KODEN

OPERATION MANUAL

GPS NAVIGATOR
KGP-922

KGP-922 Operation Manual
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Document Revision History

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3	0093130022-01A	2023/01/30	Cover
4			
5			
6			
7			
8			
9			
10			

KM-F81: System ROM
KM-F82: Language ROM

Document No. Revised Version Norm

When part of the document needs to be revised, the document has advanced revision number.

The document No. is indicated at the lower right side on the cover and at the left or right side of the footer region of each page.

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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 Koden 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.

⚠ Caution	**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.

Precautions on handling

⚠ Warning	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.
⚠ Warning	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.
⚡	**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.
⚠ Caution	The information displayed on this equipment is not intended to use for your navigation. For your navigation, be sure to see the specified materials.

Contents

Introduction

The KGP-922 is a GNSS navigator able to work with the GPS satellite system.
GPS is a navigation system using 24 satellites (21 plus 3 in service) orbiting 20,183 km high from the earth every 11 hours 58 minutes.

The main features of this unit are as follows:

- KGP-922 consists of two main components, Display and Antenna.
  Display unit has processor, receiver and LCD display built-in.

- KGP-922 has high-resolution color LCD of high brightness type.

- KGP-922 can support DGPS by connecting an external beacon receiver.

- Also support DGPS by SBAS (Satellite Based Augmentation System).

- KGP-922 can storage 5,000 waypoints, 100 routes, and 3,000 track points.

- KGP-922 has two data port of NMEA 0183.

- Ethernet port for connection to a LAN.

System Configuration

Connection diagram

Legend
- Standard configuration
- Option
- Owner supply

Antenna unit GA-09(IMO)

Display unit KGP-922

With mounting bracket and cover

Note: The GND terminal is a protective ground and should be connected to ship's ground.

NETWORK Connector

CW-426-0.3M

HUB
Ethernet equipment

GND

DATA 2 Connector

CW-376-5M

Beacon receiver

DATA 2 Connector

CW-373-5M

Marine radar
Chart Plotter
Echo sounder
Auto pilot

CW-376-5M

DATA 1 Connector

CW-373-5M

Marine radar
Chart Plotter
Echo sounder
Auto pilot

CW-376-5M

POWER Connector

CW-276-2M

Red +

Black -

10.8 to 31.2VDC

System Configuration (with Junction box)

Connection diagram

Legend
- Standard configuration
- Option
- Owner supply

Antenna unit GA-09(IMO)

Display unit KGP-922

With mounting bracket and cover

Note: The GND terminal is a protective ground and should be connected to ship's ground.

NETWORK Connector

CW-426-0.3M

HUB
Ethernet equipment

GND

DATA 2 Connector

CW-376-5M

Beacon receiver

DATA 2 Connector

CW-373-5M

CW-376-5M

Marine radar
Chart Plotter
Echo sounder
Auto pilot

CW-376-5M

POWER Connector

CW-276-2M

DATA 3 Connector

CW-376-5M

Marine radar
Chart Plotter
Echo sounder
Auto pilot

Junction Box
JB-35

DATA 4 Connector

CW-376-5M

Marine radar
Chart Plotter
Echo sounder
Auto pilot

DATA 1 Connector

CW-376-5M

Marine radar
Chart Plotter
Echo sounder
Auto pilot

Red +
Black -
10.8 to 31.2VDC

Configuration of Equipment

Standard Equipment Configuration List

No	Item	Type name	Remarks	Weight/Length	Q'ty
01	Display unit	KGP-922	With mounting bracket and front cover	0.97 kg	1
02	Antenna unit	GA-09(IMO)[15M]	With antenna cable and BNC connector	0.89kg 15m	1
03		GA-09(IMO)[0.5M]	With antenna cable and N-P connector	0.29kg 0.5m	
04	DC power cable	CW-276-2M	With 5-pin connector, other end plain	2.0m	1
05	Truss tapping screw	TPT5X20U	For mounting bracket		4
06	Operation manual	KGP-922.OM.E	English		1

Option List

No	Item	Type name	Remarks	Weight/ Length
01	Antenna holder	RAH-29	Ratchet mount	0.68kg
02	Connecting cable	CW-373-5M	6 pin water resistant connectors both ends	5m
03		CW-376-5M	6 pin water resistant connector and other end plain	5m
04		CW-426-0.3M	4 pin water resistant connector and RJ45 connector	0.3m
05	Junction box	JB-35	1 input, 3 outputs with CW-376-5M	--
06	Hose band	738-1015	2pcs for antenna fixture	--
07	Power rectifier	PS-010	With 5A fuses 2pcs	3.5kg
08	AC power cable	VV-2D8-3M	For PS-010, both ends plain	3 m
09	Antenna cable extension kit	CW-839-30M KIT	5DFB cable with N-J connector and other end plain, N-J connector, and CW-826-0.5M	30m
10*	Antenna cable extension kit	CW-394-60M KIT	8DSFA cable with N-J connector and other end plain, N-J connector, N-BNC connector* and CW-826-0.5M	60m
11	Conversion cable	CW-826-0.5M	A BNC connector / N-P connector	0.5m
12	Operation manual	KGP-922.OM.E	English	
13	Service manual	KGP-922.SM.E	English	

*10. N-BNC connector in the kit will not be used.

Chapter 1   Basic Operation

1.1 The name and function of each part

Display unit

Knob

Knob

Control panel

Mounting bracket

1.1.1 Control panel

Recalls memory position,
entry of numerical values,
and selection
North or South latitude or
East or West longitude.

Selects NAV1, NAV2, NAV3, NAV4,
NAV5 ,NAV6 or NAV7 screen.

Recalls the menu

Activates MOB (Man Over
Board) function.

Press this key when NAV1,
NAV2, NAV3, NAV4, NAV5,
NAV6 or NAV7 screen is displayed
to display the Alert List screen.

Enters a numeric/optional
parameter.

Acknowledges an
unacknowledged alert or
clears numeric/optional
parameter.

• Turns the power on
• Press and hold the power OFF
• Changes the brightness
• Changes Day/Night color

1.2 Power On/Off

BRILL   Press to power on.

Initial message appears during power-on.
The receiver is performing the self-check.
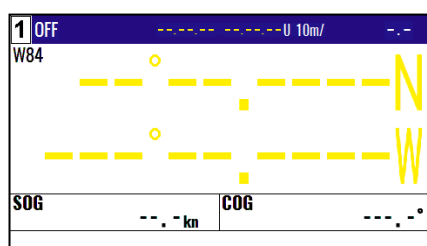
Latitude and longitude position is not
displayed when receiver is searching
GPS satellites.
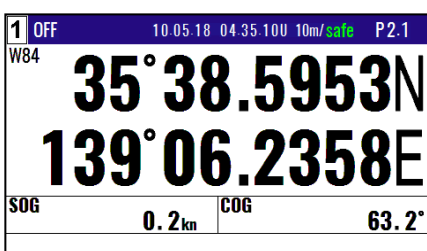
When NAVIGATOR receives signals from 3
or more satellites, it displays present latitude
and longitude position with solid N (or S) and
W (or E).

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

> **CAUTION**
> *Be sure to turn off the power in the above procedure.*

1.3 Adjusting brightness of display and panel key

BRILL   Press to change the LCD brightness in 7 levels.
After the popup of below was displayed, push the ⬦ key.
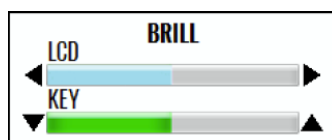
Switch Day/Night color mode:

When the [0] key is pressed while the above pop-up is displayed, the display switches between
day mode and night mode. In night mode the background changes from white to black, letters etc
from black to white.

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

1.4 Selecting the screen

1.4.1 Display Modes

KGP-922 has 7 display modes: Nav data display1 (NAV1), Nav data display2 (NAV2), Nav data display3 (NAV3), Navigation Graph display (NAV4), Highway display (NAV5), Plotter display (NAV6), Data display (NAV7). Screen will change in two ways.

1. Press numeric key on the upper-left corner of the screen

2. Press (MODE) key to select the display mode.

Nav data display1   Nav data display2   Nav data display3

Navigation Graph display

Data display   Plotter display   Highway display
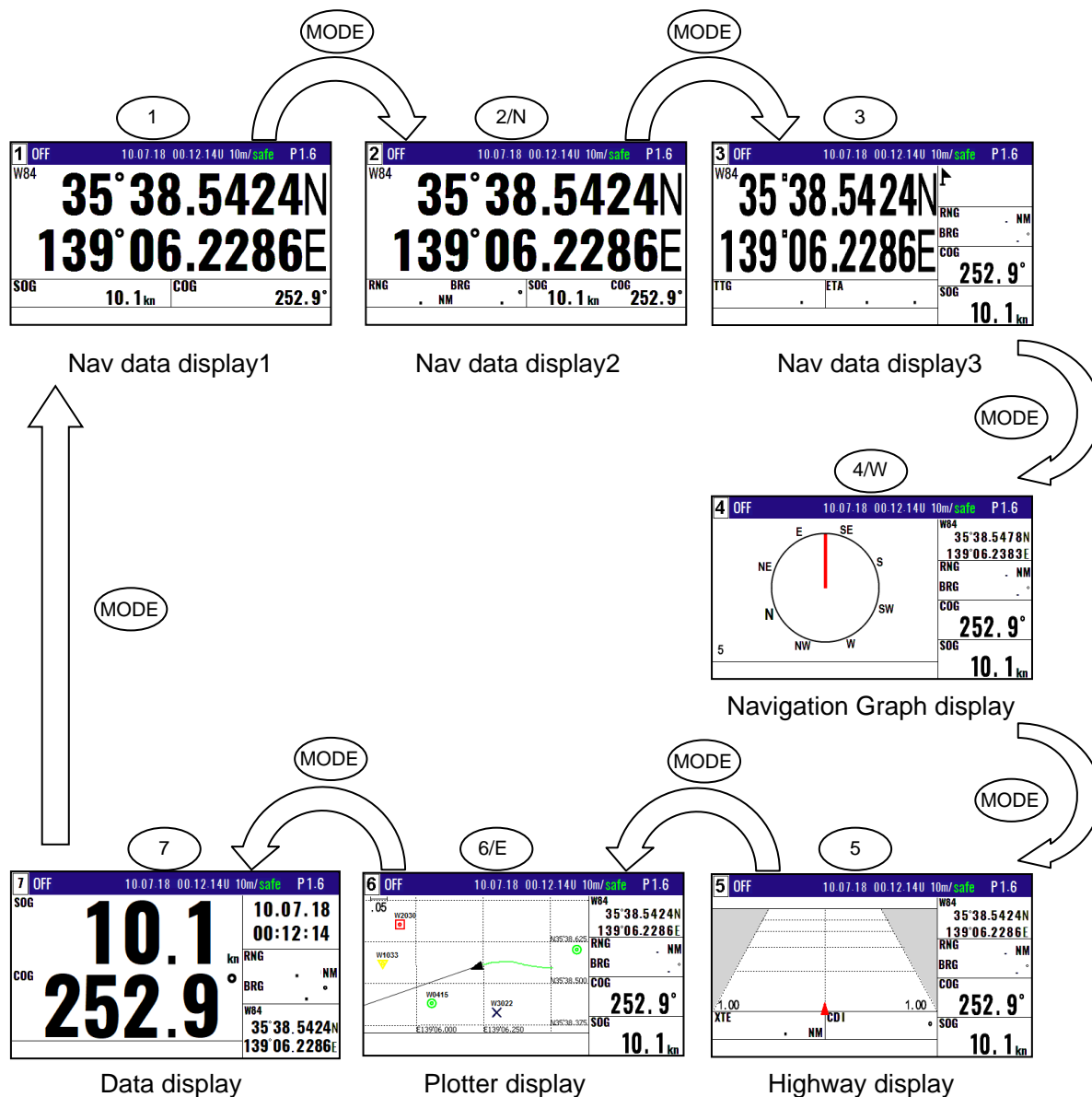
1.4.2   Nav data display1 (NAV1) screen : Nav data1 mode

Setting destination

Time/Date

*RAIM

P1.6 is DOP value

Screen mode →

1 OFF   10.07.18 00.12.14U 10m/safe   P 1.6   ← D is DGPS mode

W84

35°38.5424N

Position in latitude
and longitude →

139°06.2286E

SOG   COG

10.1 kn   **252.9°**

Speed Over Ground   Alert indicator   Course Over Ground

*RAIM: Receiver autonomous integrity monitoring
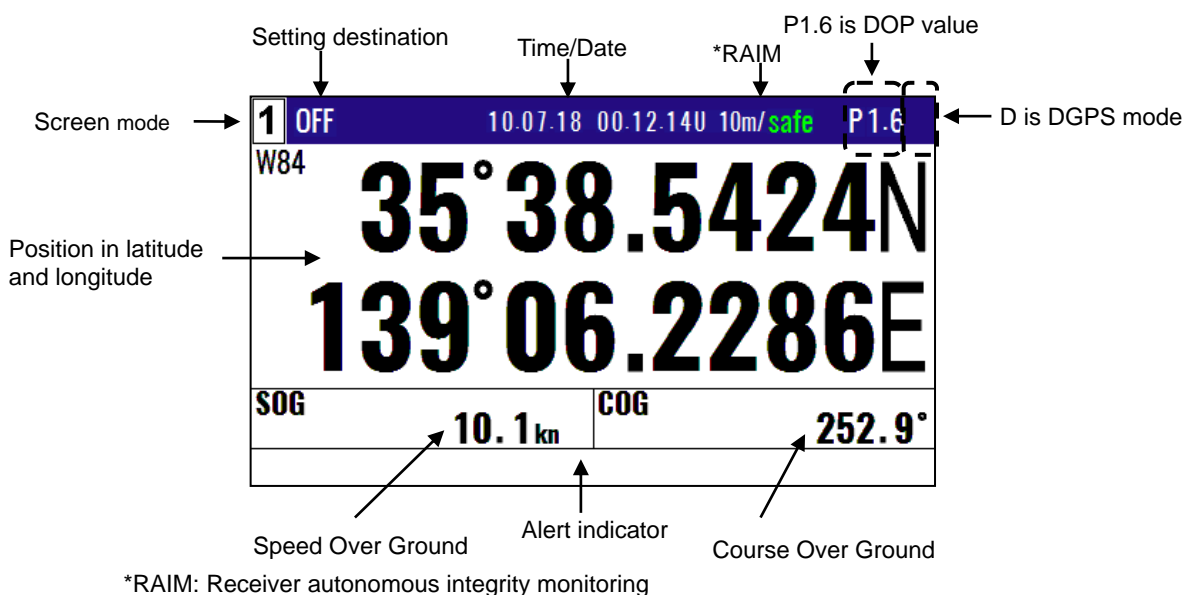
1.4.3   Nav data display2 (NAV2) screen : Nav data2 mode

2 OFF   10.07.18 00.12.14U 10m/safe   P 1.6

W84

35°38.5424N

Position in latitude
and longitude →

139°06.2286E

RNG   BRG   SOG   COG
.   NM   .   °   **10.1** kn   **252.9°**

Course Over Ground

Speed Over Ground
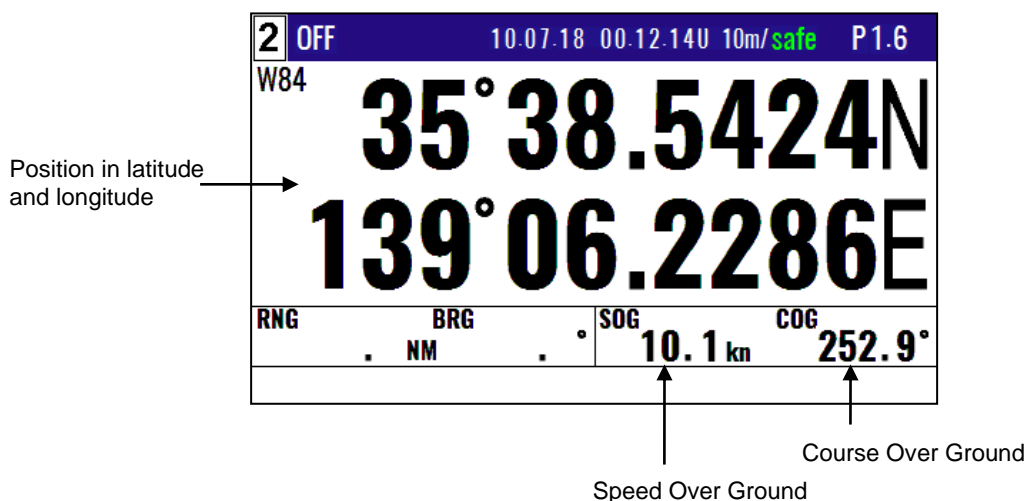
1.4.4   Nav data display3 (NAV3) screen : Nav data3 mode

3 OFF   10.07.18 00.12.14U 10m/safe   P 1.6

W84
35°38.5424N

Position in latitude
and longitude →

139°06.2286E

RNG   - NM
BRG   - °
COG

252.9°   ← Course Over Ground

TTG   ETA
.   .   .

SOG

10.1 kn   ← Speed Over Ground
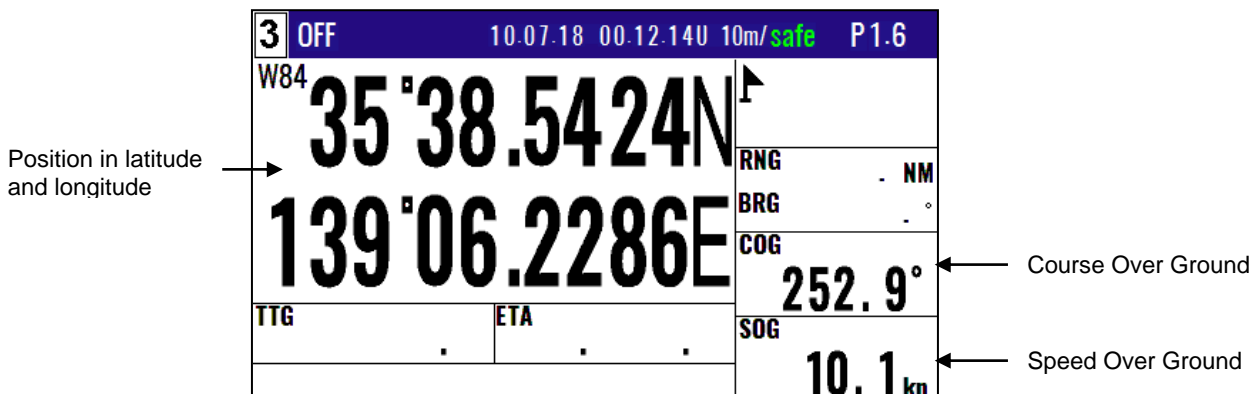
1.4.5   Navigation Graph display (NAV4) screen : Navigation Graph mode

Heading Line

Position in latitude and longitude

Course Over Ground

Range ring

Range

Speed Over Ground
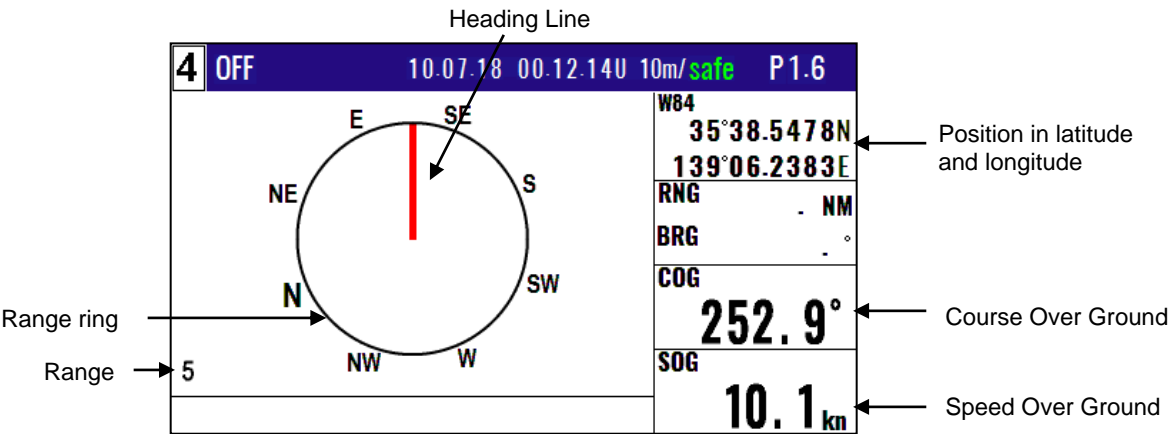
1.4.6   Highway display (NAV5) screen : Highway mode

XTE alarm range

Position in latitude and longitude

Course Over Ground

Speed Over Ground

Cross Track Error   Course Deviation Angle
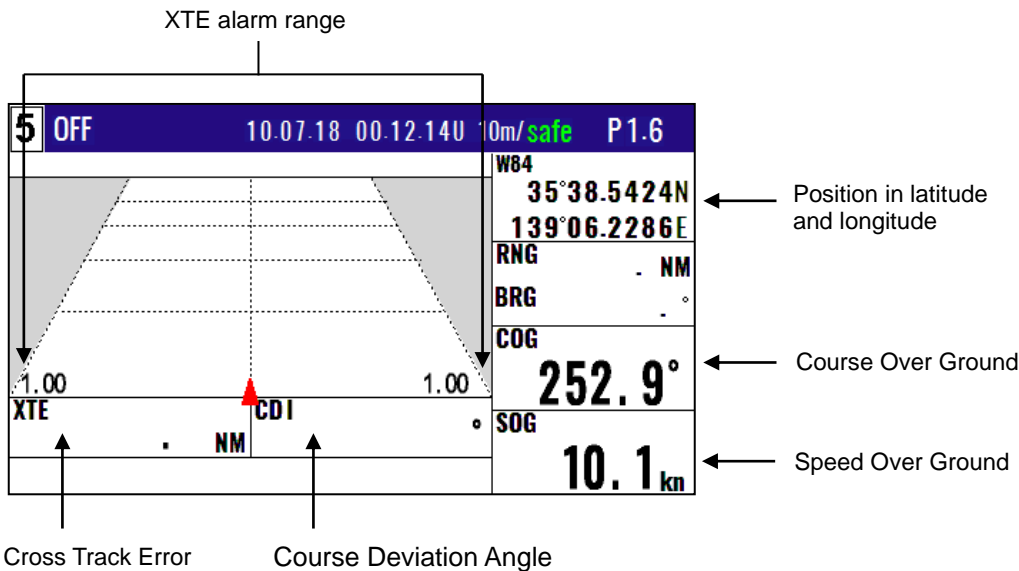
1.4.7   Plotter display (NAV6) screen : Plotter mode

Heading Line   Own boat mark

Range

Position in latitude and longitude

Course Over Ground

Speed Over Ground
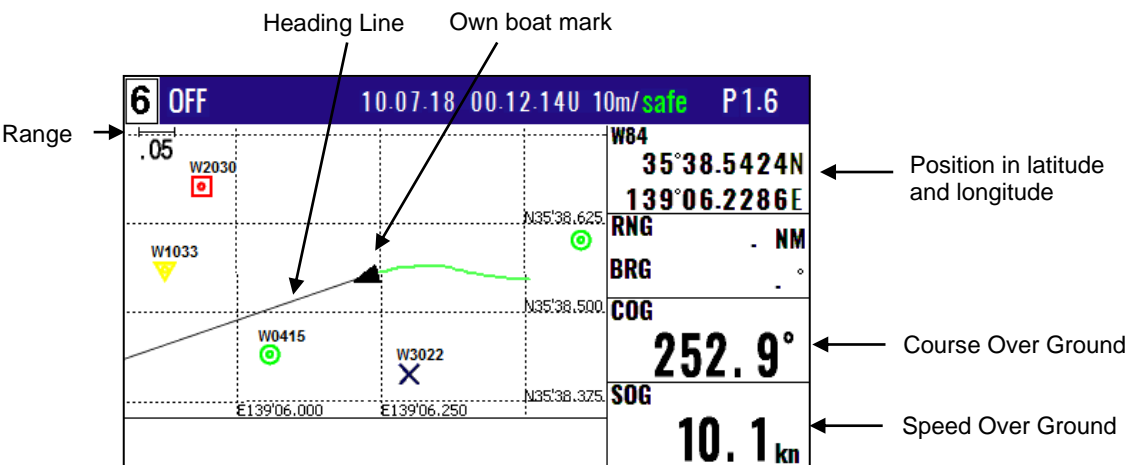
1.4.8   Data display (NAV7) screen : Data mode

Speed Over Ground

Course Over Ground

Day (mm.dd.yy)
Time (hh:mm:ss)

Position in latitude and longitude
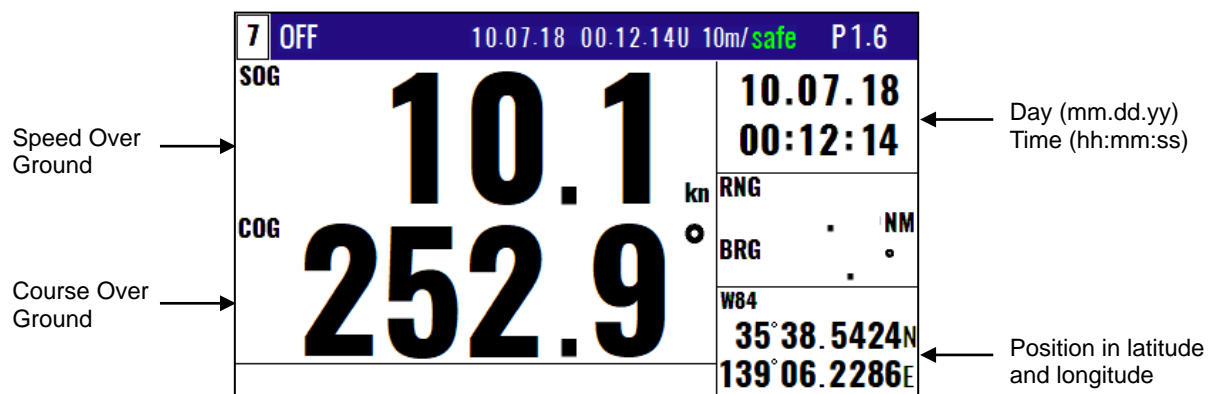
1.5 Storing present position (EVENT)

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 on the PLOT screen) 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.

• 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 to page 6-5)

⚠	**CAUTION** *EVT key does not function when positioning is invalid*

1.5.1 AUTO

```
Goto MOB :[MOB]
Goto Event:[ENT ]
Cancel    :[CLR]
```

MOB
EVT

(1) Press (MOB / EVT) key to appear the pop-up.

(2) Press (ENT) 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.

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

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

1.5.2 MANUAL

MOB
EVT

(1) Press (MOB / EVT) key to show the registration number display window.

(2) Press (ENT) key to store your present position.

(3) Specify a desired registration number by numeric keys.

(4) Press (ENT) key. The event will be registered to the number specified.

Blinks for 10 seconds

```
EVT=W0000  ──── The latest event number
```

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 10 appears.

(2) Press (0) key to select "**10: 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.

Initial setup: ◎ (Green)
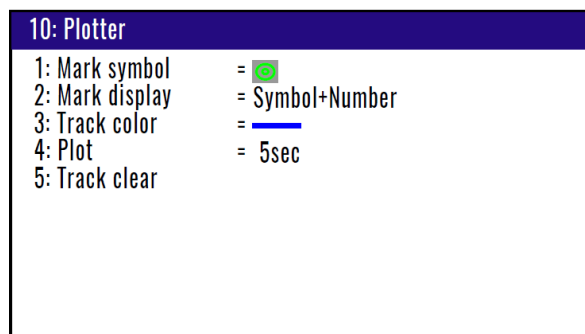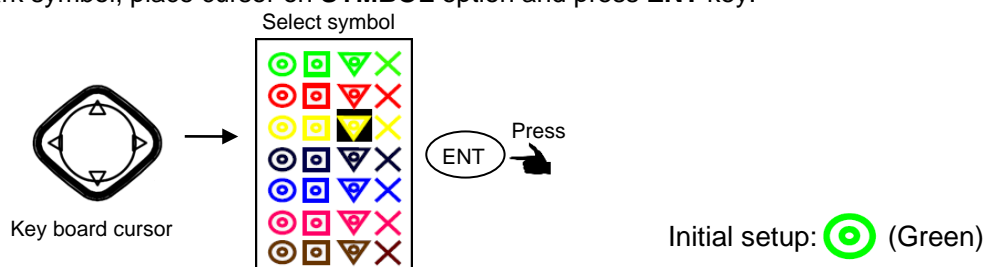
2)   2: Mark display (Press (2/N) key)

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

Initial setup: Symbol + Number
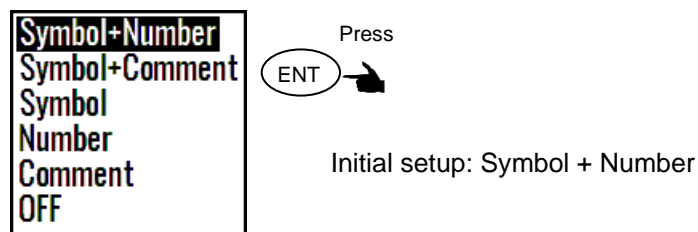
1.6 Using MOB (Man over-board)

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

⚠	**CAUTION** *MOB key does not function when positioning is invalid*

```
┌─────────┐                                          ┌──────────────────────┐
│  MOB    │   (1) Press ( MOB ) key to appear the     │ Goto MOB  :[MOB]     │
│  EVT    │              ( EVT )  pop-up.             │ Goto Event:[ENT]     │
│         │   (2) Press ( MOB ) key to store MOB      │ Cancel     :[CLR]    │
└─────────┘              ( EVT )  position.           └──────────────────────┘
```

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

MOB appears
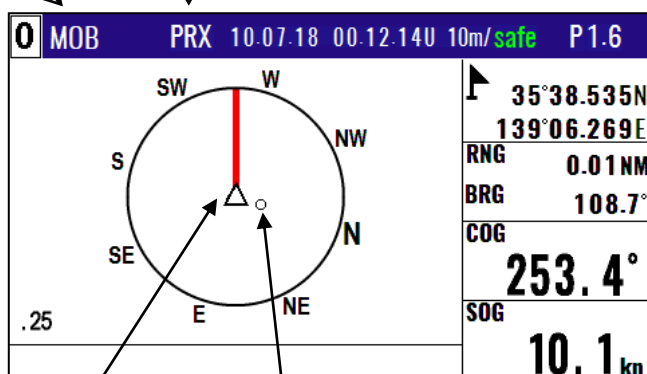
Latitude and Longitude of MOB position

Distance (in nm) from your present position to the point you pressed MOB key

Bearing to the point where you pressed MOB key

Present position

Point where you pressed MOB key

```
┌─────────┐
│  ACK    │   Clears the MOB mode, and returns to the previous screen when you pressed
│  CLR    │   MOB key. When alarm sounds, press ACK/CLR key to stop it. Press it again to
│         │   return to the screen you were at before you pressed MOB key.
└─────────┘
```

1.7 Recalling Event and MOB position

(1) Press (MENU) key until menu options 1 to 10 appears.

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

(3) Enter a storage number P0000 and W0001 to W0999 is MOB and Event position data.

NOTE: *P0000: Position data where you pressed MOB key* *0001 to 0999: Position data that contains events*

1:Waypoints

P0000	⊙	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

●
●
●

W0999

P0000 is MOB position data

W0001～W0999 is

Event position data

1.8 Copying Event and MOB position

(1) Press (MENU) key until Menu options 1 to 10 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 [**Copy**] in the pop-up and press (ENT) key.

(6) Enter a source point number (0000 to 0999) by numeric keys.

(7) 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		18 13:56
W0002	▽	35°38.052N		16 11:23
W0003	⊙	35°38.229N		03 23:37
W0004	▽	35°37.810N		21 17:29
W0005	⊙	35°37.727N		15 14:58
W0006	⊙	35°36.245N		15 19:47
W0007	⊙	35°38.222N		22 19:53
W0008	⊙	35°38.092N	139°06.165E	16 04:52
W0009	⊙	35°38.085N	139°06.144E	16 04:59

Copy
0002→0000

W0000

0° 00.000N
0° 00.000E

1.8.1 Erasing Event and MOB position

(1) Press (MENU) key until Menu options 1 to 10 appears.

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

(3) Enter storage number (0001 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.

