LORAN C NAVIGATOR

XJ-9

OPERATION MANUAL

SI-TEX®

DOC NO. XJ-9 10-94

For Proper Operation

Tips for mounting the navigator

Avoid following locations or situations:

- A place exposed to direct sun or near a heating device.
- A place adjacent to Magnetic Compass.
- A place exposed to strong vibration or shock.

Special note for LCD (Liquid Crystal Display)

Avoid following conditions to insure good LCD visibility.

- Long-time exposure to direct sun rays or UV.
- Extremely hot (surrounding temperature more than 50°C, 120°F) or cold (less than 0°C, 32°F) environment.

Welcome to Loran C navigator

The Loran C navigator receives signals from a master station and 2 secondary stations in a Loran C chain to show your position either in LOP or LAT/LONG in the chain coverage. An additional GPS receiver module makes the navigator a combination system of Loran C and GPS and you can enjoy the benefits of both navigational systems.
Please read this manual carefully before turning the power on, as you will find important information on navigating with your navigator.

IMPORTANT

This device is an aid to navigation.
When in actual use, carefully compare data of your GPS navigator with all available navigation sources such as Loran C, Decca, other navigators, charts, visual navigation, depth, water temperature, etc., for good navigation judgment.
Navigation judgment is your responsibility.

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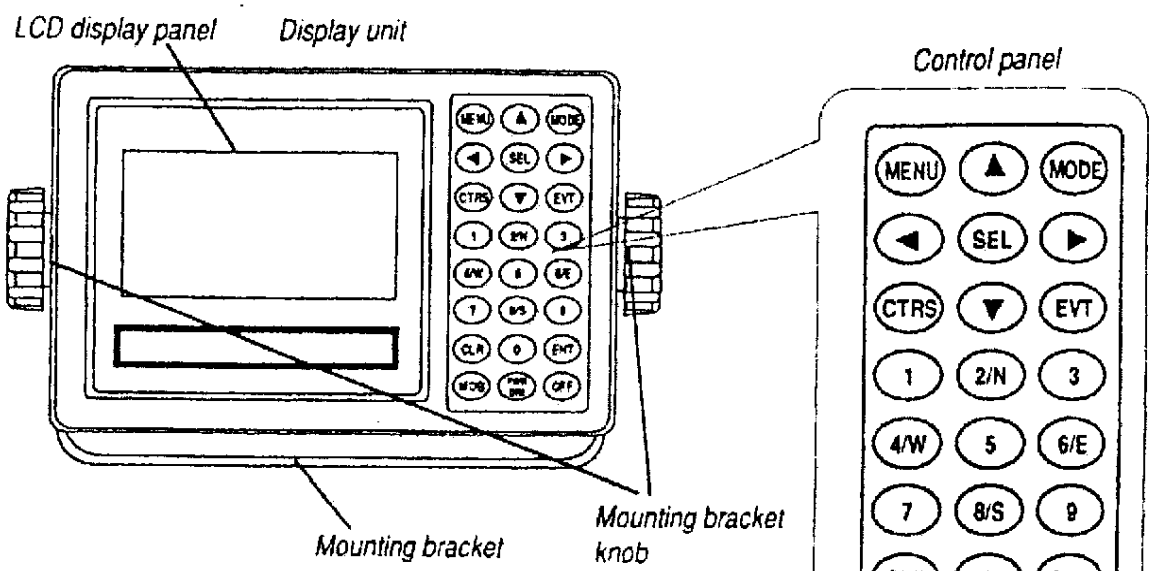
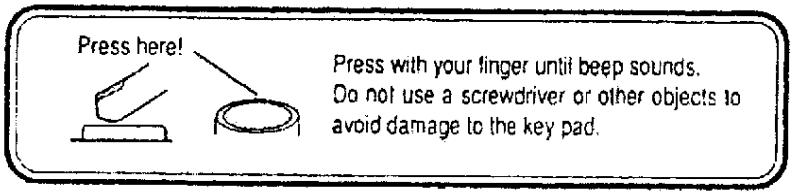
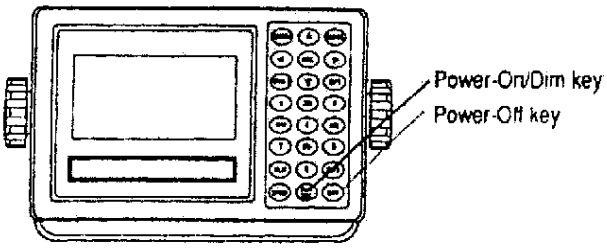
Display Unit





Screen switching MODE	Selects either NAV1, NAV2 or NAV3 screens.	Emergency MOB	Activates MOB (Man Over Board) function.
Menu MENU	Recalls the menu.	Power/dimmer PWR DIM	Turns the power on and changes the brightness of the display (2 levels).
Clear CLR	Clears a numeric or optional parameter or stops alarm sound temporarily.	Power-Off OFF	Turns the power off.
Entry ENT	Enters a numeric or optional parameter.	1 2/N 3 4/W 5 6/E 7 8/S 9 0	Numeric keypads for recall of memory position, entry of numerical values, and selection of North or South latitude or East or West longitude.
Event EVT	Stores an event position		
Contrast CTRS	Changes the LCD contrast in 8 levels.	Cursor shift ▲ ◀ ▶ ▼	Shifts the cursor in direction of the respective key on the screen when you select an option or enter a numeric value.
Selection SEL	Selects parameters.		

Getting Started



On-screen messages change in the following sequence.

PWR DIM — Press to turn NAVIGATOR on.

```
LORAN
ROM No. KM-A00
checking
```

Initial message during power-on

Dim/bright the display:

PWR DIM — Press to dim/brighten the screen.

```
LORAN
ROM No. KM-A00
check OK
```

Message to indicate checking of Loran C receiver and display has been completed.

Change the contrast:

CTRS — Press to change the LCD contrast (intensity) in 8 levels.

```
NAV1
SPEED      kt
COURSE
```

Display with no chain data.
When the navigator is turned on for the first time, entry of chain number and two secondary stations is required (refer to "Selection of Loran C chain number and combination of secondary stations"). Normally chain data is retained in the memory for the next operation.

Power off:

OFF — Press to turn NAVIGATOR off. All data before power-off is kept in memory for later use.

Blinking

```
NAV1      14248.8
          44713.8
SPEED     15.0kt
COURSE    359.9°
```

Loran C LOP

Display when Loran C signals are acquired and tracked.
During the process of receiving Loran C signals, the last digits of LOPs in LOP mode or N (or S) and E (or W) in L/L mode are kept blinking.
After reception of Loran C signals is completed, blink stops.

What is failure of positioning?
At least master and two secondary station signals should be received for positioning.

No blinking

```
NAV1   27°54.00N
       82°41.67W
SPEED     15.0kt
COURSE    359.9°
```

Latitude/longitude

Entering Loran C chain number and secondary stations

MENU ⇨ 2 ⇨ ▶ ⇨ ○○○○ ⇨ ○-○ ⇨ ENT ⇨ MODE

- MENU: Press to display Menu options 1 to 4.
- 2: Select 2: LORAN MON.
- ▶: Press to move _ cursor to the (4-digit) Loran C chain entry field.
- ○○○○: Enter a (4-digit) Loran C chain number.
- ○-○: Enter the most significant digit (10 thousand microseconds) of two Loran C secondary stations.
- ENT: Press to enter Loran C chain data.
- MODE: Press until NAV1 screen appears.

Correction of input error

◀ ▶ Locate _ cursor onto incorrect number and enter correct one.

CLR — Press to clear incorrect input. You can reenter numeric data.

```
MENU 1:WAYPOINT
     2:LORAN MON
     3:GPS MON
     4:COMP
```

→

```
2:LORAN 7980 1-4
  MASTER  068 O
  20071.5 059 O
  55747.3 078 O
```

Chain number — Most significant digit of two secondary stations

When center two digits (L/L or LOP) are blinking (blink alarm)

This means a Loran C station or more then two stations in the chain are in trouble and the users are advised not to use the chain. False alarm is indicated seldom due to poor signal conditions.

Loran C LOP

```
NAV1      14248.8
          44713.8
SPEED     15.0kt
COURSE     359.9°
```

Blinks when secondary 1 station transmits blink signal.

Blinks when secondary 2 station transmits blink signal.

Latitude/longitude

```
NAV1   27°54.00N
       82°41.67W
SPEED     15.0kt
COURSE     359.9°
```

How to reset blink alarm	CLR	CLR key press stops blinking momentarily. But it will come back as long as blink alarm signal exists.

When right most digits (L/L or LOP) are blinking (CS and S/N alarm)

If either one of the above fails, following alarm is indicated. The detailed status can be confirmed in a menu screen. Main cause of the alarm comes from out of coverage use, poor grounding of the unit, inappropriate antenna location, alternator noise and near band radio noise.

Loran C LOP

```
NAV1      14248.8
          44713.8
SPEED     15.0kt
COURSE     359.9°
```

Blinks when either one of master, secondary 1 or 2 signal becomes unstable.

Latitude/longitude

```
NAV1   27°54.00N
       82°41.67W
SPEED     15.0kt
COURSE     359.9°
```

How to reset S/N or CS alarm	CLR	CLR key press stops blinking but it will come back as long as unstable signal exists Detail of trouble can be monitored in a menu screen.

How to find out Loran C signal with trouble

MENU ⇒ 2/N

Select 2: LORAN MON.

Press to display Menu options 1 to 4.

```
MENU  1 :WAYPOINT
      2 :LORAN MON
      3 :GPS MON
      4 :COMP
```

Proper cycle selection (cs) is not made for master signal

```
2 :LORAN 7980  1-4
  MASTER   001  X
  14248.8  059  O
  44713.8  078  O
```

Proper cycle selection (cs) is not made for secondary 1 signal

```
2 :LORAN 7980  1-4
  MASTER   068  O
  14248.8  001  X
  44713.8  078  O
```

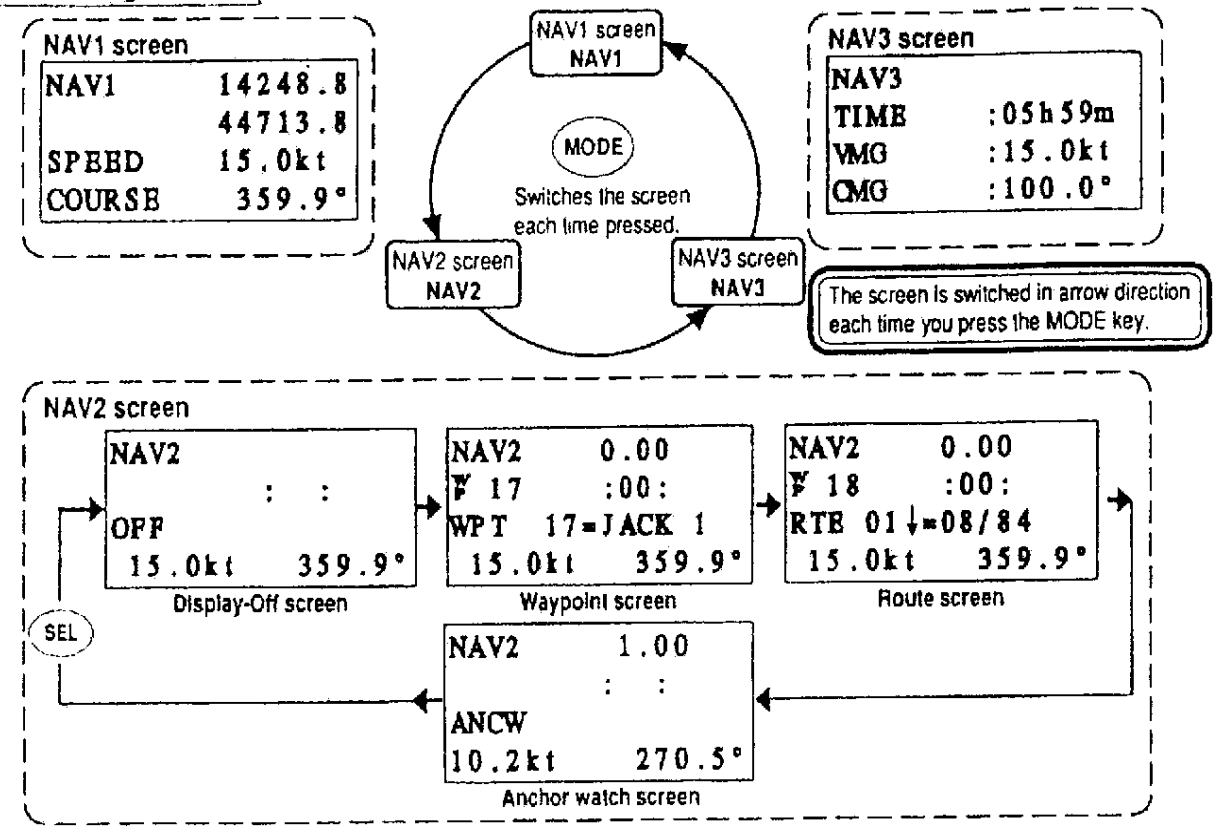
Proper cycle selection (cs) is not made for secondary 2 signal

```
2 :LORAN 7980  1-4
  MASTER   068  O
  14248.8  059  O
  44713.8  001  X
```

If signal strength is too low, number becomes 0 and it initiates the alarm (S/N alarm)

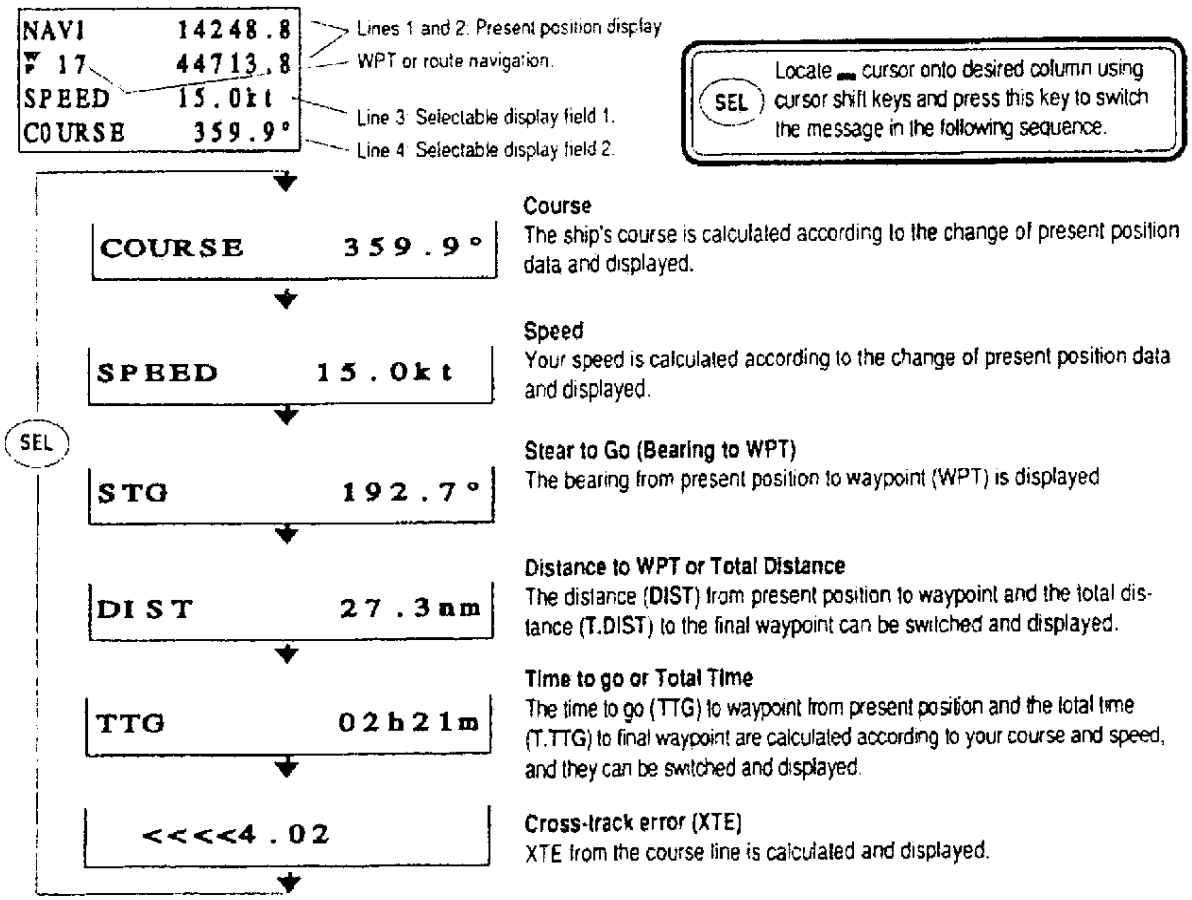
When cycle selection is not made it initiates the alarm (cs alarm)

Switching screens



Operation of NAV1 screen

Data on line 3 and 4 are independently selectable.



Course
The ship's course is calculated according to the change of present position data and displayed.

Speed
Your speed is calculated according to the change of present position data and displayed.

Stear to Go (Bearing to WPT)
The bearing from present position to waypoint (WPT) is displayed

Distance to WPT or Total Distance
The distance (DIST) from present position to waypoint and the total distance (T.DIST) to the final waypoint can be switched and displayed.

Time to go or Total Time
The time to go (TTG) to waypoint from present position and the total time (T.TTG) to final waypoint are calculated according to your course and speed, and they can be switched and displayed.

Cross-track error (XTE)
XTE from the course line is calculated and displayed.

How to Find Out Your Position

You can find your position by simply reading the NAV1 display either in LAT/LONG or LOPs.

MODE — Press this key to recall NAV1 (Navigation 1) screen.

NAV 1 screen

```
NAV1      14248.8
          44713.8
SPEED     15.0kt
COURSE     359.9°
```

- Blinks if positioning is interrupted.
- Present position
- Secondary 1 station LOP
- Secondary 2 station LOP
- Speed in knots
- Bearing in degrees

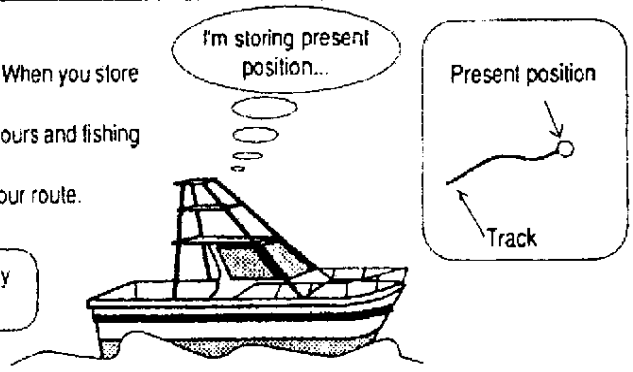
```
NAV1   27°54.00N
       82°41.67W
SPEED     15.0kt
COURSE     359.9°
```

- Blinks if positioning is interrupted.
- Present position
- North or South latitude
- East or West longitude
- Speed in knots
- Bearing in degrees

Blinks when compensation to position or bearing is imposed.

Storing present position (EVENT)

You can store up to 10 points (point number 01 to 10) in memory. When you store more points, old ones are overwritten.
Use memory data when you check the pass through points (tidal hours and fishing areas).
Also use it to determine the waypoint or pass through points of your route.



EVT

CLR — Returns to previous display screen.

Press this key to store the present position. You can store up to 10 points, and then the oldest data will be replaced with a new one in numerical order

```
EVT       14248.8
          44713.8
01        14249.9
          44713.3
```

Latest event point number is shown.

The position data of event point number 01.

EVT key precedes any other key on any screen except Menu.
You can also store the present position (memory number 00) using MOB key.

When you press MOB key, your present position is stored in memory number 00.

Recalling event or MOB position

MENU ⇨ 1 ⇨ ◯◯

Enter an event number (one of point number 00 to 10) you wish to recall. Point number 00 contains the position data when you have pressed MOB key.

Select 1: WAYPOINT.

Press to display Menu options 1 to 4.

Specified event point number is shown.

Event or MOB position recalled.

```
WPT   01=
          14249.9
          44713.3
```

CLR — Use this key if you have entered an incorrect number. You can reenter an event point number.

MOB (Man Over Board) function

MOB function is provided for an emergency situation to make it easier to return to MOB point.

Caution: MOB key does not function if positioning is not available.

MOB Press to store present position and to select the **MOB** (Emergency Navigation) screen.

MOB mode has been selected.

Distance from present position to the point where you pressed **MOB** key

Bearing from present position to the point where you pressed **MOB** key

MOB	14248.8	Present position
	44713.8	
2.7	14249.9	Point where you pressed **MOB** key
270°	44713.3	

CLR Clears the **MOB** mode and returns to the previous screen.

You can use only the following four keys in MOB mode.

CLR CTRS PWR DIM OFF

Average speed/course/elapsed time

MODE

Press until NAV3 screen appears.

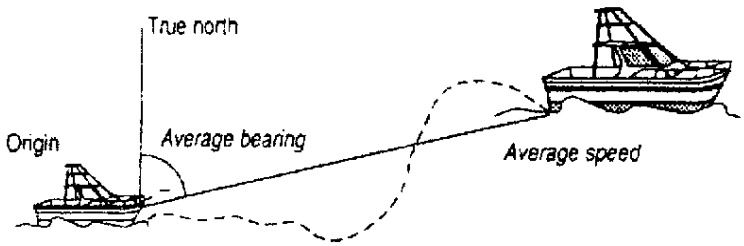
CLR Press to reset the elapsed time.

