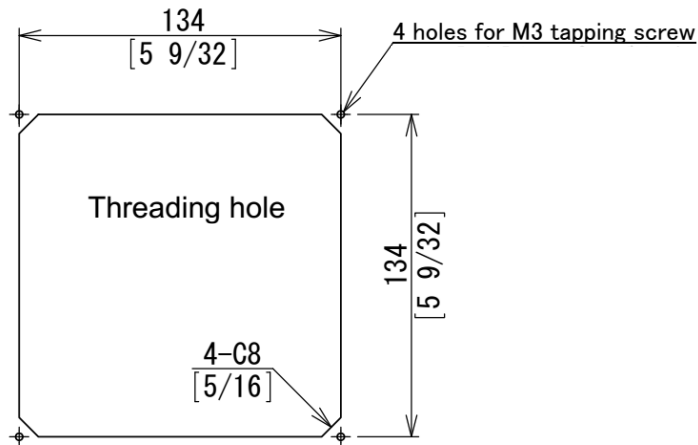
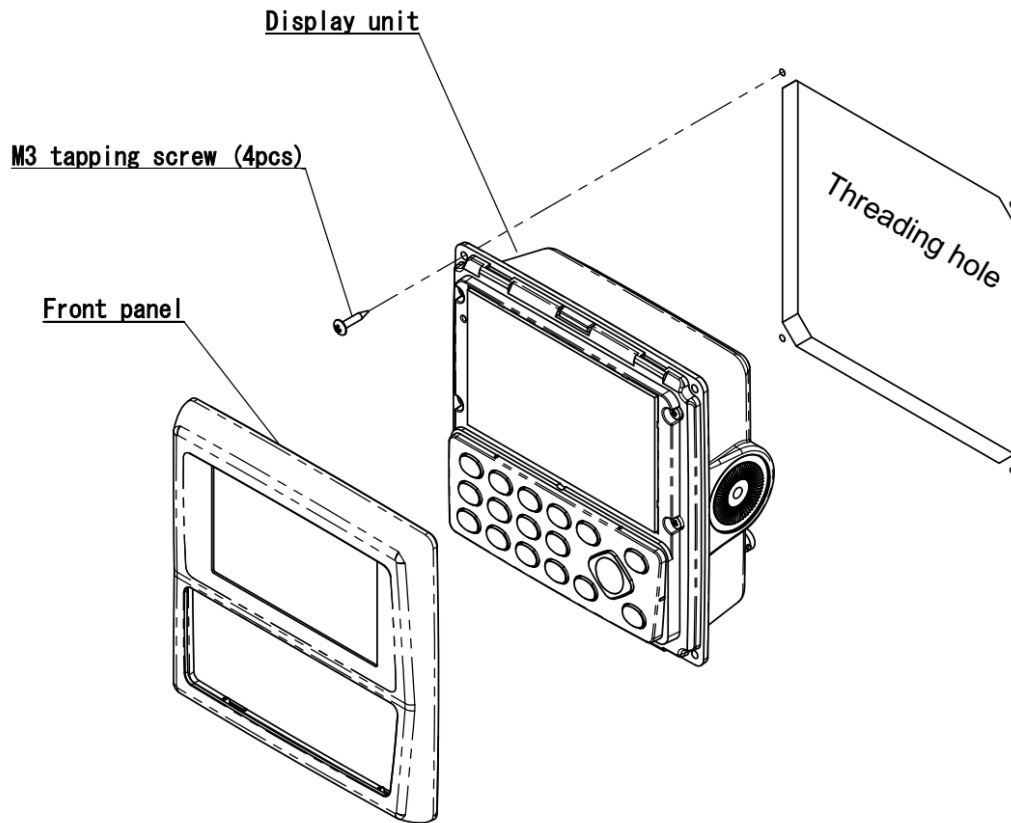