Set
Reset
Edit
Copy
Delete

Press 👉 (ENT)

1:Waypoints

P0000	◉	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		03 23:37
W0004	▽	35°37.810N		21 17:29
W0005	◉	35°37.727N		15 14:58
W0006	◉	35°36.245N		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

Delete
Are you sure?
Yes   **No**
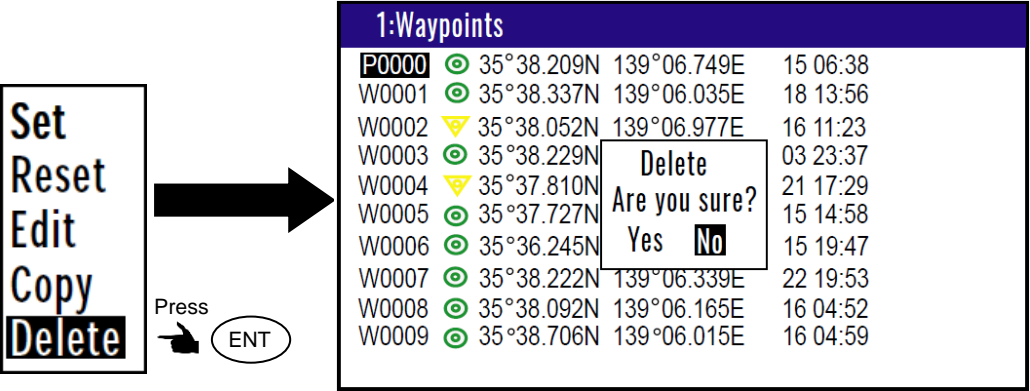
- This page intentionally left blank.-

Chapter 2   Various Navigation

2.1 Storing waypoints (LAT/LONG) data
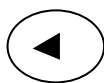
◀	**NOTE:** *Press to backspace the cursor to correct an input error.*	ACK CLR	**NOTE:** *Press to clear incorrect Input. You can reenter Numeric data.*

2.1.1   Storing a new waypoint or updating an existing a waypoint

Up to 5000 waypoints can be stored in memory. As 1000 points (numbers 0000 and 0999) are reserved for MOB and event registration, you can use 1000 to 4999 (total of 4000 points) to store waypoints.

Storage position

| | LAT/LONG mode (Example) | | Number | Mark | Latitude | Longitude | | | Comment |

MENU
1: Waypoints
2: Routes
3: GPS
4: DGPS
5: Compensation
6: Alerts
7: Calculation
8: Initial setup
9: Interface
10: Plotter

Press 1 key →

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

Keys: 1 2/N 3 MODE MENU MOB/EVT 4/W 5 6/E 0 ◀▲▶▼ 7 8/S 9/AL ENT ACK/CLR BRILL

(1) Press MENU key until Menu options 1 to 10 appears.

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

(3) Enter storage number (0000 to 4999) by numeric keys and press ENT 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 → → →   3 6/E 2/N 2/N →

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 ENT key to display the pop-up.

(5) Select [**Edit**] in the pop-up and press ENT key.

Pop-up appear
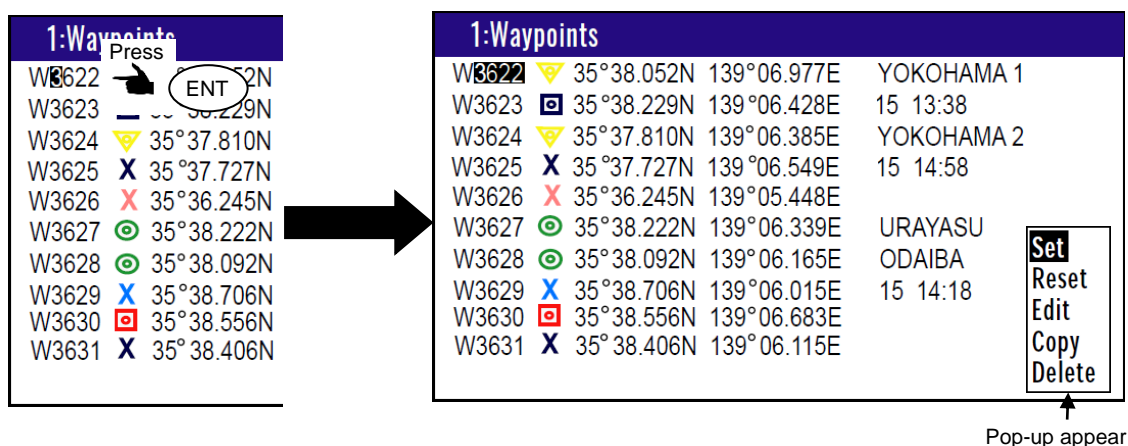
(6) Move the cursor to where you want to change. [Mark], [Latitude], [Longitude] or [Comment]

• Press [▶] [◀] key to move the cursor.
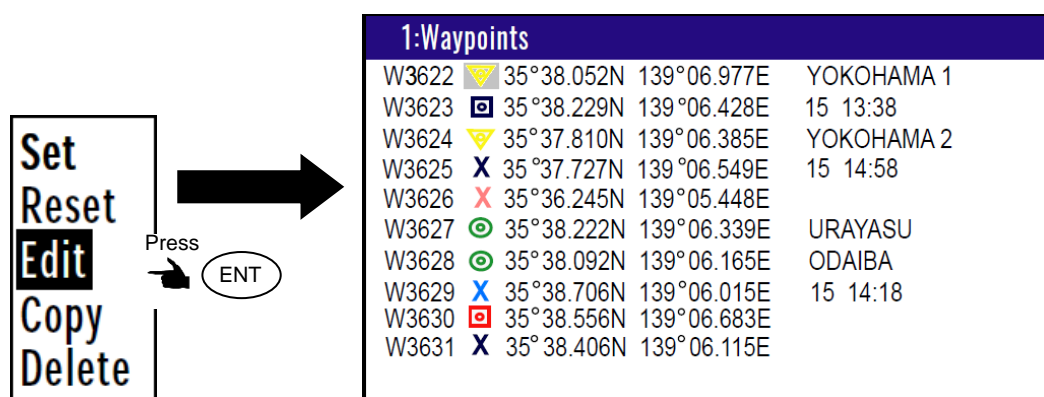
(7) If you want to change the [Mark].

1) Press (ENT) key to select of the [Mark].

2) Press [◇] key to select the shape of the mark.

3) Press (ENT) key.

(8) If you want to change the [Latitude] and [Longitude].

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) If you want to change the [Comment].

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.

(10) Press [▲] [▼] key when the work has been completed.

2.1.2 Copying a position

You can copy the position data (stored with numbers 0000 to 4999) to the waypoint data (having numbers 1000 to 4999).

(1) Press (MENU) key until Menu options 1 to 10 appears.

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

(3) Enter storage number (0000 to 4999) 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 4999) by numeric keys.

(7) Press (ENT) key to copy the storage data.

Original number

Enter the number of the copy destination

Information of the copy destination
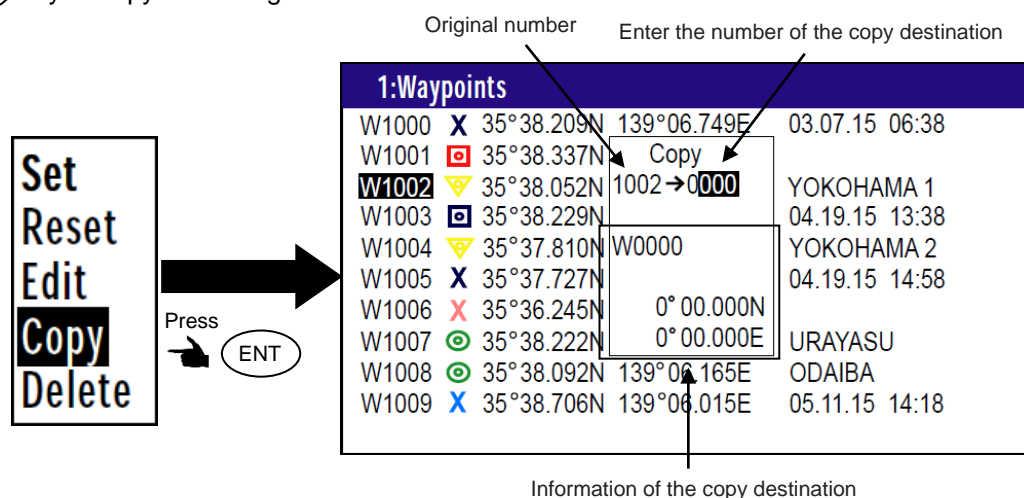
2.1.3 Erasing a single waypoint

(1) Press (MENU) key until Menu options 1 to 10 appears.

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

(3) Enter storage number (0001 to 4999) 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.
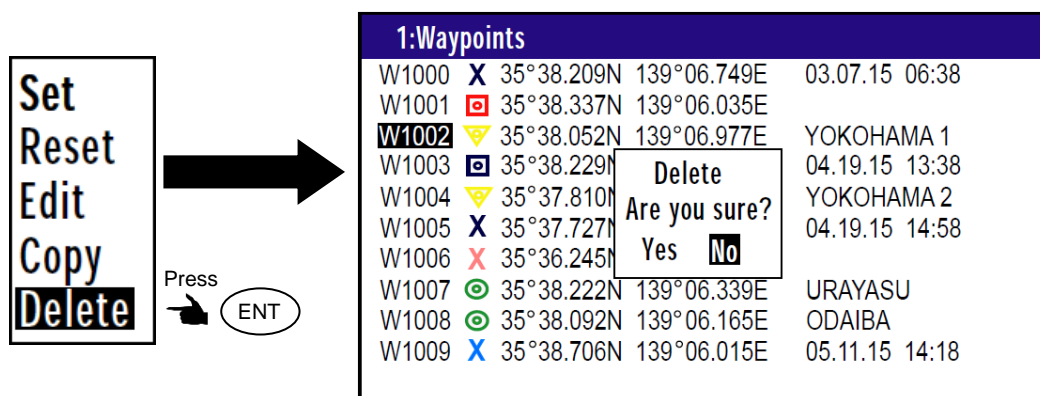
> **NOTE:** *To erase an entire data from memory simultaneously, see* **"WPT./Route clear"** *(page 6-5).*

2.2 Setup of waypoint navigation
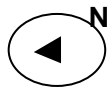
◀ **NOTE:** *Press to backspace the cursor to correct an input error.*

ACK CLR **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 **A** (NAV1), **B** (NAV2), **C** (NAV3), **D** (PLOT) or **E** (Data) screen (called the quick waypoint navigation).

(1) Press MENU key until Menu options 1 to 10 appears.

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

(3) Enter storage number (0000 to 4999) 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.

2.2.2   Quick waypoint setup

Quick WPT (first priority waypoint) can be set by specifying it directly either from the NAV1, NAV2, NAV3, NAV4, NAV5, NAV6 or NAV7 screen. 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 4998. Old data is replaced with a new during quick WPT setup. **While the 1st to 6th pages of either the NAV1, NAV2, NAV3, NAV4, NAV5, NAV6, or NAV7 are displayed.**

(1) Press 0 key to display "**QUICK**" pop-up menu.
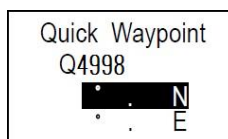
(2) Enter latitude and longitude.

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 4998.

2.2.3   Canceling waypoint navigation

To cancel waypoint navigation, turn WPT to Reset on NAV1, NAV2, NAV3, NAV4, NAV5, NAV6 or
NAV7 screen. There are two ways.

• Cancel from [MENU].

• Cancel from NAV1, NAV2, NAV3, NAV4, NAV5, NAV6 or NAV7 screen.

1) When Reset from [MENU].

(1) Press (MENU) key until Menu options 1 to 10 appears.

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

(3) Enter storage number (0000 to 4999) 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.
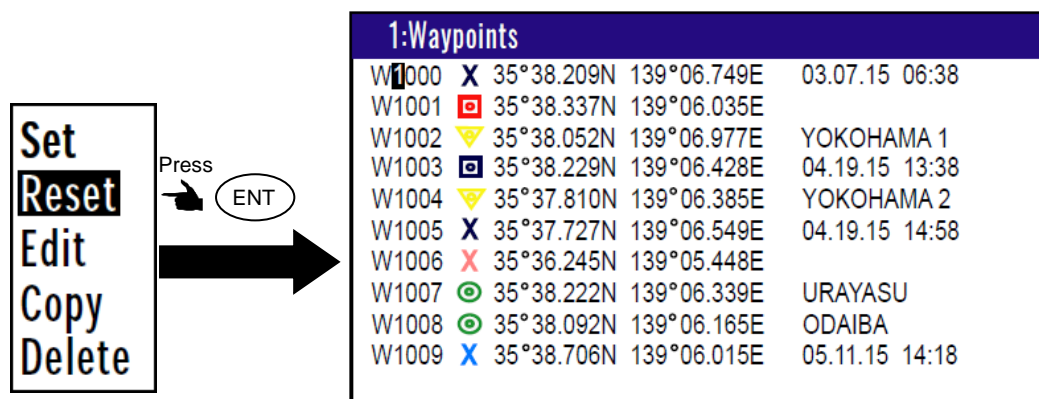
2) When Reset from NAV1, NAV2, NAV3, NAV4, NAV5, NAV6 or NAV7 screen.

(1) Press (ACK 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.
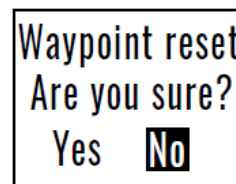
2.2.4   NAV2 screen during waypoint navigation

Alarm

ANCH: Anchor watch alarm
PRX: Proximity alarm
XTE: Cross track error alarm
CDI: Course deviation angle alarm

Waypoint number

Position in latitude
and longitude

Distance from
present position from

| 2 W2030 | PRX 10.07.18 02.31.12U 10m/safe | P1.6 |

W84

35°38.5424N
139°06.2286E

RNG   BRG   SOG   COG
0.28 NM 297.9°   10.1 kn   252.9°

Bearing from present
position from WPT

Course Over Ground

Speed Over Ground

2.2.5   NAV3 screen during waypoint navigation

Position in latitude
and longitude

| 3 W2030 | 10.07.18 00.12.14U 10m/safe | P1.6 |

W84

35°38.5424N
139°06.2286E

TTG   ETA
0.11   10.07 00.23

35°38.675N
139°05.944E
RNG   1.02NM
BRG   275.9°
COG
252.9°
SOG
10.1 kn

Latitude and Longitude
of WPT

Distance from present
position from WPT

Bearing from present
position from WPT

Course Over Ground

Time-To-Go
to destination

Estimated-Time-of-A
rrival at destination

Speed Over Ground

2.2.6   NAV4 screen during waypoint navigation

2.2.7   NAV5 screen during waypoint navigation
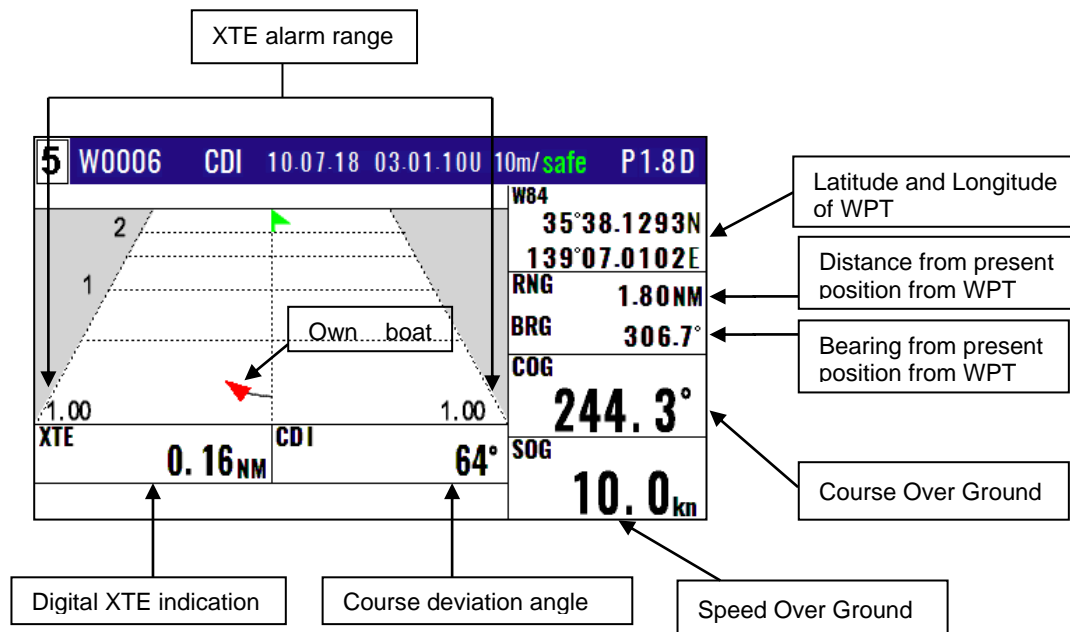
2.2.8   NAV6 screen during waypoint navigation

Heading Line | Own boat mark | Range | Waypoint | Route | Waypoint | Latitude and Longitude of WPT | Distance from present position from WPT | Bearing from present position from WPT | Course Over Ground | Speed Over Ground
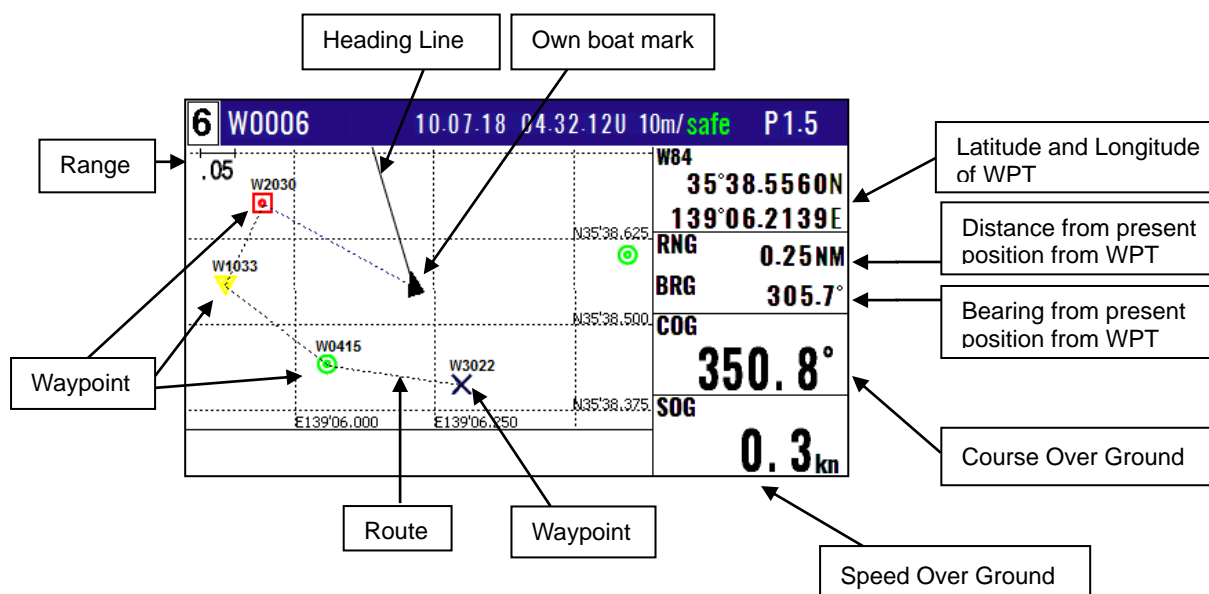
2.2.9   NAV7 screen during waypoint navigation

Speed Over Ground | Course Over Ground | Date and time of position FIX | Distance from present position from WPT | Bearing from present position from WPT | Latitude and Longitude of Ship's position
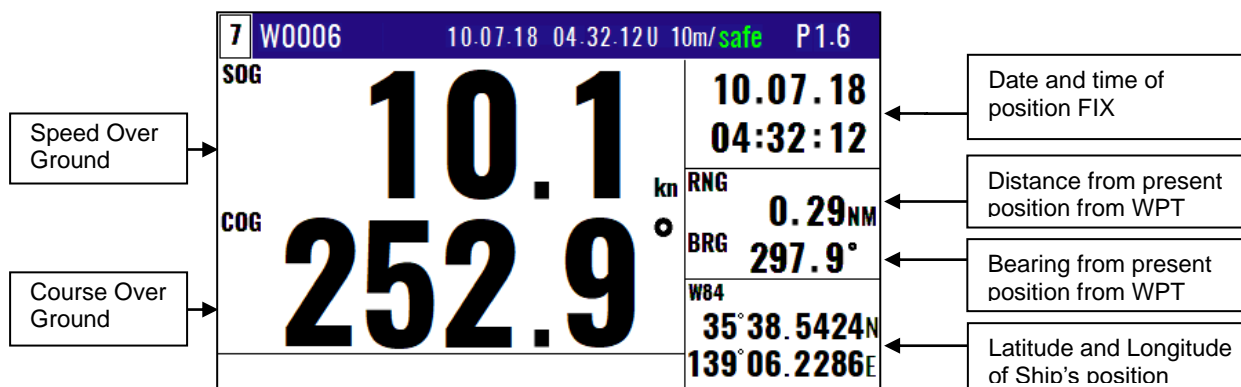
2.3 Cross track error and course deviation angle

2.3.1 Navigation graph of NAV4 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).

Waypoint

Distance from present
Position to WPT

True north

Bearing to WPT

Steer to the left to get back
to the original course.

Course

Course deviation angle

Steering direction

Steer to the right to get back
to the original course.

NOTES:

1. The cross track error (XTE) indication is 9.99 (nm, sm,km) maximum, and doesn't change beyond that limit.

2. The XTE bar graph responds up to 1.00 (nm, sm, km) deviation, and doesn't change beyond that limit.

*3. To set an XTE alarm, see the "**Alarms Setting and canceling**" (page 3-3).*

4. The course deviation angle indication is 180 degrees maximum.

NOTE: *Changing the range(radius) of Navigation graph*

*1. Press [**MODE**] key until **NAV4** screen appears.*

2. Press to [▲] or [▼] key to select a desired range.

The range that can be changed is as follows.
(0.25, 0.5, 1, 2, 5, 10, 20, 50, 100, 200)

Origin

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 (**6: Alerts**). 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, sm, km), the 4(nm, sm, km) course line is shown on the screen. When you have sailed 2 (nm, sm, km), the present position indication moves toward you and the next 4 (nm, sm, km) are shown.

Waypoint

Distance on course line

Distance to WPT

At point **E**   You are sailing outside of course width.

Present position
This marking moves at the course edge.

Course line length on the screen

Course line

Examples: The screen changes as follows when you sail along points **A**, **B**, **C** and **D**.

At point **C**

Present position

At point **D**

Present position

At point **A**

Present position

At point **B**

Present position

XTE alarm range
You can change the XTE alarm range by "**Alarms Setting and canceling**" (page 3-3).

(Nearing to the WPT)

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

NOTES: *WPT marking changes:*
When distance on course line is greater than 4 (nm, sm, km)
When distance on course line is less than 4 (nm, sm, km)

At point **K**: Distance to WPT is greater than 1 (nm, sm, km).

Present position

Waypoint

The WPT indication remains close to you, but the course length increases to 1 (nm, sm, km), 2 (nm, sm, km), and 4 (nm, sm, km). The WPT indication changes when the length exceeds 4 (nm, sm, km).

At point **J**: You have reached the waypoint.

Waypoint

The WPT marking moves toward you.

Present position

At point **I**: You are 0.5 (nm, sm, km) away from waypoint.

Waypoint

The WPT marking moves to the center of course line.

Present position

At point **H**: You are 1 (nm, sm, km) away from waypoint.

Waypoint

The course length closing up to 1 (nm, sm, km) scale from 2 (nm, sm, km) scale.

Present position

At point **F**: You are 4 (nm, sm, km) away from waypoint.

Waypoint

The present position indication moves toward you and the WPT indication changes when you have reached 4 (nm, sm, km) on the course line away from the waypoint.

Present position

Waypoint

2.4 Storing and erasing routes
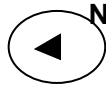
| **NOTE:** *Press to backspace the cursor to correct an input error.* ◄ | **NOTE:** *Press to clear incorrect Input. You can reenter Numeric data.* ACK CLR |

2.4.1 Storing your route

• Up to 100 routes and 500 waypoints can be registered for one route.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (2/N) key to select "**2: Routes**".

(3) Press (1) key to select "**1: Route Set / Edit**". Route Input screen is displayed.

(4) 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 [**Edit**] in pop-up and press (ENT) key.

2-1:Route Set / Edit		2-1:Route Set / Edit

(7) Move the cursor to where you want to change. [Comment] or [Waypoint]

• Press [▲] [▼] key to move the cursor.

Input of Comment

Input location of Waypoint

(8) If you want to change the [Comment]

1) Press (ENT) key to select of the [Comment].

2) Press [◇] key to select a comment letter in pop-up.

3) Press (ENT) key to after moved a cursor to the [**DECISION**] in the pop-up.

(9) If you want to change the [Waypoint]

    1) Press (ENT) key to select of the Input location of Waypoint.

    2) Enter a waypoint number (0000 to 4999) 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 (8) 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.

CIRCLE mode

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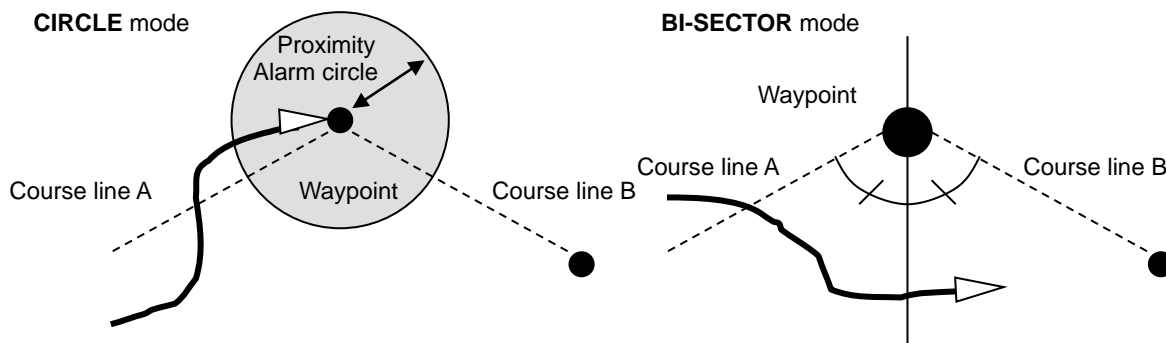
When you reach the proximity alarm circle, the course line is switched from A to B. To change the proximity alarm range, see "**_Alarms_ Setting and canceling**" (page 3-3).

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 10 appears.

(2) Press (2/N) key to select "**2: Routes**".