NAV3		
TIME	:05h59m	Elapsed time
VMG	:15.0kt	Velocity made good
CMG	:100.0°	Course made good

When you turn the power switch on, the average speed and average bearing since time reset are shown and they are updated every one minute

Press **CLR** key to reset the elapsed time.

The average speed is an average of ship's speed from the origin (that is, the point where you have reset the elapsed time) to the present position. The average bearing is an average of true bearing from origin to present position.



This display is also available during both WPT and route navigation.

VMG (Velocity made good): VMG is velocity in the direction of the desired course. It is the speed at which you are closing on the "active to" waypoint.

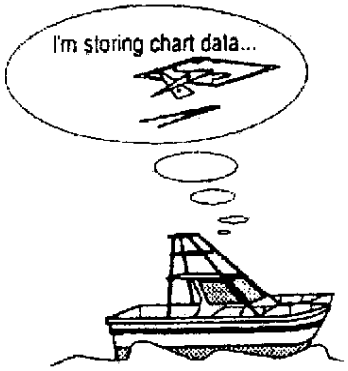
CMG (Course made good): CMG is the bearing from the "active from" waypoint to your position.

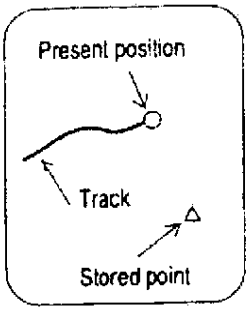
How to Get Distance and Bearing to WPT

You can obtain the following navigation information to destination (waypoint WPT):

- Distance and bearing from present position to a WPT or the final destination
- Ship's speed and time to go

You can store up to 89 points (numbers 11 to 99).





Navigation to WPT

Use the following steps (see Page 11 for operation details).

1. Determine your waypoints and/or final destination by sea charts or other sources.
2. Store opsition data of waypoints.
3. Create a new route combining stored data and new input data.
4. Check the waypoints on the store screen and correct them if necessary.
5. Start navigation.

Waypoint navigation

"Prepare sailing.
Power On! Everything OK!"

See Page 4 for operation.

Store event
"A buoy! Store this position."

See Page 7 for storage.

Setup
"We'll sail to point 17 today.
Set it as waypoint."

See Page 16 for setup.

"Check the bearing and distance.
Now, let's go!"

Waypoint 17

Course line

Route navigation

Route navigation

See Page 14 to store route.
See Page 19 to select route navigation.

Point switching range during route navigation

See Page 25 to set proximity alarm.

18

91

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When you enter the point switch range, the course is set to the next point automatically.

Storing waypoints (LAT/LONG or LOPs data)

Storing a new position

You can store up to 89 points in memory.

Adding a comment

Add a comment to a waypoint or an important point for quick recalling and later reference.

Point number (11 to 99)

MENU ⇨ 1 ⇨ ◯◯ ⇨ ▶ ⇨ ▼ ⇨ ◀ ▲ ▶ ▼ ⇨ SEL ⇨

Select 1: WAYPOINT and the Store Position screen will appear.

Press to display Menu options 1 to 4.

Press to select the Add Comment mode.

Select one character or symbol at a time. You can enter up to 8 characters by repeating these steps.

Select a character or symbol on the comment character and symbol table using ▬ cursor, or type a numeric key.

Enter point number (11 to 99) using numeric keys.

◀ Press to backspace ▬ cursor to correct an input error.

⇨ ENT ⇨ ▶ ⇨

The ▬ cursor moves to longitude field automatically, when entire 6-digit data is entered.

LAT/LONG mode ⇨ *Latitude* ° ◯◯ ◯◯ . ◯◯ ⇨ 2/N or 8/S ⇨ ▼ ⇨

Enter a 6-digit data using numeric keys (90°00.00' maximum).

◀ Press to backspace ▬ cursor to correct an input error.

Enter N for North or S for South latitude.

Longitude ° ⇨ ◯◯◯ ◯◯ . ◯◯ ⇨ 6/E or 4/W ⇨ ENT

Enter a 7-digit data using numeric keys (180°00.00' maximum).

◀ Press to backspace ▬ cursor to correct an input error.

Enter E for East or W for West longitude.

Press to enter latitude and longitude in memory.

CLR Press to get out of character and symbol table screen.

Comment character and symbol table

```
WPT  17=_
 ABCDEFGHIJKLMNO
 PQRSTUVWXYZ&bcd
↕efghijklmnopqrs
```

Comment field

```
MENU 1:WAYPOINT
     2:LORAN MON
     3:GPS MON
↕    4:COMP
```

```
WPT  17=_
  --°--.---
  ---°--.---
```

```
WPT  17=_
 tuvwxyz',.()<>:
 ;?!=#$%&*+-/↓↑
↕
```

```
WPT  17=JACK 1
     27°54.00N
     82°44.82W
```

Stored position (latitude and longitude)

Press ▲ or ▼ key to scroll comment character table page.

To store Loran C LOPs data, see the "Displaying position data in Loran C LOP mode" (page 30).

Loran C LOPs mode ⇨ *LOPs of secondary station 1* ◯◯◯◯◯ . ◯ ⇨ ▼ ⇨

Press to backspace ▬ cursor to correct an input error.

Enter a 6-digit data using numeric keys.

The ▬ cursor moves to the secondary station 2 field automatically, when entire 6-digit data entered.

LOPs of secondary station 2 ⇨ ◯◯◯◯◯ . ◯ ⇨ ENT

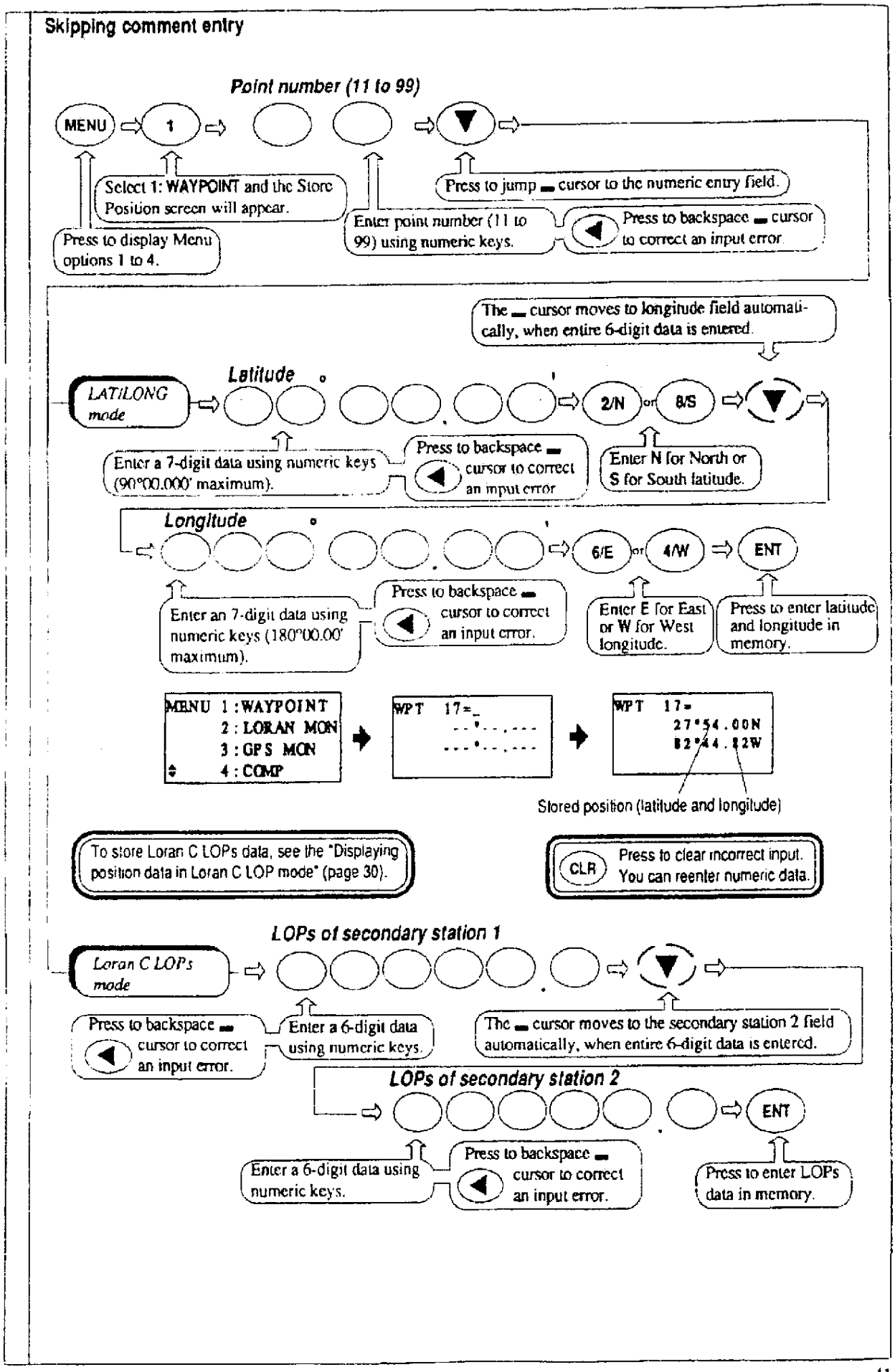
CLR Press to clear incorrect input. You can reenter numeric data.

Enter a 6-digit data using numeric keys.

◀ Press to backspace ▬ cursor to correct an input error.

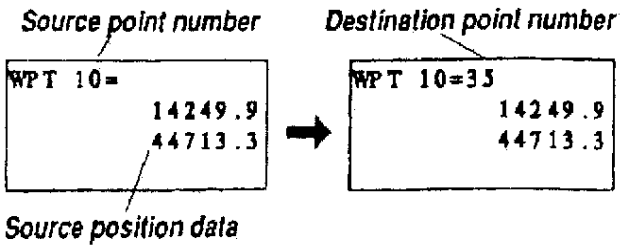
Press to enter LOPs data in memory.

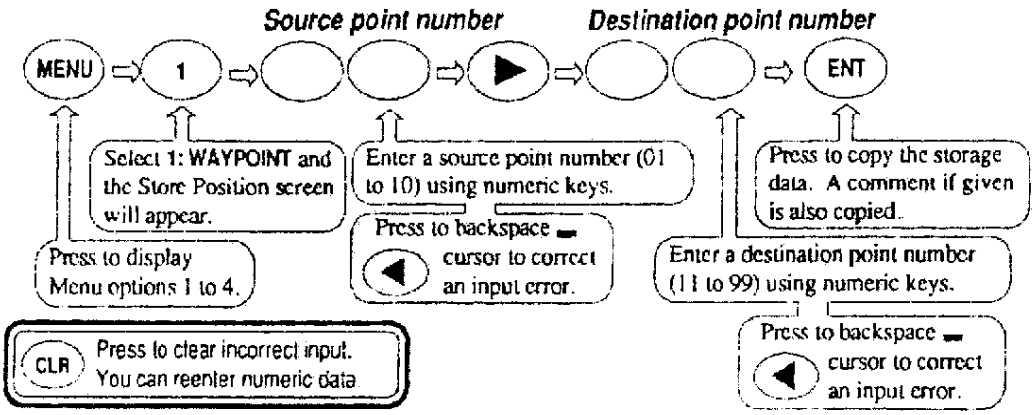
Skipping comment entry



Copying between memory areas

You can store up to 10 event points in memory by event function. When you store more than 10 points, the oldest points are overwritten by a new point. However, you can copy important data to Mark Storage area (point numbers 11 to 99) and keep them permanently. You can also copy the position data in the Mark storage area (11 to 99) and change or edit it.

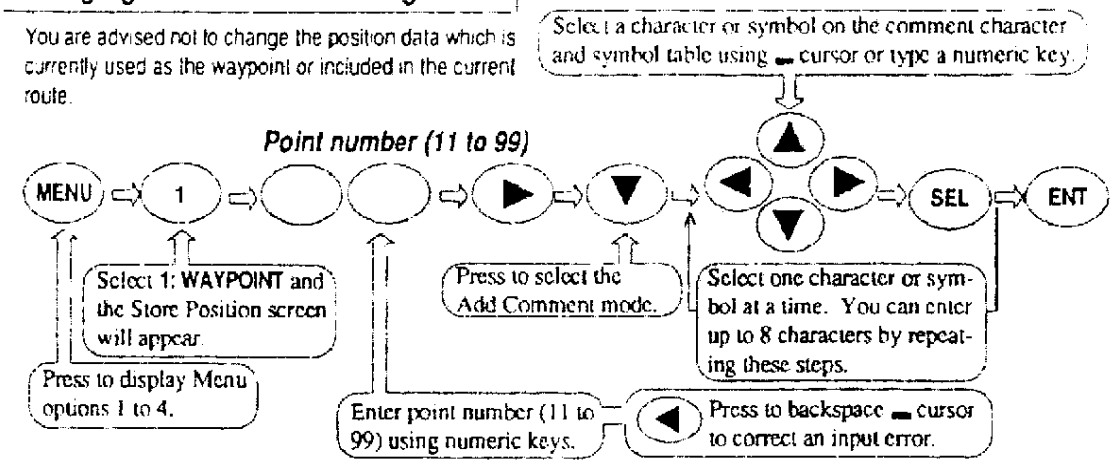


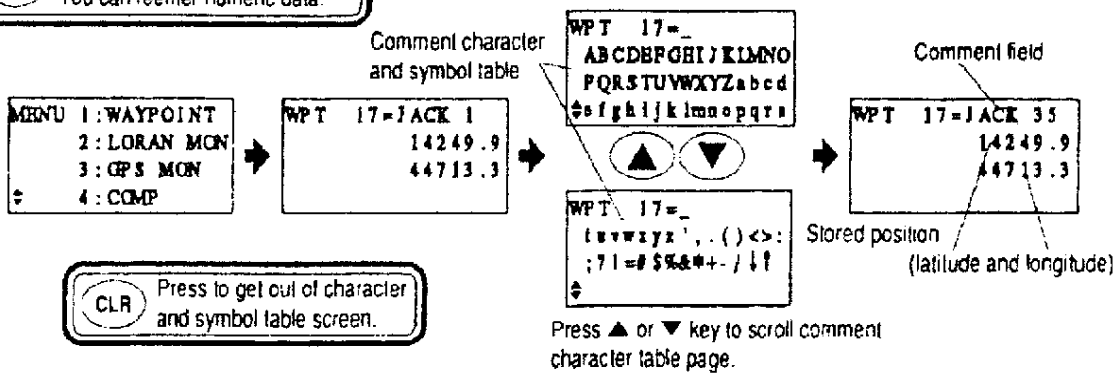


Warning! Check the position data existing at the destination point number. That data is replaced by this operation. Copy important data to another area first.

Changing a comment of storage data

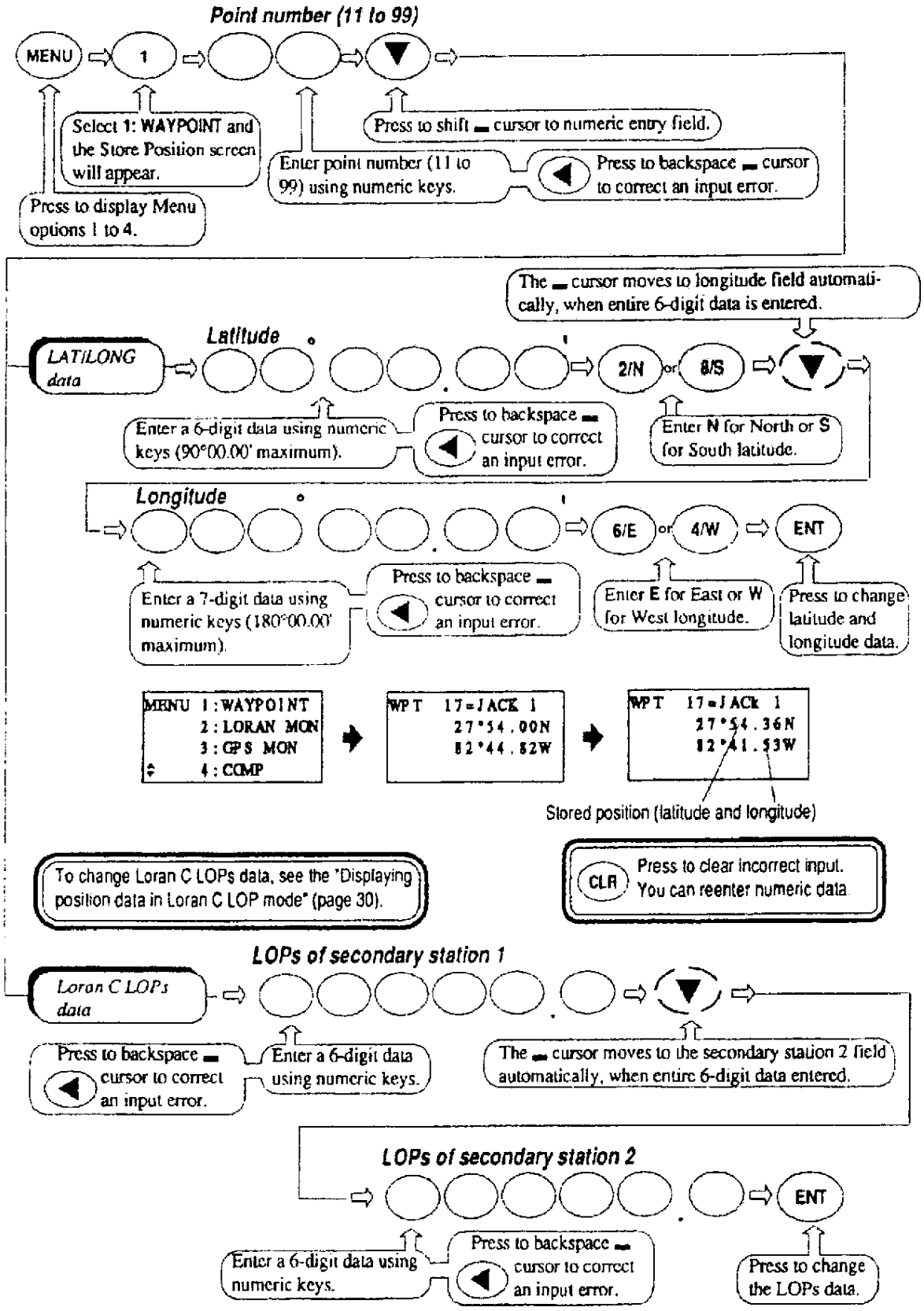
You are advised not to change the position data which is currently used as the waypoint or included in the current route.





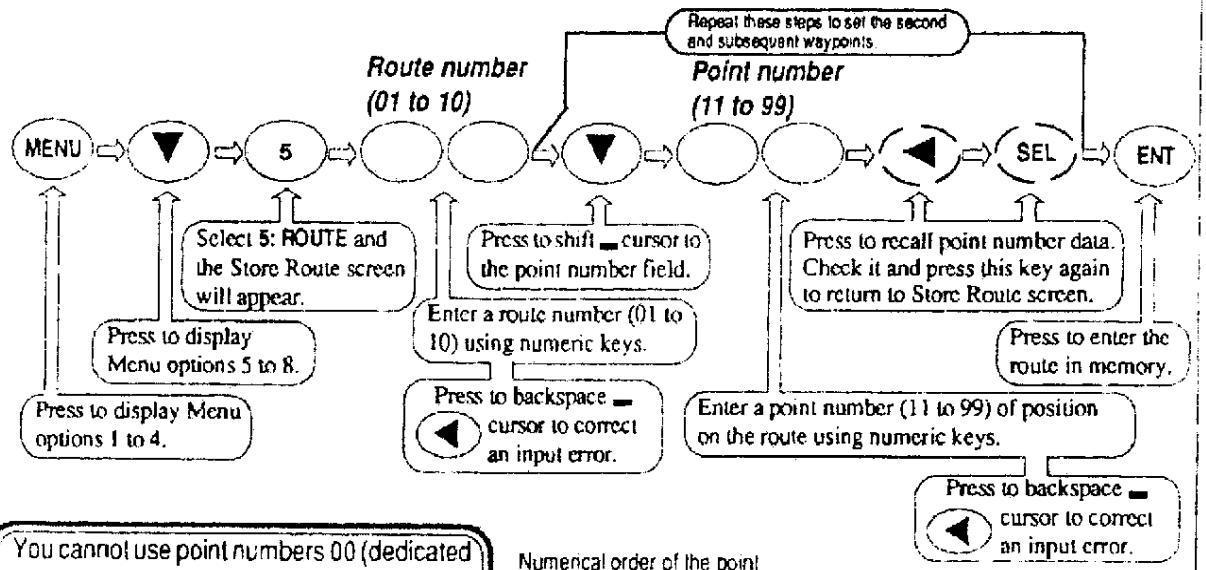
Changing position data

You are advised not to change the position data which position data which is currently used as the waypoint or included in the current route.