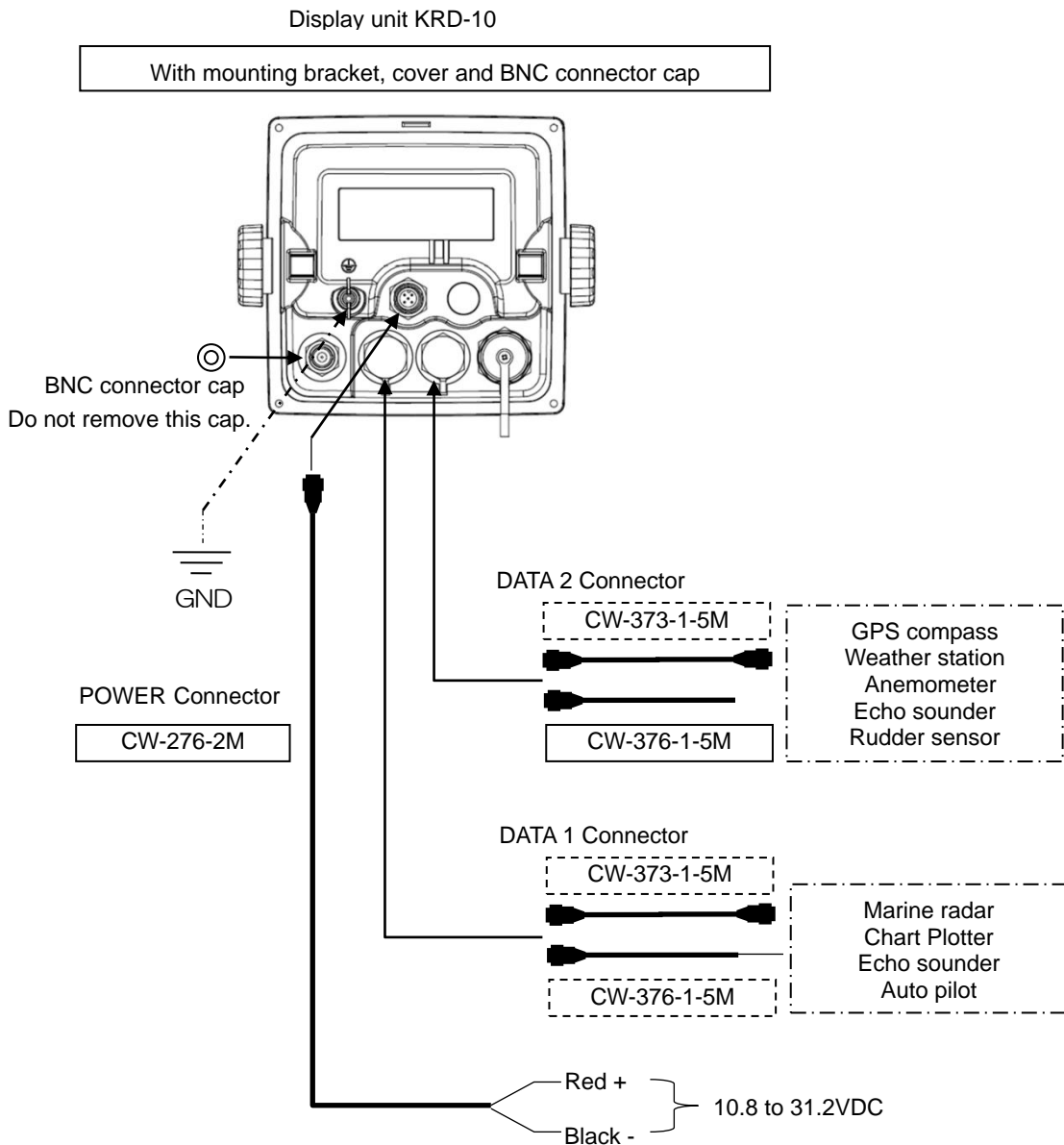
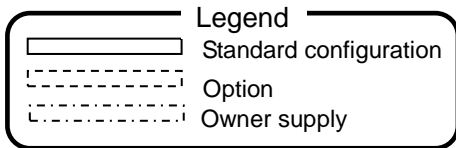