(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:Routes
1:Route Set / Edit
2:Waypoint change    = Circle
                       Bisector
```
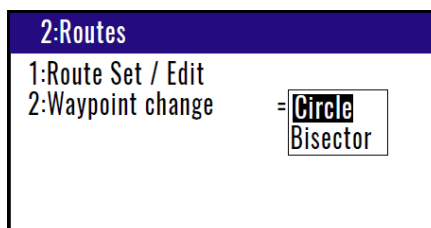
2.4.3   Copying a single route

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (2/N) key to select "**2: Routes**".

(3) Press (1) key to select "**1: Route Set / Edit**". Route Input screen is displayed.

(4) Enter a route number (01 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.

2-1:Route Set / Edit			
	1st WP	last WP	T.RNG NM
R001:SURUGAWAN	W1000 -	W1010	256.80
R002:YOKOHAMA3	Copy	0025	21.74
R003:SURUGAWAN2	007→010	054	9.98
R004:		2075	198.80
R005:ODAWARA2	R010	0010	224.50
R006:ODAWARA3		0018	48.29
R007:ODAIBA	W -W	3040	27.13
R008:	W3041 -	W3049	6.74
R009:	W3050 -	W3065	187.50
R010:	W - W		.
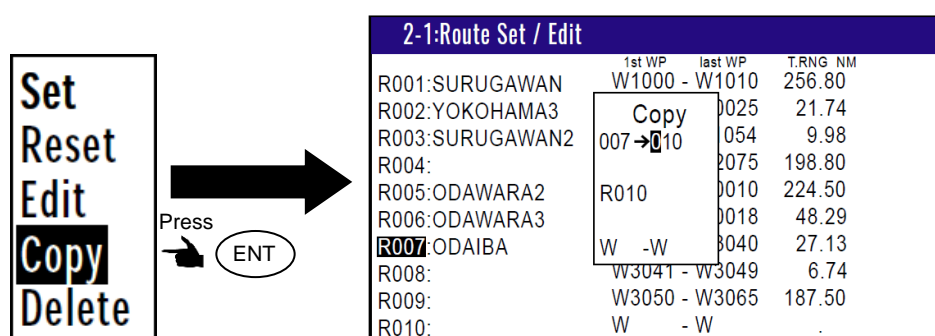
Press → ENT

2.4.4 Erasing point data

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (2/N) key to select "**2: Routes**".

(3) Press (1) key to select "**1: Route Set / Edit**". Route Input screen is displayed.

(4) 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 [**Edit**] in the pop-up and press (ENT) key.

(7) If you want to delete any Waypoint, press (ACK CLR) key in a place that is registered

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

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

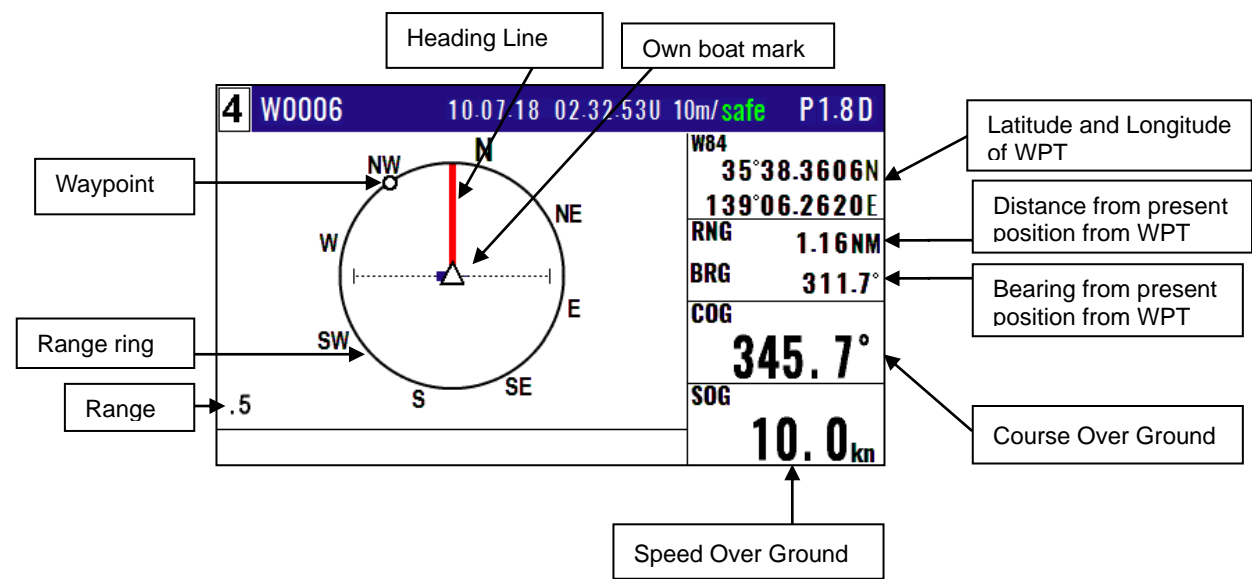| 2-1:Route Set / Edit		
R005:ODAWARA2	(Total:	
01: W0003	35°38.706N	
02: W0004	35°38.052N	
03: W0127	35°37.810N	
04: W0136	35°36.245N	
05: W1007	35°38.222N	
06: W0010	35°38.092N	
07: W	° .	N
08: W	° .	N
09: W	° .	N
10: W	° .	N

Press → ACK CLR

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	Clear	OSHIMA
04: W0136	35°36	Are you sure?	MIYAKE
05: W1007	35°38		URAYASU
06: W0010	35°38	Yes No	ODAIBA
07: W	° . N	° . E	
08: W	° . N	° . E	
09: W	° . N	° . E	
10: W	° . N	° . E	

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: W0010	35°38.092N	139°06.165E	ODAIBA
06: W	° . N	° . E	
07: W	° . N	° . E	
08: W	° . N	° . E	
09: W	° . N	° . E	
10: W	° . N	° . E	

2.4.5 Erasing a single route

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (2/N) key to select "**2: Routes**".

(3) Press (1) key to select "**1: Route Set / Edit**". Route Input screen is displayed.

(4) 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.

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

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

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

2-1:Route Set / Edit			
	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:		075	198.80
R005:ODAWARA2	Delete	010	224.50
R006:ODAWARA3	Are you sure?	018	48.29
R007:ODAIBA	Yes No	040	27.13
R008:	W3041	- W3049	6.74
R009:	W3050	- W3065	187.50
R 10:	W	- W	.

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

2.5 Route setup

You can use up to 500 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 "**2.1 Storing waypoints (LAT/LONG) data**" (page 2-1).

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 10 appears.

(2) Press (2/N) key to select "**2: Routes**".

(3) Press (1) key to select "**1: Route Set / Edit**". Route Input screen is displayed.

(4) Enter a route number (01 to 100) by numeric keys and press (ENT) key.

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

Route

Direction

First destination

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	
06: W0010	35°38.092N	139°06.165E	Route R005 01
07: W ° . N ° . E			W1003 35°38.706N
08: W ° . N ° . E			139°06.015E
09: W ° . N ° . E			▲ : → Foward
10: W ° . N ° . E			▼ : ← Reverse
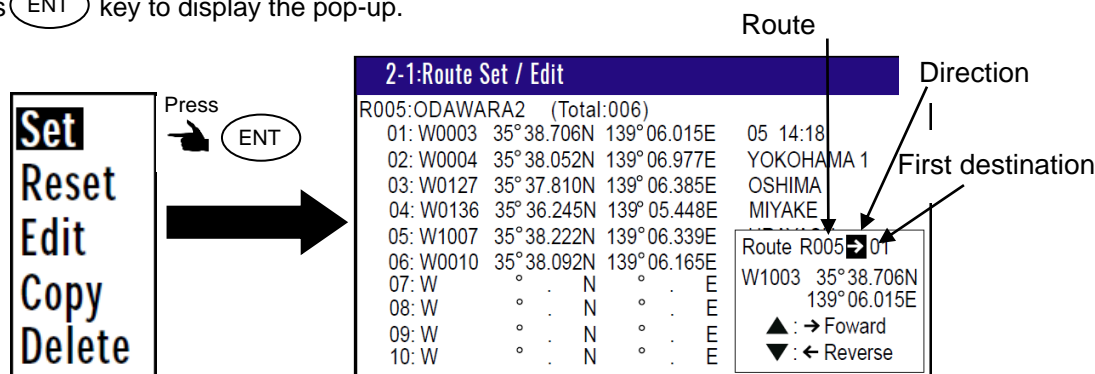
(6) Select [**Set**] in the pop-up and press (ENT) key.

(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) Determined by (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 10 appears.

(2) Press (2/N) key to select "**2: Routes**".

(3) Press (1) key to select "**1: Route Set / Edit**". Route Input screen is displayed.

(4) 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 [**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 A (NAV1), B (NAV2), C (NAV3), D (PLOT) or E (Data) screen.

• Cancel from [MENU]

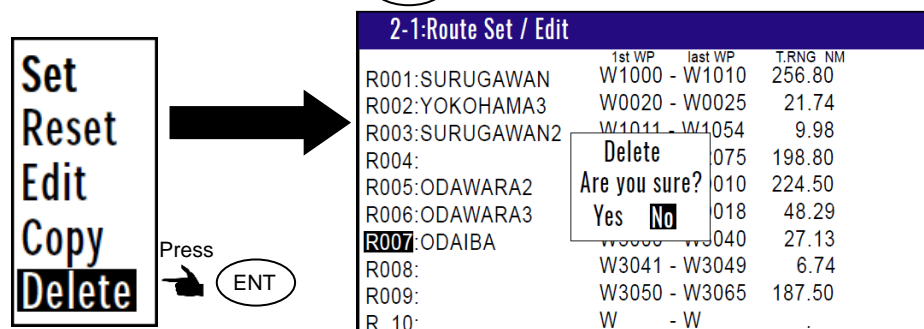• Cancel from NAV 1, NAV 2, NAV 3, NAV4, NAV5, NAV6 or NAV7 screen.

1) When Reset from [MENU]

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (2/N) key to select "**2: Routes**".

(3) Press (1) key to select "**1: Route Set / Edit**". Route Input screen is displayed.

(4) 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 [**Reset**] in the pop-up and press (ENT) key.
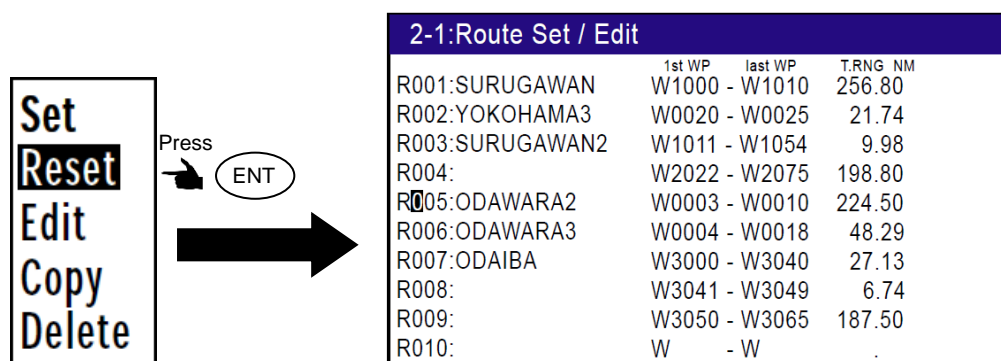
Set		
Reset	Press → (ENT)	
Edit		
Copy		
Delete		

2-1:Route Set / Edit

	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) When Reset from NAV1, NAV2, NAV3, NAV4, NAV5, NAV6 or NAV7 screen.

(1) Press (ACK/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.

**Waypoint reset
Are you sure?
Yes   No**
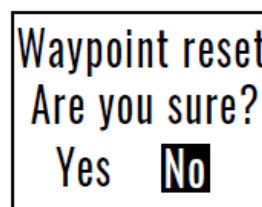
2.5.4 Switching between distance and time to go

When you select the "**RNG**" (Distance to WPT) or "**T.RNG**" (Total distance) on NAV2, NAV3, NAV4, NAV5, NAV6 or NAV7 screen 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) Press (MODE) key until NAV2, NAV3, NAV4, NAV5, NAV6 or NAV7 screen appears.

(2) Press [◄] key to display "**RNG**" "**TTG**".

2 R001➡01 10.07.18 04.32.12U 10m/safe P1.5
W84
35°38.5424N
139°06.2286E
RNG 0.29NM BRG 297.9° SOG 10.1kn COG 252.9°

3 R001➡01 10.07.18 04.32.12U 10m/safe P1.5
W84
35°38.5424N
139°06.2286E
35°38.675N
139°05.944E
RNG 0.29NM
BRG 297.9°
COG 252.9°
TTG 0.11 ETA 10.07 00.23 SOG 10.1kn

4 R001➡01 10.07.18 04.32.12U 10m/safe P1.5D
N NW NE W E SW SE S
W84
35°38.5424N
139°06.2286E
RNG 0.29NM
BRG 297.9°
COG 252.9°
SOG 10.1kn
.5

5 R001➡01 10.07.18 04.32.12U 10m/safe P1.5D
2 1
1.00 1.00
XTE 0.16NM CDI 64°
W84
35°38.5424N
139°06.2286E
RNG 0.29NM
BRG 297.9°
COG 252.9°
SOG 10.1kn

6 R001➡01 10.07.18 04.32.12U 10m/safe P1.5
.05 W2030 W1033 W0415 W3022
N35°38.625 N35°38.500 N35°38.375
E139°06.000 E139°06.250
W84
35°38.5424N
139°06.2286E
RNG 0.29NM
BRG 297.9°
COG 252.9°
SOG 10.1kn

7 R001➡01 10.07.18 04.32.12U 10m/safe P1.6
SOG
10.1
COG
252.9
kn
°
10.07.18
04:32:12
RNG 0.29NM
BRG 297.9°
W84
35°38.5424N
139°06.2286E

(3) Press [▶] key to display "**T.RNG**" "**T.TTG**".

2 R001➡01 10.07.18 04.32.12U 10m/safe P1.5
W84
35°38.5424N
139°06.2286E
T.RNG 1.29NM BRG 297.9° SOG 10.1kn COG 252.9°

3 R001➡01 10.07.18 04.32.12U 10m/safe P1.5
W84
35°38.5424N
139°06.2286E
35°38.675N
139°05.944E
T.RNG 1.29NM
BRG 297.9°
COG 252.9°
T.TTG 0.31 ETA 10.07 00.23 SOG 10.1kn

4 R001➡01 10.07.18 04.32.12U 10m/safe P1.5D
N NW NE W E SW SE S
W84
35°38.5424N
139°06.2286E
T.RNG 1.29NM
BRG 297.9°
COG 252.9°
SOG 10.1kn
.5

5 R001➡01 10.07.18 04.32.12U 10m/safe P1.5D
2 1
1.00 1.00
XTE 0.16NM CDI 64°
W84
35°38.5424N
139°06.2286E
T.RNG 1.29NM
BRG 297.9°
COG 252.9°
SOG 10.1kn

6 R001➡01 10.07.18 04.32.12U 10m/safe P1.5
.05 W2030 W1033 W0415 W3022
N35°38.625 N35°38.500 N35°38.375
E139°06.000 E139°06.250
W84
35°38.5424N
139°06.2286E
T.RNG 1.29NM
BRG 297.9°
COG 252.9°
SOG 10.1kn

7 R001➡01 10.07.18 04.32.12U 10m/safe P1.6
SOG
10.1
COG
252.9
kn
°
10.07.18
04:32:12
T.RNG 1.29NM
BRG 297.9°
W84
35°38.5424N
139°06.2286E

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

You can set the anchor position from the NAV2, NAV3, NAV4, NAV5, NAV6 or NAV7 screen.

The following operations allow you to store and specify the current position as the anchor position. The anchor position is registered to memory number A4997 along with the comment.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (6/E) key to select "**6: Alerts**".

(3) Press (1) key to select "**1: ANCH**".

(4) Select [**ON**] in the pop-up and press (ENT) key.

```
MENU
  1:Waypoints
  2:Routes
  3:GPS
  4:DGPS
  5:Compensation
  6:Alerts
  7:Calculation
  8:Initial setup
  9:Interface
 10:Plotter
```

Press 👉 (6/E)

```
6: Alerts
1: ANCH      = OFF   1.00 NM
2: PROX      = ON    1.00 NM
3: XTE       = ON    1.00 NM
4: CDI       = ON    45 °
5: Alert Log
6: Alert History
```
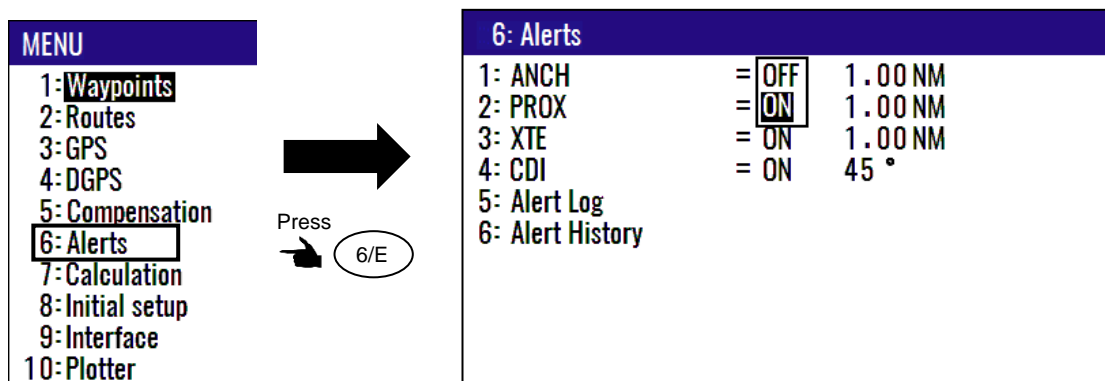
(5) Press (MODE) key until NAV2, NAV3, NAV4, NAV5, NAV6 or NAV7 screen appears.

(6) Press (MOB EVT) key.

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

```
Goto MOB  :[MOB]
Goto Event :[ENT]
⟹ Goto ANCH:[6/E]
Cancel     :[CLR]
```

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

Anchor setting mark

```
2 ANCH      10·12·18 02·32·29U 10m/safe  P1.8D
W84
    35°38.1067N
  139°06.4821E
RNG         BRG        SOG        COG
 0.49 NM  343.2°   10.0 kn    308.1°
```

```
3 ANCH      10·12·18 02·32·27U 10m/safe  P1.8D
W84
    35°38.0934N        35°38.556N
  139°06.5073E         139°06.237E
                   RNG      0.51NM
                   BRG      341.7°
                   COG
                         304.8°
TTG         ETA           SOG
 0.00    10.12 02.32     10.0 kn
```

Anchor position

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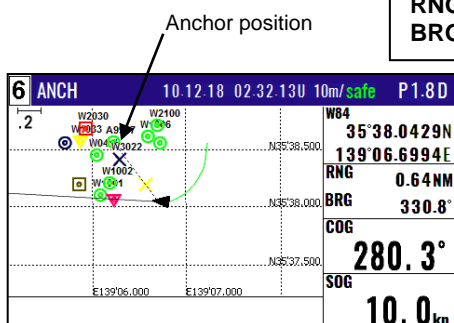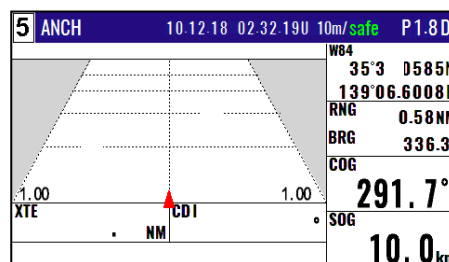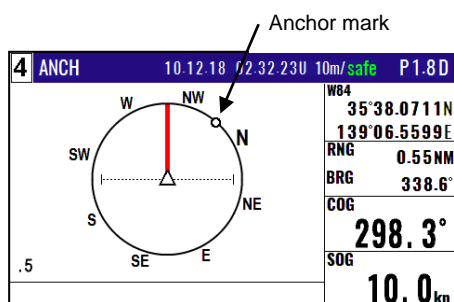
RNG: Distance from anchor position.
BRG: Bearing from anchor position.
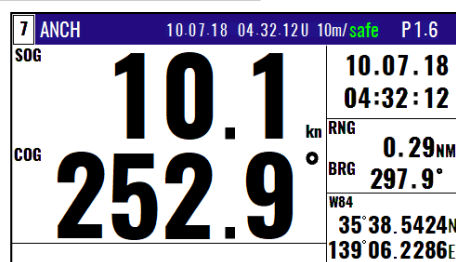
Anchor position

2.6.2   Canceling anchor position

(1) Press (MODE) key until NAV1, NAV2, NAV3, NAV4, NAV5, NAV6 or NAV7 screen appears.

(2) Press (ACK 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.

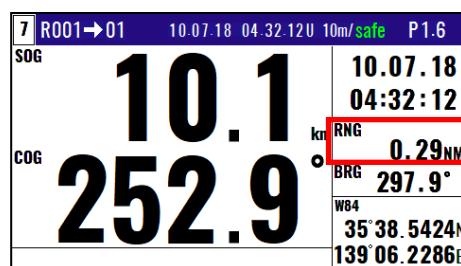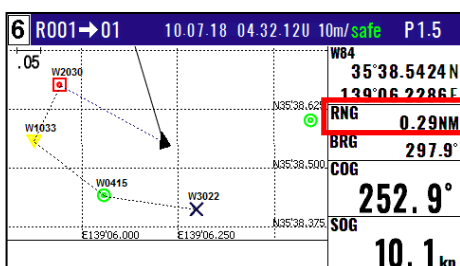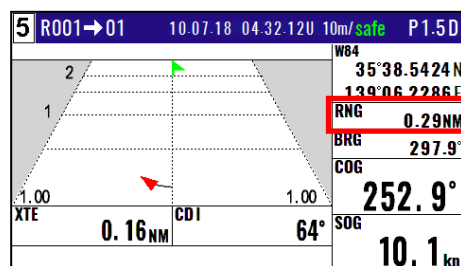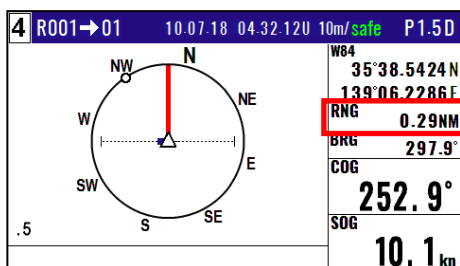## 2.7 Track display

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

2.7.1   Display a cross cursor on NAV6 screen

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

(How to use cross cursor)

(1) Press (MODE) key until NAV6 screen appears.

(2) When you press (ENT) key, cursor appears.

(3) Press [◇] key to move display cursor.

Move quickly display cursor by pressing a long time [◇] key
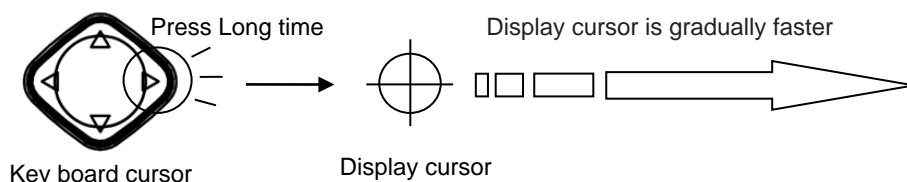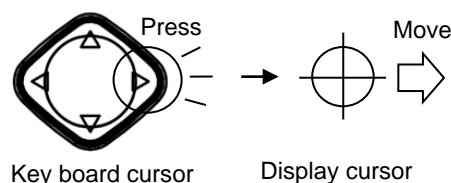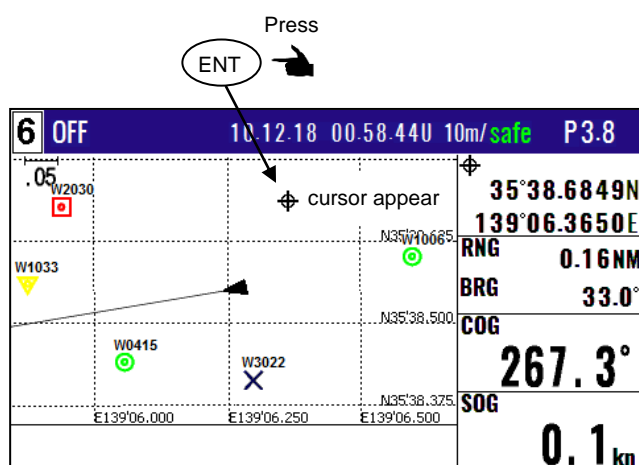
(How to store display cursor position)

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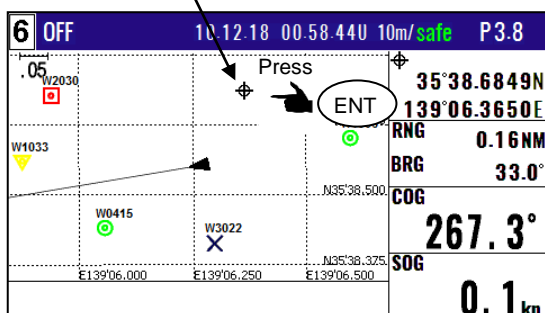
2.7.2   Screen scrolling

You can scroll the NAV6 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.

NAV6 screen moves by pressing (8/S) key and [◇] key, when display cursor is not displayed.

2.7.3   Scaling the PLOT screen

You can select a display scale of PLOT 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)

▲

⇧ Range Up

⇩ Range Down

▼

Scale indication fields

Initial scale: 1

| 6 | R001➡01 | 10·12·18 01·12·55U | 10m/safe | P1.9 |

W84
35°38.5597N
139°06.2654E
RNG   0.29NM
BRG   301.0°
COG
319.4°
SOG
10.2 kn
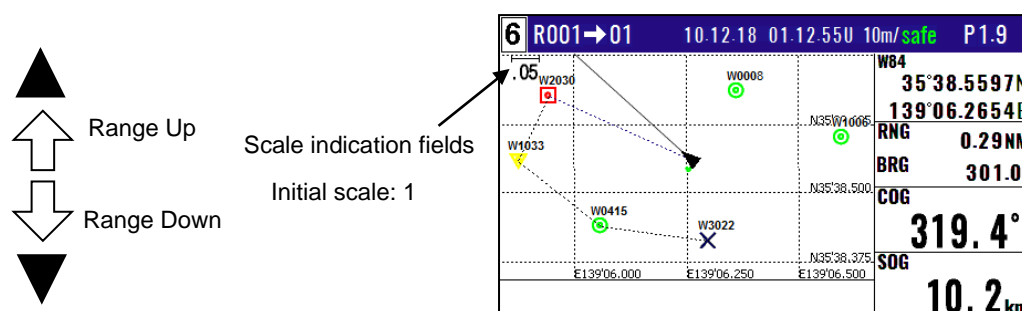
NOTE: *You can change the scale unit from Menu **2: Units** of **8: Initial setup**.*

2.7.4   Changing the setup contents

(1) Press [**MENU**] key until Menu options 1 to 10 appears.

(2) Press [**0**] key to select "**10: Plotter**".

10: Plotter

1: Mark symbol   = ◎
2: Mark display   = Symbol+Number
3: Track color   = ▬▬▬
4: Plot   = 5sec
5: Track clear

(3) Various settings

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

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

Select symbol

Key board cursor

ENT Press

Initial setup: ⊙ (Green)
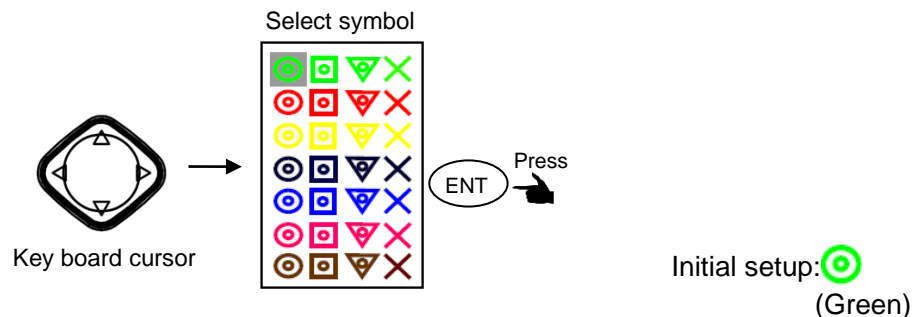
2) 2: Mark display (Press (2/N) key)

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

Symbol+Number
Symbol+Comment
Symbol
Number
Comment
OFF

ENT Press

Initial setup: Symbol + Number
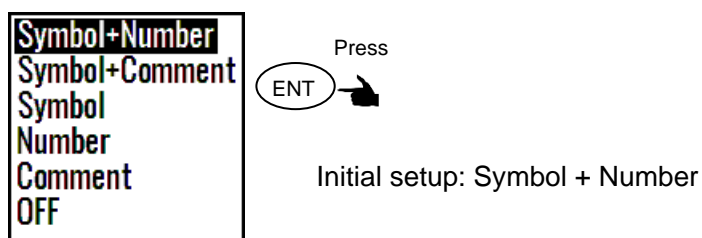
3) 3: Track color (Press (3) key)

You can select the color of the future Track.

Color select

ENT Press

Initial setup: ━━ (Green)
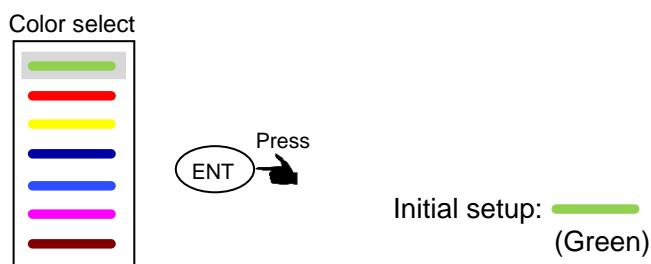
4) 4: Plot (Press (4/W) key)

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

You can set the unit of track distance interval from the Menu **8-2: Units**

Select color

5sec .01NM OFF
10sec .05NM
20sec .1NM
30sec .5NM
 1min   1NM

ENT Press

Initial setup: 5sec.

Plot speed select
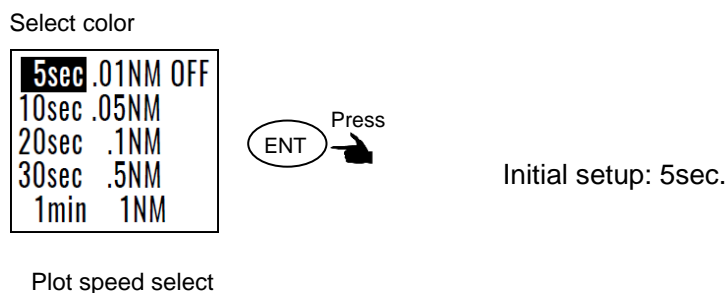
5) 5: Track clear (Press (5) key)

You can delete the track according to color or all color.

If you press the **ENT** key when the cursor is positioned at **Track clear**, the pop-up of select color will appear. Press **ENT** key after select color.

Select delete color

Confirmation screen

```
Clear
Are you sure?
Yes   No
```

Select Yes or No
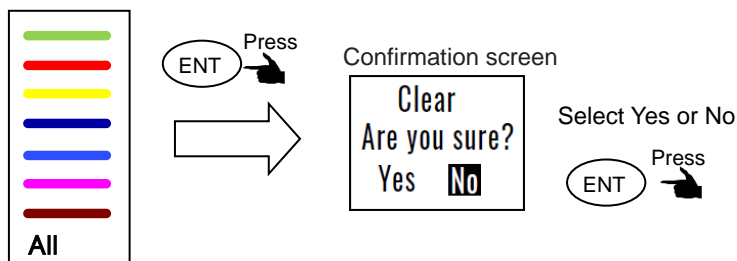
Chapter 3   Alarms

3.1   Kinds of alarms

There are five kinds of alarms, anchor watch (**ANCH**), proximity (**PROX**), cross track error (**XTE**) and course deviation angle (**CDI**).

3.1.1   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". **ANCH** letters blink and buzzer (short beep) sounds when outside of alarm range. Please refer to **2.6.1 Storing an anchor position**. Press **ACK/CLR** key If you want to turn off buzzer.
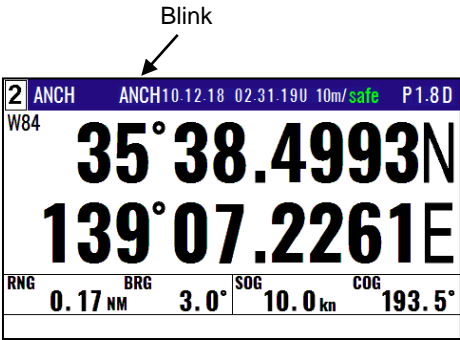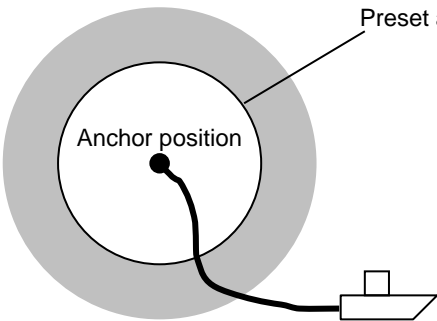
Initial setup: OFF, 1.00NM
Enter an alarm range: 0.00 to 9.99

3.1.2   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). **PRX** letters blink and buzzer (short beep) sounds when I arrive. Press **ACK/CLR** key, if you want to turn off buzzer.

Preset alarm range
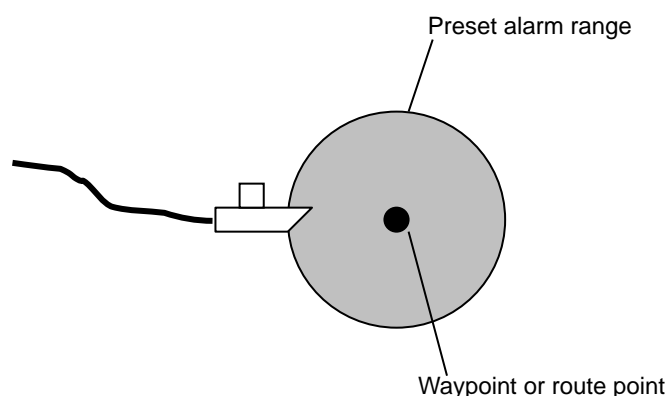
Blink

2 R001 → 04PRX 10·12·18 01·40·56U 10m/safe P1·5
W84
35°38.5430N
139°06.2765E

RNG	BRG	SOG	COG
0.13 NM	178.1°	10.0 kn	118.8°

Waypoint or route point

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

3.1.3   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 NAV5 screen is the same as the XTE alarm value you have set. **XTE** letters blink and buzzer (long beep) sounds when I'm away from XTE range.

Press **ACK/CLR** key, if you want to turn off buzzer.

Present alarm range

Blink

Origin

Waypoint or route point

Course line
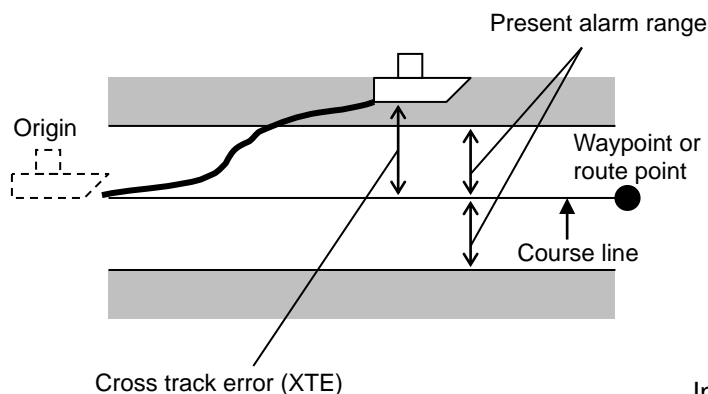
2 R001 → 04XTE 10·12·18 02·31·25U 10m/safe P1·8 D
W84
35°38.4149N
139°07.2115E

RNG	BRG	SOG	COG
0.74 NM	276.8°	10.0 kn	201.7°

Cross track error (XTE)

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

3.1.4   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". **CDI** letters blink and buzzer (long beep) sounds when I'm away from CDI range. Press **ACK/CLR** key, if you want to turn off buzzer.

Waypoint or route point

Bearing to waypoint

Course deviation angle (CDI)

Course
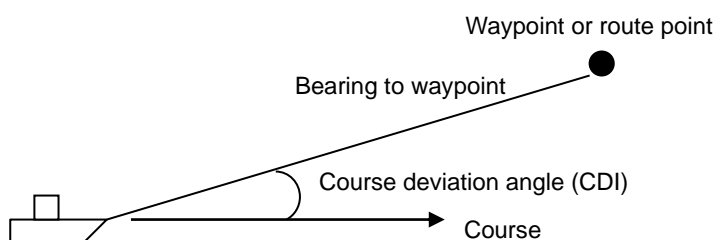
2 R001 → 04CDI 10·12·18 02·33·45U 10m/safe P1·8 D
W84
35°38.9906N
139°06.5073E

RNG	BRG	SOG	COG
0.60 NM	203.1°	10.0 kn	72.5°

Initial setup: ON, 45 degrees
Enter an alarm range: 00 to 45 degrees

3.2   Alarms Setting and canceling

(Setting alarm)

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (6/E) key to select "**6: Alerts**".

(3) Select item number of the alarm to be set by numeric keys.

(4) Press [▲] or [▼] key to move cursor to [**ON**].

(5) Press (ENT) key.

```
OFF
ON
```

(Changing alarm range)

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (6/E) key to select "**6: Alerts**".

(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. CDI alarm range is 2-digit.

(6) Press (ENT) key.

1.00NM

(Canceling alarm)

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (6/E) key to select "**6: Alerts**".

(3) Select desired alarm number by numeric keys.

(4) Press [▲] or [▼] key to move cursor to [**OFF**].

(5) Press (ENT) key.