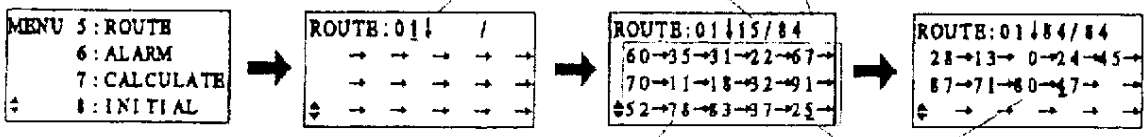


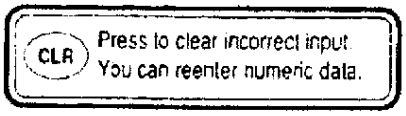
Storing navigation route

You can use up to 89 points on up to 10 routes (01 to 10), or you can store all 89 points on a single route.
You must store waypoints of a route in advance, as you need to specify point number during route storage.

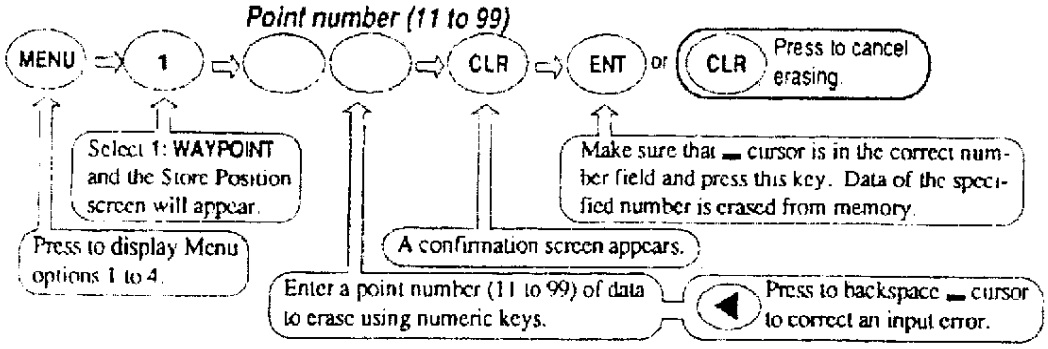


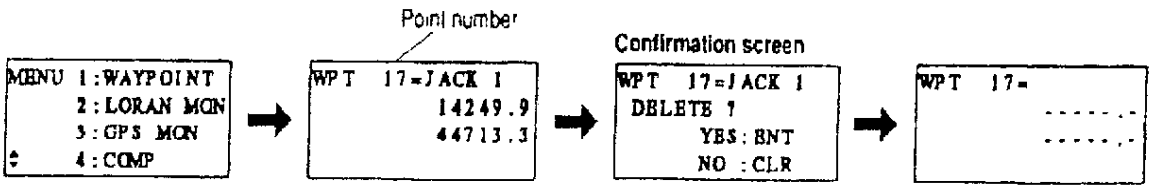
You cannot use point numbers 00 (dedicated to MOB) and 01 to 10 (dedicated to event storage) during route storage.



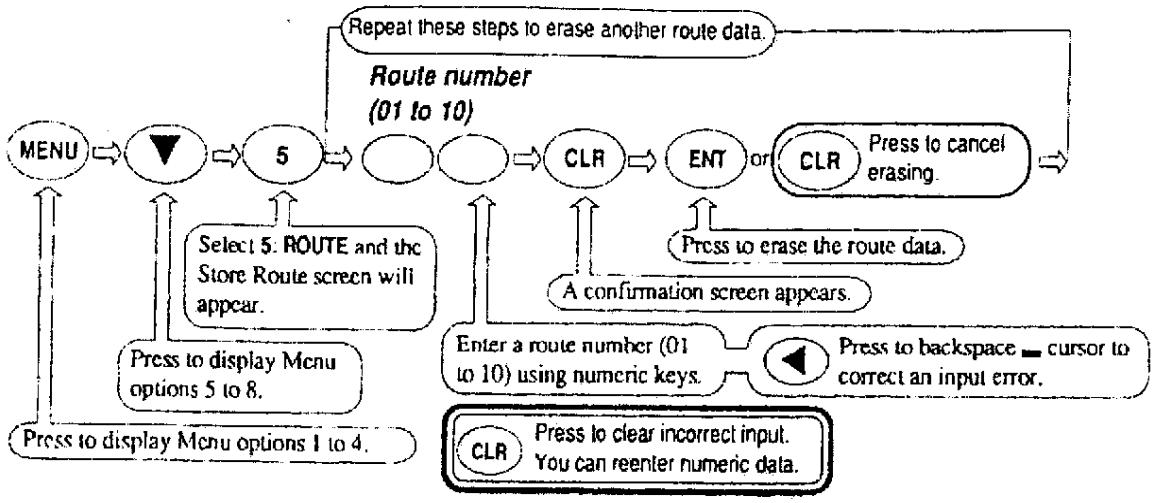


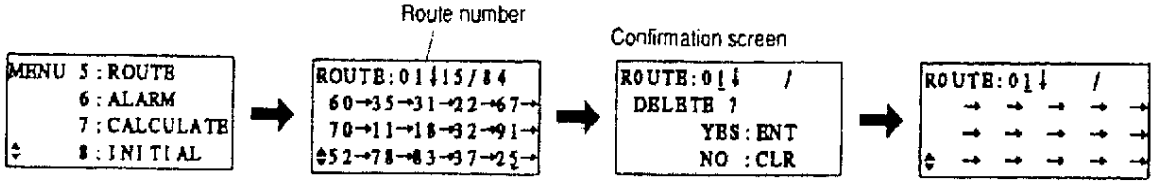
Erasing a single point of position data





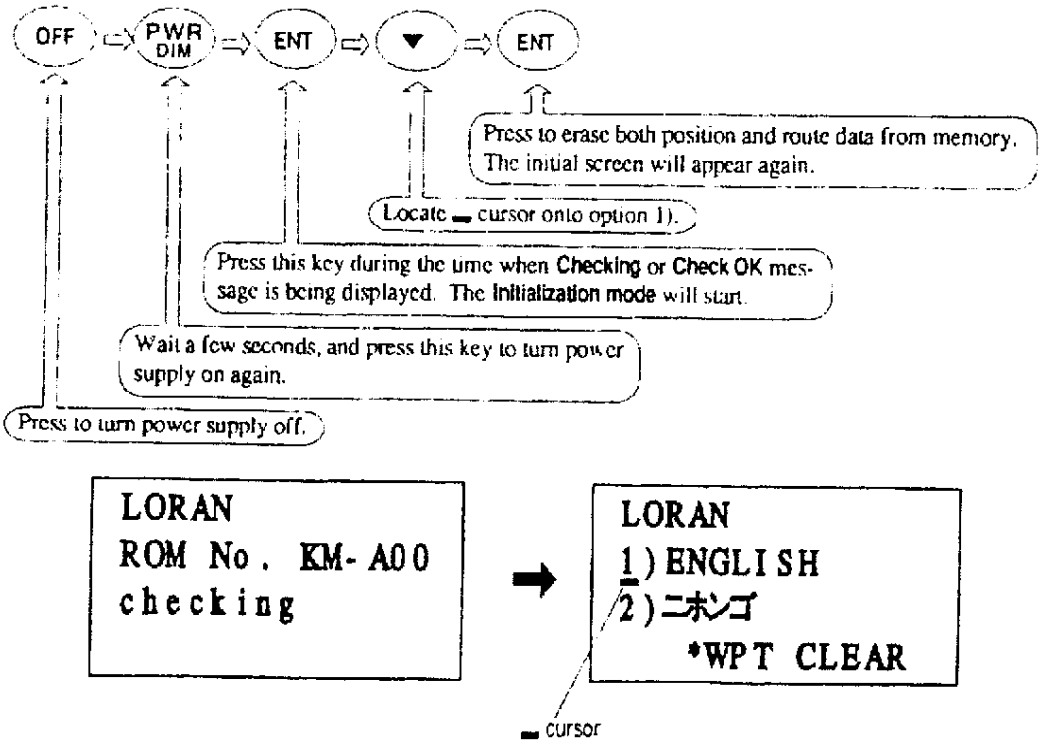
Erasing a single route of data





Data of specified route number (01 in this example) is erased from memory

Erasing entire data from memory



Setup of Waypoints

The positional data of each waypoint must be registered prior to setting up waypoints. Then specify the point number via NAV 2 menu to allow the waypoints to be set.

Point number (17)

```
NAV1   27°54.00N
W 17   82°41.67W
SPEED     15.0kt
COURSE     359.9°
```

NAV1 screen

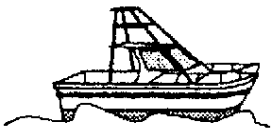
Point number (17)

```
NAV2      0.00
W 17      :00:
WPT   17=JACK 1
15.0kt    359.9°
```

NAV2 screen

Setting waypoint navigation

Use waypoint navigation to sail to a single point as the destination.



Waypoint (17)

Note:
If you have modified waypoint data in memory, you must set the waypoint navigation again.

Point number

MODE ⇨ SEL ⇨ ( ) ( ) ⇨ ENT

- MODE: Press until NAV2 screen appears.
- SEL: Press until WPT= appears.
- ( ) ( ): Enter a point number (00 to 99) using numeric keys.
- ENT: Press to set the point as WPT.

```
NAV2
        :  :
OFF
15.0kt    359.9°
```

→

```
NAV2
        :  :
WPT     =
15.0kt    359.9°
```

→

Point number

```
NAV2
W       :  :
WPT   17=JACK 1
15.0kt    359.9°
```

→

Waypoint number

```
NAV2      0.00
W 17      :00:
WPT   17=JACK 1
15.0kt    359.9°
```

Recalling a waypoint

You can recall and check the present waypoint on the Menu screen during waypoint or route navigation.

Point number

MENU ⇨ 1 ⇨ ( ) ( )

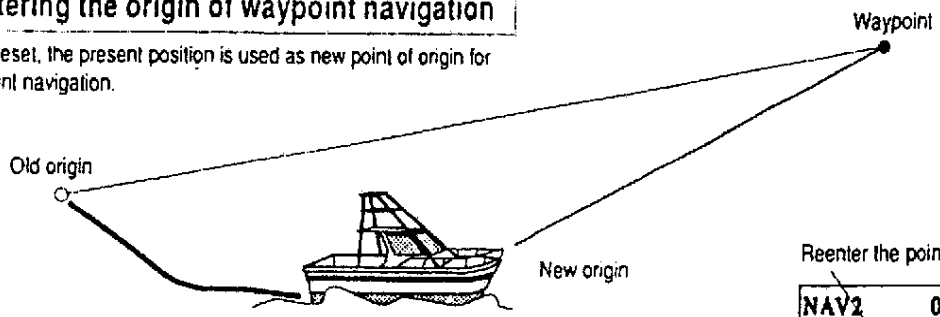
- MENU: Press to display Menu options 1 to 4.
- 1: Select 1:WPT.
- ( ) ( ): Enter a point number (00 to 99) using numeric keys.

WPT position

```
WPT   17=JACK 1
      14249.9
      44713.3
```

Reentering the origin of waypoint navigation

Once reset, the present position is used as new point of origin for waypoint navigation.



Reenter the point number.

```
NAV2        0.00
W 17        :00:
WPT  17=JACK 1
15.0kt    359.9°
```

MODE ⇨ SEL ⇨ ENT

Press until NAV2 screen appears.

Press until WPT= appears.

Press to set the point as WPT.

NAV1 screen during waypoint navigation

```
NAV1        14248.8
W 17        44713.8
SPEED       15.0kt
COURSE        359.9°
```

Present position (LAT/LONG or Loran C LOPs)

The last figures blink during positioning interruption

Waypoint number

See page 6 to select a desired column.

NAV2 screen during waypoint navigation

```
NAV2        0:72>>>
W 17        :   :31
WPT  17=JACK 1
  0.2kt     329.2°
```

Cross track error (XTE) (See page 18.)

Course deviation angle (See page 18.)

Waypoint number

Point number used as the waypoint

Comment

Speed

Course

Canceling waypoint navigation

To cancel waypoint navigation, turn WPT to OFF on NAV2 screen.

MODE ⇨ SEL ⇨ ENT

Press until NAV2 screen appears.

Press until OFF screen appears.

Press to confirm.

"WP" and numbers are cleared (Display Off).

```
NAV2
            :   :
OFF
15.0kt    359.9°
```

"OFF" message appears.

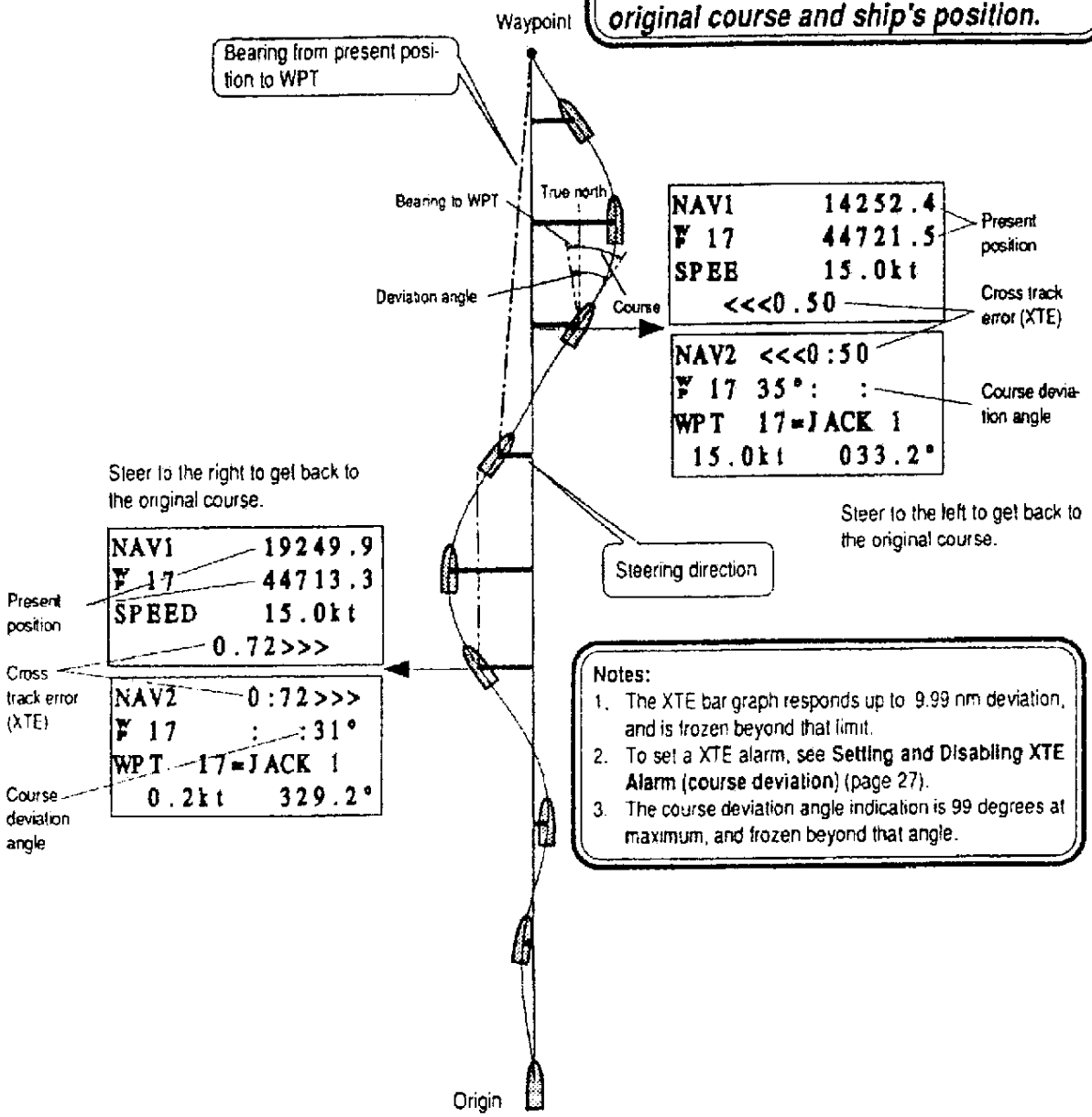
"WP" and number are cleared.

```
NAV1        14248.8
            44713.8
SPEED       15.0kt
COURSE        359.9°
```

Cross track error and course deviation angle

Check the cross track error (XTE) and course deviation angle together with the distance and bearing to the waypoint during navigation. You have to set the waypoint or route navigation to utilize these pieces of navigational information.

This chart gives a relationship between original course and ship's position.



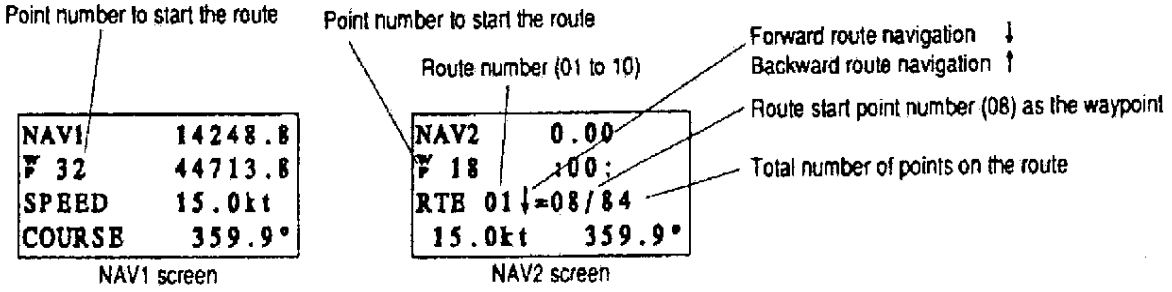
Notes:

1. The XTE bar graph responds up to 9.99 nm deviation, and is frozen beyond that limit.
2. To set a XTE alarm, see **Setting and Disabling XTE Alarm (course deviation)** (page 27).
3. The course deviation angle indication is 99 degrees at maximum, and frozen beyond that angle.

XTE amount	Steer to Left			Steer to Right		
0.00 nm	0.00			0.00		
0.01 to 0.09 nm	<0.01	to	<0.09	0.01>	to	0.09>
0.10 to 0.49 nm	<<0.10	to	<<0.49	0.10>>	to	0.49>>
0.50 to 0.99 nm	<<<0.50	to	<<<0.99	0.50>>>	to	0.99>>>
1.00 nm or more	<<<<1.00	to	<<<<9.99	1.00>>>>	to	9.99>>>>

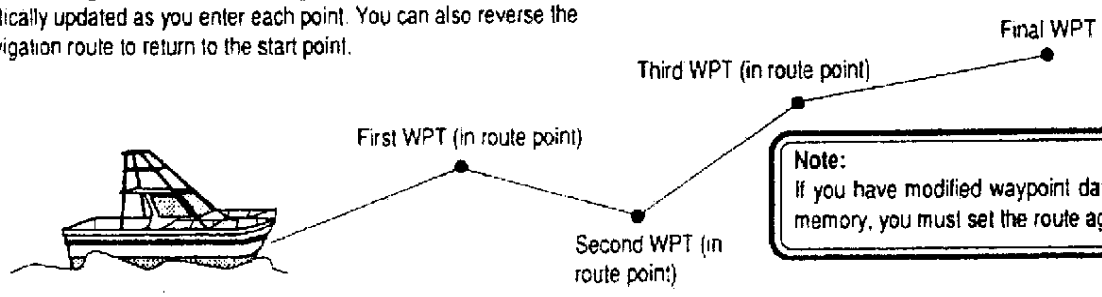
Route Setup

Following procedure shows how to set up new navigation route using previously entered route number and route point number. Specify the first waypoint in NAV2 screen, by entering the registered route and route point number respectively. If you want to trace back the route, direction of navigation can be reversed.

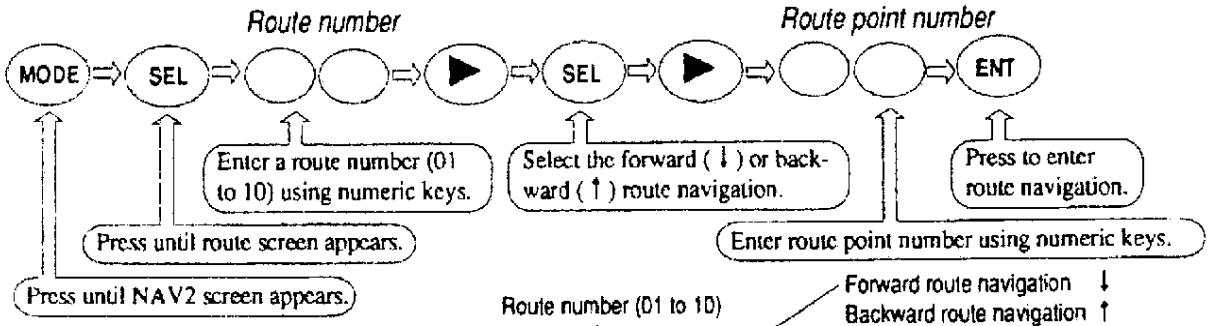


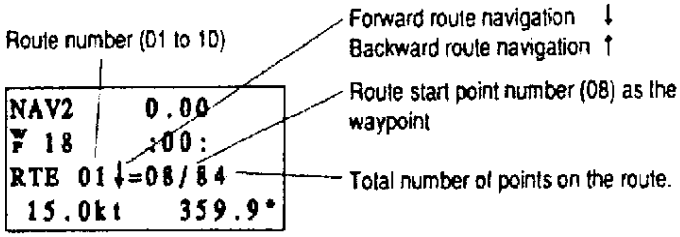
Selecting route navigation

You can navigate on a route following the route point, which is automatically updated as you enter each point. You can also reverse the navigation route to return to the start point.