Figure 7.3 Flush Mount installation

Unit: mm (inch)

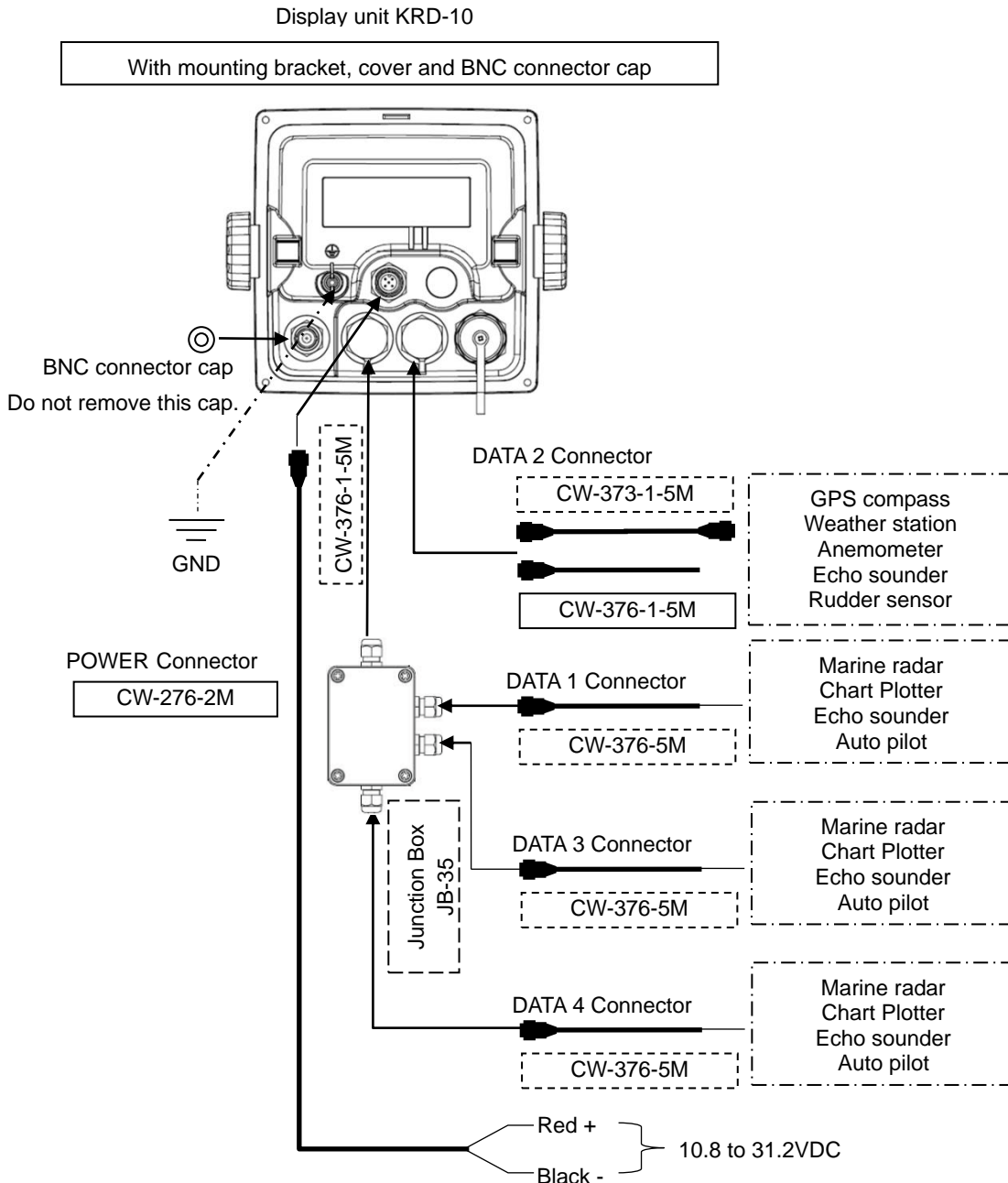
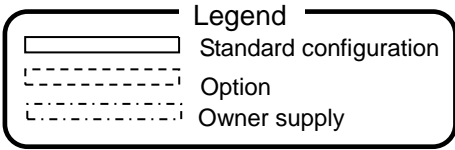
7.5 Cable connections to KRD-10

7.5.1 Single connection



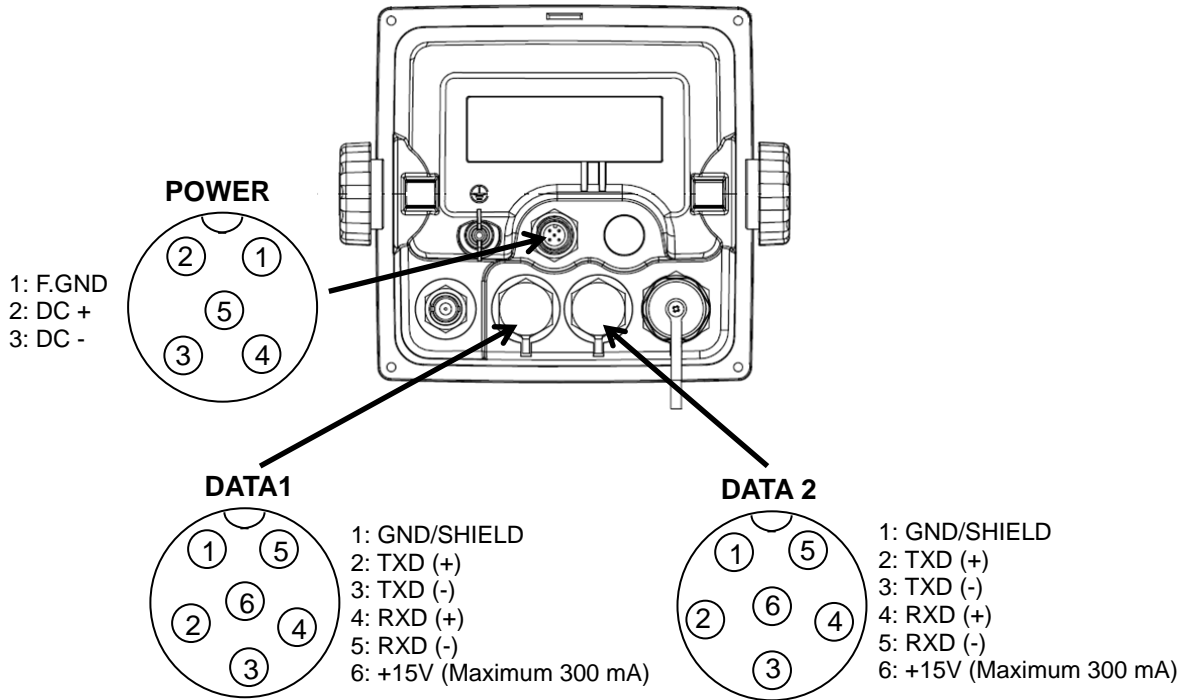
Note: When connecting a data cable from an external device to KRD-10, please use a connecting cable with a ferrite core.
Do not remove connector cap when not connected to the cable.