```
OFF
ON
```

3.3   Alerts

Alerts are different from alarms. There is no setting on / off by the operator. It occurs when you should pay attention to or warn about system and operating conditions.

There are three types of Alerts: Alarm, Warning, and Caution.

Alarm   : Condition requiring immediate attention and action to maintain safe navigation
            Note: GNSS products do not initiate alarms

Warning: In situations where it is necessary to immediately check the status and take preventive measures.

Caution : There is no urgency but need to pay attention.

*Alert icon   Alert ID   Time (UTC)   Alert message   *Number of alert:
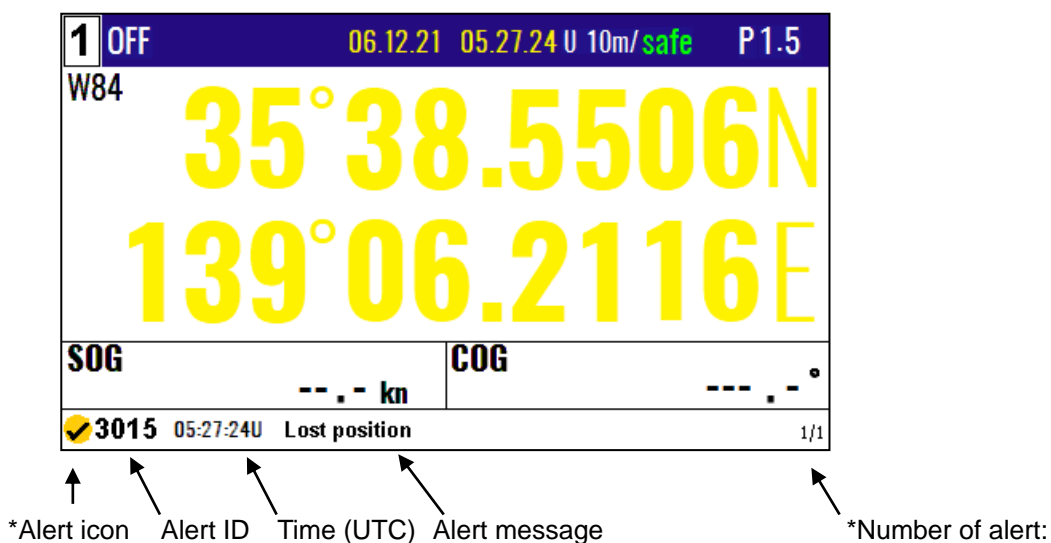
*When multiple alerts are occurring, pressing the [▲]key will display the next alert.

*Type of Alert icon

: Active – unacknowledged Alarm **(Note: Not used in GNSS products)**

: Rectified – unacknowledged Alarm **(Note: Not used in GNSS products)**

: Active – unacknowledged Warning

: Active – silenced Warning

: Active – acknowledged Warning

: Active – responsibility transferred Warning

: Rectified – unacknowledged Warning

: Caution

3.3.1   Acknowledge of alerts

When an alert occurs, the buzzer sounds (except Caution) and the contents of the alert is displayed at the bottom of the screen. When you acknowledge an alert and press the **ACK/CLR** key, the buzzer is silence and the alert disappears. Automatically, by receiving a new alert, the top most alert is displayed in the Alert display line. All active alerts are available in the Alert List, in which the alerts can be acknowledged as well. If the condition recovers before acknowledge, the

buzzer will be silence, but the alert display remains as Rectified.

3.3.2   Alert List

You can check the date/time and the latitude/longitude of alert occurrence.

The procedure is as follows:

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (6/E)key to select "**6: Alerts**".

(3) Press (5) key to select "**5: Alert List**".

　　*Up to 9 alerts will be displayed in the list.

Page
（1/3,2/3,3/3）

| Icon | Priority | Category | State | ID number | Instance number |

Alert message

Date　　　Time(UTC)　　Latitude / Longitude
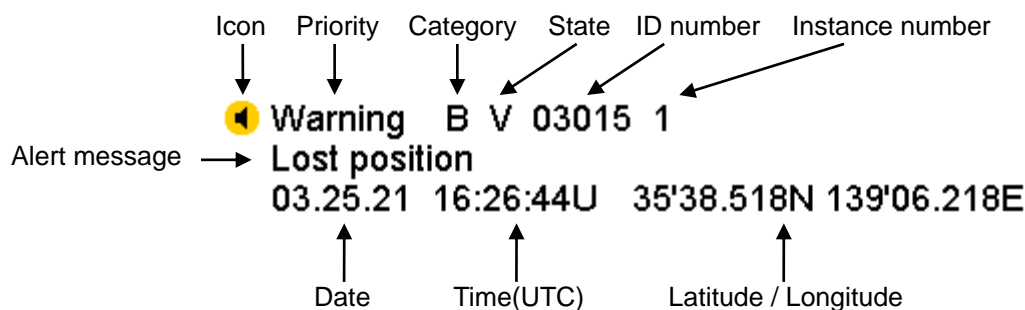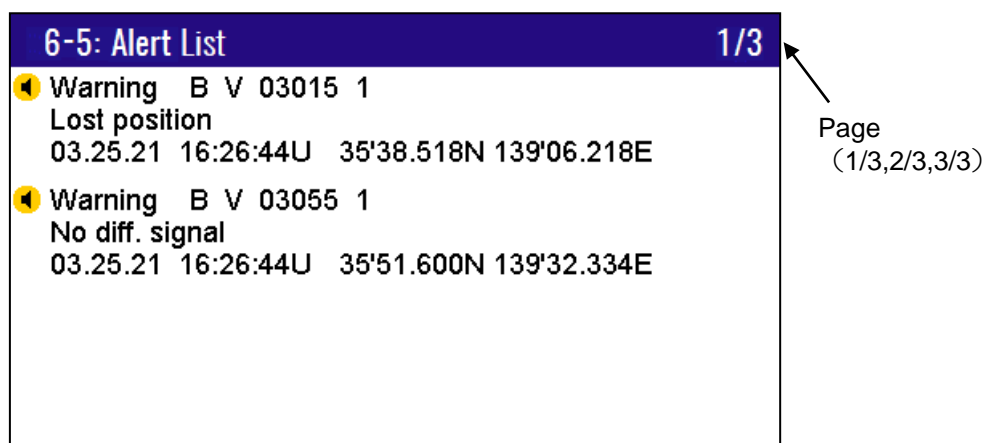
You can scroll and acknowledge the list in the Alert List screen.

(1) Press [▲] or [▼] key to select an alert.

　　The cursor on the ID number will move up and down.

(2) Press [▶] or [◀] key to switch pages.

(3) When you are on page 2/3 or 3/3, press (1) key to move to page 1/3.

(4) Select an alert and press (ACK CLR) key to acknowledge it.

> **NOTE:** *Pressing the "9/AL" key during the NAV1, NAV2, NAV3, NAV4, NAV5, NAV6 or NAV7 screen will display the Alert List screen.*

> **NOTE:** *In case that the Alert List is open, by pressing "9/AL" key, the 1st Alert with the highest priority in selected with the single operator action.*

3.3.3 Alert History

You can check the history of alerts. The procedure is as follows:

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (6/E) key to select "**6: Alerts**".

(3) Press (6/E) key to select "**6: Alert History**".

 *Up to 40 alerts will be displayed in the history.

6-6: Alert History	1/4
01 041825 B W U 03055 **No diff. signal**	
02 041825 B W U 03015 **Lost position**	
03 041809 B W V 03055 **No diff. signal**	
04 041809 B W V 03015 **Lost position**	
05 041749 B C N 03056 **HDOP exceeded**	
06 041617 B W U 03055 **No diff. signal**	

No.   Time   Type   ID   Alert title

3.3.4 Alert list

List of system alert and message.

Category

Priority (A: ALARM, W: Warning, C: Caution)

ID number (0-9999: IMO, 10000-9999999: Maker)

Instance number

				Alert title	Purpose
B	C	3056	1	HDOP exceeded	The value of HDOP exceeded 4.0
B	W	3008	1	Lost calculation	Can not calculate position for more than 5 minutes
B	W	3015	1	Lost position	A new position has not been calculated for more than 1 s
B	W	3055	1	No diff. signal	Differential signal not available
B	W	3055	2	Diff not applied	Differential correction not applied
B	W	3012	1	Doubtful pos.	Station is unhealthy, unmonitored, or signal quality is below threshold
B	W	3062	2	RAIM Limit	Alert Limit Exceeded

1) Category B: Alerts where no additional information for decision support is necessary besides the information which can be presented using alert source and alert description text.

2) Escalation: All Warnings are escalating to a Warning after a fixed time of 60s.

3) Responsibility Transfer: For all CAT B Warnings, the Responsibility Transfer is allowed. Active Responsibility Transfer cannot be hidden.

4) Silencing an Alert: Silencing an alert is possible with the alert acknowledgement or by the BAM/CAM with the alert communication.

3.3.5 Alert sentence

You can output alert related sentences to external devices. The procedure is as follows:

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (5) key to select "**5: ALF**".

(4) Press [▲] or [▼] key to move cursor onto "**OFF**" or "**ALF**".

(5) Press (ENT) key.

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Chapter 4   Setup Procedure

4.1   Menu options

```
MENU
 1: Waypoints
 2: Routes
 3: GPS
 4: DGPS
 5: Compensation
 6: Alerts
 7: Calculation
 8: Initial setup
 9: Interface
10: 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 erase 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 erase a route. Forward/backward navigation Selection. Automatic route switching. Waypoint data switching. (See pages 2-12 to 2-18).

```
2-1:Route Set / Edit
R010: ■              (Total:000)
   01: W      °   .   N      °   .   E
   02: W      °   .   N      °   .   E
   03: W      °   .   N      °   .   E
   04: W      °   .   N      °   .   E
   05: W      °   .   N      °   .   E
   06: W      °   .   N      °   .   E
   07: W      °   .   N      °   .   E
   08: W      °   .   N      °   .   E
   09: W      °   .   N      °   .   E
   10: W      °   .   N      °   .   E
```

(3) GPS

Display GPS satellite status. Switch (2- and 3-dimensional) positioning modes. Select datum. Set antenna height (above sea level). See DOP value to limit fix data Set satellite elevation angle limit. Select RAIM function. Select RAIM accuracy.

```
3: GPS
1: GPS monitor
2: GPS mode       = GPS
3: Datum          = WGS-84
4: C/N mask       = 35 dB
5: Elevation mask = 5 °
6: RAIM Limit     = 10 m
```

(4) Differential GPS (DGPS)
Select DGPS style. Select DGPS mode. Set DGPS timeout. Select beacon station. Set beacon frequency. Select beacon bit rate. Set DGPS input baud rate. Monitor DGPS data. Monitor beacon message.

```
4: DGPS
1: DGPS mode       = Auto
2: Time out        = 060  sec.
3: SBAS selection  = Auto
4: SBAS  Other     = PRN  120
5: Beacon selection = Auto
6: Frequency       = 283.5  kHz
7: Bit rate        = 200  bps
8: Baud rate       = 4800  bps
9: Beacon monitor
```

(5) Compensation
Position correction (LAT/LONG, LOP) Compass correction Time difference

```
5: Compensation
1: Latitude / Longitude
2: LOP
3: Magnetic variation   = Auto
                        = +006.8°
4: Time difference      = +00:00
```

(6) Alerts (See pages 3-1 to 3-7)
You can set up about alarm. Anchor watch alarm. Proximity alarm. XTE alarm. CDI alarm.
And you can check alert status.

```
6: Alerts
1: ANCH      = Off    1.00 NM
2: PROX      = ON     1.00 NM
3: XTE       = ON     1.00 NM
4: CDI       = ON     45 °
5: Alert List
6: Alert History
```

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

```
7: Calculation
1: 2Points
2: L/L→LOP
3: Navigation plan
```

(8) Initial setup

Set average constants. Select distance/speed units. Select antenna height (above sea level) units. Select navigation mode. Select position display mode (LAT/ LONG, LOPs). Select LAT/LONG display digits Set chain.

```
8: Initial setup
1: Averaging        = 0
2: Units            = NM
3: Sailing mode     = Great circle
4: Position         = L/L
5: L/L units        = .001
6: GNSS source      = Internal
7: Language         = Engrish
8: Lop              = LoranC
9: Chain            = 0000-0-0
```

(9) Interface

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

```
9: Interface
1: Connector        = DATA1
2: Format           = IEC 61162-1
3: Baud rate        = 4800
4: Main Talker ID   = System dependent
5: ALF              = OFF
6: Sentence edit
7: Ethernet
8: Ethernet         (SYSLOG)
9: Ethernet         (Special)
```

(10) Plotter

You can change the settings of [**Plotter**]. NAV6 screen

```
10: Plotter
1: Mark symbol      = ⊙
2: Mark display     = Symbol+Number
3: Track color      = ▬
4: Plot             = 5sec
5: Track clear
```

4.2   Menu 3: GPS

4.2.1   Monitoring GPS satellite signal reception

You can monitor the signal status from GPS (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 10 appears.

(2) Press (3) key to select "**3: GPS**".

(3) Press (1) key to select "**1: GPS Monitor**". Reason for alarm notification is displayed.

```
3: GPS
1: GPS monitor
2: GPS mode        = GPS
3: Datum           = WGS-84
4: C/N mask        = 35 dB
5: Elevation mask  = 5 °
6: RAIM Limit      = 10 m
```

Press
(1) →

```
3-1: GPS monitor        GPS  1/2          P 2.5
No.  07  08  09  11  16  18  21  26  27  01  10  20
C/N  25  24  14  20  26  26  32  36  21  23  --  --
ELV  29  55  12  20  55  26  15  33  68  04  09  11
AZM 313 272 269 219 071 193 041 100 004 200 100 075
```
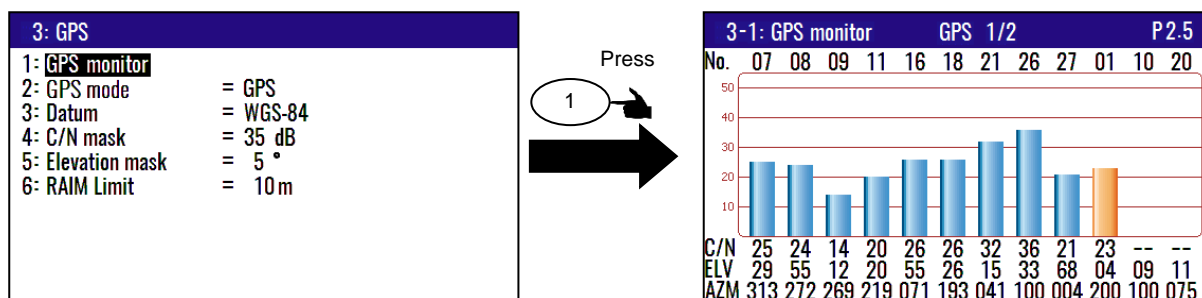
4.2.2   Selecting a GNSS mode

Only GPS mode can be used.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (3) key to select "**3: GPS**".

(3) Press (2/N) key to select "**2: GPS mode**".

(4) Press [▲] or [▼] key to select desired measuring system mode.

(5) Press (ENT) key.

```
3: GPS
1: GPS monitor
2: GPS mode        = GPS
3: Datum           = WGS-84
4: C/N mask        = 35 dB
5: Elevation mask  = 5 °
6: RAIM Limit      = 10 m
```

Initial setup: GPS

4.2.3   Selecting a geodetic datum

The latitude and longitude are calculated based on the WGS-84 with GPS system. However, the charts used in many countries are based on different geodetic datum. You can compensate this difference from your chart by converting GPS position data into your actual chart system. To select a geodetic datum, see "Local Geodetic Systems" (Chapter 11 Annex).

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (3) key to select "**3: GPS**".

(3) Press (3) key to select "**3: Datum**".

(4) Press [▲] or [▼] key to move cursor onto the desired geodetic datum.

(5) Press (ENT) key.

```
3: GPS
1: GPS monitor
2: GPS mode      = GPS
3: Datum         = WGS-84
4: C/N mask      = 35 dB
5: Elevation mask = 5 °
6: RAIM Limit    = 10 m
```

Press 3 →

```
3-3: Datum                           1/5
00: WGS-84        10: NRD-83
01: WGS-72        11: ICELAND 55
02: TOKYO         12: IRELAND 65
03: NRD-27        13: NEWZELAND
04: ALASKA/KANADA 14: EUROPIAN 79
05: EUROPIAN 50   15: ROME 40
06: AUSTRALIAN 84 16: SOUTH AFRICA
07: SOUTH ASIA    17: SAUDI ARABIA
08: SOUTH AMERICA 18: INDIAN/NEPAL
09: GREENLAND     19: PHILPPINES
```

Initial setup: WGS-84

4.2.4   Setting the mask level of carrier-to-noise ratio

Usually this set value is used initial set other than the special case.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (3) key to select "**3: GPS**".

(3) Press (4/W) key to select "**4: C/N mask**".

(4) Press [▲] or [▼] key to move cursor onto the desired C/N mask.

(5) Press (ENT) key.

```
3: GPS
1: GPS monitor
2: GPS mode      = GPS
3: Datum         = WGS-84
4: C/N mask      = 35 dB
5: Elevation mask = 5 °
6: RAIM Limit    = 10 m
```

Press 4/W →

```
3: GPS
1: GPS monitor
2: GPS mode      = GPS
3: Datum         = 45 S-84
4: C/N mask      = 40 dB
5: Elevation mask = 35 °
6: RAIM Limit    = 30 m
                   25
                   20
                   15
                   10
```
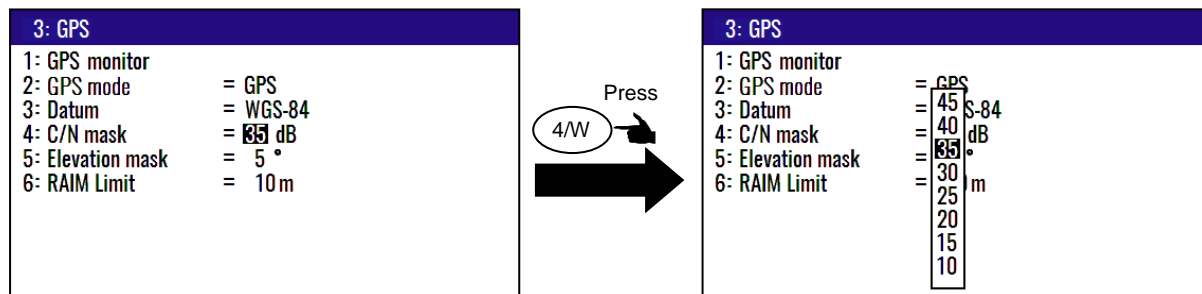
Initial setup: 35dB

4.2.5 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 10 appears.

(2) Press (3) key to select "**3: GPS**".

(3) Press (5) key to select "**5: Elevation mask**".

(4) Press [▲] or [▼] key to move cursor onto elevation angle masking.

(5) Press (ENT) key.

```
3: GPS
1: GPS monitor
2: GPS mode       = GPS
3: Datum          = WGS-84
4: C/N mask       = 35 dB
5: Elevation mask = 5 °
6: RAIM Limit     = 10 m
```

Press 5

```
3: GPS
1: GPS monitor
2: GPS mode       = GPS
3: Datum          = WGS-84
4: C/N mask       = 35 dB
5: Elevation mask = 0 °
6: RAIM Limit     = 3 m
                    5
                    10
                    15
```

Initial setup: 5°
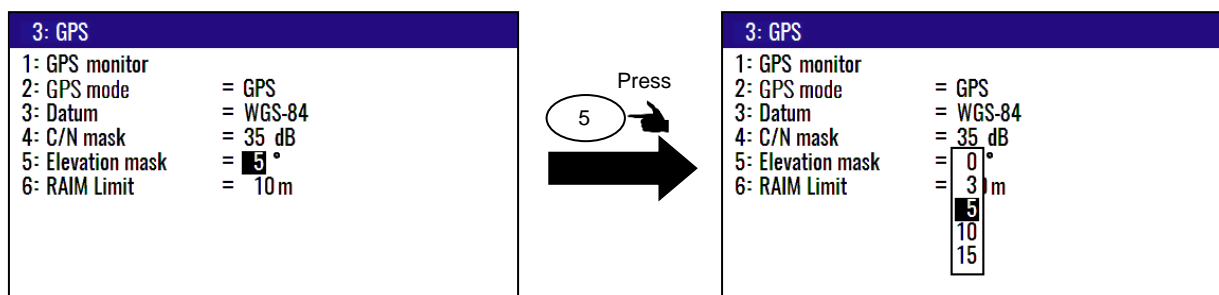
4.2.6 RAIM

RAIM (Receiver Autonomous Integrity Monitoring) is the function, which supervises whether GPS holds the accuracy, which the user chose (10m/50m/100m/OFF). And the status is displayed after position fix is available.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (3) key to select "**3: GPS**".

(3) Press (6/E) key to select "**6: RAIM Limit**".

(4) Press [▲] or [▼] key to move cursor onto RAIM limit.

(5) Press (ENT) key.

```
3: GPS
1: GPS monitor
2: GPS mode       = GPS
3: Datum          = WGS-84
4: C/N mask       = 35 dB
5: Elevation mask = 5 °
6: RAIM Limit     = 10 m
```

Press 6/E

```
3: GPS
1: GPS monitor
2: GPS mode       = GPS
3: Datum          = WGS-84
4: C/N mask       = 35 dB
5: Elevation mask = 5 °
6: RAIM Limit     = 10 m
                    50 m
                    100 m
                    OFF
```

Initial setup: 10m

```
10m/safe    P1.7D
```

RAIM limit

RAIM status

Safe   : When the expected position error is within the RAIM limit.

Caution : When can not calculate the expected position error.

Unsafe : When the expected position error exceeds the RAIM limit.

4.3   Menu 4: Differential GPS (DGPS)

This DGPS system can improve the GPS positioning accuracy. There are three styles, Auto and SBAS and Beacon. "BEACON" requires a signal from the external receiver system which outputs the compensation data of RTCM SC-104.

"AUTO" mode is automatically changes SBAS and Beacon which continue DGPS performance.

4.3.1   Displaying DGPS

When the DGPS is set, the DGPS status is displayed with letters **D** by the top right corner of the screen.

4.3.2   Selecting a style of DGPS

Auto   : DGPS correction takes place when DGPS correction data is received.

BEACON : DGPS for RTCM SC-104.

SBAS   : WAAS / EGNOS / MSAS / GAGAN / SDCM / Other

OFF   : Normal GPS positioning takes place. **D** letter is not shown.

(1) Press (MENU)   key until Menu options 1 to 10 appears.

(2) Press (4/W)   key to select "**4: DGPS**".

(3) Press (1)   key to select "**1: DGPS mode**".

(4) Press [▲] or [▼] key to move cursor onto "**Auto**", "**SBAS**", "**Beacon**" or "**OFF**".

(5) Press (ENT)   key.

Initial setup: Auto

4.3.3   Setting a DGPS timeout

If the correction data from beacon receiver is interrupted or has errors, NAVIGATOR holds the last differential correction for the duration of timeout. You can set Time out to 005 to 100 seconds. However, the position accuracy degrades as Time out lengthens.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (4/W) key to select "**4: DGPS**".

(3) Press (2/N) key to select "**2: Time out**".

(4) Enter a timeout (005 to 100 seconds) by numeric keys.

(5) Press (ENT) key.
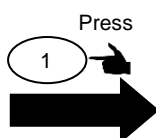
```
4: DGPS
1: DGPS mode        = Auto
2: Time out         = 060  sec.
3: SBAS selection   = Auto
4: SBAS  Other      = PRN  120
5: Beacon selection = Auto
6: Frequency        = 283.5  kHz
7: Bit rate         = 200  bps
8: Baud rate        = 4800  bps
9: Beacon monitor
```

Initial setup: 60 sec

4.3.4   Selecting a SBAS station

KGP-922 can utilize the SBAS. Kind of receivable SBAS is WAAS, EGNOS, MSAS, GAGAN, SDCM, Other. There is an Auto function in the selection of SBAS. Auto function selects the nearest station. PRN number zone becomes valid if you select the other. This mode is disable when "**1: DGPS mode**" is selected "**Beacon**" or "**OFF**".

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (4/W) key to select "**4: DGPS**".

(3) Press (3) key to select "**3: SBAS selection**".

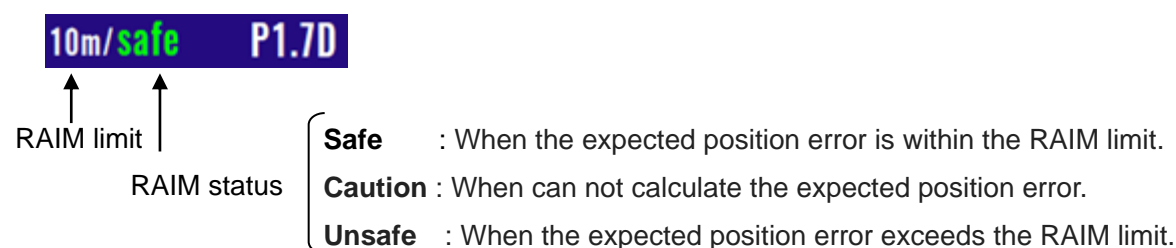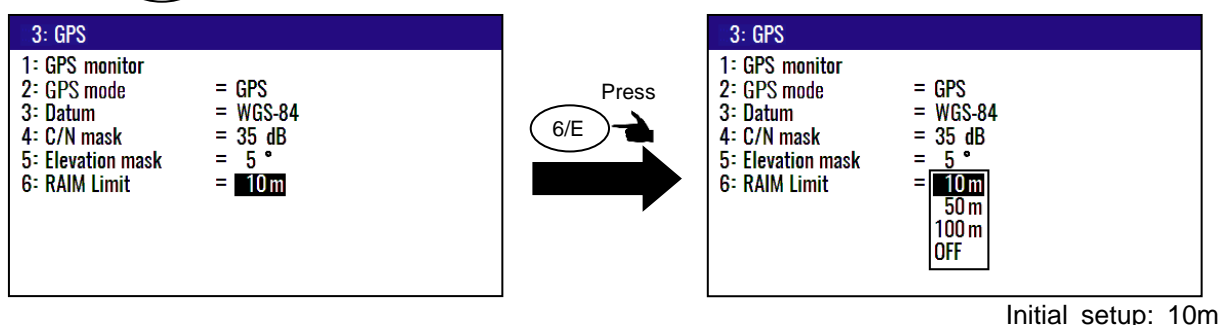(4) Press [▲] or [▼] key to move cursor onto selecting function.

(5) Press (ENT) key.

```
4: DGPS
1: DGPS mode        = Auto
2: Time out         = 060  sec.
3: SBAS selection   = Auto
4: SBAS  Other      = PRN  120
5: Beacon selection = Auto
6: Frequency        = 283.5  kHz
7: Bit rate         = 200  bps
8: Baud rate        = 4800  bps
9: Beacon monitor
```

Press (3) →

```
4: DGPS
1: DGPS mode        = Auto
2: Time out         = 060  sec.
3: SBAS selection   = Auto
4: SBAS  Other      =  WAAS   2
5: Beacon selection =  EGNOS
6: Frequency        =  MSAS    kHz
7: Bit rate         =  GAGAN  bps
8: Baud rate        =  SDCM
9: Beacon monitor      Other
```

Initial setup: Auto

(Selecting a station in the Other mode)

(6) Press (4/W) key to select "**4: SBAS Other**".

(7) Enter a PRN number (120 to 158) by numeric keys.

(8) Press (ENT) key.

Initial setup: PRN120

4.3.5   Selecting a beacon station (Beacon DGPS only)

A beacon station is selectable in both the manual or auto mode. This mode is disable when "**1: DGPS mode**" is "**SBAS**" or "**OFF**".

If the beacon receiver to be connected supports automatic tuning, in the auto mode, the nearest station will be selected based on actual longitude and latitude among all the stored beacon stations.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (4/W) key to select "**4: DGPS**".

(3) Press (5) key to select "**5: Beacon selection**".

(4) Press [▲] or [▼] key to move cursor settings you select

(5) Press (ENT) key.

Initial setup: Auto

4.3.6   Setting receiving frequency and bit rate of a beacon station

You can set the receiving frequency (283.5 kHz to 325.0 kHz) that is transmitted from a beacon station. In addition, Bit rate you can also change "50bps", "100bps", "200bps". This mode is disabled when "**5: Beacon selection**" is "**AUTO**".

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (4/W) key to select "**4: DGPS**".

(3) Press [▲] or [▼] key to move cursor "**6: Frequency**".

(4) Specify receiving frequency (4-digit) of beacon station by numeric keys (0 to 9).

(5) Press (ENT) key to set receiving frequency.

(6) Press [▼] key to move cursor onto "**7: Bit rate**".

(7) Press (ENT) key.

(8) Press [▲] or [▼] key to set bit rate "50bps", "100bps", "200bps".

(9) Press (ENT) key.

```
4: DGPS
1: DGPS mode      = Auto
2: Time out       = 060  sec.
3: SBAS selection = Auto
4: SBAS  Other    = PRN  120
5: Beacon selection = Manual
6: Frequency      = 283.5  kHz
7: Bit rate       = 200  bps
8: Baud rate      = 4800  bps
9: Beacon monitor
```
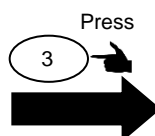
```
4: DGPS
1: DGPS mode      = Auto
2: Time out       = 060  sec.
3: SBAS selection = Auto
4: SBAS  Other    = PRN  120
5: Beacon selection = Manual
6: Frequency      = 283.5  kHz
7: Bit rate       = | 50 | bps
8: Baud rate      = |100 | bps
9: Beacon monitor   |200 |
```

Frequency Initial setup:	**283.5 kHz**
Selectable range:	**283.5 to 325.0 kHz**
Bit rate Initial setup:	**200 bps**

4.3.7 Selecting the DGPS input signal baud rate

Adjust the baud rate of RTCM SC-104 format signal reception to the output signal baud rate of beacon receiver.

To change the baud rate, the following settings are required

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) "**1: Connector**". = ''**DATA2**''

   "**2: Format**". = ''**RTCM**''

```
9: Interface
1: Connector      = DATA2
2: Format         = RTCM
3: Baud rate      = 4800
4: Main Talker ID = System dependent
5: ALF/ALR        = OFF
6: Sentence edit
7: Ethernet
8: Ethernet       (SYSLOG)
9: Ethernet       (Special)
```

*Note: Without "**9: Interface**" setting, "**4: DGPS**" in "**8: Baud rate**" cannot change

To change the baud rate

This mode is disabled when "**5: Beacon selection**" is "**AUTO**".

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (4/W) key to select "**4: DGPS**".

(3) Press (8/S) key to select "**8: Baud rate**".

(4) Press [▲] or [▼] key to move cursor onto the correct baud rate "2400", "4800" or "9600".

(5) Press (ENT) key.
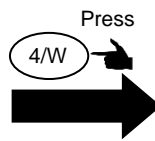
```
4: DGPS
1: DGPS mode      = Auto
2: Time out       = 060  sec.
3: SBAS selection = Auto
4: SBAS  Other    = PRN  120
5: Beacon selection = Manual
6: Frequency      = 283.5  kHz
7: Bit rate       = 200  bps
8: Baud rate      = 4800  bps
9: Beacon monitor
```

Press
(8/S) ➡
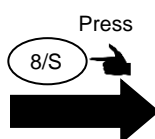
```
4: DGPS
1: DGPS mode      = Auto
2: Time out       = 060  sec.
3: SBAS selection = Auto
4: SBAS  Other    = PRN  120
5: Beacon selection = Manual
6: Frequency      = 283.5  kHz
7: Bit rate       = 200  bps
8: Baud rate      = |2400| bps
9: Beacon monitor   |4800|
                    |9600|
```

4.3.8 Beacon monitor

DGPS monitor provides information on the DGPS beacon receiver interface and receiving status.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (4/W) key to select "**4: DGPS**".

(3) Press (9/AL) key to select "**9: Beacon monitor**".

```
4: DGPS
1: DGPS mode          = Auto
2: Time out           = 060  sec.
3: SBAS selection     = Auto
4: SBAS  Other        = PRN  120
5: Beacon selection   = Auto
6: Frequency          = 283.5  kHz
7: Bit rate           = 200  bps
8: Baud rate          = 4800  bps
9: Beacon monitor
```
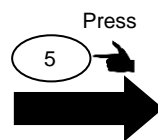
Press
(9)

```
4-9: Beacon monitor
Frequency          = 309.0 kHz
Bit rate           = 200 bps
S/N                = 28 dB
ID No.             = 686
Data age           = 004
Beacon Health      = 0

Type 16 message: Type16 no data
```
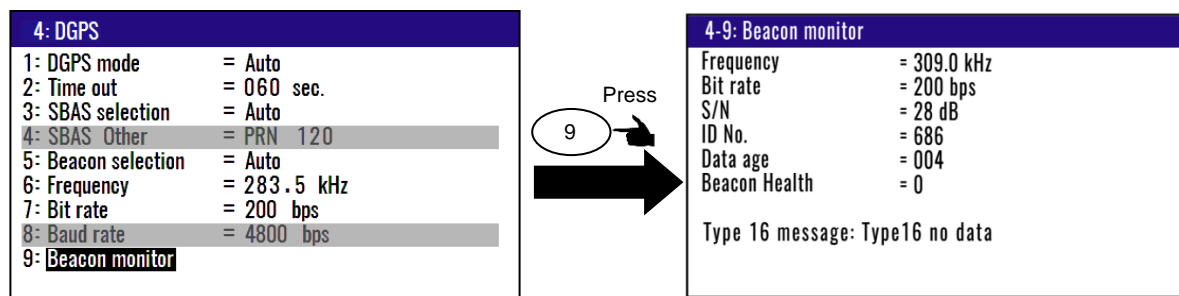
4.4   Menu 5: Compensation

4.4.1   Correcting your position

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

• Enter the latitude and longitude of your actual position by numeric keys.

• Enter the correction offset to use.

```
5: Compensation
1: Latitude / Longitude
2: LOP
3: Magnetic variation     = Auto
                          = +006.8°
4: Time difference        = +00:00
```
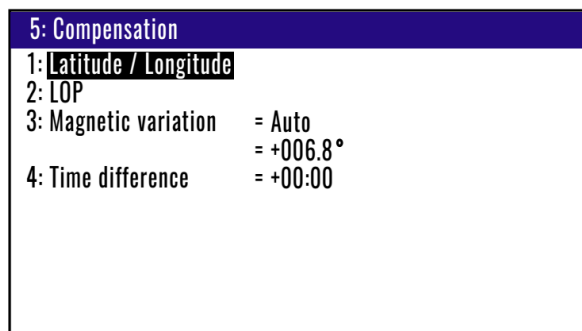
(Direct entry of actual position data)

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 10 appears.

(2) Press (5) key to select "**5: Compensation**".