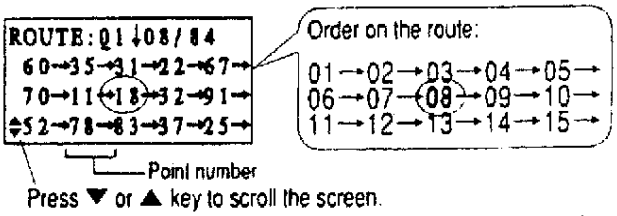


Note:
If you have modified waypoint data in memory, you must set the route again.





What is the route point number?



A route point number is the numerical order to the point numbers previously entered.

Route point numbers during forward and reverse navigation

```
ROUTE:01↓08/84
 60→35→31→22→67→
 70→11→18→32→91→
↕52→78→83→37→25→
```

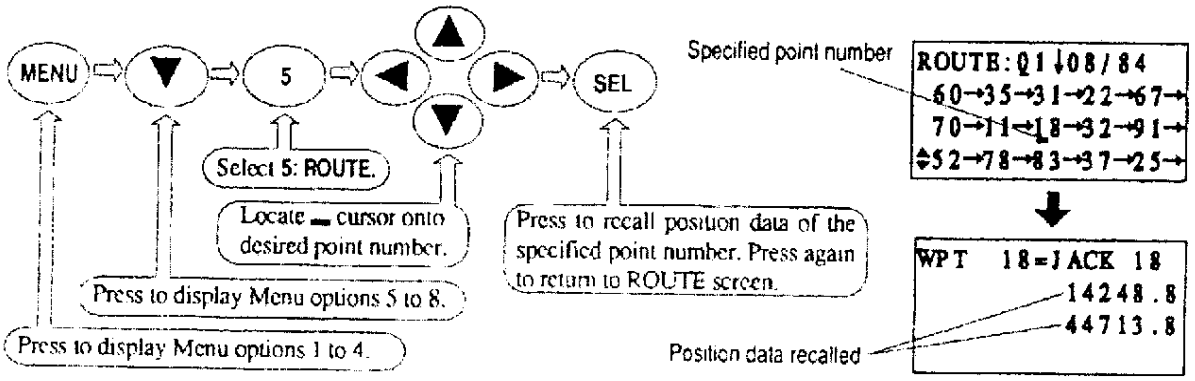
WPT numbers during route setup
60→35→31→22→67→
70→11→(18)→32→91→
52→78→83→37→25→(Continued to next screen page)

If you activate a route at point number 18 (route point number 08), the forward (↓) and backward (↑) navigation are as follows:

Forward (↓) navigation	Backward (↑) navigation
(18)→32→91→52→78→83→37→25→(Continued to next screen page)	(18)→11→70→67→22→31→35→60

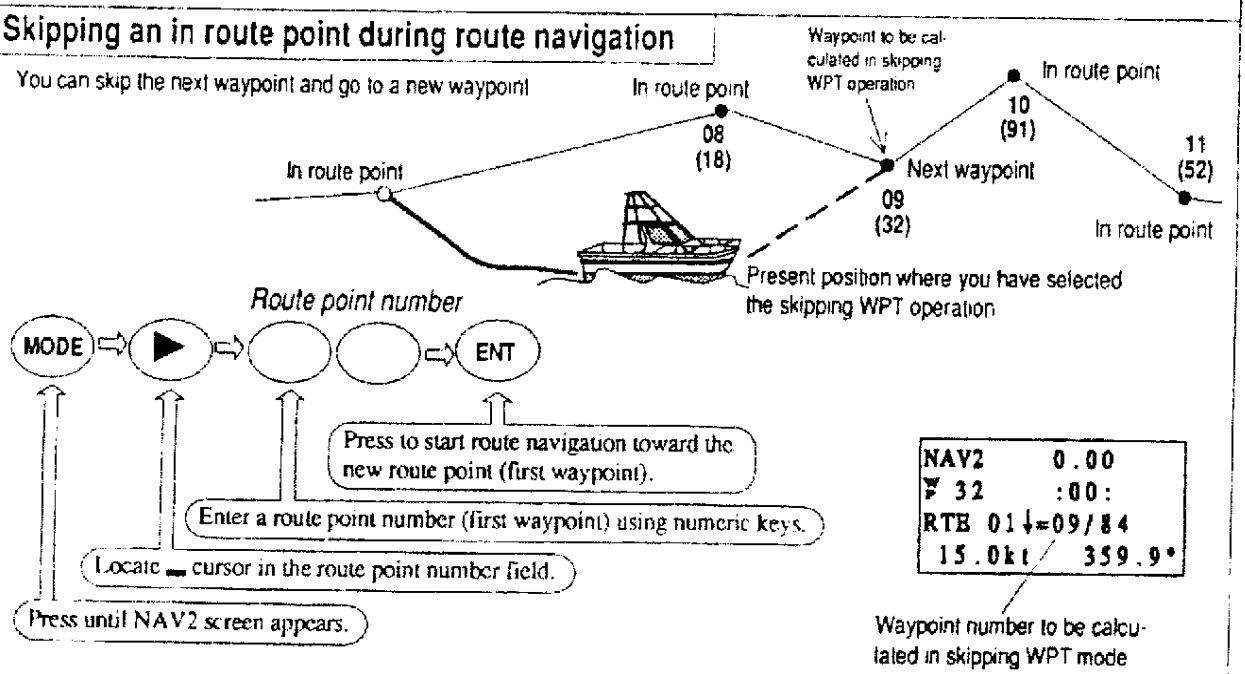
Checking a route position or a route point position

You can check a route and its points in the Menu screen.

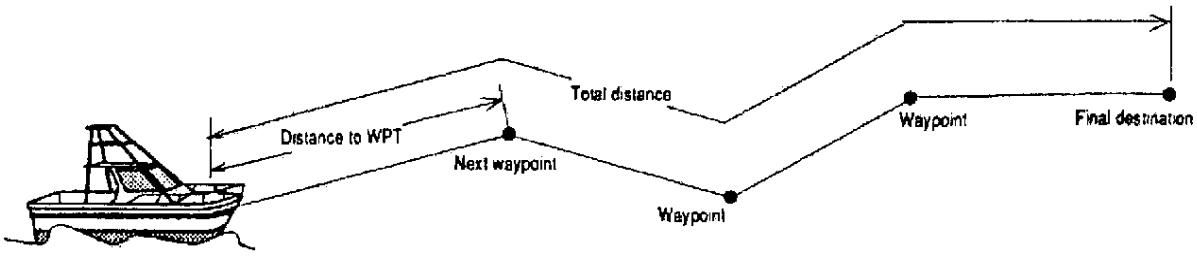


Skipping an in route point during route navigation

You can skip the next waypoint and go to a new waypoint

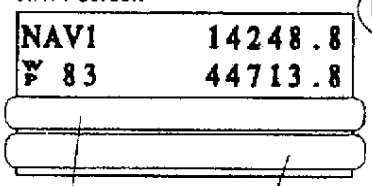


Switching between distance to WPT and total distance

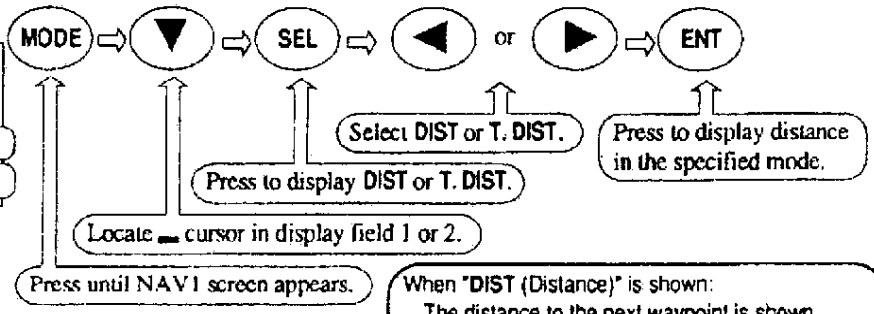


To switch the display between the distance (**DIST**) to the next waypoint and the total distance (**T. DIST**) to the final destination:

NAV1 screen

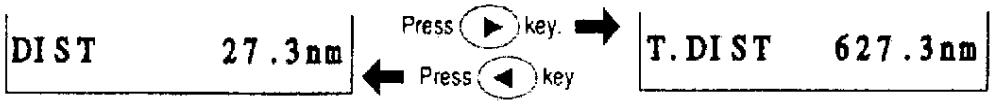


Display field 1 Display field 2

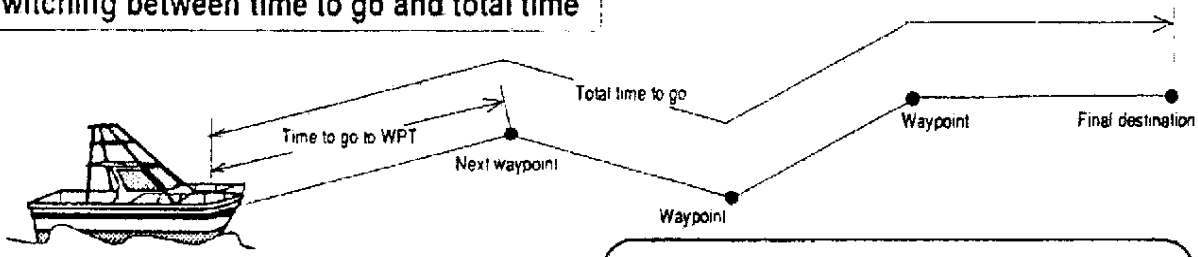


When "**DIST** (Distance)" is shown:
The distance to the next waypoint is shown.
When "**T.DIST** (Total Distance)" is shown:
The total distance required to arrive at the final destination is shown (9999 nm, sm , km maximum).

9999	Positioning has failed or the required distance has exceeded 9999 nm, sm, or km.



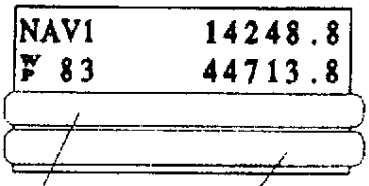
Switching between time to go and total time



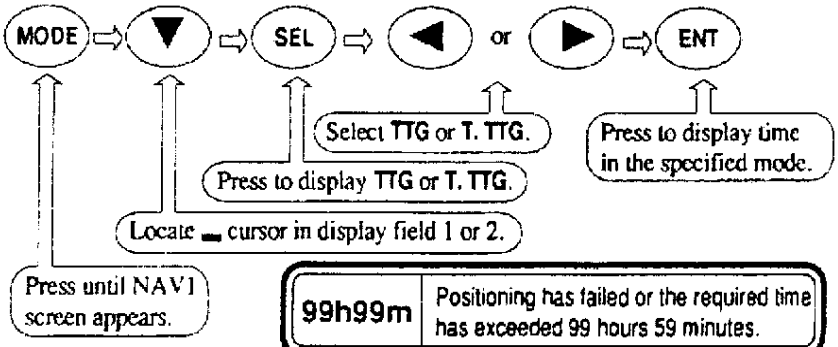
To switch the display between the time to go (**TTG**) to the next waypoint and the total time (**T.TTG**) required to the final destination:

When "**TTG** (Time to Go)" is shown:
The time to go to the next waypoint is shown.
When "**T.TTG** (Total Time)" is shown:
The total time required to arrive at the final destination is shown (99 hours 59 minutes maximum).

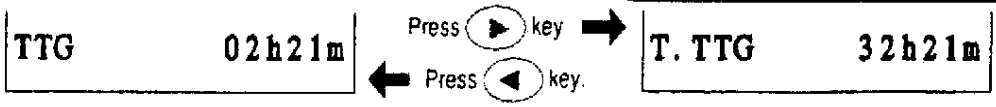
NAV1 screen



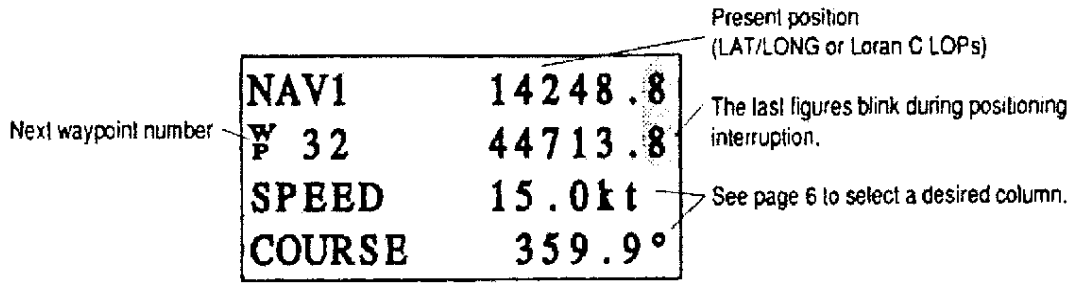
Display field 1 Display field 2



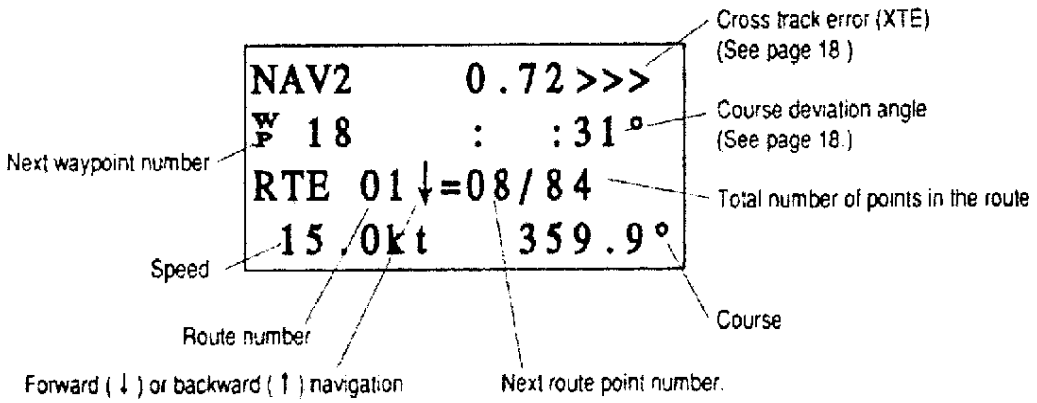
99h99m	Positioning has failed or the required time has exceeded 99 hours 59 minutes.



NAV1 screen during route navigation

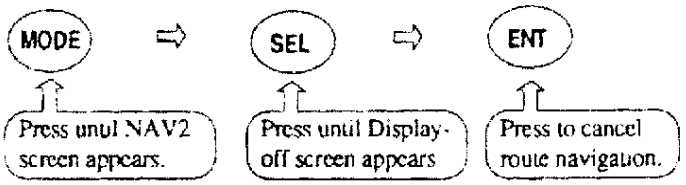


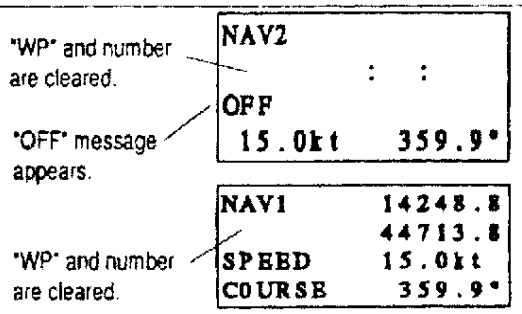
NAV2 screen during route navigation



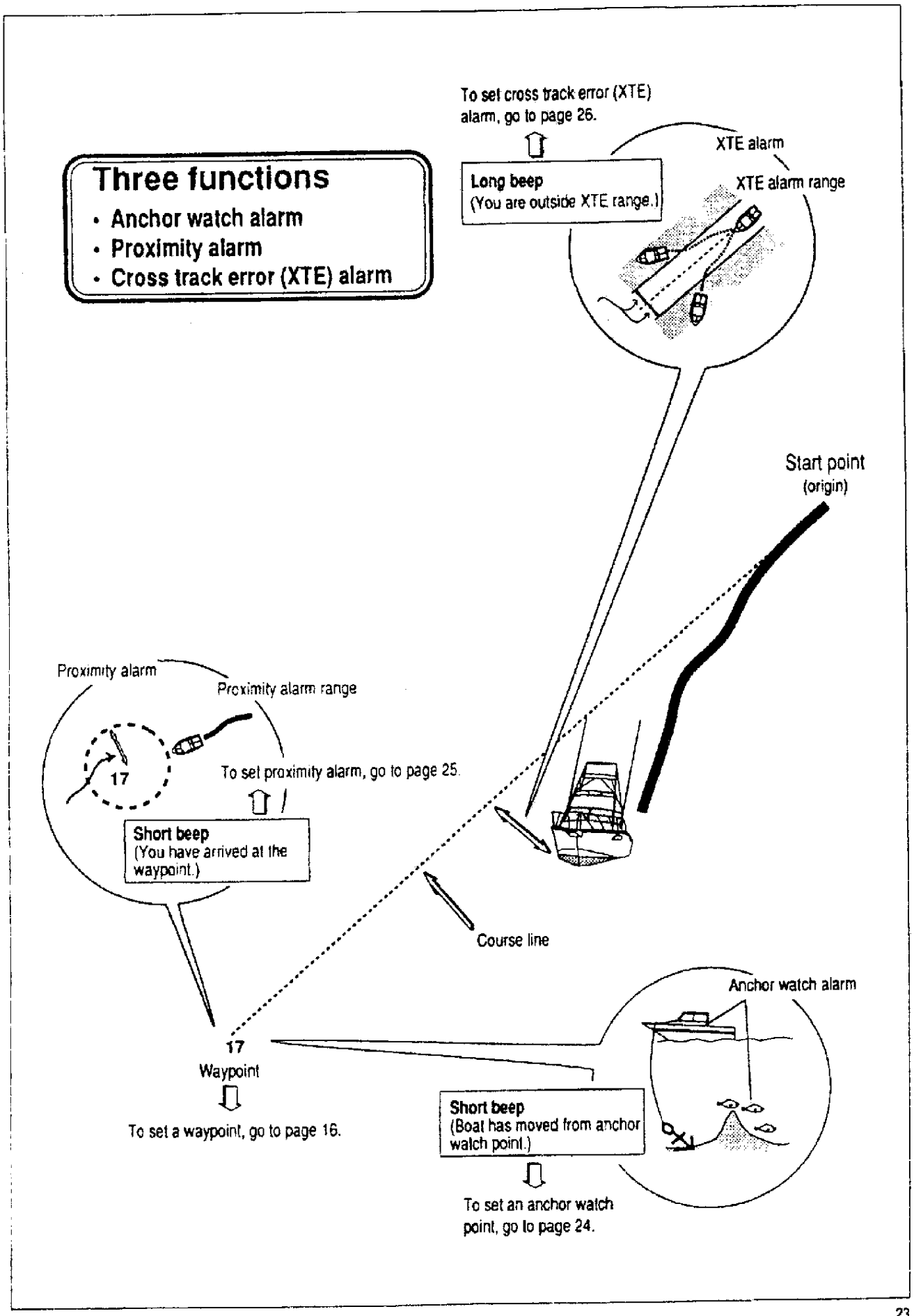
Canceling the route navigation

To cancel route navigation, get NAV2 display off screen and press ENT.





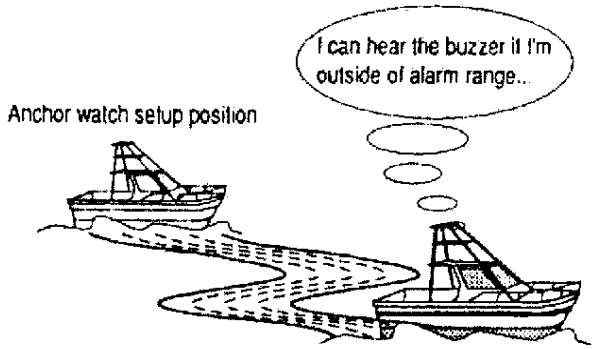
Alarms

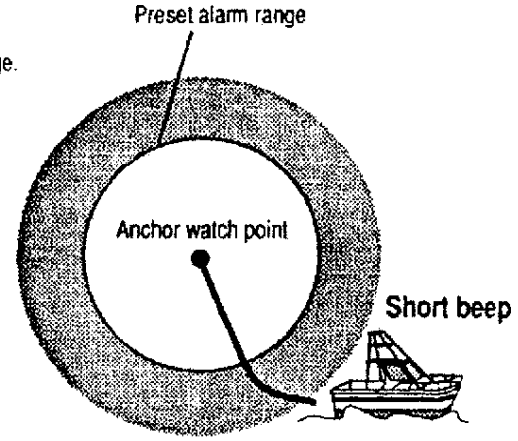

Three functions
• Anchor watch alarm
• Proximity alarm
• Cross track error (XTE) alarm
To set cross track error (XTE) alarm, go to page 26.
Long beep
(You are outside XTE range.)
XTE alarm
XTE alarm range
Start point
(origin)
Proximity alarm
Proximity alarm range
17
To set proximity alarm, go to page 25.
Short beep
(You have arrived at the waypoint.)
Course line
Anchor watch alarm
17
Waypoint
To set a waypoint, go to page 16.
Short beep
(Boat has moved from anchor watch point.)
To set an anchor watch point, go to page 24.

Setting and Disabling an Anchor Watch Alarm

What is an anchor watch alarm?

The buzzer sounds when boat has moved outside of anchor watch alarm range.