7.5.2 Multi connections



Note: When connecting a data cable from an external device to KRD-10, please use a connecting cable with a ferrite core.
Do not remove connector cap when not connected to the cable.

7.6 Connector pin outs



CAUTION



The maximum current capacity is **300 mA in total**, then it should not exceed. Take care that the grand total of each connector does not exceed 300 mA.

(DATA1 and DATA 2 port)

This port is general data output port. Output data is selected by the menu “**8: Interface**”.

Note: “**8: Interface**”: Refer to “**Chapter 4.6 Menu 8: Interface**”

CAUTION



When the output power (6 pin, +15V) of DATA1 or DATA2 is supplied to external devices, connect the external power line (+) to the 6 pin (+15V) and the external power line (-) to the 1 pin (GND/SHIELD). Do not connect the external shield line to the 1 pin (GND/SHIELD)

7.7 Connection with external equipment (DATA1, DATA2)

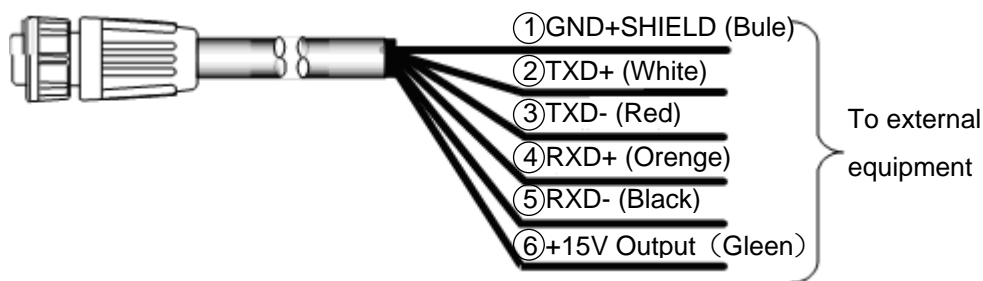
KRD-10 has DATA1 (input / output) and DATA2 (input / output) of NMEA0183 / IEC61162 port for connecting to external devices such as navigation equipment. A 6-pin water resistant connector and one end plain (with ferrite core) cable (CW-376-1-5M) is supplied as a standard to connect to any devices, and cables with connectors at both ends (CW-373-1-5M) is available as options.


Connection cable CW-376-1-5M has 6 wires and a shield wire around it. Signals are output from white (TXD+) and red (TXD-), and signals are input from the orange (RXD+) and black (RXD-) lines.

Refer to the following for the connection of CW-376-1-5M.

When cables are connected to each other, please implement the waterproof and insulation treatment on the connected part with the self-melting tape.

Structure of CW-376-1-5M



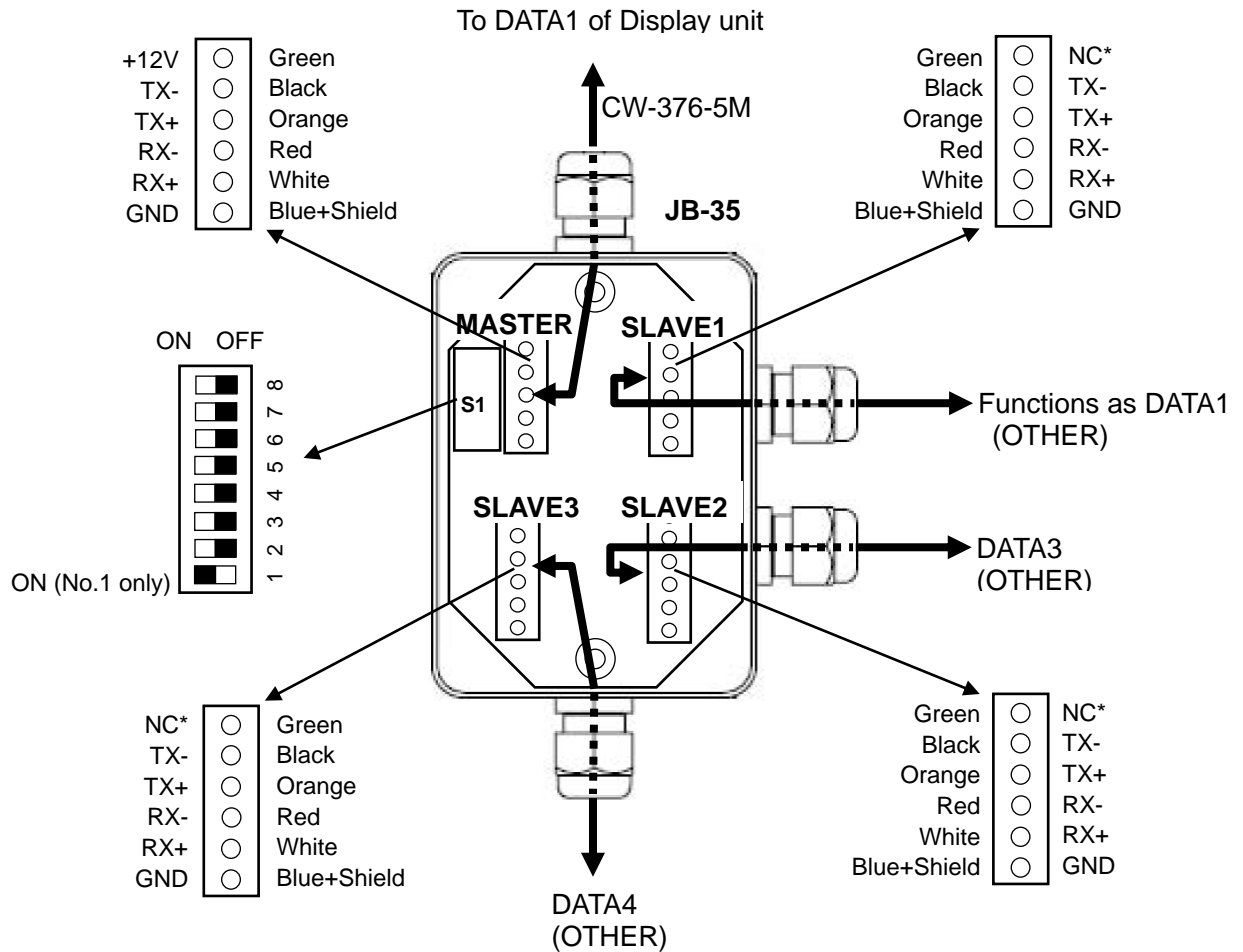
CAUTION
 Wind the insulation tape around the un-used lead wire for core-wires not to contact each other.