(3) Press (1) key to select "**1: Latitude / Longitude**".

(4) Enter the correct latitude and longitude value.

   Example: The position "N35°38.544 / E139°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**], [**9**], [**0**], [**6**], [**1**], [**8**], [**3**], [**E**], [**ENT**]

```
5-1: Latitude/Longitude
Latitude      =  35° 38.544N
Longitude     = 139° 06.183 E

Latitude      =  00° 00.008S
Longitude     = 000° 00.003E
```

Actual position →
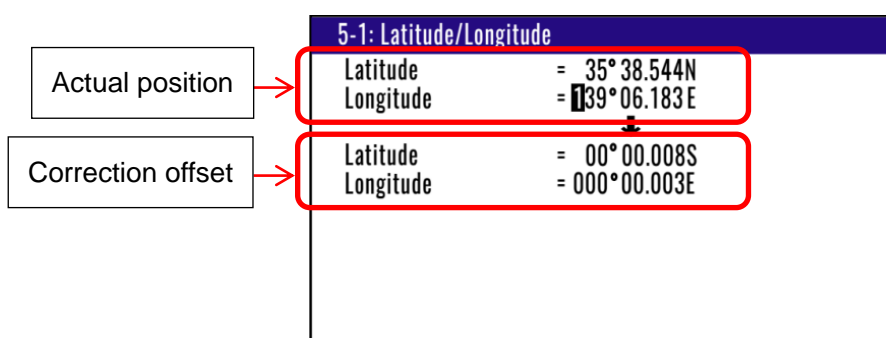
Correction offset →

(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 10 appears.

(2) Press (5) key to select "**5: Compensation**".

(3) Press (1) key to select "**1: 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]

5-1: Latitude/Longitude

Corrected position → | Latitude   = 35° 38.544 N
                       Longitude   = 139° 06.183 E

Correction offset → | Latitude   = 00° 00.008 S
                      Longitude   = 000° 00.003 E
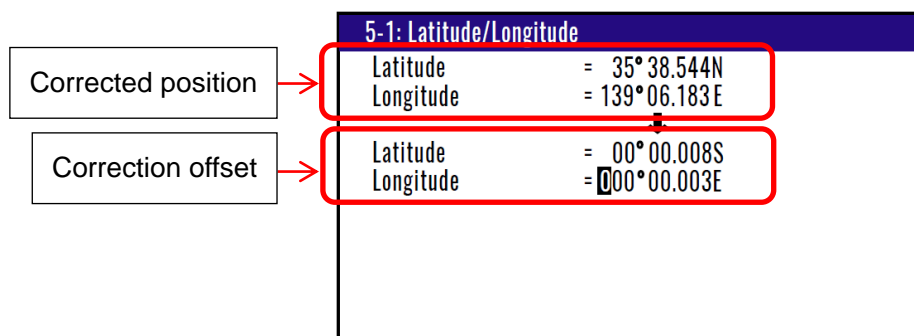
4.4.2   Disable position correction

To delete and disable the correction offset follow these steps:

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (5) key to select "**5: Compensation**".

(3) Press (1) key to select "**1: Latitude / Longitude**".

(4) Press (ACK 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.

Delete
Are you sure?
Yes   No
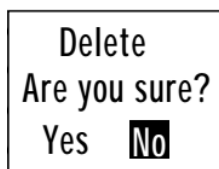
4.4.3   Compensating the LOP

KGP-922 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 "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 **Menu8: Initial setup.**

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (8/S) key to select "**8: Initial setup**".

(3) Press (8/S) key to select "**8: Lop**".

(4) Setting "LoranA", "LoranC" or "Decca"

(5) Press (ENT) key.

(6) Press (9/AL) key to select "**9: Chain**".

(7) Select a station you want to measure.

```
8: Initial setup
1: Averaging          = 0
2: Units              = NM
3: Sailing mode       = Great circle
4: Position           = Lop
5: L/L units          = .001
6: GNSS source        = Internal
7: Language           = Engrish
8: Lop                = LoranC
9: Chain              = 9970-3-5
```

To change the "2: LOP"

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (5) key to select "**5: Compensation**".

(3) Press (2/N) key to select "**2: LOP**".

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

In the case of LoranC

```
5-2: LOP
              S1              = 35558.1
              S2              = 60214.0

              S1              = +0001.0
              S2              = -0000.8

         LoranC
         Chain    9970-3-5
```

Actual position → (S1, S2)
Correction offset → (S1, S2)

```
5-2: LOP
              S1              = 35558.1
              S2              = 60214.0

              S1              = +0001.0
              S2              = -0000.8

         LoranC
         Chain    9970-3-5
```

Corrected position → (S1, S2)
Correction offset → (S1, S2)

In the case of LoranA

```
5-2: LOP
              S1              = 4398.3
              S2              = 1254.3

              S1              = -001.2
              S2              = +000.9

         LoranA
         Chain    2S1-2S2
```

In the case of DECCA

```
5-2: LOP
  S1                = OF:31:95
  S2                = OG:53:19
                         ↓
  S1                = +:00:02
  S2                = +:00:05


DECCA
Chain   Auto
        41-GP
```

4.4.4 Compensating the compass

The course and bearing to waypoint is shown in true bearing. You can adjust the GPS 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 10 appears.

(2) Press (5) key to select "**5: Compensation**".

(3) Press (3) key to select "**3: Magnetic variation**".

(4) Press [▲] or [▼] key to move cursor onto "**Auto**".

(5) Press (ENT) key.

```
5: Compensation
1: Latitude / Longitude
2: LOP
3: Magnetic variation    = Auto
                         = Manual
4: Time difference       = +00:00
```

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) Press [▲] or [▼] key to use the current positive (+) or negative (-) sign as it is.

(8) Enter a (4-digit) compensation offset by numeric keys.

(9) Press (ENT) key.

```
5: Compensation
1: Latitude / Longitude
2: LOP
3: Magnetic variation    = Manual
                         = +000.0°
4: Time difference       = 00:00
```
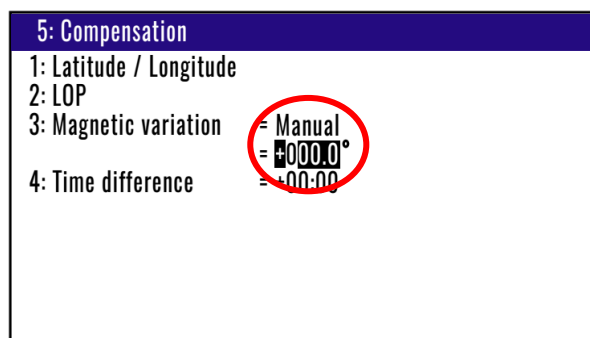
Initial setup: 0.0°
Setup range: -180.0° to +180.0°

4.4.5   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 10 appears.

(2) Press (5) key to select "**5: Compensation**".

(3) Press (4/W) key to select "**4: Time difference**".

(4) Press (ENT) key to change the correction offset.

(5) Press [▲] or [▼] key to use the current positive (+) or negative (-) sign as it is.

(6) Enter a (4-digit) compensation offset by numeric keys.

(7) Press (ENT) key.

> (ACK CLR) **NOTE:** *Press to clear incorrect input. You can reenter a "+" or "-" sign and numeric data.*
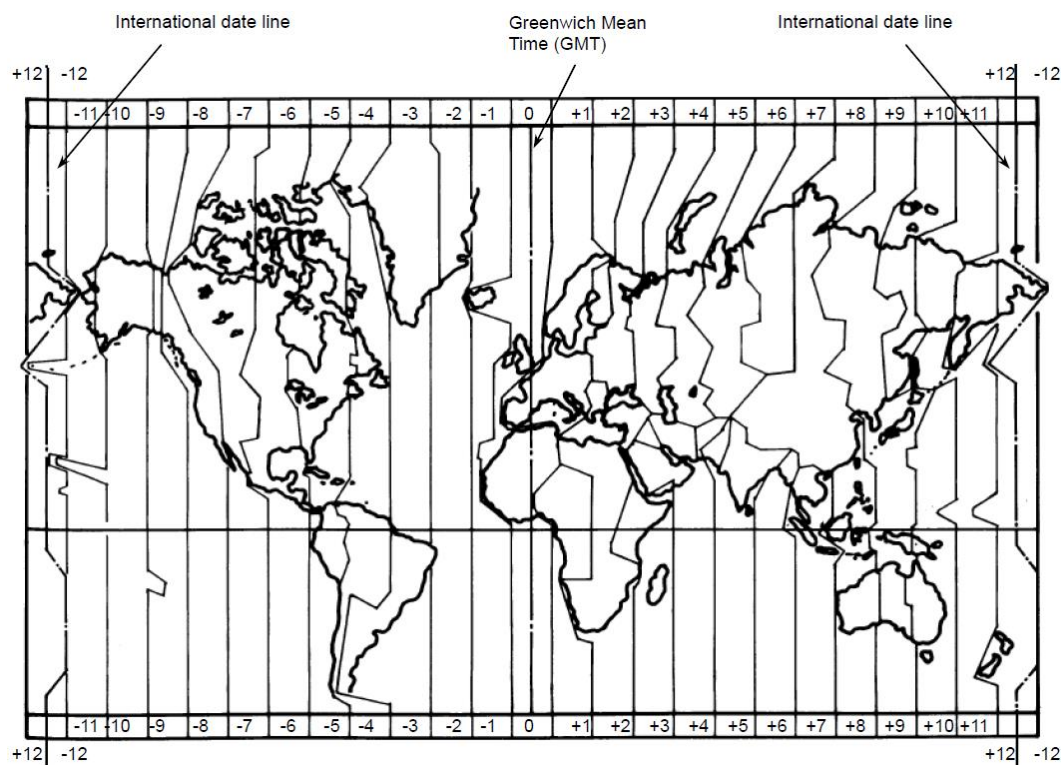
Figure 4.1 Time difference chart

Initial setup: 00:00 hour

4.5   Menu 7: Calculation

4.5.1   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 10 appears.

(2) Press (7) key to select "**7: Calculation**".

(3) Press (1) key to select "**1: 2Points**".

(4) Enter a (4-digit) origin WPT number (0000 to 4999).

(5) Press (ENT) key.

(6) Press [▶] key.

(7) Enter a (4-digit) final WPT number (0000 to 4999).

(8) Enter "N" for north or "S" for south latitude.

(9) Press (ENT) key.
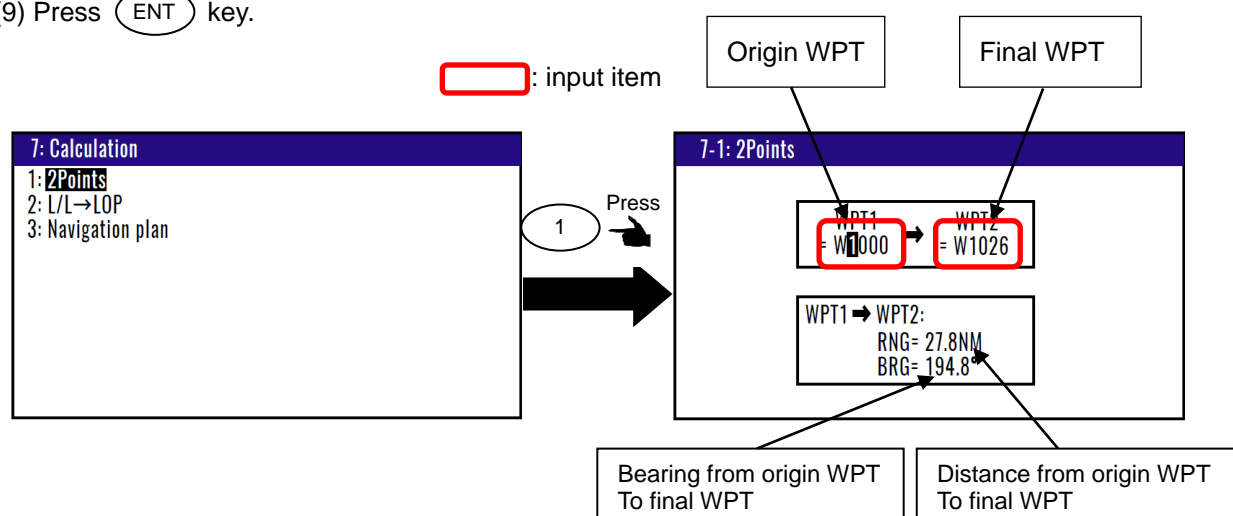
4.5.2   Calculating LOPs based on LAT/LONG data

You can enter a Loran C, 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 **Menu8: Initial setup.**

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (8/S) key to select "**8: Initial setup**".

(3) Press (8/S) key to select "**8: Lop**".

(4) Setting "LoranA", "LoranC" or "Decca"

(5) Press (ENT) key.

(6) Press (9/AL) key to select "**9: Chain**".

(7) Select a station you want to measure.

In the case of Loran C

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (7) key to select "**7: 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 secondary 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.
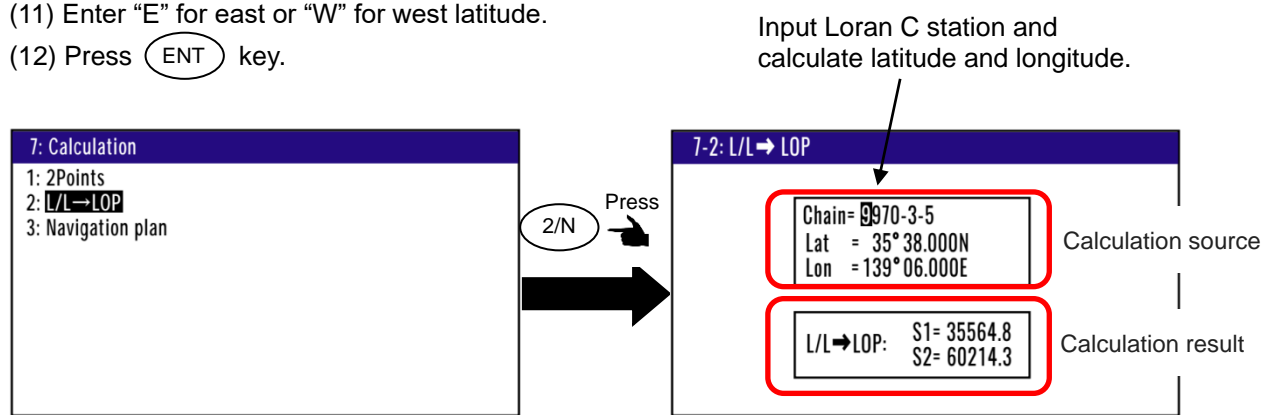
Input Loran C station and calculate latitude and longitude.

If you store the calculation result

(1) Press [▼] key to display page 2/2.

(2) Enter a data number (1000 to 4999) 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 secondary 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 10 appears.

(2) Press (7) key to select "**7: Calculation**".

(3) Press (2/N) key to select "**2: L/L→LOP**".

(4) Press (ENT) key.

(5) Press [▲], [▼], [▶] or [◀] key to select the secondary station 1.

(6) Press (ENT) key.

(7) Press [▶] key to move the cursor to secondary station 2 field.

(8) Press (ENT) key.

(9) Press [▲] or [▼] key to select the secondary 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.

To choose from this

If you store the calculation result

(1) Press [▼] key to display page 2/2.

(2) Enter a data number (1000 to 4999) 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 10 appears.

(2) Press (7) key to select "**7: Calculation**".

(3) Press (2/N) key to select "**2: L/L→LOP**".

(4) Press (ENT) key.

(5) Enter (2-digit) Decca chain number.

(6) Press (ENT) key.

(7) Press [►] key to move the cursor to combination field of secondary stations.

(8) Press (ENT) key.

(9) Press [▲] or [▼] key to select a combination of secondary stations.

(10) Press(ENT) key.

(11) Press [▼] key to move the cursor to latitude field.

(12) Enter (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.

2-digit write

RG
RP
GP

7-2: L/L ➡ LOP

Chain= **43**·GP
Lat   = 35° 38.000N
Lon = 139° 06.000E

L/L ➡LOP: 0 F:30:92
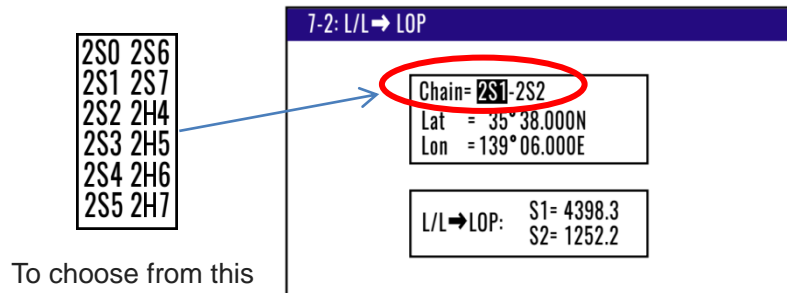   0G:53:79
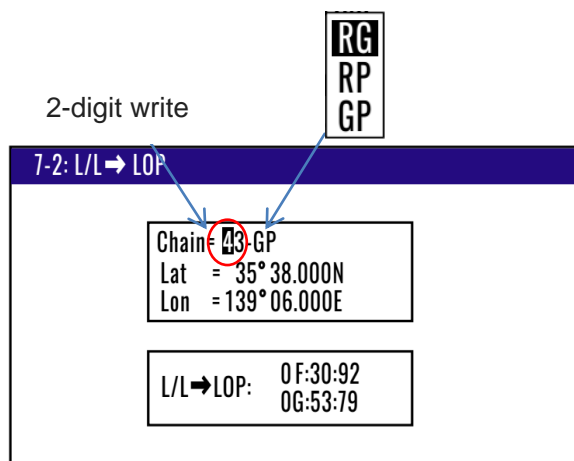
If you store the calculation result.

(1) Press [▼] key to display page 2/2.

(2) Enter a data number (1000 to 4999) using numeric keys.

(3) The existing data, if any, is displayed for your checkout.

(4) Press (ENT) key.

4.5.3   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 10 appears.

(2) Press (7) key to select "**7: 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 4999).

(7) Press (ENT) key.

(8) Press [▼] key and enter a (3-digit) boat speed.

(9) Press (ENT) key.

WPT number | Boat speed

: input item

```
7: Calculation
1: 2Points
2: L/L→LOP
3: Navigation plan
```

Press
3

```
7-3: Navigation plan

Navigation mode= Waypoint
   WPT = V2051
   SOG = 013 kt

   ETA = 06/05. 10:48
   TTG = 053:07
```

Time to go to Waypoint | Arrival time

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

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (7) key to select "**7: 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 4999).

(7) Press (ENT) key.

(8) Press [▼] key two times.

(9) Enter arrival time by numeric keys.

(10) Press (ENT) key.

WPT number | Boat speed

: input item

```
7: Calculation
1: 2Points
2: L/L→LOP
3: Navigation plan
```

Press
3

```
7-3: Navigation plan

Navigation mode= Waypoint
   WPT = V2051
   SOG = 013 kt

   ETA = 06/05. 10:48
   TTG = 053:07
```

Time to go to Waypoint | Arrival time

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

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (7) key to select "**7: 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 500).

(10) Press (ENT) key.

(11) Press [▼] key and enter a (3-digit) boat speed.

(12) Press (ENT) key.
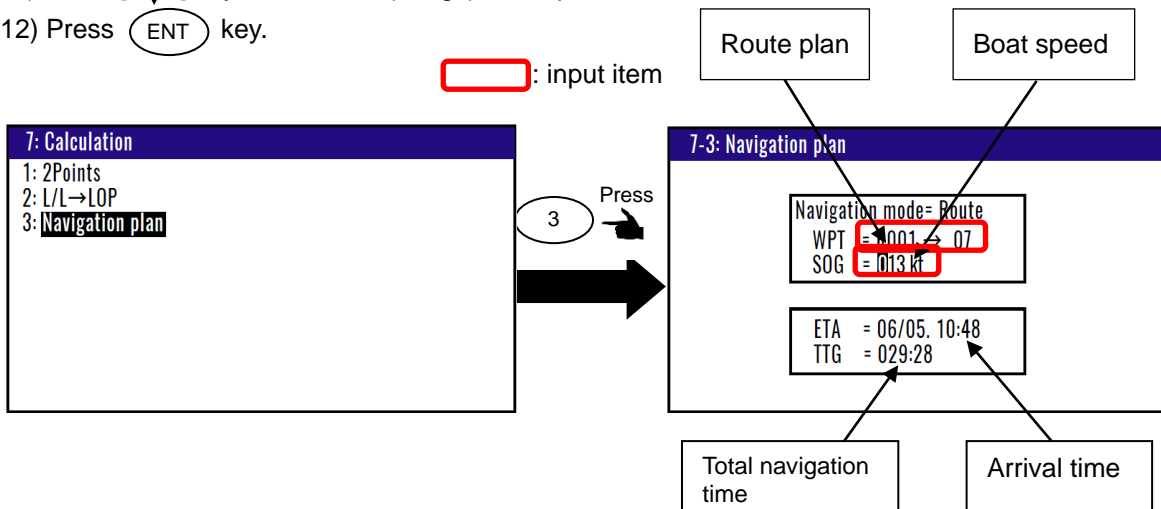
Calculating boat speed and time to go to waypoint from WPT number and arrival time.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (7) key to select "**7: 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 (4-digit) origin WPT number (0000 to 4999).

(7) Press (ENT) key.

(8) Press [▼] key two times.

(9) Enter arrival time by numeric keys.

(10) Press (ENT) key.
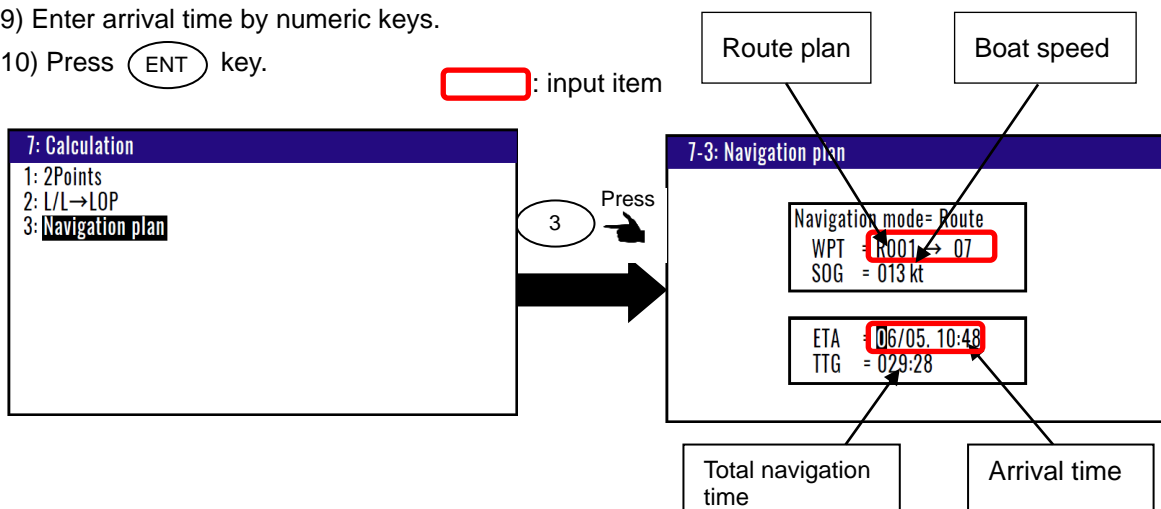
4.6   Menu 8: Initial setup

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

Use the averaging function to compare GPS sensor signals several times and get their average. This stabilizes the GPS position (latitude and longitude), speed and course data. The maximum averaging rate is "4" and the minimum averaging rate is "0". When you select "4" 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 10 appears.

(2) Press (8/S) key to select "**8: Initial setup**".

(3) Press (1) key to select "**1: Averaging**".

(4) Press [▲] or [▼] key to move cursor onto the average constants to select "0 to 4".

(5) Press (ENT) key.
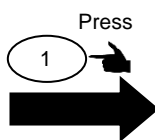
Initial setup: 0

4.6.2   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 10 appears.

(2) Press (8/S) key to select "**8: Initial setup**".

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

(4) Press [▲] or [▼] key to move cursor onto the distance or speed unit "NM", "km" or "sm".

(5) Press (ENT) key.
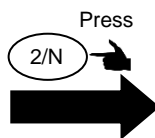
Initial setup: NM

4.6.3   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 10 appears.

(2) Press (8/S) key to select "**8: 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.

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

Press (3) →

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

Initial setup: Great Circle

4.6.4   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 10 appears.

(2) Press (8/S) key to select "**8: 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.

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

Press (4/W) →

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

Initial setup: L/L

4.6.5 Changing the latitude and longitudinal display digits

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

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (8/S) key to select "**8: 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.

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

Press (5)
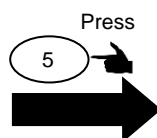
8: Initial setup	
1: Averaging	= 0
2: Units	= NM
3: Sailing mode	= Great Circle
4: Position	= L/L
5: L/L units	= .001 / .0001
6: GPS source	= Internal
7: Language	= English
8: Lop	= LoranC
9: Chain	= 0000-0-0

Initial setup: .0001

4.6.6 Selecting GNSS source

You can select the GPS source from Internal or External. If you select External, you can use KGP-922 as a remote indicator. At that time, connect external equipment to DATA2 connector, and input GGA / VTG / ZDA of NMEA sentence.

The procedure is as follows:

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (8/S) key to select "**8: Initial setup**".

(3) Press (6/E) key to select "**6: GPS source**".

(4) Press [▲] or [▼] key to move cursor to "Internal" or ".External".

(5) Press (ENT) key.

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

Press (6/E)
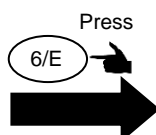
8: Initial setup	
1: Averaging	= 0
2: Units	= NM
3: Sailing mode	= Great Circle
4: Position	= L/L
5: L/L units	= .0001
6: GPS source	= Internal / External
7: Language	= English
8: Lop	= LoranC
9: Chain	= 0000-0-0

Initial setup: Internal

4.6.7   Selecting a Language

You can select the language from the pop-up.

The procedure is as follows:
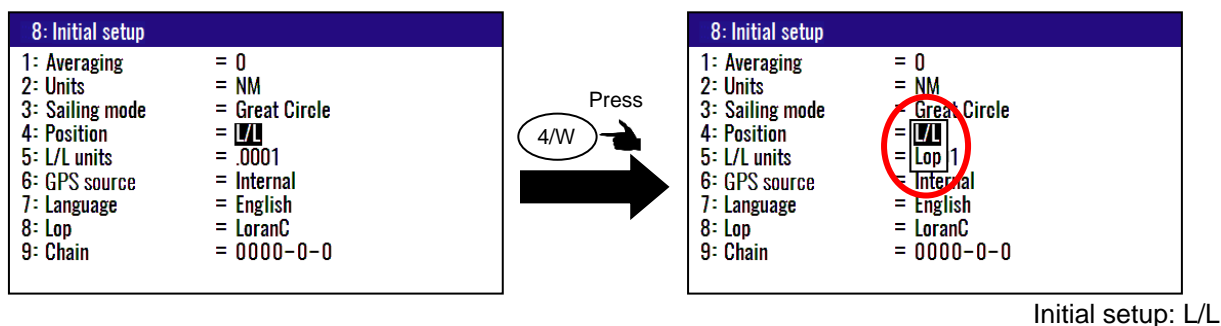
(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (8/S) key to select "**8: Initial setup**".

(3) Press (7) key to select "**7: Language**".

(4) Press [▲] or [▼] key to move cursor onto the language.

(5) Press (ENT) key.
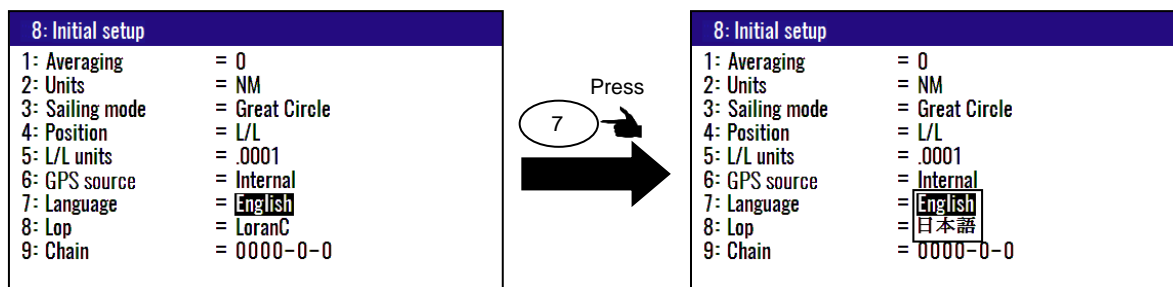
Initial setup: English

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

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

The procedure is as follows:

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (8/S) key to select "**8: 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.
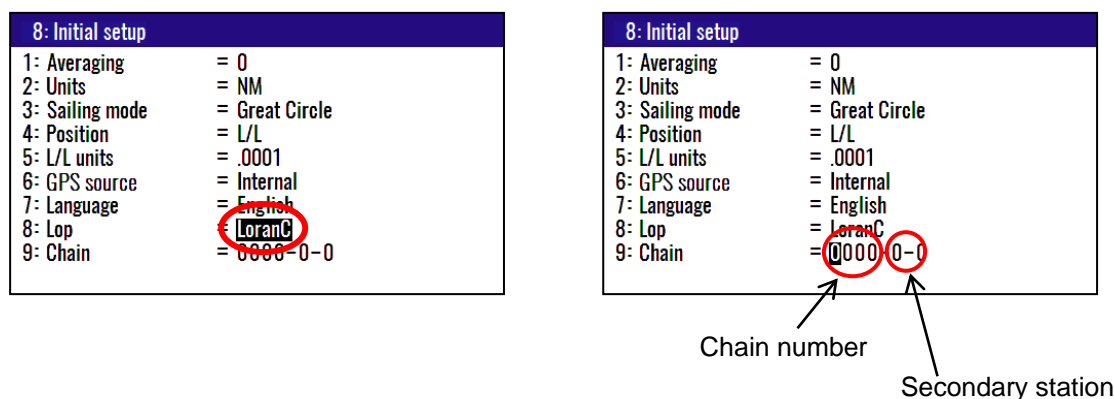
Chain number

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 [◀] 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.

If you select "Manual"

(9) Press [▼] key to move cursor onto cursor chain number.

(10) Input chain number of DECCA by numeric keys and press (ENT) key.

(11) Press [▼] key to move cursor onto secondary station and press (ENT) key.

(12) Select combination of two secondary station of DECCA by [▲] or [▼] key.

(13) Press (ENT) key.

Chain number

Combination of two secondary station

4.7   Menu 9: Interface

4.7.1   Selecting a DATA port and NETWORK port to setting.

NETWORK
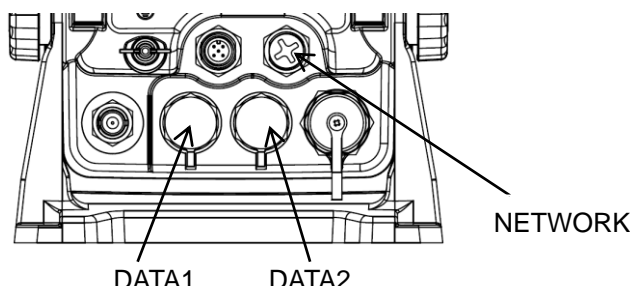
DATA1   DATA2

You can select the format of output data.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (1) key to select "**1: Connector**".

(4) Press [▲] or [▼] key to move cursor onto the data port to select "DATA1", "DATA2" or "Ethernet".

(5) Press (ENT) key.
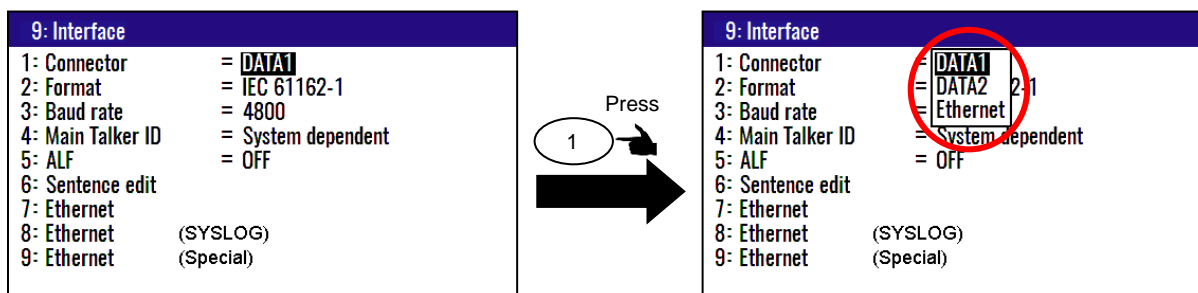
4.7.2   Selecting an output data format of DATA1 and DATA2 port

You can select the format of output data format.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (2/N) key to select "**2: 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.
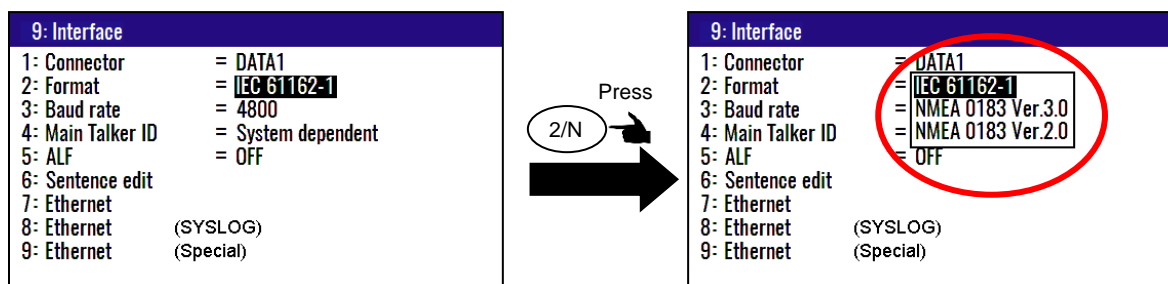
Initial setup: IEC61162-1

You can select from three formats.