Setting an anchor watch alarm range

MENU ⇨ ▼ ⇨ 6/E ⇨ 3 ⇨ ○ ○ ○ ⇨ ENT

- MENU: Press to display Menu options 1 to 4.
- ▼: Press to display Menu options 5 to 8.
- 6/E: Select 6: ALARM.
- 3: Select 6-3: ANCW.
- ○ ○ ○: Enter an alarm range (0.01 to 9.99) using numeric keys.
- ENT: Press to set.

CLR: Press to clear incorrect input. You can reenter numeric data.

cursor

```
MENU 5 : ROUTE
     6 : ALARM
     7 : CALCULATE
     8 : INI TI AL
```

```
6-1 : XTE      0.00
  2 : PROX     0.00
  3 : ANCW     2.00
```

Anchor watch alarm range

Setting the anchor watch alarm

MODE ⇨ SEL ⇨ ENT

- MODE: Press until NAV2 screen appears.
- SEL: Press until anchor watch screen appears.
- ENT: Press to set.

CLR: Press to temporarily stop the alarm sound.

cursor

```
NAV2
          :  :
OFF
10.2kt     270.5°
```

```
NAV2       1.00
          :  :
ANCW
10.2kt     270.5°
```

The anchor watch alarm is canceled when you set the NAV2 screen to "OFF" mode, "WPT" mode for waypoint navigation setup, or "ROUTE" mode for route navigation setup.

Disabling the anchor watch alarm

MENU ⇨ ▼ ⇨ 6/E ⇨ 3 ⇨ CLR

- MENU: Press to display Menu options 1 to 4.
- ▼: Press to display Menu options 5 to 8.
- 6/E: Select 6: ALARM.
- 3: Select 6-3: ANCW.
- CLR: Alarm range is reset to 0.00 and the anchor watch alarm is canceled.

cursor

```
MENU 5 : ROUTE
     6 : ALARM
     7 : CALCULATE
     8 : INI TI AL
```

```
6-1 : XTE      0.00
  2 : PROX     0.00
  3 ANCW       0.00
```

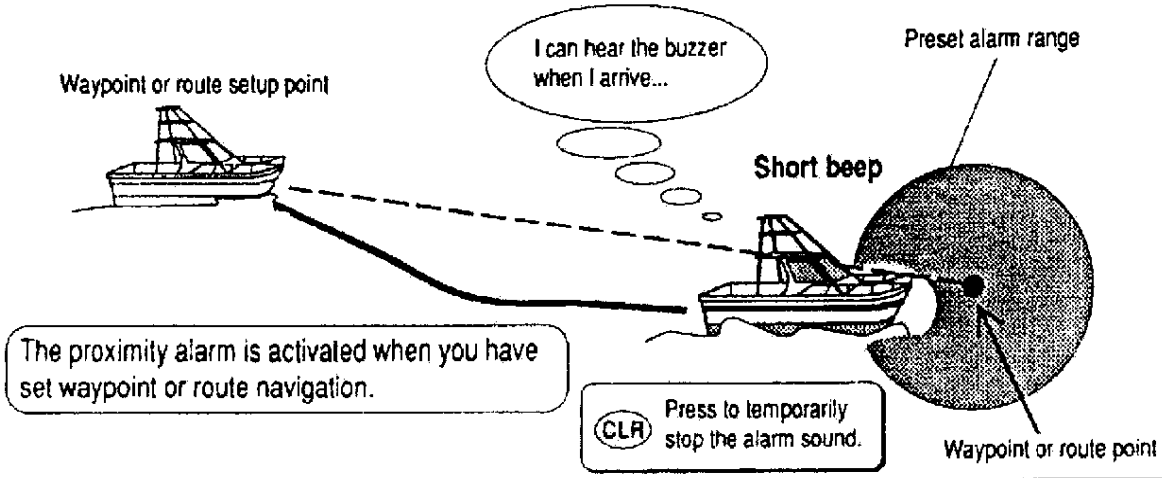
Anchor watch alarm range

When a proximity alarm or an XTE alarm is set, the anchor watch alarm is canceled automatically.

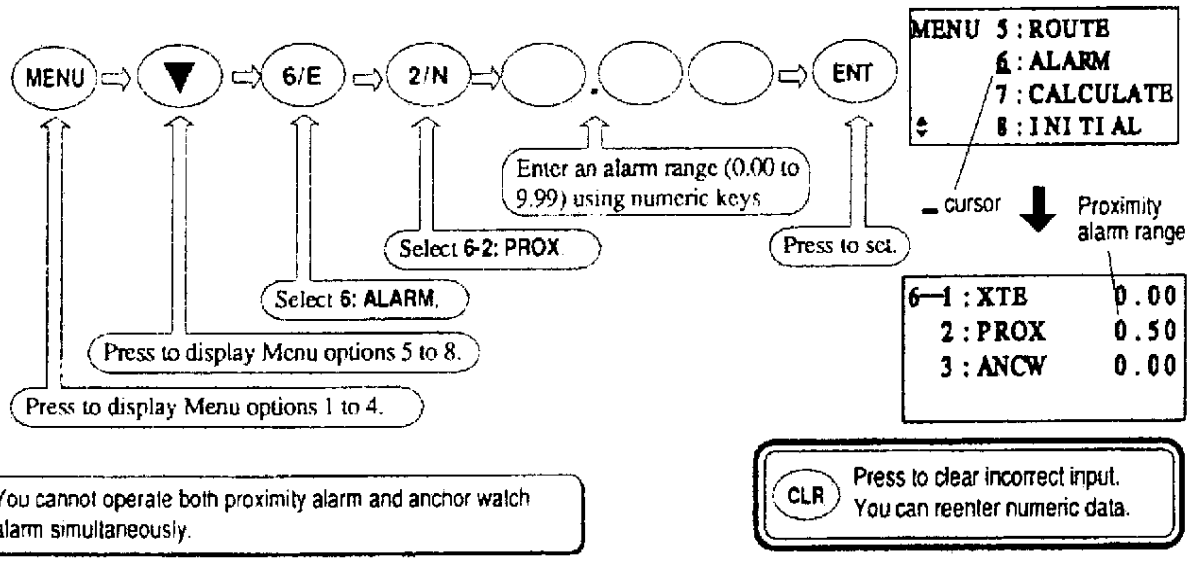
Setting and Disabling a Proximity Alarm

What is a proximity alarm?

The buzzer sounds when you have arrived at the waypoint during waypoint or route navigation. This alarm is set automatically when you have selected the waypoint or route navigation. However, the proximity alarm does not operate if its alarm range is set to 0.00 or if an anchor watch alarm has been set. (Initial set :0.00)

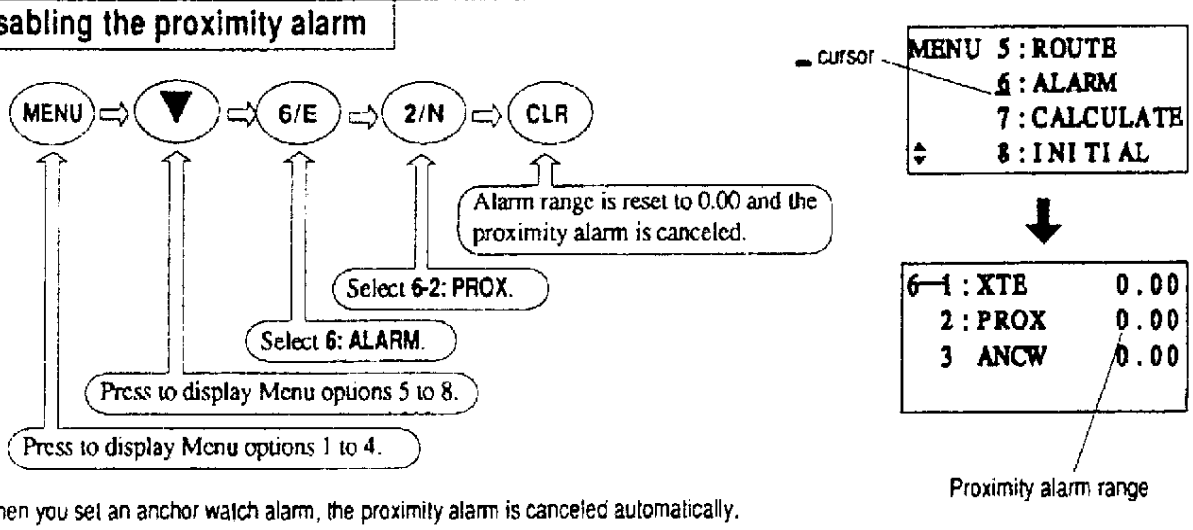


Setting a proximity alarm range



You cannot operate both proximity alarm and anchor watch alarm simultaneously.

Disabling the proximity alarm

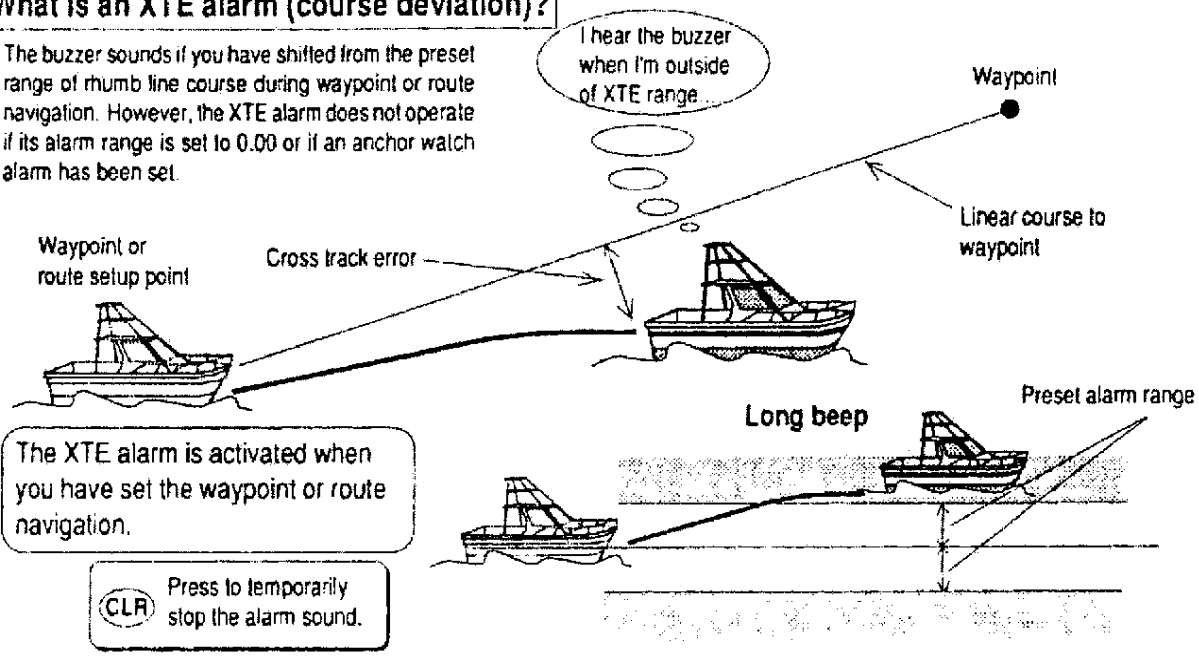


When you set an anchor watch alarm, the proximity alarm is canceled automatically.

Setting and Disabling an XTE Alarm

What is an XTE alarm (course deviation)?

The buzzer sounds if you have shifted from the preset range of rhumb line course during waypoint or route navigation. However, the XTE alarm does not operate if its alarm range is set to 0.00 or if an anchor watch alarm has been set.



The XTE alarm is activated when you have set the waypoint or route navigation.

CLR Press to temporarily stop the alarm sound.

Setting an XTE alarm range

MENU ⇨ ▼ ⇨ 6/E ⇨ 1 ⇨ ◯ . ◯ ◯ ⇨ ENT

Enter an alarm range (0.00 to 9.99) using numeric keys.

Press to set.

Select 6-1: XTE.

Select 6: ALARM.

Press to display Menu options 5 to 8.

Press to display Menu options 1 to 4.

```
MENU 5 : ROUTE
     6 : ALARM
     7 : CALCULATE
     8 : INITIAL
```

cursor

XTE alarm range

```
6—1 : XTE      2.00
  2 : PROX     0.00
  3 : ANCW     0.00
```

You cannot operate both XTE alarm and anchor watch alarm simultaneously.

CLR Press to clear incorrect input. You can reenter numeric data.

Disabling the XTE alarm

MENU ⇨ ▼ ⇨ 6/E ⇨ 1 ⇨ CLR

Alarm range is reset to 0.00 and the XTE alarm is canceled.

Select 6-1: XTE.

Select 6: ALARM.

Press to display Menu options 5 to 8.

Press to display Menu options 1 to 4.

cursor

```
MENU 5 : ROUTE
     6 : ALARM
     7 : CALCULATE
     8 : INITIAL
```

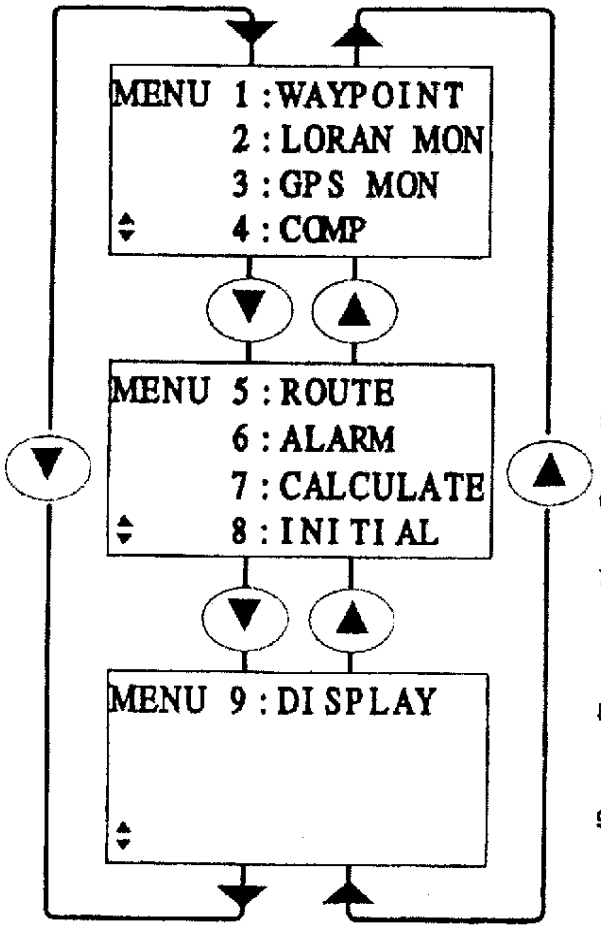
```
6—1 : XTE      0.00
  2 : PROX     0.00
  3 ANCW       0.00
```

XTE alarm range

When you set an anchor watch alarm, the XTE alarm is canceled automatically.

Setup Procedure

Menu options

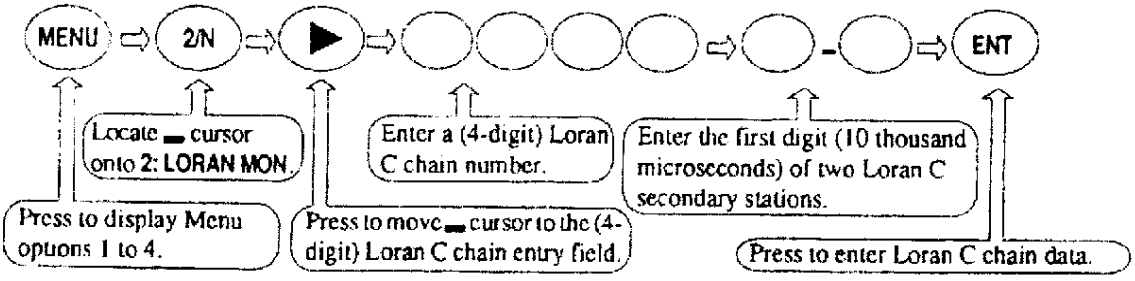


1. **WAYPOINT**
   Store, edit, copy, and erase waypoints.
   (see pages 9 to 18).
2. **LORAN MON (Loran C monitor)**
   Displays Loran C signal reception status
   Enters chain number and secondary stations.
   Shifts master, secondary 1 or secondary 2, signal tracking point in 10 µsec steps.
   Resets whole, secondary 1 or secondary 2 signal reception for reacquisition.
3. **GPS MON (GPS monitor)**
   Displays GPS signal reception status by satellite numbers and DOP figure.
4. **COMP (Correction and compensation)**
   Latitude/Longitude position correction
   LOPs position correction (ASF correction)
   Compass bearing compensation
5. **ROUTE**
   Store, set, cancel, and erase a route
   (see pages 10 to 15 and 19 to 22)
6. **ALARM**
   Enter alarm range and inhibit alarms for XTE alarm, proximity alarm, and anchor watch alarms
7. **CALCULATE (Calculation)**
   Distance and bearing between two points
   Position conversion from LAT/LONG to LOPs
   Position conversion from LOPs to LAT/LONG
   LOPs position conversion from one chain to the other chain
8. **INITIAL (Initial setup)**
   Sets average constant.
   Select distance and speed units.
   Select data output format and edit NMEA-0183 format.
9. **DISPLAY (Display setup)**
   Select the position indication (LAT/LONG or Loran C LOPs)
   Select position source (Loran C or GPS)
   Setup real time conversion from the receiving chain to a different chain.

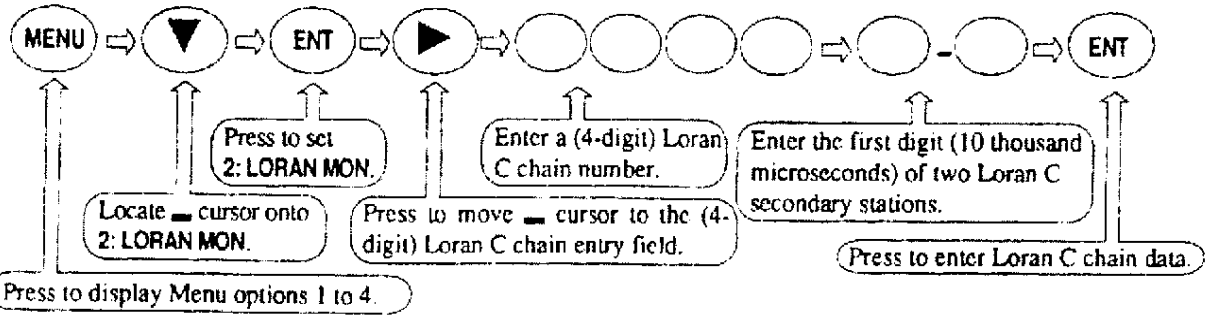
Selecting a Menu option

You can select an option on the Menu screen in two ways: by direct numeric number entry and by selection using ▬ cursor. This section explains numeric key entry for easy understanding, but you can also use the cursor for option selection. The following compares these two methods when you enter Loran C chain number and secondary station pair (page 28) as an example:

Numeric number entry

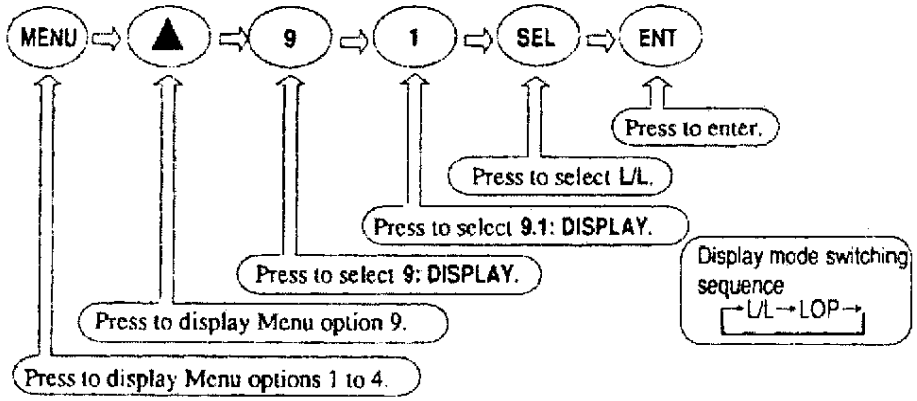


▬ cursor selection



Displaying position data in LAT/LONG mode

You can select LAT/LONG position by following operation.



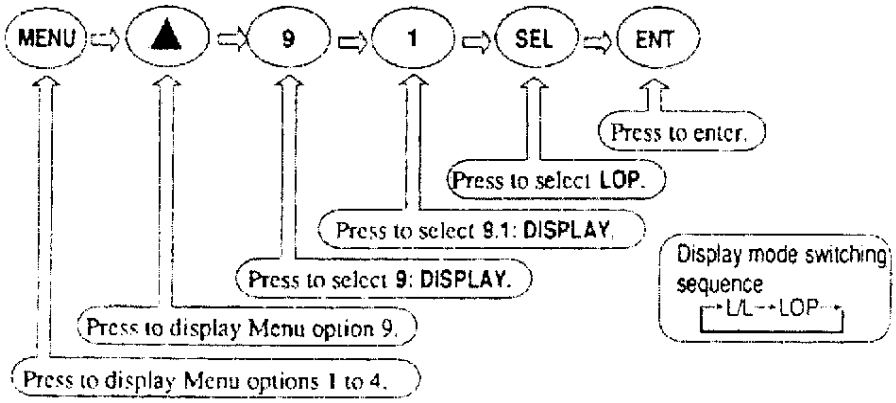

```
MENU 9 : DISPLAY
```

```
9—1 : DISPLAY    L/L
  2 : POSITION   LR
  3 : LOP.CONV   OFF
```

L/L

Displaying position data in Loran C LOP mode

You can select LOP position by following operation.