7.8 How to use junction box JB-35

When connecting JB-35 and increasing the DATA connector, connect as shown below.

Set the DIP switch (S1) as shown below.

When connecting using the optional CW-376-5M, wire as shown in the color diagram below.



CAUTION

Make sure that the cable is not connected to the NC pin of SLAVE1, SLAVE2, and SLAVE3.

Note: Before turning on the KRD-10, connect JB-35 to the KRD-10 connector DATA1.
KRD-10 automatically recognizes the connection of JB-35 at startup, and DATA3 and DATA4 are added as "1: Connector" to the menu "8: Interface".

7.9 Inspection after installation

Before you turn the unit on, check the following points to make sure the system operates properly.

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

Voltage range : 10.8 to 31.2 VDC measured at the power connector input

Power consumption: 4.5 W

(2) Is the connection between the Display and Other unit correct?

(3) Are the cables routed and connected properly?

(4) To check NMEA data input after connecting the other device, refer to "**6.3 NMEA Monitor**".

Chapter 8 Specifications

8.1 Specification

8.1.1 Specifications

| | | |
|--|--|---|
| Display | 4.3 inch color LCD (480×272 dot's, effective picture area: 95.04 x 53.86 mm) | |
| Display mode | Navigation information, Hull information, Outboard information, General information, Custom, POB (People Over Board) | |
| Track display | Display range | 0.025, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20 NM (sm, km) |
| | Usable ground | Within 80° in latitude |
| | Plotting interval | 5, 10, 20, 30 seconds, 1 minutes, 0.01, 0.05, 0.1, 0.5, 1 NM (sm, km) |
| | Plotting capacity | 3,000 points |
| Position data display | Latitude/longitude in increments of 0.0001 minutes, converted Loran C LOPs, converted Loran A LOPs, converted Decca LOPs, | |
| Data display | Speed, Course, Distance/Bearing to waypoint, Cross track error, Time to go to waypoint, Total time to go and distance on route, DOP value, Present time (UTC or LTC), Navigation1, Navigation2, Navigation3, Steering, Highway, Plotter, Compass1, Compass2, ROT INFO, Rudder Angle, Distance info, Wind Direction analog, Water Temperature Graph, General1, General2, Tide Current, Weather Info, Rain Gauge, Lat/Lon, COG, SOG/STW, Rudder sensor Angle, TRIP/ODO, Current L1 SPD/DIR, Current L2 SPD/DIR, Current L3 SPD/DIR, Wind DIR/SPD, Wind Chill (REL), Wind Chill (TRUE), Heat Index, Air Pressure, Heave, Pitch, Roll, Rain Accumulation, Rain Duration, Rain Intensity Rate, Peak Rain Intensity Rate, Temperature, Humidity, Dew Point, Wind Direction (REL/TRUE), Wind Speed (REL/TRUE), Satellite status, Distance/Bearing between two points, POB display | |
| Instant (event) memory | 1000 points | |
| Waypoint memory | 9000 points | |
| Route memory | 100 routes reverse trail possible | |
| Alarm | GNSS Fix, Proximity, Cross track error, CDI, Anchor watch, Water temperature, Depth | |
| Position compensation | Latitude/longitude, LOPs | |
| Magnetic compensation | Auto or Manual | |
| Parameters | Position (L/L, LOP), Language, LOP (Loran C, Loran A, Decca), Memory of waypoints and name (up to 10 letters), Selection of measuring unit (NM·kn, km·km/h, sm·mph), Temperature unit (°C, °F), Depth unit (m, fm, l.fm, ft, J.fm), Wind speed unit (kn, m/s, mph), SOG/COG/Heading/Rotation averaging (smooth) factor, Sailing mode (Great Circle, Rhumb Line) | |
| Output data format (DATA1/2 connector) | NMEA 0183 Ver.2.0/3.0 (AAM, APB, BOD, BWC, DCN, DTM, GGA, GLC, GLL, GSA, GSV, MSS, RMB, RMC, RTE, VTG, WPL, XTE, ZDA, DPT, HDT, HDM, MTW, MWV, VHW, HEV, HPR, ROT) | |
| Input data format | NMEA 0183 | |