1) IEC61162-1

2) NMEA0183 Ver3.0

3) NMEA0183 Ver2.0

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.
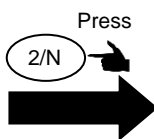
Initial setup: IEC61162-1

You can select from five formats.

1) IEC61162-1

2) NMEA0183 Ver3.0

3) NMEA0183 Ver2.0

4) KBG (When you connected KBG, select this)

5) RTCM (When you connected external beacon receiver, select this.)

4.7.3   Setting the Baud rate

You can change the Baud rate of DATA1 and DATA2.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (3) key to select "**3: Baud rate**".

(4) Press [▲] or [▼] key to move cursor onto the baud rate "4800", "9600", "19200" or "38400".

(5) Press (ENT) key.
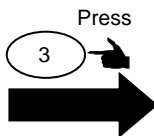
Initial setup: 4800

4.7.4 Setting the output Talker ID

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

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (4/W) key to select "**4: Main Talker ID**".

(4) Press [▲] or [▼] key to move cursor onto the Main Talker ID "GP", "System dependent".

(5) Press (ENT) key.

```
9: Interface
1: Connector        = DATA2
2: Format           = IEC 61162-1
3: Baud rate        = 4800
4: Main Talker ID   = System dependent
5: ALF              = OFF
6: Sentence edit
7: Ethernet
8: Ethernet         (SYSLOG)
9: Ethernet         (Special)
```

Press (4/W)

```
9: Interface
1: Connector        = DATA2
2: Format           = IEC 61162-1
3: Baud rate        = 4800
4: Main Talker ID   = System dependent
5: ALF              = GP Fix
6: Sentence edit
7: Ethernet
8: Ethernet         (SYSLOG)
9: Ethernet         (Special)
```

Initial setup: System dependent

4.7.5 Setting the output ALF

You can output alert related sentences to external devices.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (5) key to select "**5: ALF**".

(4) Press [▲] or [▼] key to move cursor onto "**OFF**" or "**ALF**".

(5) Press (ENT) key.

```
9: Interface
1: Connector        = DATA2
2: Format           = IEC 61162-1
3: Baud rate        = 4800
4: Main Talker ID   = System dependent
5: ALF              = OFF
6: Sentence edit
7: Ethernet
8: Ethernet         (SYSLOG)
9: Ethernet         (Special)
```

Press (5)

```
9: Interface
1: Connector        = DATA2
2: Format           = IEC 61162-1
3: Baud rate        = 4800
4: Main Talker ID   = System dependent
5: ALF              = OFF
                      ALF
6: Sentence edit
7: Ethernet
8: Ethernet         (SYSLOG)
9: Ethernet         (Special)
```

Initial setup: OFF

4.7.6 Selecting an output sentence

To determine the sentence to be output from the NMEA0183 or CIF:

Output interval can sets 01 to 99 seconds. Sentence does not output when output interval sets 00 second.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (6/E) key to select "**6: Sentence edit**".

```
9: Interface
1: Connector        = DATA2
2: Format           = IEC 61162-1
3: Baud rate        = 4800
4: Main Talker ID    = System dependent
5: ALF              = OFF
6: Sentence edit
7: Ethernet
8: Ethernet         (SYSLOG)
9: Ethernet         (Special)
```

Press 6/E →

```
9-6: Sentence edit    DATA1
AAM = 00   APB = 00   BOD = 00   BWC = 00   DCN = 00
DTM = 00   GBS = 00   GGA = 01   GLC = 00   GLL = 01
GNS = 00   GSA = 00   GSV = 00   MSS = 00   RMB = 00
RMC = 01   RTE = 00   VTG = 01   WPL = 00   XTE = 00
ZDA = 01

0% [=====        ] 100%
```

(4) Press [▲], [▼], [▶] or [◀] key to select the output sentence.

(5) Press numeric keys to change output interval. Set **00** if you want to stop output.

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

0% [=====   ] **100%**

4.7.7   Setting the sentence to output to Ethernet

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (6/E) key to select "**6: Sentence edit**".

```
9: Interface
1: Connector        = Ethernet
2: Format           = ──
3: Baud rate        = ──
4: Main Talker ID    = ──
5: ALF              = OFF
6: Sentence edit
7: Ethernet
8: Ethernet         (SYSLOG)
9: Ethernet         (Special)
```

Press 6/E →

```
9-6: Sentence edit    Ethernet
AAM = 00   APB = 00   BOD = 00   BWC = 00   DCN = 00
DTM = 00   GBS = 00   GGA = 01   GLC = 00   GLL = 00
GNS = 00   GSA = 00   GSV = 00   MSS = 00   RMB = 00
RMC = 00   RTE = 00   VTG = 00   WPL = 00   XTE = 00
ZDA = 01

0% [             ] 100%
```
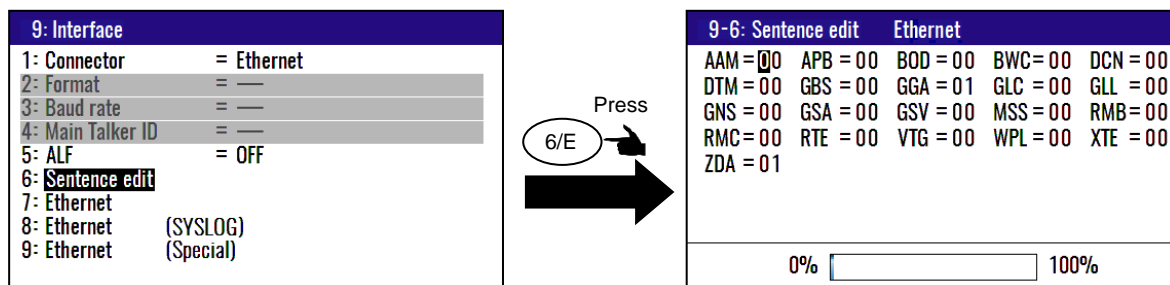
(4) Press [▲], [▼], [▶] or [◀] key to select the output sentence.

(5) Press numeric keys to change output interval. Set **00** if you want to stop output.

4.7.8   Setting the IP Address

Set the IP Address and Subnet mask, Default gateway.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (7) key to select "**7: Ethernet**".

```
9: Interface
1: Connector       = DATA1
2: Format          = IEC 61162-1
3: Baud rate       = 4800
4: Main Talker ID  = System dependent
5: ALF             = OFF
6: Sentence edit
7: Ethernet
8: Ethernet        (SYSLOG)
9: Ethernet        (Special)
```
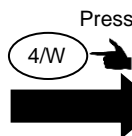
Press (7) →

```
9-7: Ethernet
1: IP addr.        = 192:168:001:015
2: Subnet Mask     = 255:255:255:000
3: Default Gateway = 192:168:001:001
4: DHCP            = OFF
5: OWN SFI   [GN]  = 9999
6: NET SFI   [ND]  = 9999
```
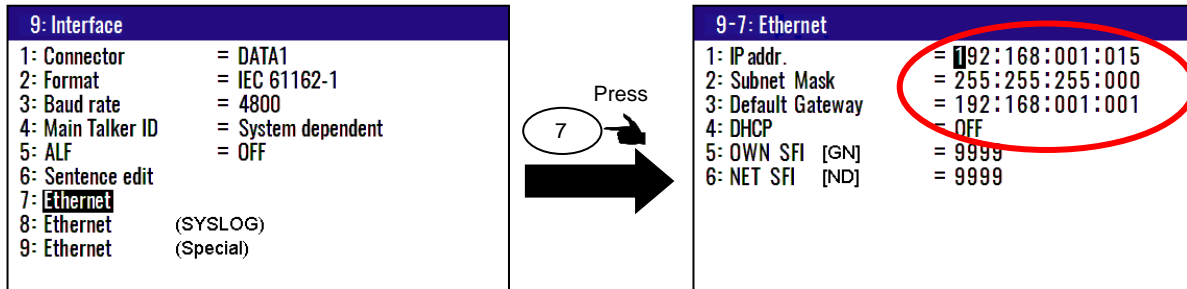
(4) Enter the IP address for your equipment, subnet mask and default gateway with the numeric keys.

> **NOTE:**   *Be sure the IP address is not the same as other equipment on the network.*

4.7.9   Setting the DHCP

There are two ways to set the IP address, either by automatic acquisition from the DHCP server on the network or by manually setting the address.

To obtain it automatically, do the following operation.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (7) key to select "**7: Ethernet**".

(4) Press [▲] or [▼] key to selec "**4: DHCP**".

(5) Press (ENT) key.

```
9-7: Ethernet
1: IP addr.        = 192:168:001:015
2: Subnet Mask     = 255:255:255:000
3: Default Gateway = 192:168:001:001
4: DHCP            = OFF
5: OWN SFI   [GN]  = 9999
6: NET SFI   [ND]  = 9999
```

Select
4: DHCP →

```
9-7: Ethernet
1: IP addr.        = 192:168:001:015
2: Subnet Mask     = 255:255:255:000
3: Default Gateway = 192:168:001:001
4: DHCP            = OFF
                     ON  9
6: NET SFI   [ND]  = 9999
```
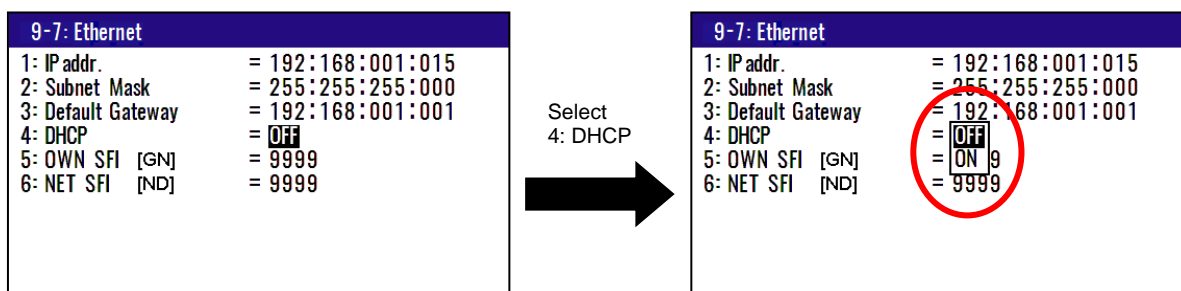
(6) Press [▲] or [▼] key to move cursor onto "**OFF**" or "**ON**".

(7) Press (ENT) key. A pop-up will be displayed.

```
9-7: Ethernet
1: IP addr.              = 192:168:001:015
2: Subnet Mask          = 255:255:255:000
3: Default Gateway      = 192:168:001:001
4: DHCP                 = ON
5: OWN SFI  [GI
6: NET SFI   [NI  Please power off
```

(8) Please turn off the power and restart it.

> **NOTE:** *Even when it is "ON", if the DHCP server etc is not working, it will operate with local IP.*

4.7.10   Setting the SFI

SFI (System Function ID) is an identification code used by the system.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (7) key to select "**7: Ethernet**".

(4) Press [▲] or [▼] key to selec "**5: OWN SFI (or 6: NET SFI)**".

```
9-7: Ethernet
1: IP addr.              = 192:168:001:015
2: Subnet Mask          = 255:255:255:000
3: Default Gateway      = 192:168:001:001
4: DHCP                 = OFF
5: OWN SFI   [GN]       = 9999
6: NET SFI    [ND]      = 9999
```

(5) Enter the Ethernet SFI with the numeri keys (combination of four numerals).

> **NOTE:** *Set the SFI to eliminate overlap with other ones.*

4.7.11   Ethernet error counter

The SYSLOG counts LAN errors, filing the errors in one of six error groups.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press (8/S) key to select "**8: Ethernet (SYSLOG)**".

```
9: Interface                              9-8: Ethernet
1: Connector       = DATA1                1: Invalid header              000
2: Format          = IEC 61162-1          2: Tag block checksum error    000
3: Baud rate       = 4800          Press  3: Tag block framing error     000
4: Main Talker ID  = System dependent     4: Tag block syntax error      000
5: ALF             = OFF           ( 8/S )➘ 5: Incorrect tag block        000
6: Sentence edit                          6: Incorrect sentence          000
7: Ethernet
8: Ethernet        (SYSLOG)
9: Ethernet        (Special)
```

(4) Press (ACK CLR) key.

(5) Select [**YES**] in the pop-up and press (ENT) key to clear the SYSLOG error count.

   If clear cancel, select [No] in the pop-up and press ENT (ENT) key.

```
9-8: Ethernet
1: Invalid header                   000
2: Tag block checksum error         000
3: Tag block framing error          000
4: Tag block syntax       Clear       0
5: Incorrect tag bloc  Are you sure?  0
6: Incorrect sentenc   Yes    No      0
```

4.7.12   Ethernet (Special)

The settings described in this section are done at the service menu which the customer cannot access to.

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (9/AL) key to select "**9: Interface**".

(3) Press [▲] or [▼] key to selec "**9: Ethernet (Special)**".

```
9: Interface
1: Connector       = DATA1
2: Format          = IEC 61162-1
3: Baud rate       = 4800
4: Main Talker ID  = System dependent
5: ALF             = OFF
6: Sentence edit
7: Ethernet
8: Ethernet        (SYSLOG)
9: Ethernet        (Special)
```
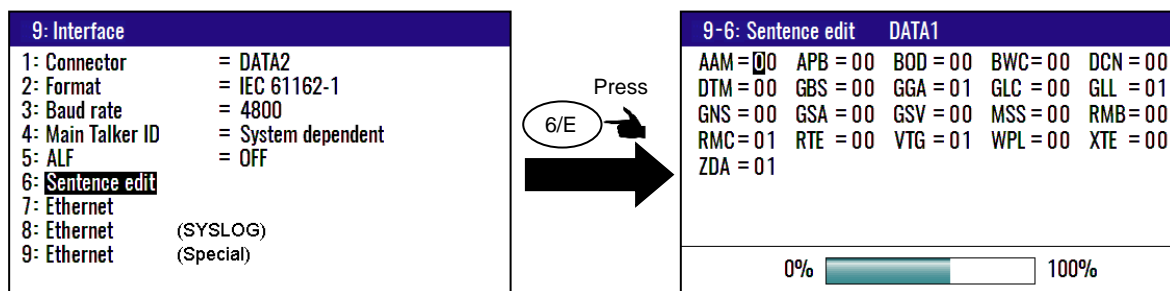
Chapter 5   How to use LOPs

5.1   Initial setup for LOPs display

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

| ◀ | **NOTE:** *Press to backspace the cursor to correct an input error.* | ACK CLR | **NOTE:** *Press to clear incorrect Input. You can reenter Numeric data.* |

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

You can select the type to translate from longitude and latitude.

The procedure is as follows:

(1) Press (MENU) key until Menu options 1 to 10 appears.

(2) Press (8/S) key to select "**8: 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 the station of LoranC by numeric keys.

When serect Loran C, you must select 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**".

(7) Input the station of LoranA use to [▲], [▼], [►] or [◄] key.

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**".

(7) Press [▲] or [▼] key to move cursor onto the "Auto" or "Manual".

(8) Press (ENT) key.

```
8: Initial setup
1: Averaging       = 0
2: Units           = NM
3: Sailing mode    = Great Circle
4: Position        = L/L
5: L/L units       = .0001
6: GPS source      = Internal
7: Language        = English
8: Lop             = DECCA
9: Chain           = Auto
   Chain           = 43 - GP
```

When select Auto mode, KGP-922 finds the optimal station

If you select "Manual"

(9) Input the station of DECCA by numeric keys.

(10) Press [▶] key.

(11) Input the station of DECCA use to [▲] or [▼] key. You can select "RG", "RP" or "GP".

(12) Press (ENT) key.

```
8: Initial setup                      8: Initial setup
1: Averaging       = 0                1: Averaging       = 0
2: Units           = NM               2: Units           = NM
3: Sailing mode    = Great Circle     3: Sailing mode    = Great Circle
4: Position        = L/L              4: Position        = L/L
5: L/L units       = .0001            5: L/L units       = .0001
6: GPS source      = Internal         6: GPS source      = Internal
7: Language        = English          7: Language        = English
8: Lop             = DECCA            8: Lop             = DECCA
9: Chain           = Manual           9: Chain           = Manual
   Chain           = 00  RG              Chain           = 00  RG
                                                              RP
                                                              GP
```

When select Manual mode, you must select station

```
1 OFF        10-12-18 02-44-22U 10m/safe   P1.5
W84
G  0F:31:99                               ← Green station
P  0G:52:97                               ← Purple station
SOG              COG
       10.0kn            162.1°
```

5.2   Storing waypoints (LOPs data)

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

| ACK CLR | **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 5000 waypoints can be stored in memory. As 1000 points (numbers 0000 and 0999) are reserved for MOB and event registration, you can use 1000 to 4999 (total of 4000 points) to store waypoints.

(1) Press $\boxed{\text{MENU}}$ key until Menu options 1 to 10 appears.

(2) Press $\boxed{1}$ key to select "**1: Waypoints**".

(3) Enter storage number (0000 to 4999) by numeric keys and $\boxed{\text{ENT}}$ key.

LOP mode (Example)

MENU
- 1: Waypoints
- 2: Routes
- 3: GPS
- 4: DGPS
- 5: Compensation
- 6: Alerts
- 7: Calculation
- 8: Initial setup
- 9: Interface
- 10: Plotter

Press ① Key →

Storage position: **LoranC**

1: Waypoints

Number	Mark	S1	S2	Comment
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**

1: Waypoints

Number	Mark	S1	S2	Comment
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

KGP-922 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 4.4.3 "Compensating the LOP"

• "In the case of LoranC" (See page 4-14)

• "In the case of LoranA" (See page 4-14)

• "In the case of DECCA" (See page 4-15)

5.4   Calculating LOPs based on LAT/LONG data

KGP-922 can calculate the LOPs based on the specified LAT/LONG data and displays the LOP values.

• "In the case of LoranC" (See page 4-18)

• "In the case of LoranA" (See page 4-18/19)

• "In the case of DECCA" (See page 4-19/20)

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Chapter 6   Data backup and Initialization

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    922⇒USB
Writing of Waypoint/Route data     USB⇒922
Read out of setting values         922⇒USB
Writing of setting values          USB⇒922
```
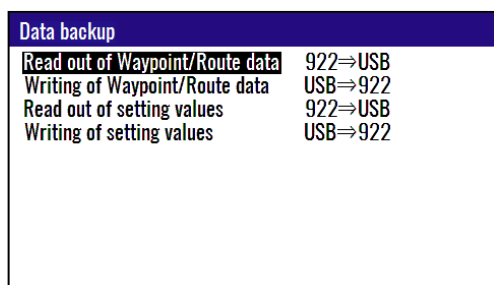
6.1.2   Insert USB memory

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

USB mark

```
Data backup                              ▣
Read out of Waypoint/Route data    922⇒USB
Writing of Waypoint/Route data     USB⇒922
Read out of setting values         922⇒USB
Writing of setting values          USB⇒922
```
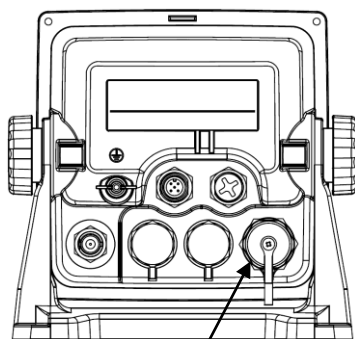
USB connector
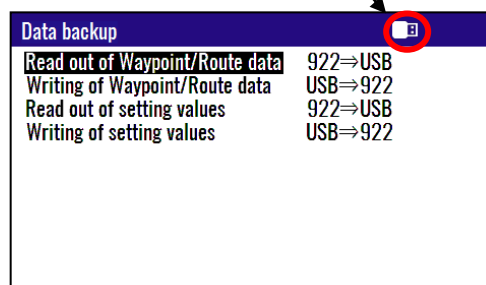
> **NOTE:** *If USB mark is not appear,*
> *Change USB memory for new one.*

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 called "Read out complete" appears, it is the end.

```
Read out complete
```

   *The name of data file is "KM-F81_WPT_RTE.dat".
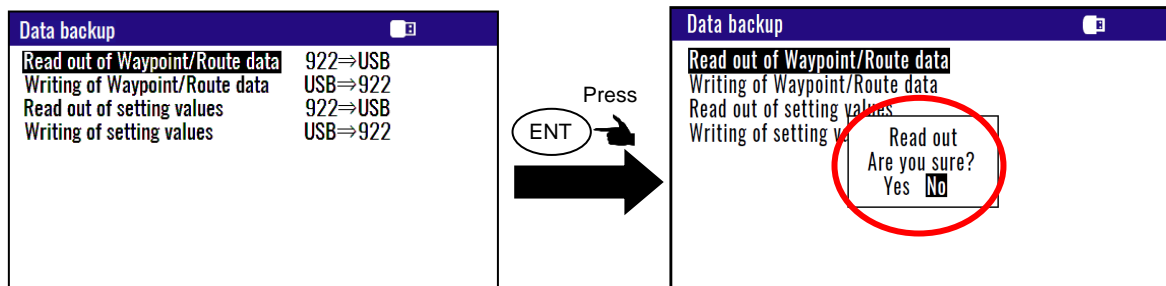
In the case "Read out of setting values"

(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 called "Read out complete" appears, it is the end.

  *The name of data file is "KM-F81_SETUP.dat".

Read out complete
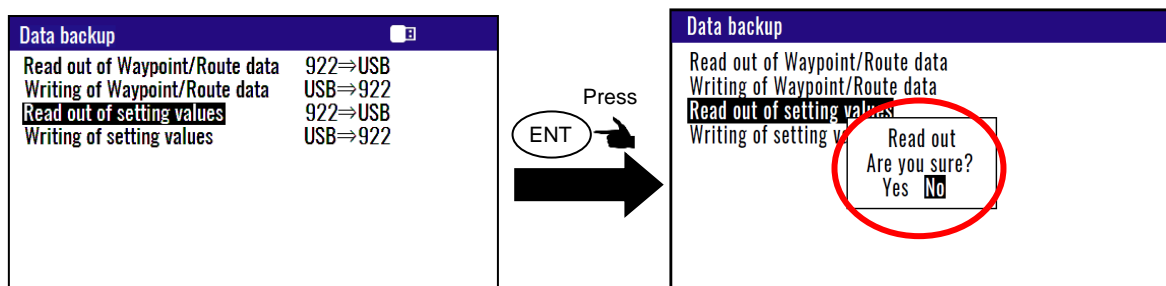
6.1.4 Writing of data

In the case "Writing of Waypoint / Route data"

  *The data file is necessary in USB memory named "KM-F81_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 called "Writing complete" appears, it is the end.

Writing complete

CAUTION
Data is overwritten
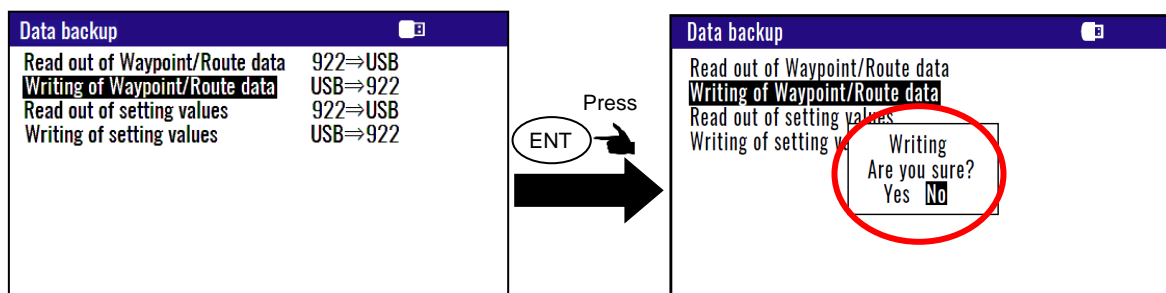
In the case "Writing of setting value"

　*The data file is necessary in USB memory named "KM-F81_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 called "Writing complete" appears, it is the end.

> Writing complete

⚠ **CAUTION**
Data is overwritten
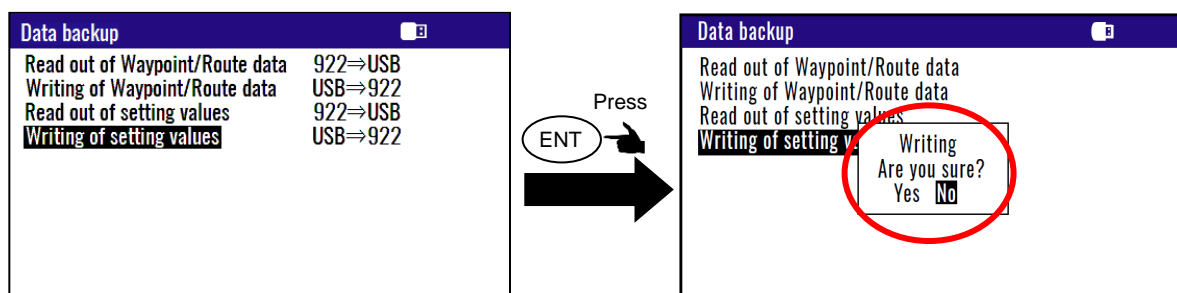
6.2   Initialization

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.

```
Initial menu
1: Initialize
2: Language           = English
3: WPT./Route clear
4: Event              = Auto
5: L/L default        = N/W
6: Buzzer 1           = 1
7: Buzzer 2           = 2.85 kHz
8: Ship setting
9: NAV start POSN     = Mode1
                      [Mode key to exit]
```

6.2.2   Initialize

Before initializing please note all system parameters and reset them after initialize, or backup for setting value in USB memory. (Refer to page 6-2)

(1) Press [▲] or [▼] key to move cursor onto the "**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, MOBs and routes remain unchanged.*

```
Initial menu
1: Initialize
2: Language           = English
3: WPT./Route clear
4: Event              = Auto
5: L/L default        = N/W
6: Buzzer 1           = 1
7: Buzzer 2           = 2.85 kHz
8: Ship setting
9: NAV start POSN     = Mode1
                      [Mode key to exit]
```

Press (ENT) ➡

```
Initial menu
1: Initialize
2: Language           = English
3: WPT./Route clear
4: Event
5: L/L default        Initialize
6: Buzzer 1           Are you sure?
7: Buzzer 2           Yes  No    = 2.85 kHz
8: Ship setting
9: NAV start POSN     = Mode1
```

> **NOTE:** *If you want to go back up for before initialize, please write setting value of USB memory. Refer to page 6-2*

6.2.3   WPT./Route clear

You can erase the entire data such as waypoints, events, MOB, 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.

Initial menu
```
1: Initialize
2: Language        = English
3: WPT./Route clear
4: Event           = Auto
5: L/L default     = N/W
6: Buzzer  1       = 1
7: Buzzer  2       = 2.85 kHz
8: Ship setting
9: NAV start POSN  = Mode1
                   [Mode key to exit]
```

Press
ENT

Initial menu
```
1: Initialize
2: Language        = English
3: WPT./Route clear
4: Event
5: L/L default       Clear
6: Buzzer  1       Are you sure?
7: Buzzer  2       Yes   No      = 2.85 kHz
8: Ship setting
9: NAV start POSN  = Mode1
```
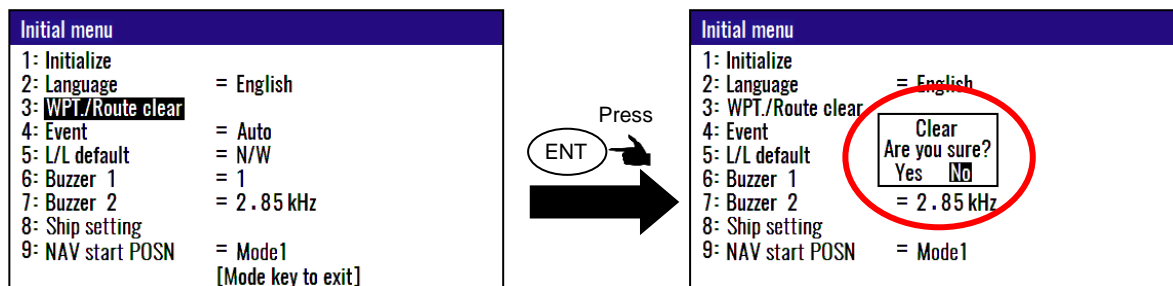
> **Note:** *If you want to go back up for before clear data,*
> *please write Waypoint/Route data of USB memory.*
> *Refer to page 6-2*

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 through 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 menu
```
1: Initialize
2: Language        = English
3: WPT./Route clear
4: Event           = Auto
5: L/L default     = N/W
6: Buzzer  1       = 1
7: Buzzer  2       = 2.85 kHz
8: Ship setting
9: NAV start POSN  = Mode1
                   [Mode key to exit]
```

Press
ENT

Initial menu
```
1: Initialize
2: Language        = English
3: WPT./Route clear
4: Event           = Auto
5: L/L default       Manual
6: Buzzer  1       = 1
7: Buzzer  2       = 2.85 kHz
8: Ship setting
9: NAV start POSN  = Mode1
```
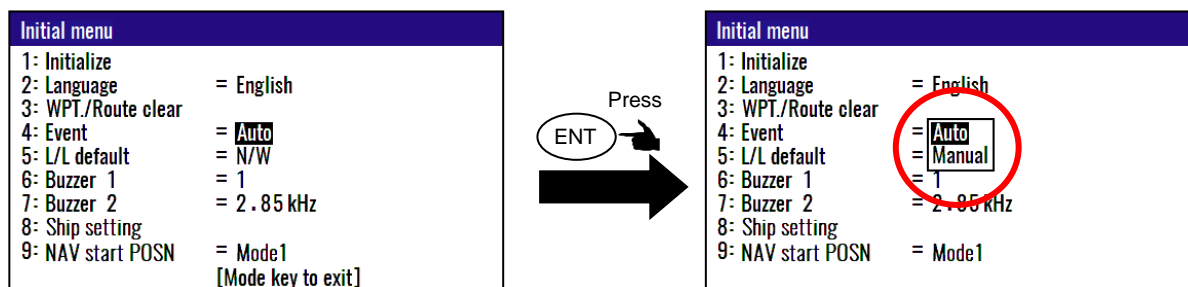
initial setup: Auto

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

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

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

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

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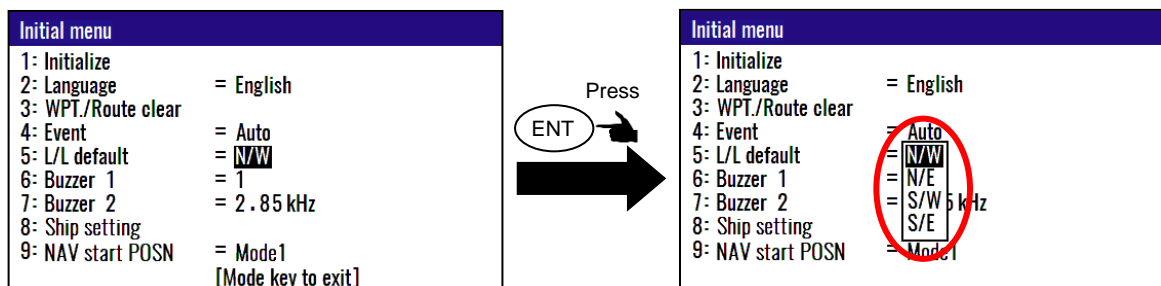
Initial setup: N/W

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.
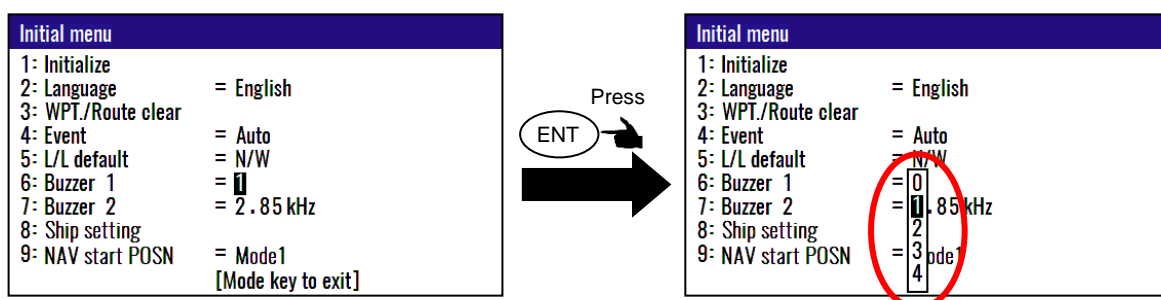
Initial setup: 1

6.2.7   Frequency adjustment of the alert sound

You can change the frequency of the alert sound.

Enter a frequency (2.20 to 3.20) by numeric keys.
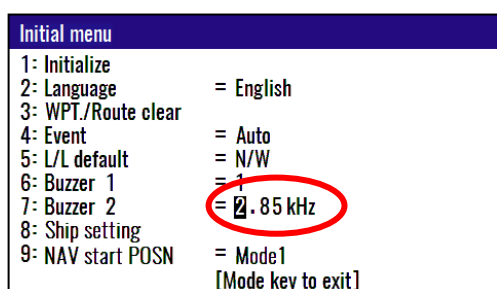
Initial setup: 2.85 kHz

6.2.8   Setup own ship outline

Set up own ship outline and antenna position from CCRP (Consistent common reference point).
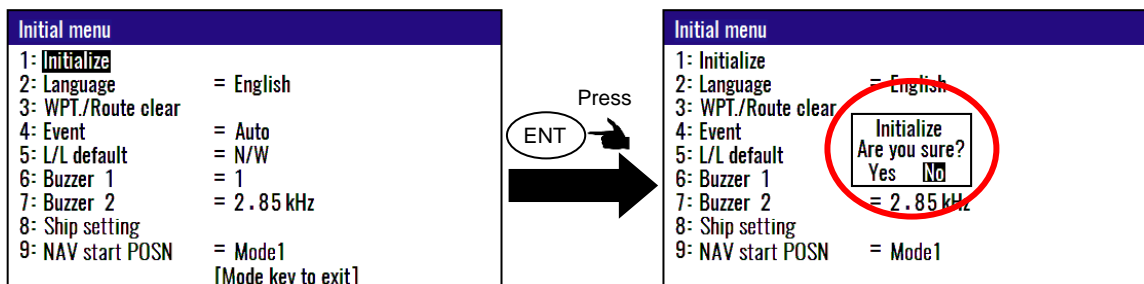
```
Initial menu
1: Initialize
2: Language          = English
3: WPT./Route clear
4: Event             = Auto
5: L/L default       = N/W
6: Buzzer 1          = 1
7: Buzzer 2          = 2.85 kHz
8: Ship setting
9: NAV start POSN    = Mode1
                     [Mode key to exit]
```

Press ENT →