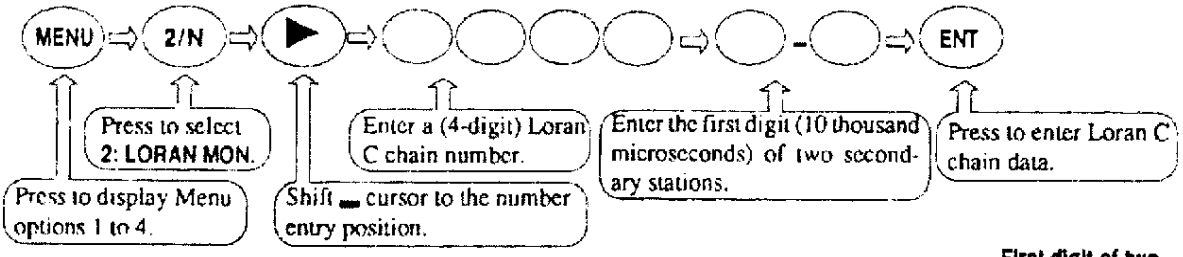



```
MENU 9 : DISPLAY
```

```
9—1 : DISPLAY    LOP
  2 : POSITION   LR
  3 : LOP.CONV   OFF
```

LOP

Entering Loran C chain number and secondary stations



Correction of input error

◀ ▶ Locate _ cursor onto incorrect number and enter correct one.

CLR Press to clear incorrect input. You can reenter numeric data.

```
MENU 1 : WAYPOINT
     2 : LORAN MON
     3 : GPS MON
     4 : COMP
```

Chain number — First digit of two secondary stations

```
2 : LORAN 7980 1-4
  MASTER   068 O
  20071.5  059 O
  55747.3  078 O
```

Display LOPs of different chain

When an old Loran C chain is replaced by a new chain, position in the new chain can be converted into LOPs in the old chain and displayed as a special function. If you have position information previously obtained by LOPs in the old chain and prefer to operate in the old chain, this function gives you the accustomed old chain operation as if you still have the old chain.

MENU ⇨ ▲ ⇨ 9 ⇨ 3 ⇨ SEL ⇨ ENT ⇨ ○○○○ ⇨ ○-○ ⇨ ENT

- Press to display Menu options 1 to 4.
- Press to display Menu options 9.
- Select 9: DISPLAY.
- Select 9-3: LOP. CONV.
- Change to ON.
- Enter chain number (4-digit) of the old chain.
- Enter the most significant digit (10 thousand microseconds) of two secondary stations.
- Press to enter Loran C chain data.

Correction of input error

◄ ► Locate _ cursor onto incorrect number and enter correct one.

```
MENU 9 : DISPLAY
```

➡

```
9—1 : DISPLAY   LOP
  2 : POSITION  LR
  3 : LOP. CONV ON
    7930  1-4
```

Chain number

First digit of two secondary stations

Enter your LOP positions in the old chain into waypoint memories to utilize them.

How to return to normal operating chain

MENU ⇨ ▲ ⇨ 9 ⇨ 3 ⇨ SEL ⇨ ENT

- Press to display Menu options 1 to 4.
- Press to display Menu options 9.
- Select 9: DISPLAY.
- Select 9-3: LOP. CONV.
- Change to OFF.
- Press to enter.

Monitoring Loran C signal reception

Loran C signal receiving status is monitored.

MENU ⇨ 2/N

- Select 2: LORAN MON.
- Press to display Menu options 1 to 4.

```
2 : LORAN 7980  1-4
  MASTER    058  O
  20071.5   059  O
  55747.3   078  O
```

Chain number and secondary combination in use.

- Acceptable if 0 or 1 is displayed — It may show number bigger than 2 in the vicinity of the station
- Acceptable if 1 to 9 is displayed — Better with bigger number
- Acceptable if bigger than the left number

X: No good CS
O Good CS

Changing the distance or speed unit

You can change the measuring unit of distance and speed which are simultaneously converted.

```
8—1 : AVERAGE  3
  2 : UNIT     nm
  3 : FORMAT
  4 : GPS SET
```

_ cursor

MENU ⇨ ▼ ⇨ 8/S ⇨ 2/N ⇨ SEL ⇨ ENT

- Press to display Menu options 1 to 4.
- Press to display Menu options 5 to 8.
- Select 8: INITIAL.
- Select 8-2: UNIT.
- Press until desired distance or speed appear.
- Press to enter the selected unit.

Unit switching sequence

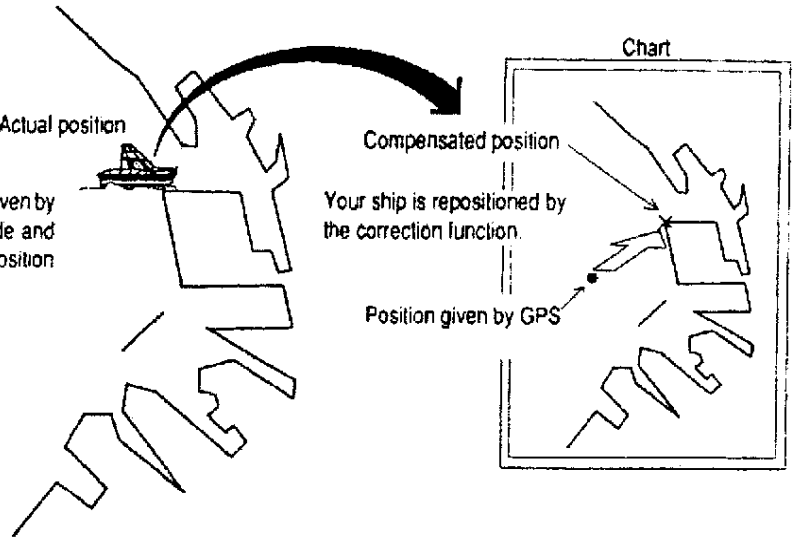
nm → kt → km/h → mph → nm (SEL)

Unit conversion

	km	nm	sm
1 km		0.540	0.622
1 nm	1.852		1.152
1 sm	1.609	0.869	

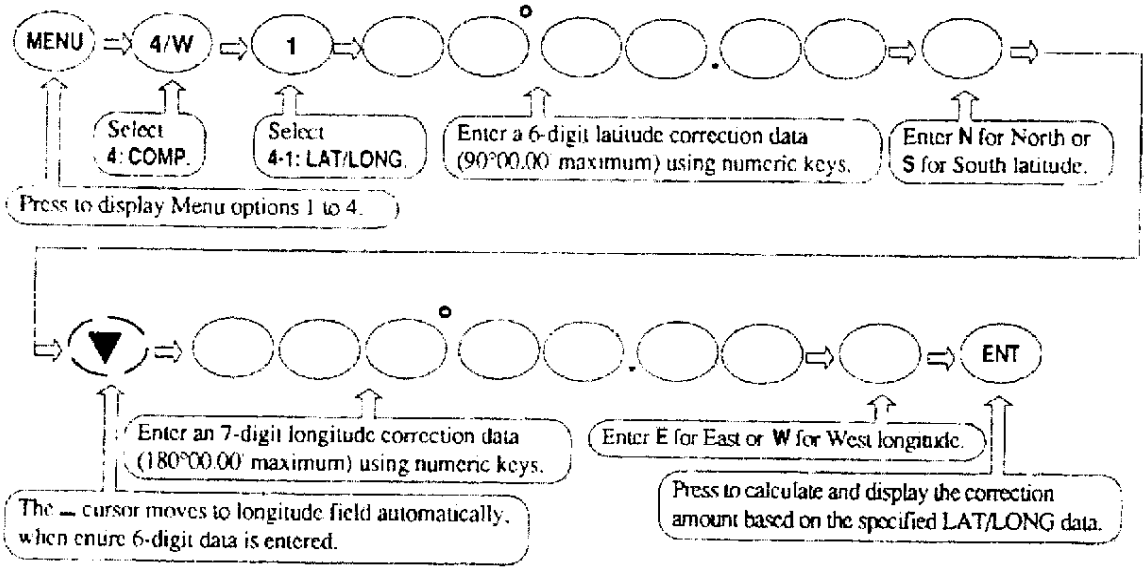
Correcting your position

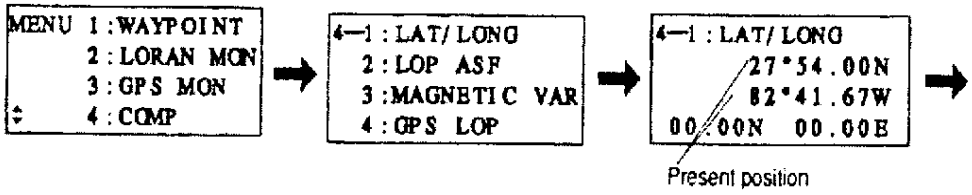
You can compensate your present position given by GPS as follows. To do so, enter the latitude and longitude (or Loran C LOPs) of your actual position using numeric keys



Correction by LAT/LONG data entry

When your present position is shown in LAT/LONG mode, you can correct it by entering the LAT/LONG correction data.

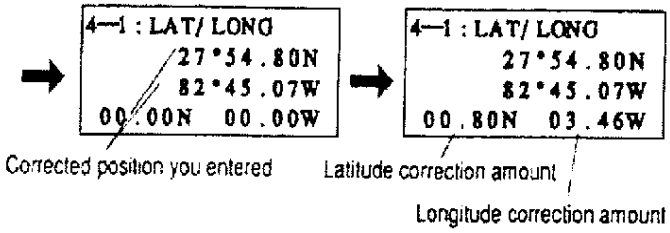




Correction of input error

Locate _ cursor onto incorrect number and enter correct one.

CLR — Press to clear incorrect input. You can reenter numeric data.

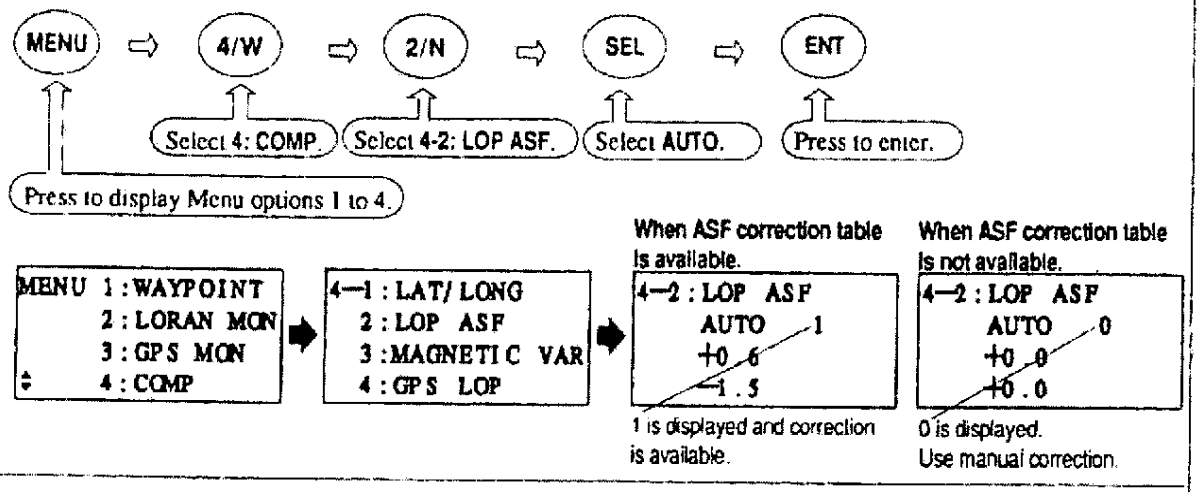


Present position				Entered position				Correction amount		
Latitude	27°	54.00	N	Latitude	27°	54.80	N	Latitude	00.80	N
Longitude	82°	41.61	W	Longitude	82°	45.07	W	Longitude	03.46	W

Correcting LOP by ASF (Additional Secondary Factor)

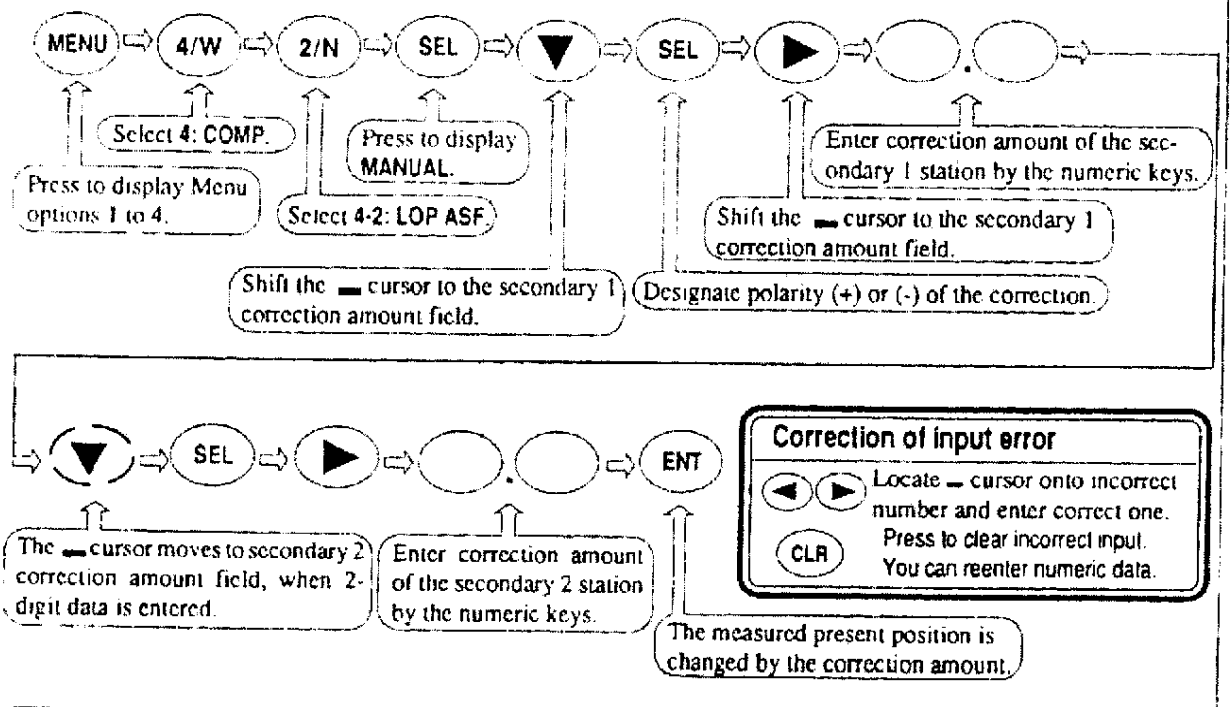
There is some discrepancy between actual measured LOPs and a Loran C chart. This is caused by the fact that a Loran C signal from a Loran C station travels slower on the land than on the sea and LOP lines are distorted while a Loran C chart is nealy theoretically computered. Correction against this discrepancy by land pass is called ASF correction (Additional Second Factor). This correction has both manual and automatic (limited to the chains with published correction tables) compensation.

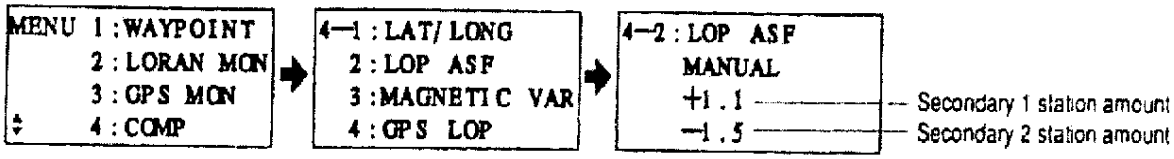
Automatic correction



Manual correction

If correct LOPs are known and difference in LOP with measured LOPs is 0.1 to 9.9 μsec, use take following operation. If compensation by ±10 μsec steps is required, perform operation "**LOP correction by 10 μsec steps**" (see page 33).



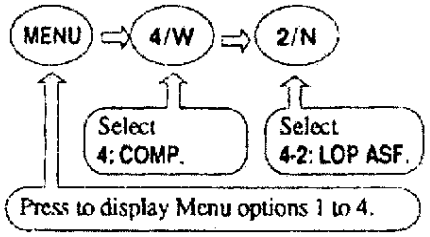


Present position	Correction amount	Corrected position
Secondary 1 station 14248.8 μsec	Secondary 1 station +1.1 μsec	Secondary 1 station 14249.9 μsec
Secondary 2 station 44713.8 μsec	Secondary 2 station —1.5 μsec	Secondary 2 station 44712.3 μsec

Check the correction amount

You can check the correction amount as follows.

Loran C LOPs mode

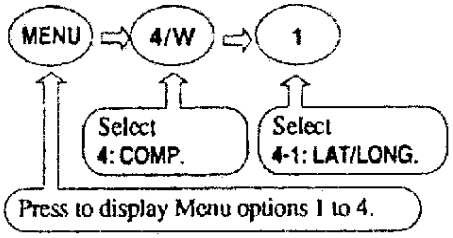



```
4—2 : LOP  ASF
      MANUAL
      +1 . 1
      —1 . 5
```

Your position has been corrected by 1.5 microseconds to the secondary.

Your position has been corrected by 1.1 microseconds to the other secondary.

LAT/LONG mode



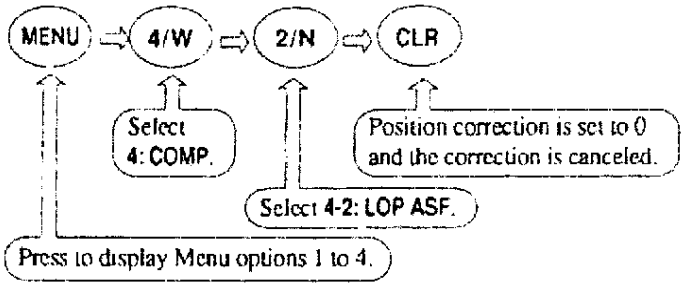

```
4—1 : LAT/ LONG
        27°54 . 80N
        82°45 . 07W
 00 . 80N   03 . 46W
```

The correction amount of 00.80' northward and 03.46' westward are shown.

Cancel the position correction

You can cancel the position correction as follows:

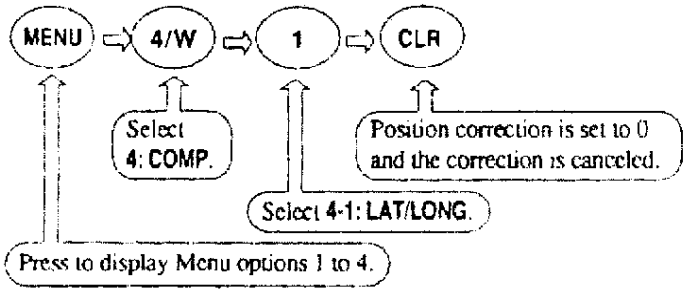
Loran C LOPs mode (ASF Correction)




```
4—2 : LOP  ASF
      MANUAL
      +0 . 0
      +0 . 0
```

Position correction has been cleared.

LAT/LONG mode




```
4—1 : LAT/ LONG
        27°54 . 00N
        82°41 . 67W
 00 . 00S   00 . 00W
```

Position correction has been cleared.

LOP correction by 10 μsec steps

10 μsec or multiple of 10 μsec error of LOP is observed in the fringe coverage area or by influence of surrounding noise. (Cycle selection error). This phenomenon opts to happen to the farthest station signal.