Note: Accuracy is subject to change in accordance with DoD civil GNSS user policy.

8.1.2 Power requirements

Input voltage: 10.8 to 31.2 VDC
 Power consumption: Less than 4.5 W (at 24VDC)
 AC Operation: AC/DC rectifier PS-010 is required.
 Input voltage range: 115 VAC to 230 VAC

8.1.3 Compass safe distance

Standard: 0.8m
 Steering: 0.4m

8.1.4 Environmental conditions

(1) Temperature and humidity

| | |
|-----------------------|--------------------------------|
| Operating temperature | Display unit: - 15°C to + 55°C |
| Humidity | 93% (+40°C) |

(2) Vibration

The equipment operates normally under the following vibrating conditions.

2 - 5 Hz to 13.2 Hz: Amplitude $\pm 1\text{mm} \pm 10\%$ (Maximum acceleration of 7 m/s^2 at 13.2 Hz)

13.2 Hz to 100 Hz: Maximum acceleration of 7 m/s^2 being applied

(3) Water proof

Display unit: IPX4

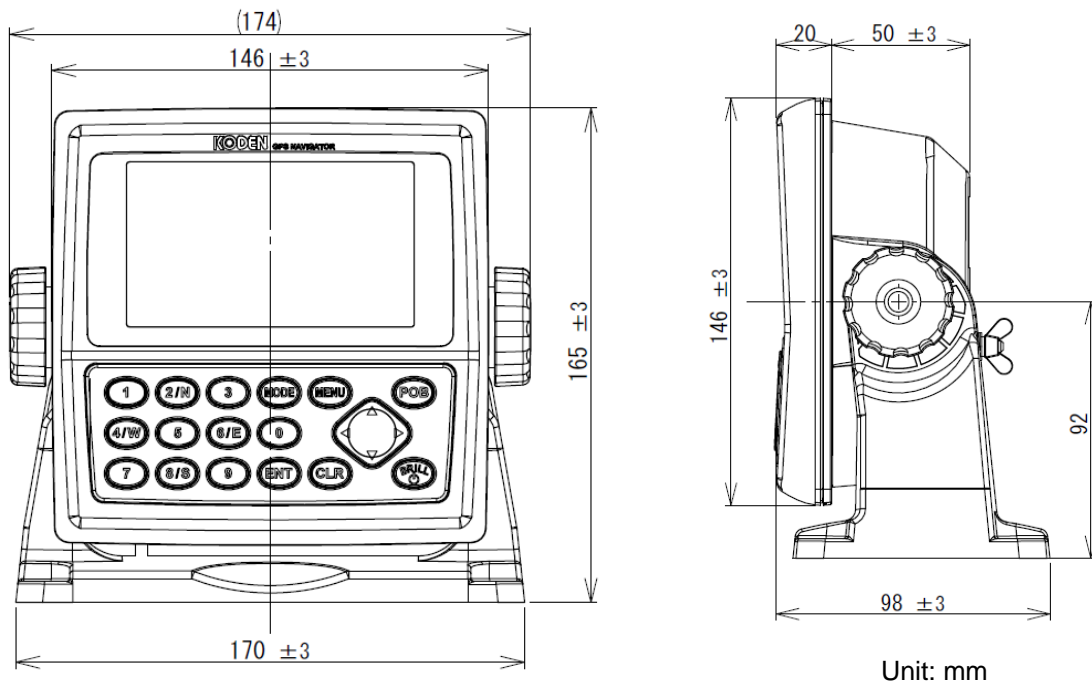
8.2 External dimensions and weight

8.2.1 External dimensions and weight of the Display unit: KRD-10.MU

External dimensions: Width x Height x Depth

Dimensions (WxHxD): 174mm x 165mm x 98mm (with mounting bracket and knobs)