```
8: Ship setting
Ship Length A     000.0 m
Ship Length B     000.0 m
Ship Width C      000.0 m
Ship Width D      000.0 m
ANT position dx   +000.0 m
ANT position dy   +000.0 m
ANT position dz   +000.0 m
```

This setup is to designate ship's outline and antenna location of CCRP.

Set the width and length of your ship. Enter the values as correct as possible because these values influence the output sentence "POS".

Set the mounting location for the antenna.

dx: The horizontal distance from the CCRP position to the antenna position.

dy: The Forward or backward distance from the CCRP position to the antenna position.

dz: The vertical distance from the CCRP position to the antenna position.

ANT position

A dx
dz dy

C B D

CCRP position
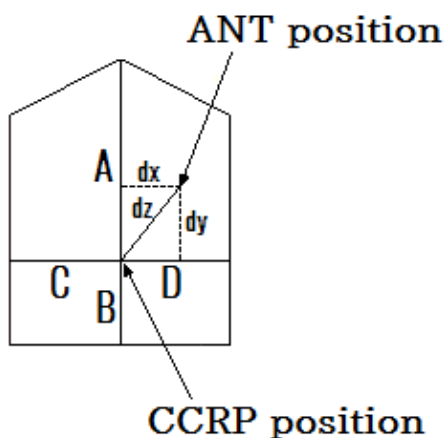
6.2.9   How to Set Route and Waypoint Start Position

You can set the route navigation and waypoint navigation start position when setting a destination.

Mode1: Sets the first waypoint of the route navigation or waypoint navigation as start position.

Mode2: The starting point is always set to own ship's position. (KODEN proprietary function without ship number.)

Mode3: Sets the own ship position at the time when setting a destination as start position.

Mode4: The starting point is always set to own ship's position. (The ship number is 0000.)

> **NOTE:**   *Select [Mode1] when using the KGP-922 as type-approved equipment.*
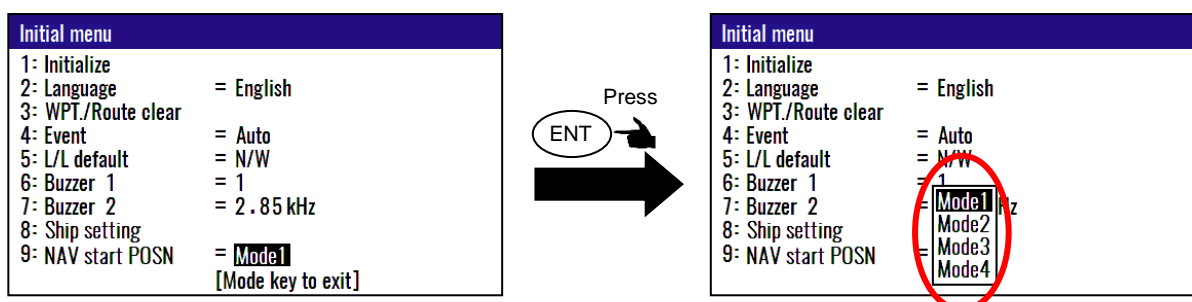
Initial setup: Mode1

Chapter 7   Installation

7.1   Installation consideration

Qualified service technicians should perform the installation of the KGP-922 series that comprises the following operations.

(1) Unpacking each component of the system.
(2) Inspection of the exterior of each component unit and accessory.
(3) Checking the ship's mains voltage and current capacity.
(4) Determining the installation site.
(5) Installing the Display unit.
(6) Planning the cable routing and connections.
(7) Adjustment and setups.

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 not, report this to an insurance agent for tracing missing goods or refund.

No.	Name of item	Type	Remark	Qty
1	Display unit	KGP-922	With mounting bracket and hard cover	1
2	DC power cable	CW-276-2M	With a 5-pin connector and one end plain	1
3	Antenna unit	GA-09(IMO)[15M]	With 3D-2V coaxial cable	1
4	Installation material	TPT5X20U	Truss tapping screw	4
5	Operation Manual	KGP-922.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.
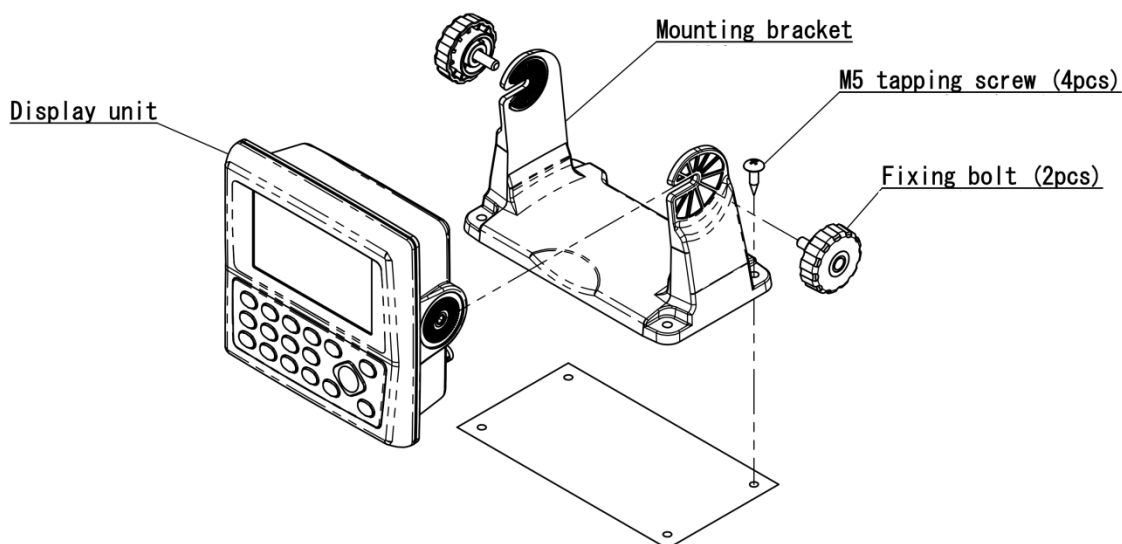
Figure 7.1 Fitting detail of KGP-922 in table mounting mode
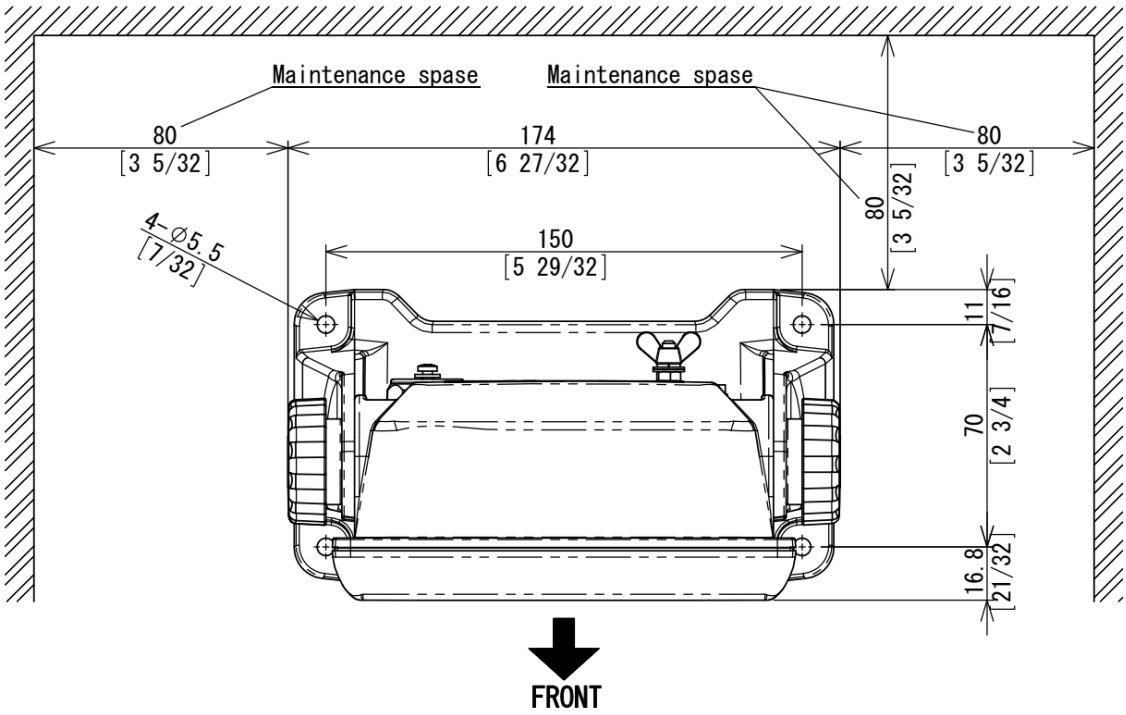
Figure 7.2 Maintenance space required for KGP-922

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, antenna 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).
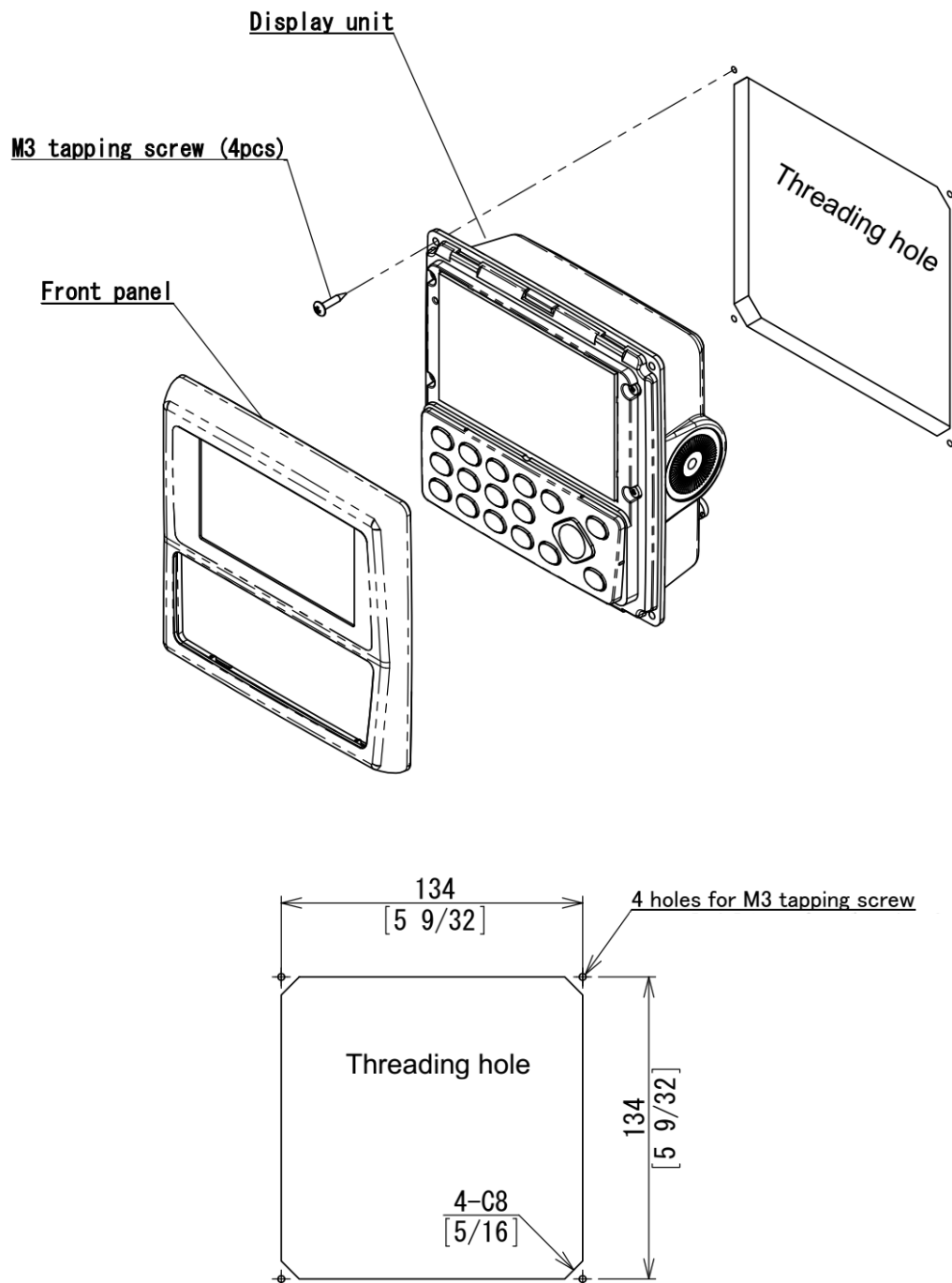
Figure 7.3 Flush Mount installation

Unit: mm (inch)

7.5   Antenna unit installation

7.5.1   Selecting the best site of GPS / Beacon antenna

Make sure to install the Antenna unit at a location where nothing shades the antenna of a view above the horizon. Objects placed above the Antenna unit or too close to the Antenna unit may cause signal to noise ratio to degrade and shorten measuring time.

(1) As far away from any metallic objects as possible.

(2) At least 4 meters (13.2 feet) away from the MF/HF reversed L-type TX antenna, VHF or HF whip antenna.

(3) At least 1.5 meter (4.9 feet) above the MF/HF reversed L-type TX antenna.

(4) At least 1 meter (3.3 feet) away from the receiving antenna.

(5) Outside radar transmitting beam (30° to 40°).

(6) At least 1 meter (3.3 feet) away from the radar antenna.

(7) At least 5 meters (16.5 feet) away from the Inmarsat antenna.

(8) At least 3 meters (9.8 feet) away from the loop antenna.

(9) At least 2 meters (6.6 feet) away from the ship's engine.

(10) At least 0.5 meters (1.6 feet) above the large metal surface.

* AT least 0.5 m (1.6 ft) above the large metal surface
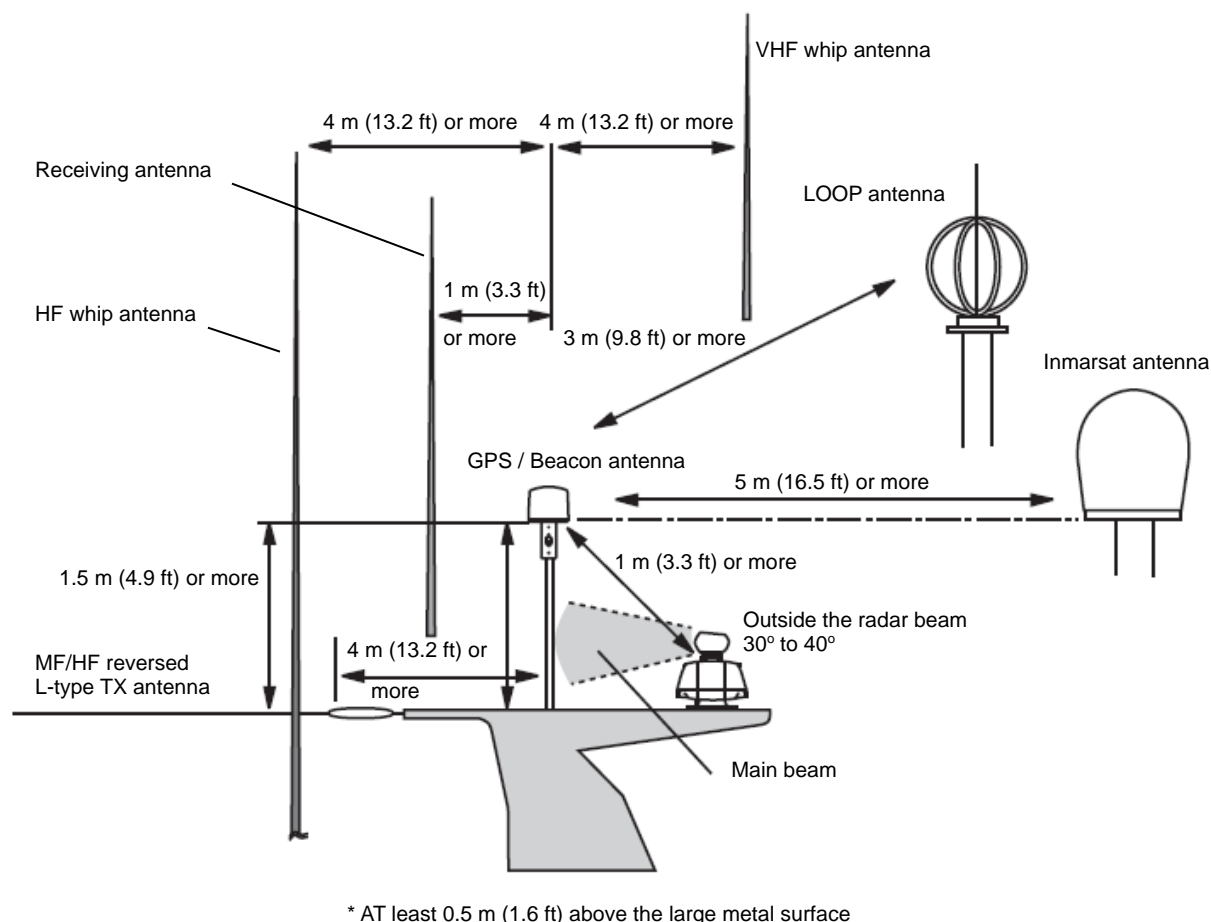
Figure 7.4 Recommended GPS / Beacon Antenna installation

7.5.2   Fixing the Antenna unit

(Case1)   **(Case2)**

Antenna unit
GA-09(IMO)[15M]
GA-09(IMO)[0.5M]

Antenna unit
GA-09(IMO)[15M]
GA-09(IMO)[0.5M]

Hose clamp
(Option)

Screw
(1"-14UNS-2B)

Mast (pole)
(not supplied)

Antenna
extension pole
(not supplied)
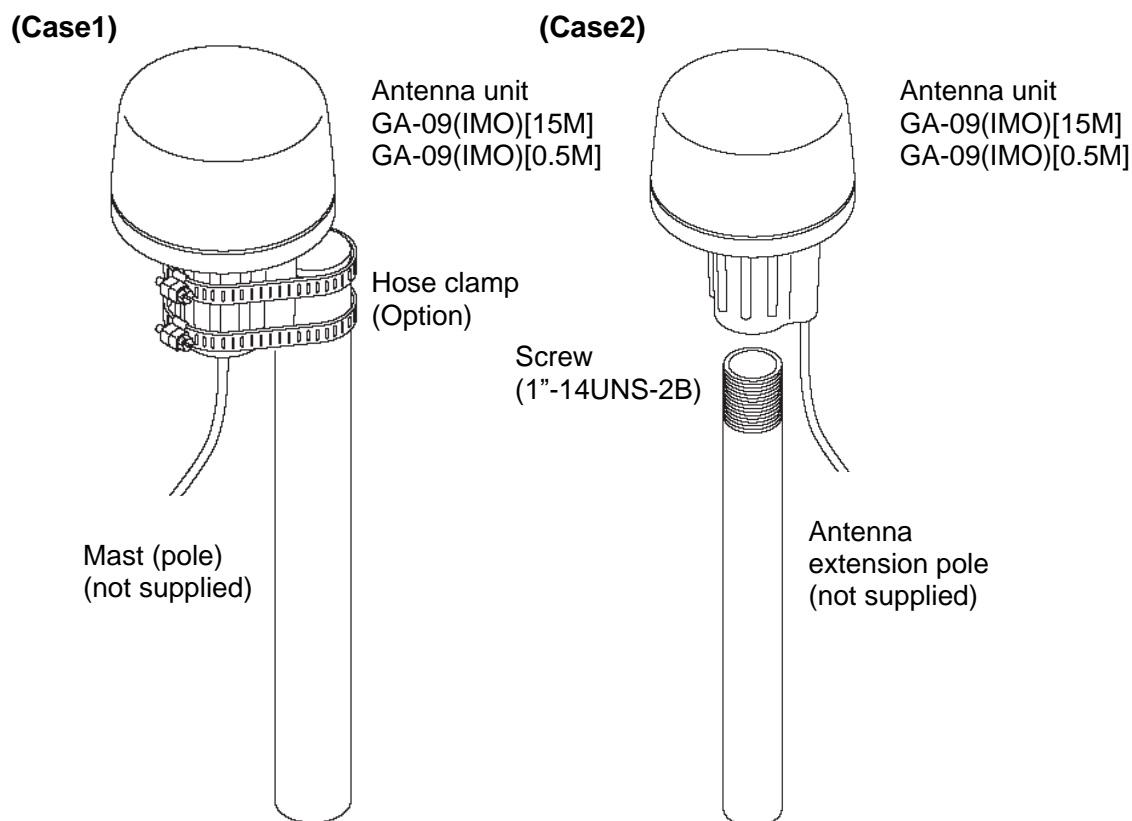
Installation precautions

(1)   Adhesive plastic sealant or silicone for plastic is recommended for fixing screws.

> **CAUTION**
> *Use of other solvent or anaerobic based-bond may cause cracking*
> *Of the chassis*

(2)   Stroke of screw insertion should be up to 25mm.

> **CAUTION**
> *Overtightening of the screw may cause cracking of the chassis*

7.5.3   Extension of an antenna cable

Although the standard length of an antenna cable is 15m, extension of 30m or 60m is possible by the antenna and extension cable of an option.

GA-09(IMO)[0.5M]

Waterproofing required

0.5m

Antenna
30m: CW-839-30M
60m: CW-394-60M

Conversion
Cable Assy

To Display unit

CW-826-0.5M
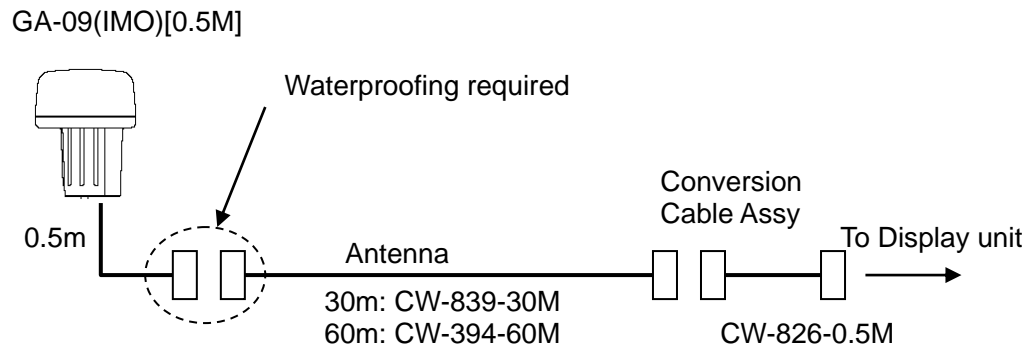
● **Waterproofing on the connector jointing section**

(1)   Wind the self-fusible tape around the jointing section.
      Pull the tape end to stretch its length to be doubled and wind it overlaid by half to 3 plies. When winding is completed, apply gentle pressure over the surface with fingers to expedite the fusion.

(2)   Apply windings of PVC tape to reinforce the protection.
      PVC tape should not be strained. Wind it overlaid by half to 3 plies. When finished, press the surface evenly without strain for complete adhesion of the tape.

Connectors

Self-fusible tape

PVC tape for protection
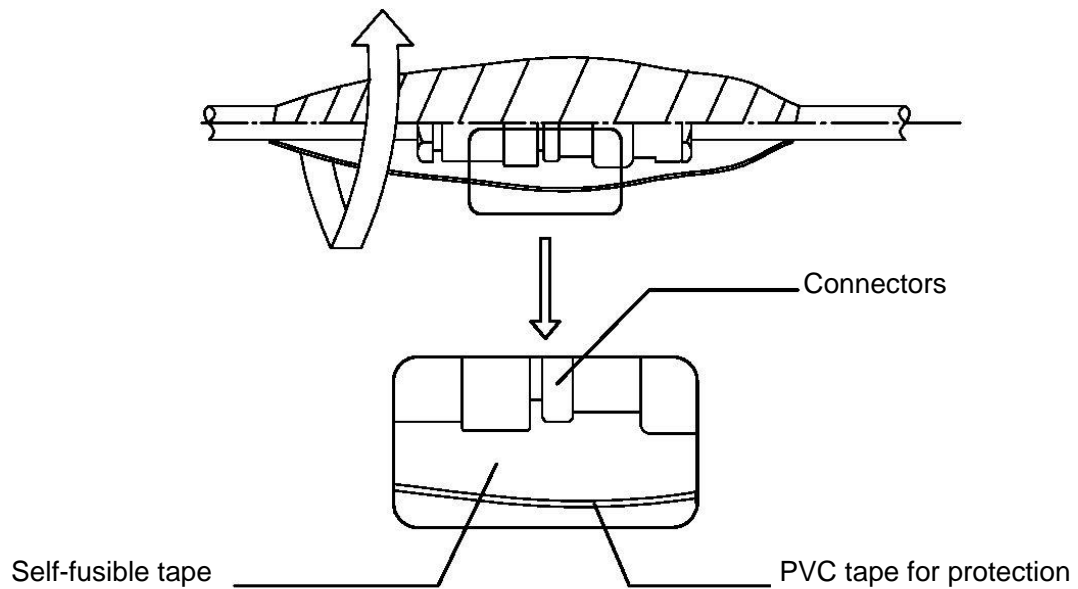
Figure 7.5 Processing on the coax cable jointing section

7.6 Cable connections to KGP-922

7.6.1 Single connection

Legend
Standard configuration
Option
Owner supply

Antenna unit GA-09(IMO)

Display unit KGP-922

With mounting bracket and cover

Note: The GND terminal is a protective ground and should be connected to ship's ground.

NETWORK Connector

HUB
Ethernet equipment

CW-426-0.3M

GND

DATA 2 Connector

Beacon receiver

CW-376-5M

DATA 2 Connector

CW-373-5M

Marine radar
Chart Plotter
Echo sounder
Auto pilot

CW-376-5M

POWER Connector

CW-276-2M

DATA 1 Connector

CW-373-5M

Marine radar
Chart Plotter
Echo sounder
Auto pilot

CW-376-5M

Red +
Black -
10.8 to 31.2VDC

7.6.2 Multi connections

Legend
Standard configuration
Option
Owner supply

Antenna unit GA-09(IMO)

Display unit KGP-922

With mounting bracket and cover

Note: The GND terminal is a protective ground and should be connected to ship's ground.

NETWORK Connector

HUB
Ethernet equipment

CW-426-0.3M

GND

DATA 2 Connector

Beacon receiver

CW-376-5M

DATA 2 Connector

CW-373-5M

Marine radar
Chart Plotter
Echo sounder
Auto pilot

CW-376-5M

CW-376-5M

POWER Connector

CW-276-2M

DATA 3 Connector

Marine radar
Chart Plotter
Echo sounder
Auto pilot

CW-376-5M

Junction Box
JB-35

DATA 4 Connector

Marine radar
Chart Plotter
Echo sounder
Auto pilot

CW-376-5M

DATA 1 Connector

Marine radar
Chart Plotter
Echo sounder
Auto pilot

CW-376-5M

Red +
10.8 to 31.2VDC
Black -

7.7   Connector pin outs

NETWORK

1: TX (+)
2: RX (+)
3: TX (-)
4: RX (-)

(General data output)

POWER

1: F.GND
2: DC +
3: DC -

DATA1

1: GND/SHIELD
2: TXD (+)
3: TXD (-)
4: RXD (+)
5: RXD (-)
6: +15V

(General data output)

DATA 2

1: GND/SHIELD
2: TXD (+)
3: TXD (-)
4: RXD (+)
5: RXD (-)
6: +15V

(General data output)

(DATA1 and DATA 2 port)

This port is general data output port. Output data is selected by the menu **"9: Interface"**.

Note: **"9: Interface": Refer to "Chapter 4 4.7 Menu 9: Interface"**

(NETWORK port)

This port is connects to the Ethernet equipment.

This port is general data output port. Output data is selected by the menu **"9: Interface"**.

Note: **"9: Interface": Refer to "Chapter 4 4.7 Menu 9: Interface"**

CW-426 cable

1 male connector M12 4 straight D coding
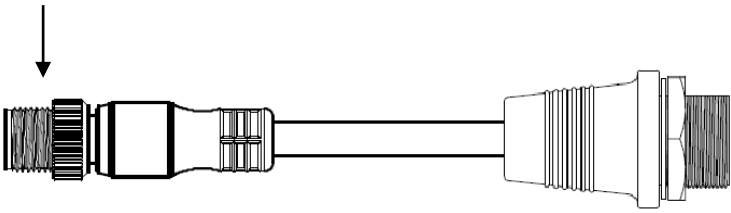
1 Female connector RJ45 straight

Straight cable

M12   **RJ45**   **RJ45**

① White / Orange ——————— White / Orange ①

② White / green ——— Orange ②

③ Orange ——— White / green ③

④ Green ④

⑤

Green ⑥

⑦

⑧

⑧ ①
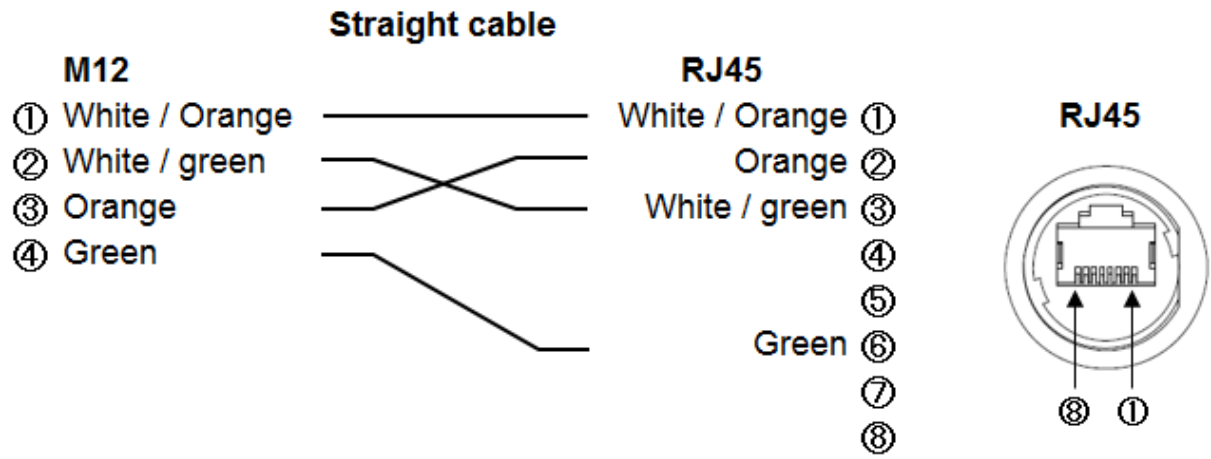
7.8   Inspection after installation

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?

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

(3) Are the cables routed and connected properly?

Chapter 8   Specifications

8.1   Specification

8.1.1   Main function

Receiving frequency		1575.42 MHz±1MHz
Receiving channel		72 channel parallel
Receiving code		C/A code
Sensitivity		Better than −148 dBm
Accuracy	Position	4.2 m 2drms(GPS), 3.3 m 2drms(DGPS)
	SOG	0.1 kt rms
HDOP: 4 or less	COG	± 1.0 °
Display		4.3 inch color LCD (480×272 dot's, effective picture area: 95.04 x 53.86 mm)
Display mode		NAV1, NAV2, NAV3, NAV4, NAV5, NAV6, NAV7, MOB (Man 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 minute, converted Loran C LOPs, converted Loran A LOPs, converted Decca LOPs
Navigational 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), Satellite status, Beacon receiving status, Distance/Bearing between two points, MOB display
Instant (event) memory		1000 points
Waypoint memory		4000 points
Route memory		100 routes reverse trail possible
Alarm		Proximity, Cross track error, CDI, Anchor watch
Position compensation		Latitude/longitude, LOPs, Datum
Magnetic compensation		Auto or Manual
Parameters		Position(L/L LOP), Memory of waypoints and name (up to 10 letters), Selection of measuring unit (nm, sm, km), SOG, COG averaging (smooth) factor, Sailing mode (Great Circle, Rhumb Line), DGPS mode, Beacon stations selection
Output data format (DATA1/2 connector)		NMEA 0183 Ver.2.0/3.0/4.1 CIF (AAM, APB, BOD, BWC, DCN, DTM, GGA, GLC, GLL, GSA, GSV, MSS, RMB, RMC, RTE, VTG, WPL, XTE, ZDA)
Input data format		RTCM SC104 Ver.2.0 (DGPS) NMEA 0183 (GPS source: External)

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

8.1.2 Power requirements

Input voltage: 10.8 to 31.2 VDC

Power consumption: Less than 6 W (at 24VDC)

AC Operation: AC/DC rectifier PS-010 is required.

                        Input voltage range: 115 VAC or 230 VAC

8.1.3 Compass safe distance

Standard: 0.6m

Steering: 0.4m

8.1.4 Environmental conditions

(1) Temperature and humidity

Operating temperature	Display unit: - 15° to + 55°C
	Antenna unit: - 25° to + 55°C
Humidity	93% (+40°C)

(2) Vibration

The equipment operates normally under the following vibrating conditions.

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

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

(3) Water proof

Display unit: IPX2 PROTECTED

Antenna unit: IPX6 EXPOSED

8.2   External dimensions and weight

8.2.1   External dimensions and weight of the Display unit: KGP-922

External dimensions: Width x Height x Depth

Dimensions (WxHxD):	174 x 165 x 98 (mm)
Weight:	0.97 kg

Unit: mm
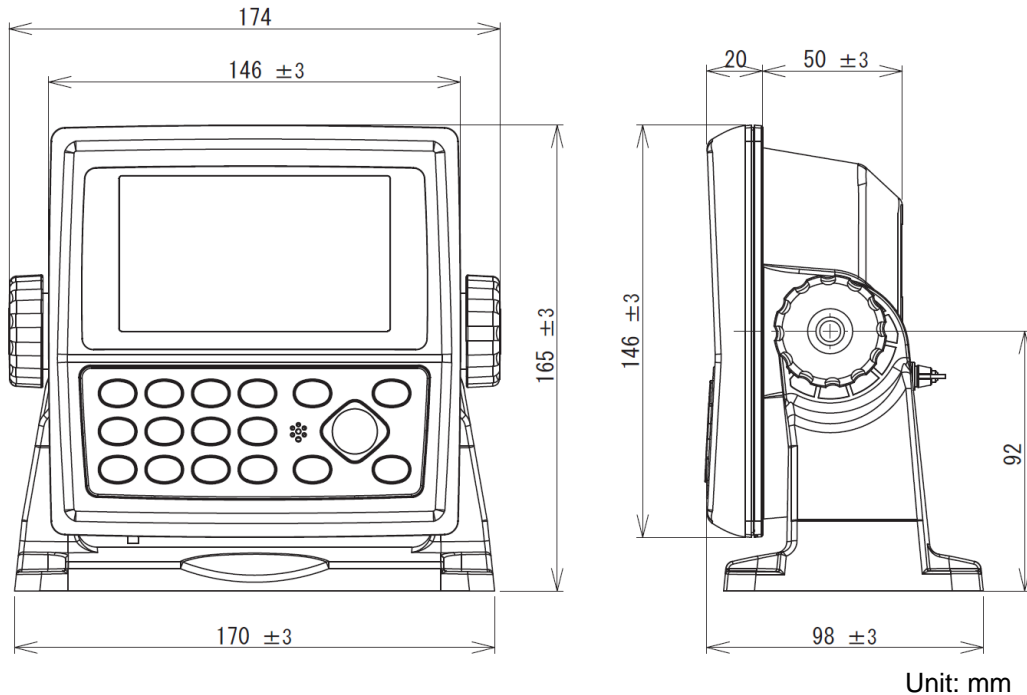
8.2.2   External dimensions and weight of the Antenna unit: GA-09

The length of the cable
GA-09(IMO)[15M]: with cable (15m)
GA-09(IMO)[0.5M]: with cable (0.5m, for extension)

Weight
Without cable: 0.23kg
GA-09(IMO)[15M]: 0.89kg
GA-09(IMO)[0.5M]: 0.29kg

Unit: mm (inch)
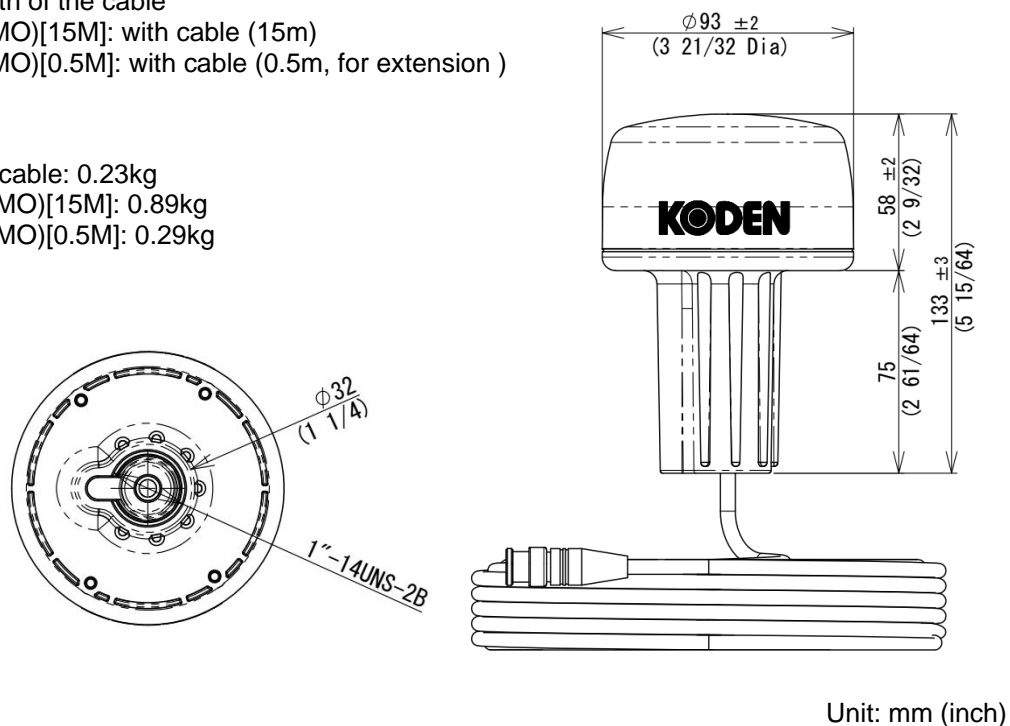
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Chapter 9   Maintenance and Troubleshooting

9.1   Periodic inspection and cleaning

9.1.1   Monthly check

Check if there is any loose connection on the Processor unit for GPS Antenna, radar or navigational unit.

9.1.2   Maintenance

If the display unit is smeared or stained with dirt, wipe the surface of the unit with soft dry cloth.

| | CAUTION
Never use solvent like thinner, alcohol, turpentine, etc. |

9.2   Trouble shooting

This chapter covers simplified fault locating procedures to assist the ship's crew to locate a faulty module as well as simple fuse replacement. If the problem continues, call for service.

9.2.1   Information required for service

Please advise the following details:

(1) Name of vessel, SATCOM number if available.

(2) Equipment type name

(3) Equipment serial number

(4) Next port of call, ship's agent name, fax number, email address, etc.

(5) Faulty conditions (precisely as possible) and the result of on board check

9.2.2   Trouble shooting

The following table provides information about first line check schedules to locate a faulty area and gives remedial measure(s), where applicable.

Symptom	Possible cause of trouble	Measure
Equipment does not turn on	1. Dose the power supply voltage line within the rated range (10.8 to 31.2VDC)? 2. Is the connection between the display unit and power supply cable firmly connected? 3. Is the power cable firmly connected to ship's battery?	1. Use a proper rated main supply. 2. Reconnect the cable firmly to the display unit. 3. Reconnect the cable firmly to the battery.

Symptom	Possible cause of trouble	Measure
Unstable signal reception	1. Are the connections between the GPS antenna and the display unit is correct and firm? 2. Is there any obstacle preventing the GPS unit from receiving the GPS signal?	1. Check the connection and reconnect, if necessary. 2. If an obstacle exists viewed from the GPS antenna site, the GPS signal cannot be received properly. Remove the obstacle or, if this is not possible, change the antenna position for better viewing range available.
Differential GPS (DGPS) Positioning fails	1. Are the baud rate you have set and the output signal baudrate of DGPS beacon receiver match? 2. Are the elevation angle set greater than 10 degrees?	1. Match the baud rate. 2. Set the elevation angle greater than 10 degrees.
Data cannot be Transmitted to external equipment.	1. Is the connection between the display unit and interface cable firmly connected? 2. Are the output data format and input data format of external equipment match?	1. Reconnect the cable firmly to the display unit. 2. Match the data format.

Chapter 10 Technical Reference

10.1 Input data format

RTCM SC-104 Ver 2.0 (DGPS) *Baud rate: 4800/9600/19200/38400, DATA2 connector only.

ACN sentence *Baud rate: 4800/9600/19200/38400, DATA1 and DATA2 connector. Sentence ACN is used for alert handling.

Description	Contents of data field

ACN	Alert command
	$ --ACN, hhmmss.ss,aaa,x.x,x.x,c,a*hh <CR><LF>
	
	Sentence status flag
	Alert command A = acknowledge