NAV1	14248.8
	44713.8
SPEED	15.0kt
COURSE	359.9°

Fig. 1 LOP display example

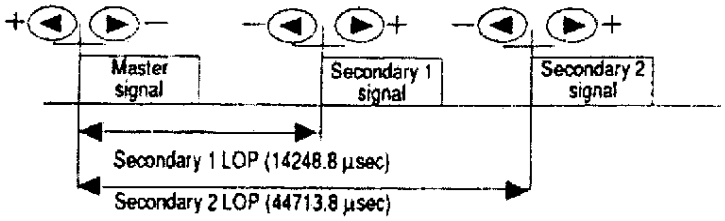
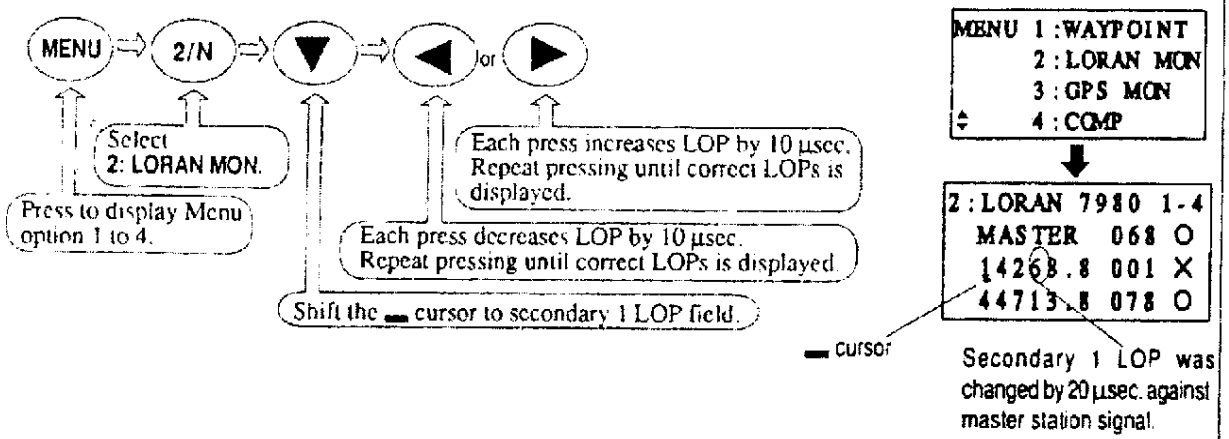


Fig. 2 Master and secondary signals and LOPs

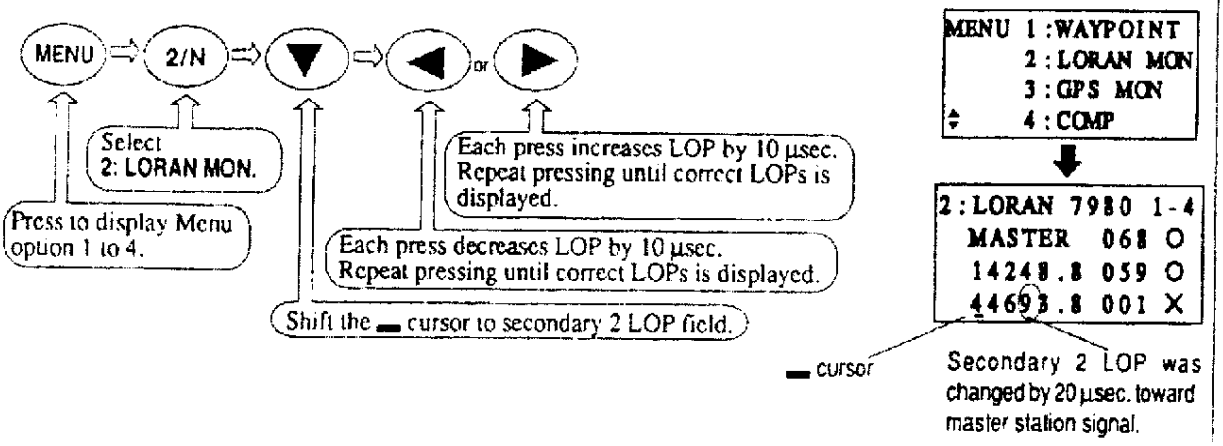
As indicated by Fig. 1 and Fig. 2, relationship of LOP error direction is opposite between master and secondary signals and correction of error requires some skill to find which station is to be corrected. Generally speaking, there is a station with strong signal level among received master and two secondary stations and usually the strongest station is locked in to the correct cycle (LOP). Station with error is decided by following procedure based on the above fact.

If either secondary 1 or secondary 2 has cycle selection error, the secondary with error displays incorrect LOP.
If both secondary 1 and 2 have cycle selection error, both secondaries display incorrect LOPs.
If master has cycle selection error, LOPs of both secondary 1 and 2 have error equivalent to the master error.
If master and one of secondaries have cycle selection error, the secondary with error displays correct or less erroneous LOP, as if it is locked on the correct cycle. On the contrary, the station locked on the correct cycle displays erroneous LOP.

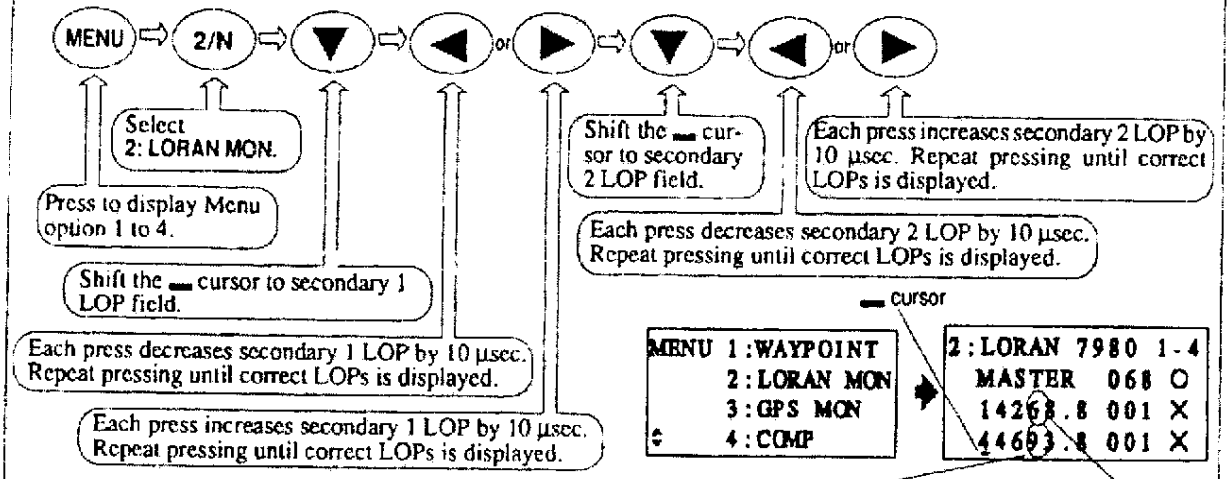
Correction of secondary 1



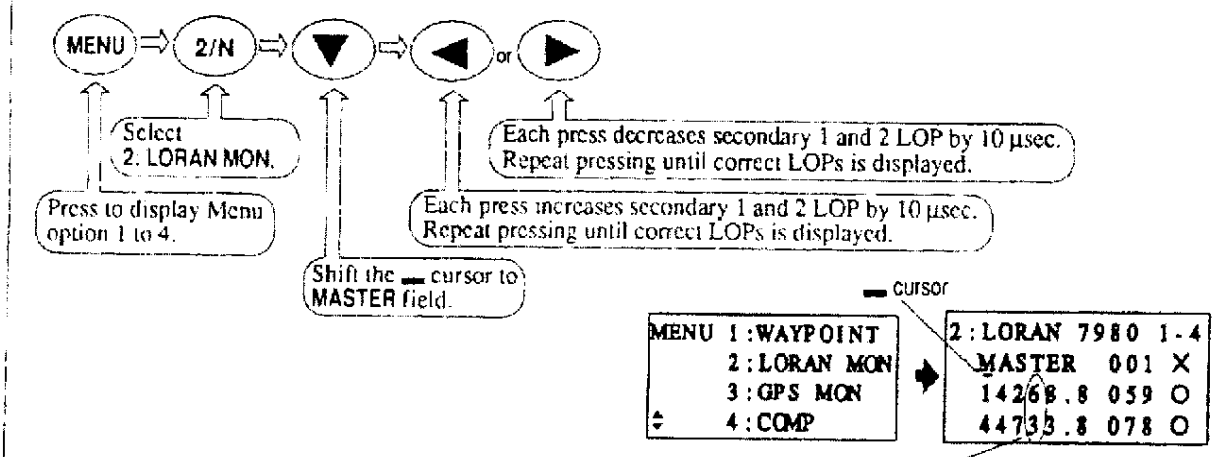
Correction of secondary 2



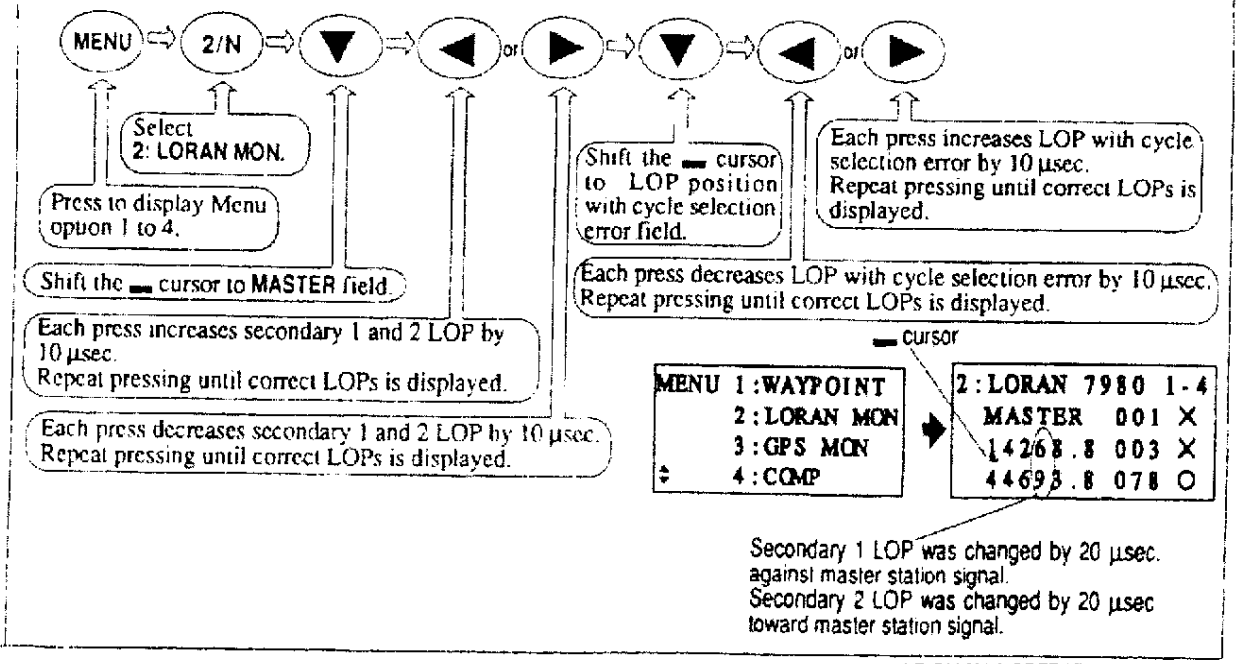
Correction of both secondary 1 and 2



Correction of master



Correction of master and secondary 1 or 2

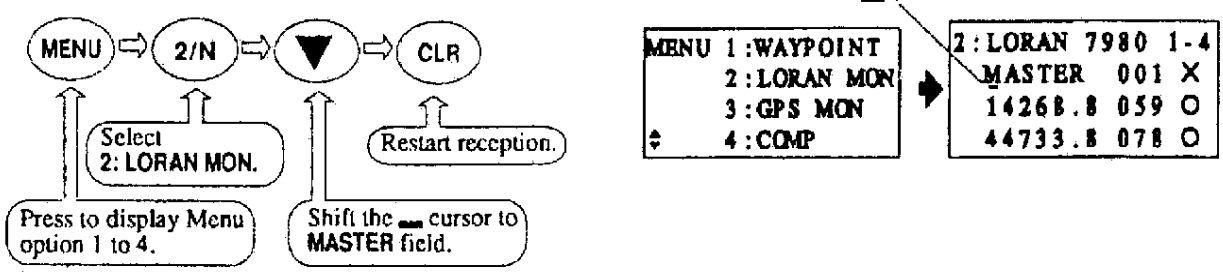


Restarting the navigator for acquisition and tracking

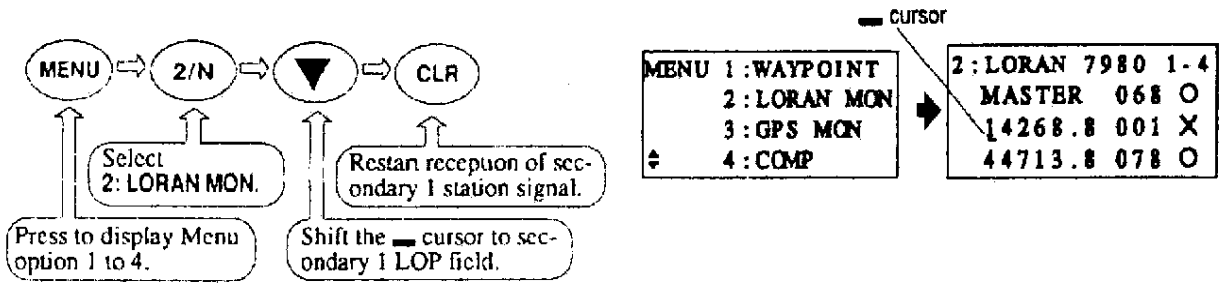
Following operation restarts reception of entire chain or selected secondary.

Restart of entire reception

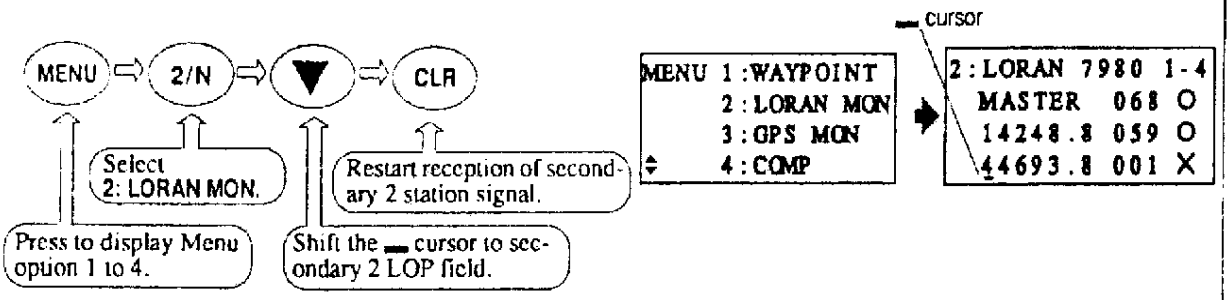
This operation makes the same sequential display changes as the navigator is turned on. For change screen, see the "Getting started" (page 4).



Restart of secondary 1 reception

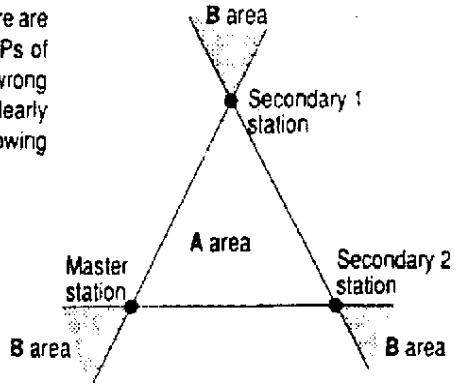


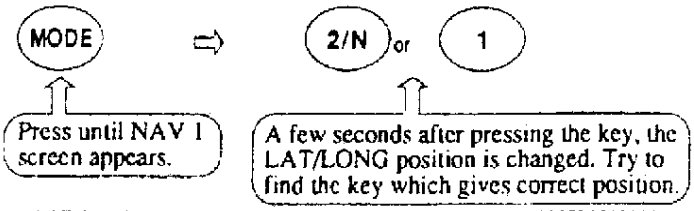
Restart of secondary 2 reception



Incorrect LAT/LONG position despite good signal condition

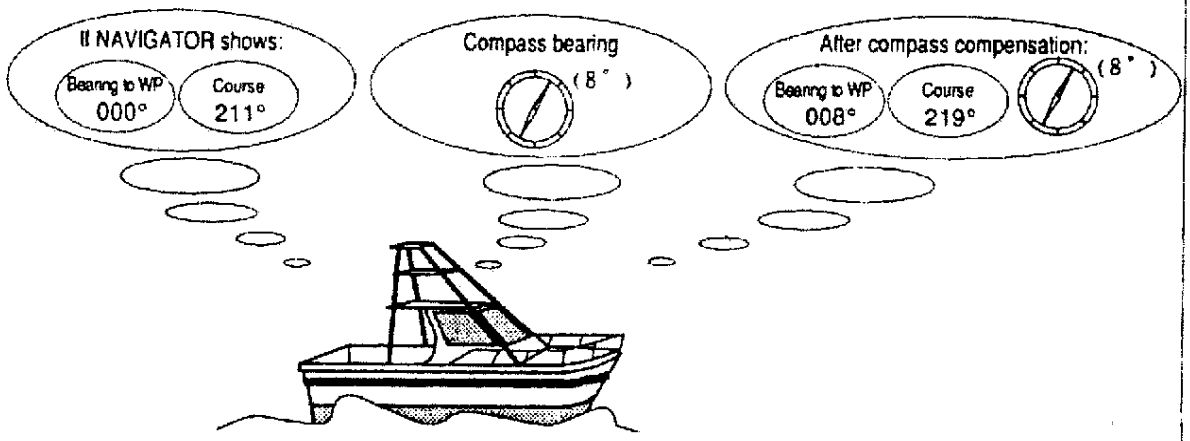
A LAT/LONG position is computed as a crossing point of secondary 1 and 2 LOPs. There are two LAT/LONG positions derived as solutions. This is due to the fact hyperbolic LOPs of secondary 1 and 2 meet, at two points (A area and B area in the figure) it is easy to find wrong point because two points are located obviously apart. If a LAT/LONG position is clearly different from an estimated position, switch to the other computed position by following operation.





Compensation of compass

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



1 Automatic compensation

(Initial setup: **Manual**)

In the Auto mode, the magnetic compass is compensated based on the built-in global magnetic variation maps. However, avoid to using this mode if you are higher than 75 degrees North or South latitude.
Also, the compass may have a small error as the system contains world maps. Correction manually is recommended.

```
4—3 : MAGNETIC VAR
      AUTO
      +008.0
```

An error (compensation amount) from true bearing is shown.

MENU ⇨ 4/W ⇨ 3 ⇨ SEL ⇨ ENT

- Press to display Menu options 1 to 4.
- Select 4: COMP.
- Select 4-3: MAGNETIC VAR.
- Press to select AUTO mode.
- Press to compensate bearing automatically.

Compass compensation sequence
→ Auto → Manual →

2 Manual compensation

(Initial setup: 0°)
(Setup range: −180.0° to +180.0°)

MENU ⇨ 4/W ⇨ 3 ⇨ SEL ⇨ ▼ ⇨

- Press to display Menu options 1 to 4.
- Select 4: COMP.
- Select 4-3: MAGNETIC VAR.
- Press to select MANUAL mode.
- Locate ▬ cursor onto + or − symbol.

```
4—3 : MAGNETIC VAR
      MANUAL
      +000.0
```

⬇

```
4—3 : MAGNETIC VAR
      MANUAL
      +008.0
```

An error (compensation amount) from true bearing is shown.

⇨ SEL ⇨ ▶ ⇨ ○○○.○ ⇨ ENT

- Press to select + or − sign.
- Enter a (4-digit) compensation amount using numeric keys.
- Press to compensate the compass manually.

Correction of input error

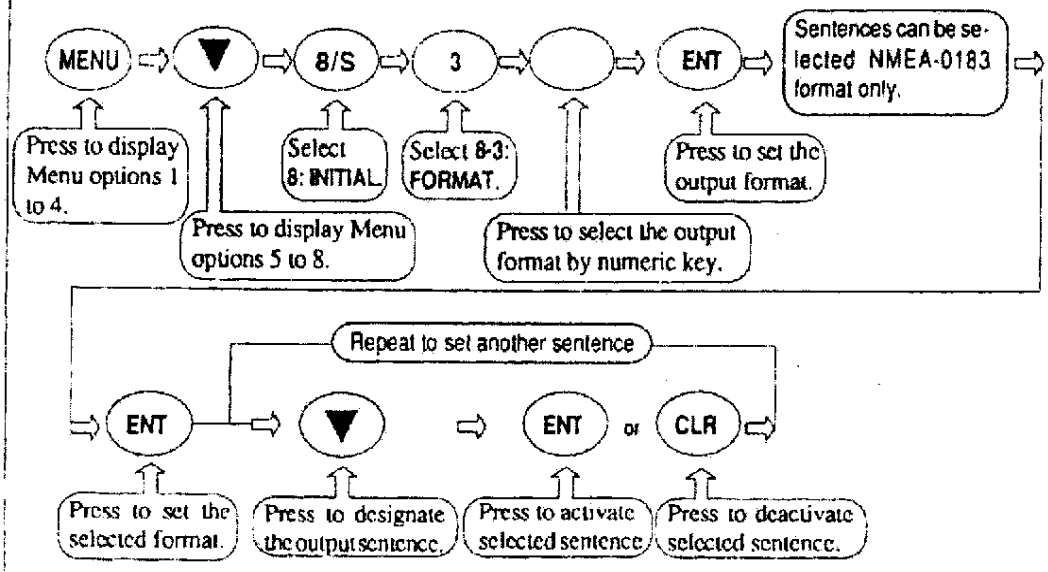
◀ ▶ Locate ▬ cursor onto incorrect number and enter correct one.

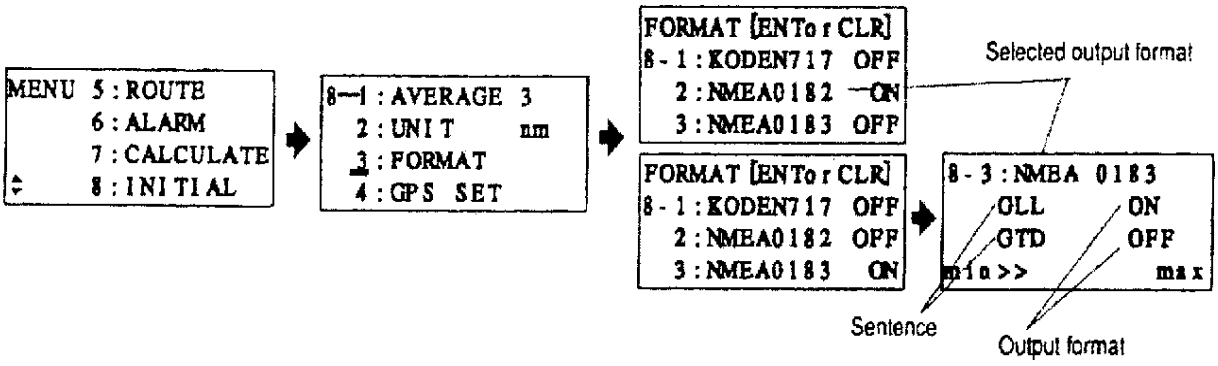
CLR Press to clear incorrect input. You can reenter numeric data.