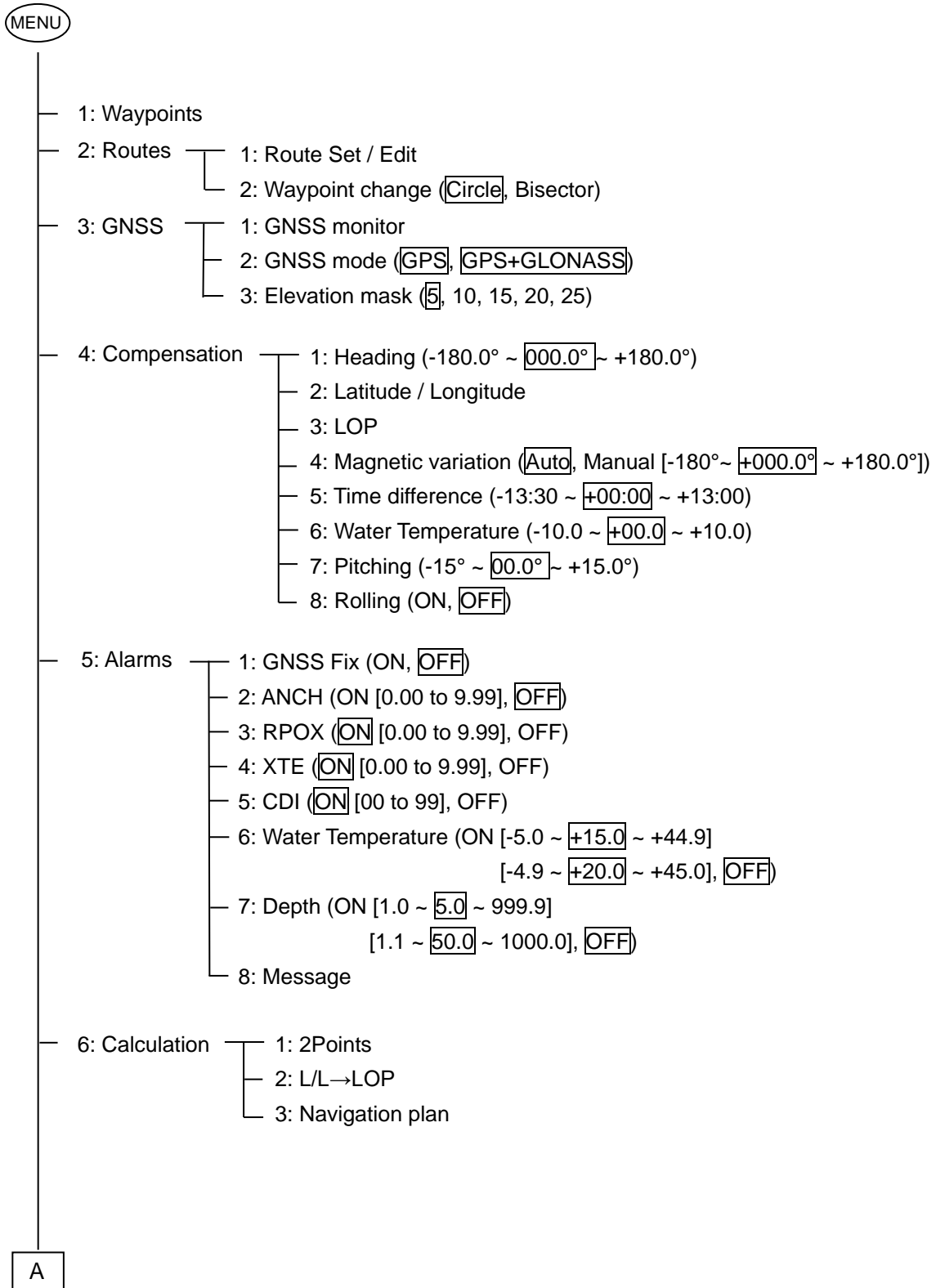
Weight: 0.74 kg



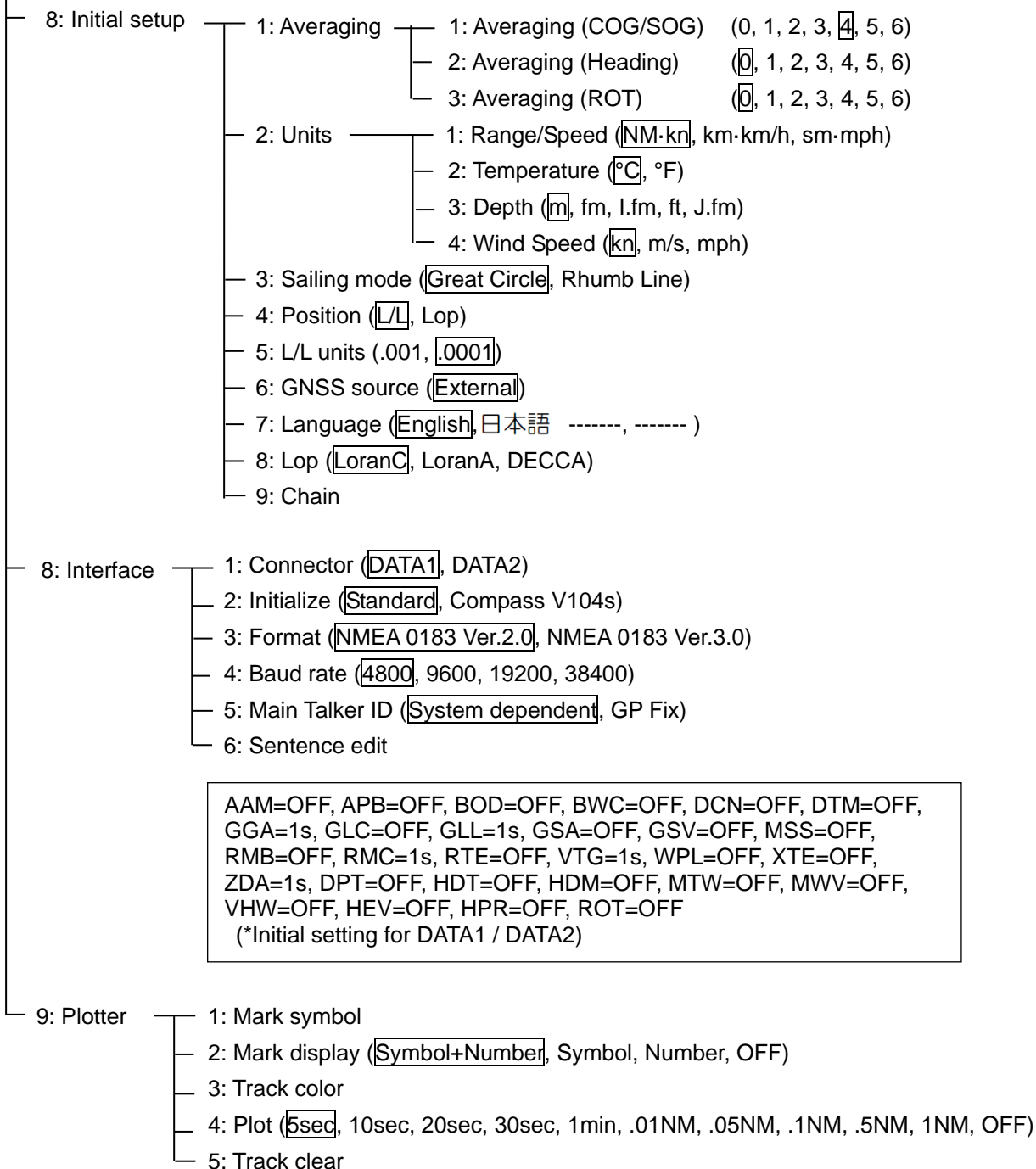
Chapter 9 Annex

9.1 Menu configuration

The factory set value is shown by the surrounding boxes.



A



9.2 Input sentence list

This unit inputs signals of NMEA0183 format. For details, refer to the table below.

Note: ">" Indicates that the priority of the left sentence is high.

| Item Name | Sentence |
|-------------------------------|-----------------------------------|
| Air Pressure | MDA > XDR |
| BRG | - |
| COG (TRUE) | VTG > RMC > RMA |
| COG (Magnetic) | VTG > RMC > RMA |
| Current L1 SPD/DIR | CUR > VDR |
| Current L2 SPD/DIR | CUR |
| Current L3 SPD/DIR | CUR |
| Depth | DPT > DBT |
| Dew Point | MDA |
| ETA | - |
| HDT (TRUE) | HDT > VHW > HDG > HDM > RMC > VTG |
| HDG (Magnetic) | HDG > HDM > VHW |
| Heat Index | XDR |
| Heave | HEV |