	                     Q = request / repeat infomation
	                     O = responsibility transfer
	                     S = silence
	Alert Instance, 1 to 999999
	Alert Identifier
	Manufacturer mnemonic code
	Time
	Sentence type
	Talker device
	Start of sentence

10.2 Output data format

IEC 61162-1, NMEA 0183 Ver.3.0, NMEA 0183 Ver.2.0

Data per one byte is as follows:

Parity bit: none

Logic 0 — Logic 1 | Start bit | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | Stop bit

1 bit, Logic 0   Data bit (ASCII code)   1 bit
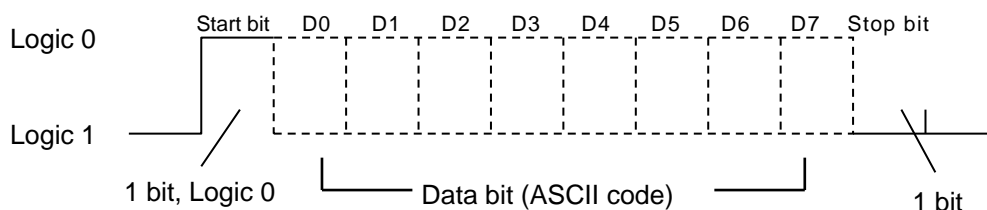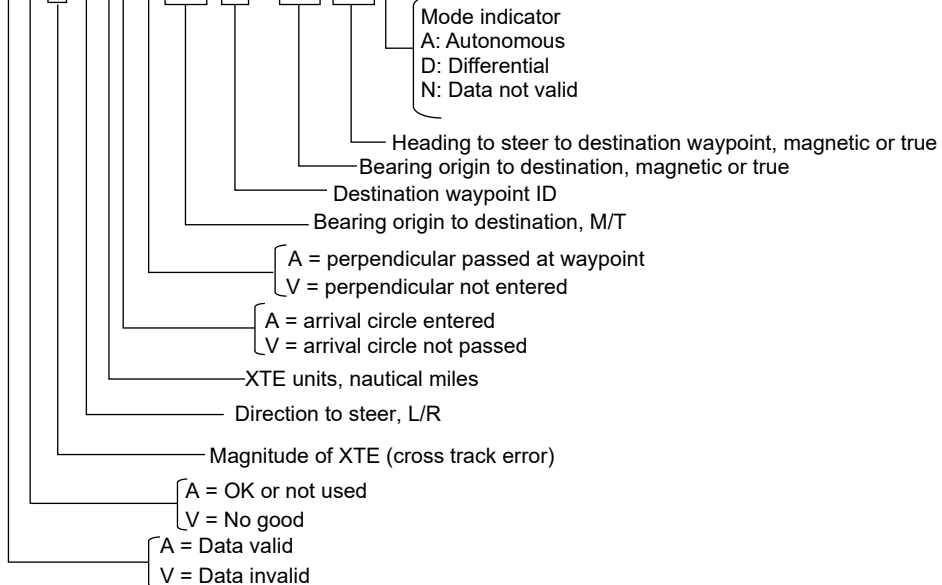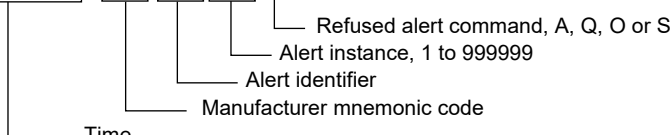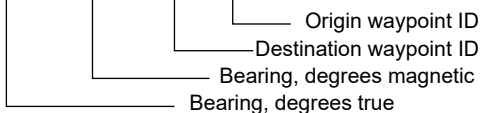
10.3 Output data specification

Baud rate	Output level	Output current	Sentence	Update rate
4800, 9600, 19200, 38400	RS422	20mA max	AAM, APB, BOD, BWC, DCN, DTM, GBS, GGA, GLC, GLL, **GNS**, GSA, GSV, MSS, RMB, RMC, RTE, VTG, WPL, XTE, ZDA **NOTE:** The sentences of bold character are set in 1 second cycle during initial setup.	Any of 1 to 99sec or OFF
			ALC, ALF, ARC	Per Event

10.4   Output sentence

Description	Contents of data field
AAM	Waypoint arrival alarm **$ GP AAM, A, A, x.x, N, c--c*hh <CR><LF>** Waypoint ID Units of radius, nautical miles Arrival circle radius A = Perpendicular passed at waypoint V = Not passed A = Arrival circle entered V = Not entered Sentence type Talker device Start of sentence
ALC	Cyclic alert list **$--ALC,xx,xx,xx,x.x,aaa,x.x,x.x,x.x,........,aaa,x.x,x.x,x.x*hh<CR><LF>** Alert entry n Additional Alert entries Revision counter Alert instance Alert identifier Manufacturer mnemonic code Number of alert entries Sequential message identifier, 00 to 99 Sentence number, 01 to 99 Total number of sentences for this message, 01 to 99
ALF	Alert sentence **$--ALF,x,x,x,hhmmss.ss,a,a,a,aaa,x.x,x.x,x.x,x,c---c*hh<CR><LF>** Alert text Escalation counter, 0 to 9 Revision counter, 1 to 99 Alert instance, 1 to 999999 Alert identifier Manufacturer mnemonic code V = active - unacknowledged S = active - silenced A = active - acknowledged or active O = active - responsibility transferred U = rectified - unacknowledged E = Alert priority, Emargency Alarm A = Alarm W = Warning C = Caution A = Category A B = Category B C = Category C Time of last change Sequential message identifier, 0 to 9 Sentence number, 1 to 2 Total number of ALF sentences for this message, 1 to 2

Description	Contents of data field
APB	Heading / track contoroller (autopoilot) sentence B $--APB,A,A,x.x,a,N,A,A,x.x,a,c--c, x.x,a,x.x,a,a*hh<CR><LF> Mode indicator A: Autonomous D: Differential N: Data not valid Heading to steer to destination waypoint, magnetic or true Bearing origin to destination, magnetic or true Destination waypoint ID Bearing origin to destination, M/T A = perpendicular passed at waypoint V = perpendicular not entered A = arrival circle entered V = arrival circle not passed XTE units, nautical miles Direction to steer, L/R Magnitude of XTE (cross track error) A = OK or not used V = No good A = Data valid V = Data invalid
ARC	Alert command refused $--ARC, hhmmss.ss, aaa, x.x, x.x, c*hh<CR><LF> Refused alert command, A, Q, O or S Alert instance, 1 to 999999 Alert identifier Manufacturer mnemonic code Time
BOD	Bearing origin to destination $--BOD, x.x, T, x.x, M, c--c, c--c*hh<CR><LF> Origin waypoint ID Destination waypoint ID Bearing, degrees magnetic Bearing, degrees true

Description	Contents of data field
BWC	**Bearing and distance to waypoint** $--BWC, hhmmss, llll.lll, a, yyyyy.yyy, a, x.x, T, x.x, M, xx, N, c--c, a*hh<CR><LF> Mode indicator A: Autonomous D: Differential N: Data not valid Waypoint ID Distance, nautical miles Bearing, degrees magnetic Bearing, degrees true Waypoint longitude, E/W Waypoint latitude, N/S UTC of observation
DCN	**DECCA position** $--DCN, xx, cc, x.x, A, cc, x.x, A, cc, x.x, A, A, A, A, x.x, N, x*hh<CR><LF> Green Purple Fix data basis Position uncertainly, n. miles Red-master line, A = valid V = data not valid Purple-line navigation use A = valid V = Data not valid Red line of position (LOP) Green-line navigation use A = valid V = Data not valid Red zone identifier, number-letter Red-line navigation use A = valid V = Data not valid DECCA chain identifier
DTM	**Datum reference** **$--DTM,ccc,a,x.x,a,x.x,a, x.x,ccc*hh<CR><LF>** Reference datum WGS84 Altitude offset, m Lon offset, min, E/W Lat offset, min, N/S Local datum subdivision code Local datum: IHO datum code W84 = WGS84 W72 = WGS72 999 = user defined

Description	Contents of data field
GBS	**GNSS satellite fault detection** $--GBS, hhmmss.ss, x.x, x.x, x.x, x.x, x.x, x.x, x.x, h, h*hh<CR><LF> — GNSS Signal ID — GNSS System ID — Standard deviation of bias estimate — Estimate of bias on most likely failed satellite — Probability of missed detection for most likely failed satellite — ID number of most likely failed satellite — Expected error in altitude — Expected error in longitude — Expected error in latitude — UTC time of the GGA or GNS fix associated with this sentence
GGA	**GPS fix data** **$--GGA, hhmmss.ss, xxxx.xxx, N/S, xxxxx.xxx, E/W, x, xx** Latitud — Longitude Number of satellite in use UTC of position fix (Hour, Min, Sec) Status of GPS fix mode 0: Fix unable 1: GPS fix 2: DGPS fix N : North latitude E: East longitude: S : South latitude W: West longitude **xxx, 0/-xxxx, M, 0/-xxx, M, xxx, xxxx *hh <CR><LF>** HDOP value Meter Meter Gioid height -: Negative DGPS reference station ID Antenna height -: Negative DGPS data correction time elapsed
GLC	**Geographic position (LORAN-C)** **$--GLC, xxxx, x.x, a, x.x, a, x.x, a, x.x, a, x.x, a, x.x, a*hh<CR><LF>** TD1 TD2 TD3 TD4 TD5 Signal status in order of priority B = blink warning C = cycle warning S = SNR warning A = valid Master TOA microseconds GRI, in tens of microseconds
GLL	**Geographic position – Latitude/longitude** **$--GLL, xxxx.xxx, N/S, xxxxx.xxx, E/W,hhmmss , A , a*hh <CR><LF>** Latitude Longitude Mode indicator Status A: Auto A: Valid D: Differential V: Invalid Fix measurement time elapsed (Hour, Min, Sec) N: North latitude E: East longitude S: South latitude W: West longitude

Description	Contents of data field
GNS	GNSS fix data **$--GNS, hhmmss.ss, lllll.lll, a, yyyyy.yyy, a, c--c, xx, x.x, x.x, x.x,** UTC of position fix (hr/min/sec) Latitude, N/S Longitude, E/W Geoidal separation, m Antenna altitude, m HDOP value Number of satellites in use, 00-99, Mode indicator NN: Fix not available or invalid AN: GPS fix valid DN: DGPS fix valid MN: Manual input SN: Simulator Navigational status indicator **x.x, x.x, a*hh\<CR>\<LF>** Differential reference station ID Age of differential data (sec)
GSA	GNSS DOP and active Satellite **$--GSA,a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.x,x.x,x.x,h*hh\<CR>\<LF>** ID numbers of satellites use in solution GNSS System ID VDOP HDOP PDOP 1 = fix not available 2 = 2D 3 = 3D M = Manual A = Auto
GSV	GNSS satellites in view **$--GSV,x,x,xx,xx,xx,xxx,xx..............,xx,xx,xxx,xx,h*hh\<CR>\<LF>** Signal ID Fourth SV Second and third SVs S/N (Signal to Noise ratio) Azimuth angle Elevation Satellite ID number First satellite Total number of satellites in view Message number, 1 ~ 9 Total message number, 1 ~ 9
MSS	MSK receiver signal status **$--MSS,,x.x,x.x,x.x,x*hh\<CR>\<LF>** Channel number Beacon bit rate (25, 50, 100, 200) bit/s Beacon frequency, 283,5 kHz to 325,0 Signal to noise ratio (S/N),dB This field is not use

Description	Contents of data field
RMB	Recommended minimum navigation information $--RMB, A, x.x, a, c--c, c--c, llll.lll, a, yyyyy.yyy, a, x.x, x.x, x.x, A, a*hh<CR><LF> Mode indicator A: Autonomous D: Differential N: Data not valid A=arrival circle, entered or perpendicular passed V = not entered or passed Destination closing velocity, knots Bearing to destination, degrees true Range to destination, nautical miles Destination waypoint longitude, E/W Destination waypoint latitude, N/S Destination waypoint ID Origin waypoint ID Direction to steer L/R Cross track error, nautical miles A = data valid V = navigation receiver warning
RMC	Recommended minimum specific GNSS data $--RMC, hhmmss.ss, A, llll.lll, a, yyyyy.yyy, a, x.x, x.x, xxxxxx, x.x, a, a*hh <CR><LF> UTC of position fix (hour/min/sec) Latitude, N/S Longitude, E/W Navigational status Mode indicator A: Autonomous D: Differential N: Data not valid Magnetic variation Degrees, E/W Date: dd/mm/yy Course over ground, degree true Speed over ground, knots A: Data valid V: Navigation receiver warning
RTE	Routes　*Maximum of four Waypoints are outputted **$--RTE, x.x, x.x, a, c--c, c--c, …... c--c*hh <CR><LF>** Waypoint "n" identifier Additional waypoint identifiers Waypoint identifier Route identifier C = complete route, all waypoints W = working route, first listed waypoint is "FROM", second is "TO" and remaining are rest of true Sentence number Total number of sentences being transmitted

VTG	Course over ground and ground speed **$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh\<CR\>\<LF\>** A = Autonomous mode; D = Differential mode; E = Estimated (dead reckoning) mode; M = Manual input mode; P = Precise. Satellite system used in precision mode. S = Simulator mode; N = Data not valid. Speed over ground, km/h Speed over ground, knots Course over ground, degrees magnetic Course over ground, degrees true
WPL	Waypoint location **$--WPL,lllll.ll,a,yyyyy.yy,a,c--c*hh\<CR\>\<LF\>** Waypoint identifier Waypoint longitude, E/W Waypoint latitude, N/S
XTE	Cross-track error, measured **$--XTE,A,A,x.x,a,N,a*hh\<CR\>\<LF\>** A = Autonomous mode D = Differential mode E = Estimated (dead reckoning) mode M = Manual input mode S = Simulator mode Units, nautical miles Direction to steer, L/R Magnitude of cross-track error A = data valid V = data invalid A = data valid V = data invalid
ZDA	Time and date **$--ZDA, hhmmss.ss, xx, xx, xxxx, xx, xx*hh\<CR\>\<LF\>** Local zone minutes , 00 to 59 Local zone hours , 00 h to ± 13h Year (UTC) Month, 01 to 12 (UTC) Day, 01 to 31 (UTC) UTC

10.5   Input / Output circuit

Port (connector) name: DATA1, DATA2
The connector used: BD-06PMMP-LC7001

(DATA port Input circuit)
Input load: 470 ohm
Device: Photo-coupler ACPL-M61L (Avago)
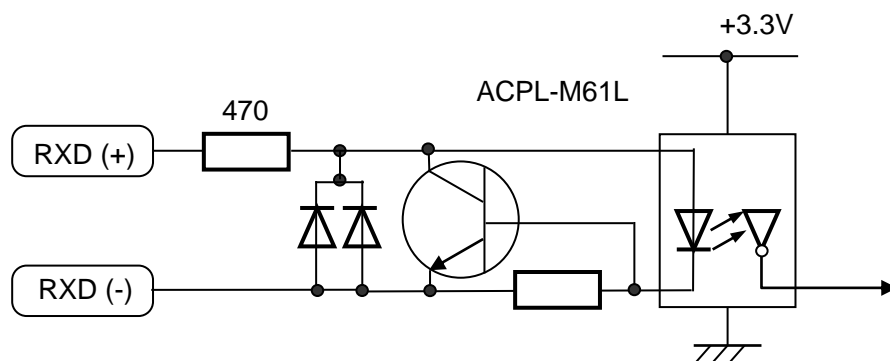
(DATA port output circuit)
Device: Driver IC HD26C31FP (Renesas)
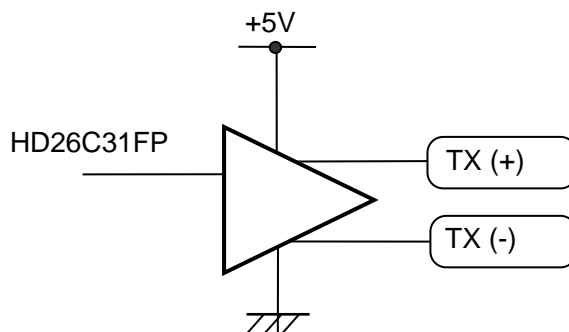
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Chapter 11 Annex

11.1 Menu configuration

The factory set value is shown by the surrounding boxes.

MENU

- 1: Waypoints
- 2: Routes
  - 1: Route Set / Edit
  - 2: Waypoint change (Circle , Bisector)
- 3: GPS
  - 1: GPS monitor
  - 2: GPS mode (GPS)
  - 3: Datum (00 to 87)
  - 4: C/N mask (10, 15, 20, 25, 30, 35 , 40, 45)
  - 5: Elevation mask (0, 3, 5 , 10, 15)
  - 6: RAIM Limit (10m , 50m, 100m, OFF)
- 4: DGPS
  - 1: DGPS mode (Auto , SBAS, Beacon, OFF)
  - 2: Time out (005s ~ 060s ~100s)
  - 3: SBAS selection (Auto , WAAS, EGNOS, MSAS, GAGAN, SDCM, Other)
  - 4: SBAS Other (120 to 158)
  - 5: Beacon selection (Auto , Manual)
  - 6: Frequency (283.5 kHz to 325.0 kHz)
  - 7: Bit rate (50, 100, 200)
  - 8: Baud rate (2400, 4800 , 9600)
  - 9: Beacon monitor
- 5: Compensation
  - 1: Latitude / Longitude
  - 2: LOP
  - 3: Magnetic variation (Auto , Manual [-180°~ +000.0° ~ +180.0°])
  - 4: Time difference (-13:30 ~ +00:00 ~ +13:00)
- 6: Alerts
  - 1: ANCH (ON [0.00 to 9.99], OFF)
  - 2: RPOX (ON [0.00 to 9.99], OFF)
  - 3: XTE (ON [0.00 to 9.99], OFF)
  - 4: CDI (ON [00 to 45], OFF)
  - 5: Alert List
  - 6: Alert History
- 7: Calculation
  - 1: 2Points
  - 2: L/L→LOP
  - 3: Navigation plan

A

A

— 8: Initial setup —— 1: Averaging (0, 1, 2, 3, 4)
                    — 2: Units (NM, km, sm)
                    — 3: Sailing mode (Great circle, Rhumb Line)
                    — 4: Position (L/L, Lop)
                    — 5: L/L units (.001, .0001)
                    — 6: GPS source (Internal, External)
                    — 7: Language (English, 日本語)
                    — 8: Lop (LoranC, LoranA, DECCA)
                    — 9: Chain

— 9: Interface —— 1: Connector (DATA1, DATA2, Ethernet)
               — 2: Format (IEC 61162-1, NMEA 0183 Ver.3.0, NMEA 0183 Ver.2.0,*[KBG, RTCM])
                           *KBG/RTCM: DATA2 only
               — 3: Baud rate (4800, 9600, 19200, 38400)
               — 4: Main Talker ID (System dependent, GP Fix)
               — 5: ALF (OFF, ALF)
               — 6: Sentence edit

                    ┌───┐
                    │ AAM=00   APB=00   BOD=00   BWC=00   DCN=00   │
                    │ DTM=00   GGA=01   GLC=00   GLL=00   GSA=00   │
                    │ GSV=00   MSS=00   RMB=00   RMC=00   RTE=00   │
                    │ VTG=00   WPL=00   XTE=00   ZDA=01   │
                    │ (*Initial setting for DATA1 / DATA2)   │
                    └───┘

               — 7: Ethernet
               — 8: Ethernet (SYSLOG)
               — 9: *Ethernet (Special)   *For serviceman.

— 10: Plotter —— 1: Mark symbol
              — 2: Mark display (Symbol+Number, Symbol+Comment, Symbol, Number, Comment, OFF)
              — 3: Track color
              — 4: Plot (5sec, 10sec, 20sec, 30sec, 1min, .01NM, .05NM, .1NM, .5NM, 1NM, OFF)
              — 5: Track clear

11.2 Local Geodetic Systems

The number assigned to each place name is the set values used in the "Selecting a geodetic datum" (Page 4-5)

Name	No.	Name	No.	Name	No.
ALASKA / CANADA	04	FLORIDA	41	PHOENIX	40
ARC 50	29	GREENLAND	09	PITCAIRN	69
ARC 60	30	GUADALCANAL	50	PORTO SANTO	77
ARGENTINA	39	GUAM 63	49	PUERTO RICO	71
ASCENSION	31	HAWAII	21	QATAR	72
AUSTRALIAN 84	06	HONG KONG 63	51	ROME 40	15
BAHRAIN	27	ICELAND 55	11	SALVAGE	59
BERMUDA	37	INDIAN / NEPAL	18	SANTA MARIA	75
BRAZIL	45	IRELAND 65	12	SANTO	74
CANARY	68	IWO JIMA	32	SAUDIARABIA	17
CAYMAN BRAC	56	JAPAN	24	SOMALIA	26
CHATHAM	43	JOHNSTON	53	SOUTH AFRICA	16
COCOS	28	KERGUELEN	55	SOUTH AMERICA	08
COLOMBIA	38	LIBERIA 64	57	SOUTH ASIA	07
CORVO/FLORES	65	MAHA 71	58	SOUTH CHILE	70
DIEGO GARCIA	52	MALAYSIA	23	SRILANKA	54
DJAKARTE	22	MALDIVE	48	ST.HELENA	34
EAST FALKLAND	76	MARCUS	35	SURINAM	83
EAST MALAYSIA	79	MARSHALL	82	SWEDEN	85
EASTER	47	MASCARENE	73	TERN	33
EFATE	36	MIDWAY 61	62	TOKYO	02
EGYPT	66	MOROCCO	61	TRINIDAD	64
ENGLAND	20	NAD-27	03	TRISTAN	80
ERITREA	60	NAD-83	10	TUNISIA	42
ETHIOPIA	25	NEW GEORGIA	46	WGS-72	01
EUROPEAN 50	05	NEW ZELAND	13	WGS-84	00
EUROPEAN 79	14	NIGERIA	63	HU-TZU-SHAN	86
FAIAL	78	OMAN	67	RUSSIA	87
FIJI	81	PARAGUAY	44		
FINLAND	84	PHILLIPPINES	19		

KODEN