| Humidity | MDA |
| ODO/TRIP | VLW |
| Own Position | GGA > GNS > RMC > RMA > GLL |
| Peak Rain Intensity Rate | XDR |
| Pitch | XDR > HPR |
| R.ANGLE | RSA |
| Rain Accumulation | XDR |
| Rain Duration | XDR |
| Rain Intensity Rate | XDR |
| RNG/T.RNG | - |
| Roll | XDR > HPR |
| ROT (Rate of Turn) | ROT |
| SOG (Speed Over the Ground) | VTG > RMC > RMA > VBW |
| STW (Speed Through the Water) | VHW > VBW |
| TEMP | MDA |
| TTG/T.TTG | - |

| Item Name | Sentence |
|-----------------------|-----------------|
| W.TEMP | MTW > MDA |
| Wind Chill (REL) | XDR |
| Wind Chill (TRUE) | XDR |
| Wind Direction (REL) | MWV > XDR > MWD |
| Wind Direction (TRUE) | MWV > MWD > XDR |
| Wind SPD/DIR (REL) | MWV > XDR > MWD |
| Wind SPD/DIR (TRUE) | MWV > MWD > XDR |
| Wind Speed (REL) | MWV > XDR > MWD |
| Wind Speed (TRUE) | MWV > MWD > XDR |
| XTE | - |
| DATE | ZDA > RMC > GGA |