Selecting and editing an output format

Initial setup: Format NMEA-0183
Sentence ..... GLL and VTG
Interval ..... 1 second

Select data output formats by following operation. If NMEA-0183 is selected, proceed to selection of output data sentences.





If NMEA-0183 format is selected

Activate required sentences by pressing ENT key. Press CLR key for unnecessary sentences. Numbers of ">" marks represents ratio of information amount to the maximum capacity (Single ">" mark represents approx. 10%). Be careful not to make marks to MAX when selecting sentences. Data output interval is approx. 6 seconds at the maximum capacity.
If it exceeds the maximum capacity, output data interval will be longer than anticipated.

AAM → BOD → BWC → GGA → GLL → GTD → SGR → VTG → WDC → XTE

Output data

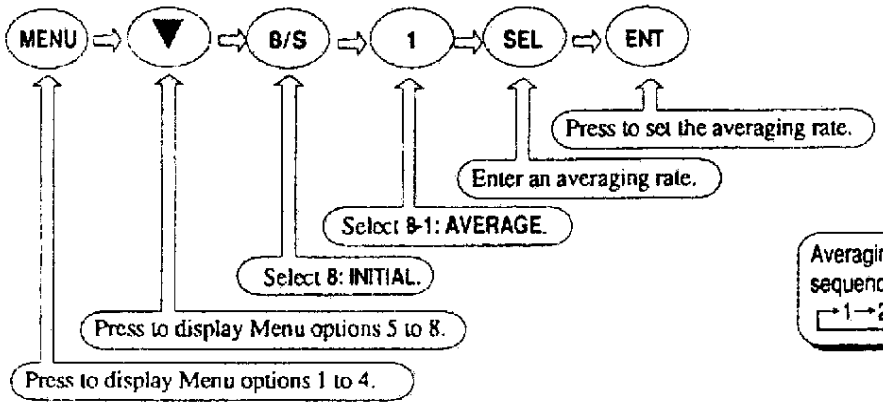
KODEN 717			Data output interval: approx. 4.5 seconds
NMEA-0182			Data output interval: approx. 3.0 seconds
NMEA-0183 (Ver. 1.5)	AAM	waypoint arrival alarm.	Data output interval: approx. 1.0 seconds
	BOD	Bearing, origin to destinations	
	BWC	Bearing & distance to waypoint	
	GGA	Global positioning system fix data	
	GLL	Geographic position latitude/longitude.	
	GTD	Loran C LOPs	
	SGR	Loran C GRI	
	VTG	Track made good and ground speed	
	WDC	Distance to waypoint	
	XTE	Cross track error measured	

Setting average constants (measuring position, speed and course)

(Initial setup: 3)

Averaging can be imposed to data derived from Loran C information. This can stabilize the measured position (latitude and longitude), speed and course data. The maximum averaging rate is 5 and the minimum rate is 1. When you select a larger value, data is averaged more often and the display data have smaller variation. However delay for updating occurs. When you select a smaller value, data is less averaged but the display data responds quickly.

```
MENU 5 : ROUTE
     6 : ALARM
     7 : CALCULATE
     8 : INITIAL
```




```
8—1 : AVERAGE 3
  2 : UNIT    nm
  3 : FORMAT
  4 : GPS SET
```

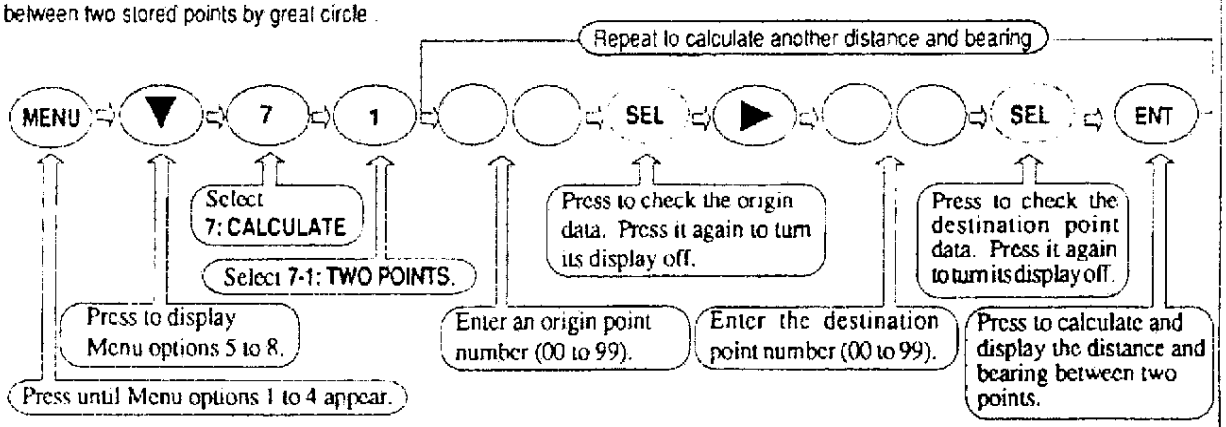
cursor

Averaging rate selection sequence
→1→2→3→4→5→

Note: Try to use an averaging rate appropriate to your ship's speed so that you can get the stable measuring position, speed and course data.

Calculating the distance and bearing between two points

You can calculate the distance and bearing between two stored points by great circle.



This example is shown in LAT/LONG mode.

cursor

```
MENU 5 : ROUTE
     6 : ALARM
     7 : CALCULATE
     8 : INITIAL
```

→

```
7—1 : TWO POINTS
  2 : L/L→LOP
  3 : LOP→L/L
  4 : LOP→LOP
```

→

```
7—1 : TWO POINTS
    00→00
DIST            nm
BRG             .°
```

→

```
7—1 : TWO POINTS
    12→00
DIST            nm
BRG             .°
```

→

```
7—1 : TWO POINTS
    12→24
DIST            nm
BRG             .°
```

→

```
7—1 : TWO POINTS
    12→24
DIST        2098nm
BRG         220.3°
```

Origin number

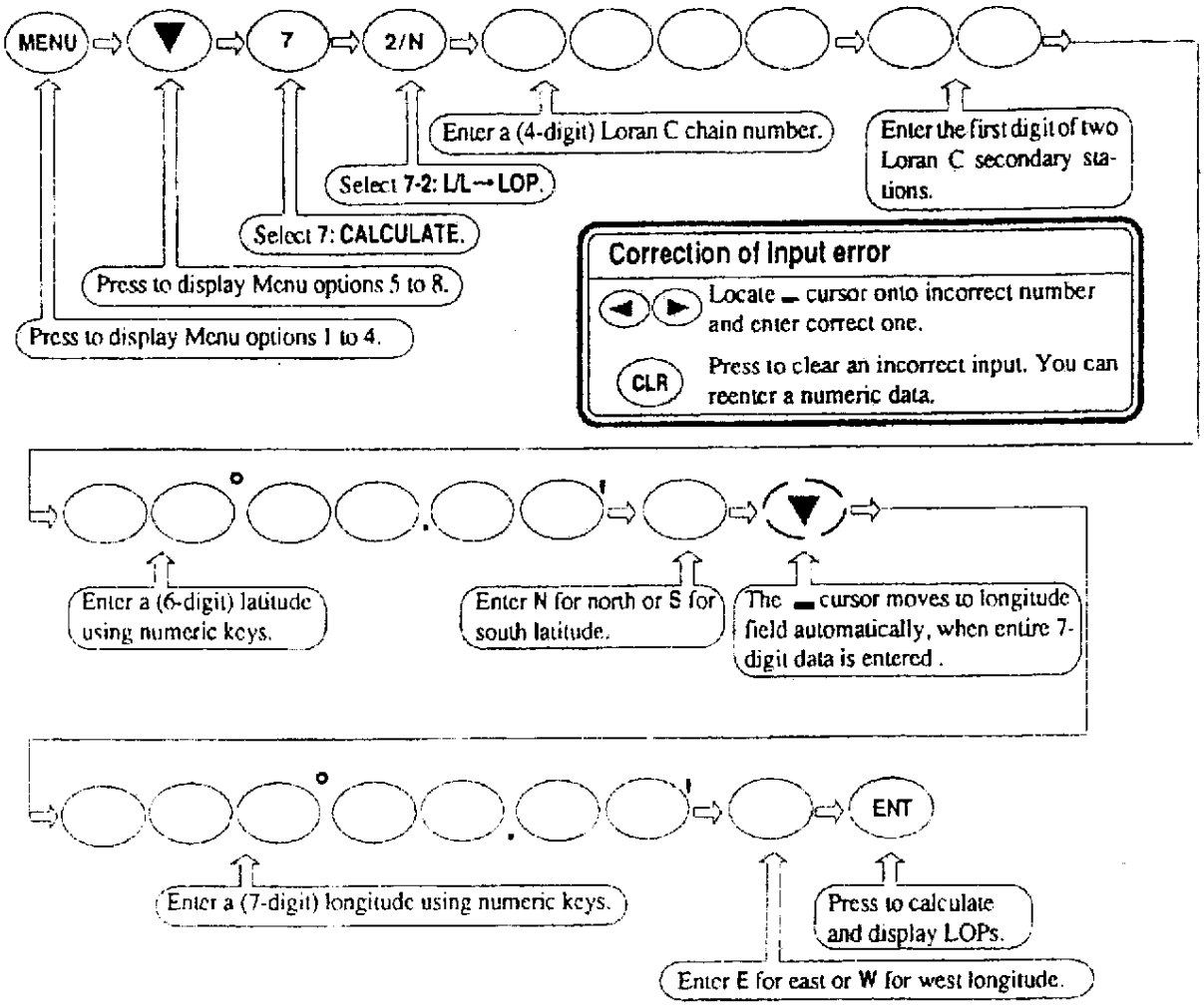
Destination point number

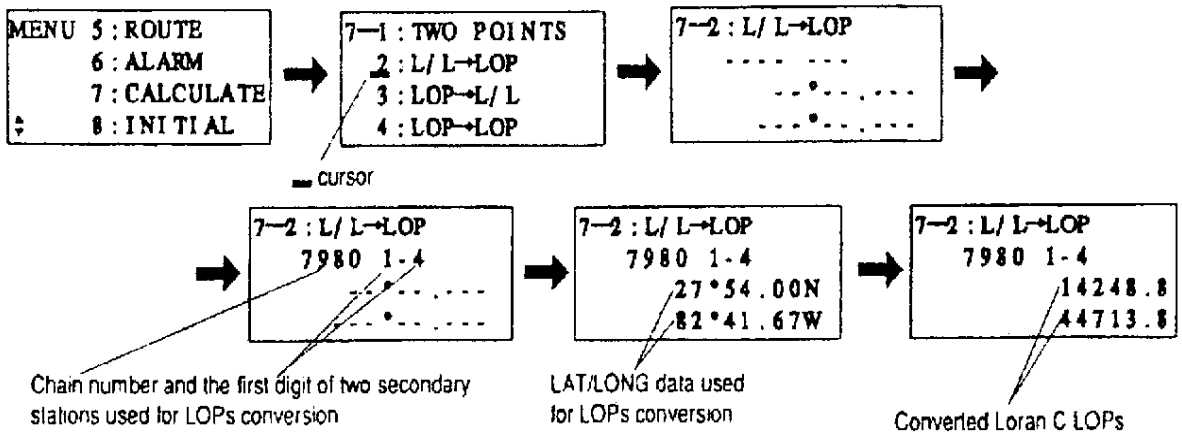
Distance from origin to destination point

Bearing from origin to destination point

Calculating Loran C LOPs based on LAT/LONG data

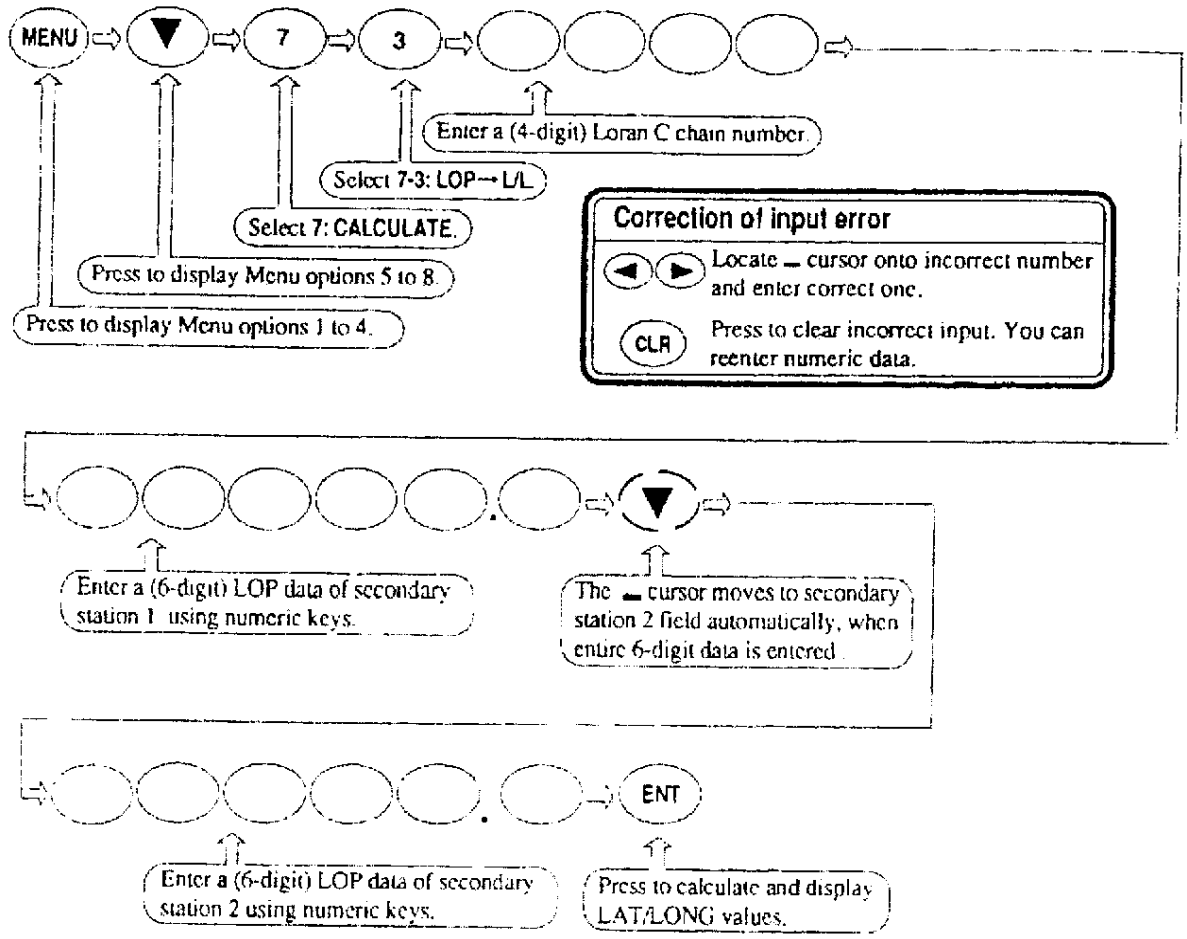
When you enter a Loran C chain number and the first digit of two secondary stations, NAVIGATOR calculates the Loran C LOPs based on the specified LAT/LONG data and displays the LOP values.

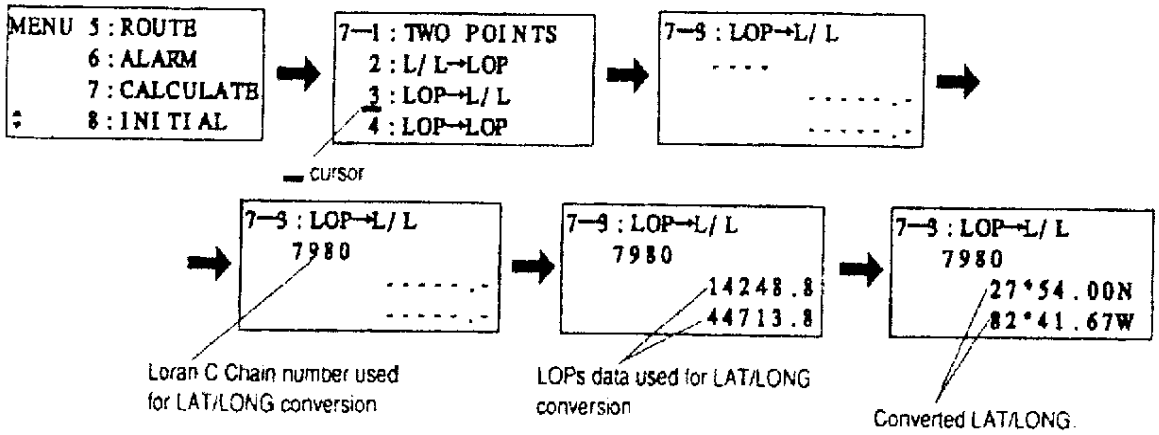




Calculating LAT/LONG based on Loran C LOPs data

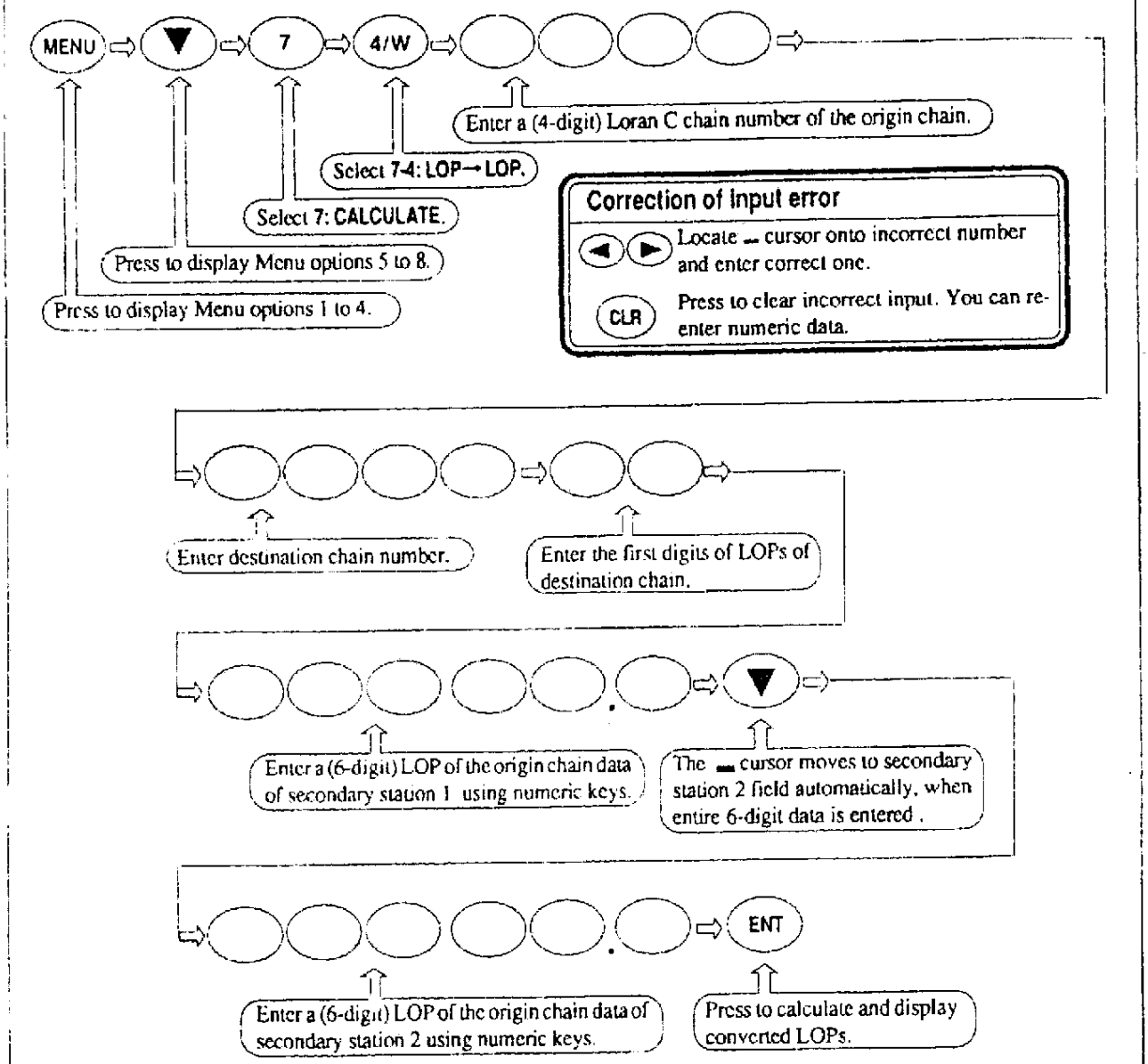
When you enter a Loran C chain number, NAVIGATOR calculates the Loran C LOPs based on the specified LAT/LONG data and displays the LAT/LONG values.

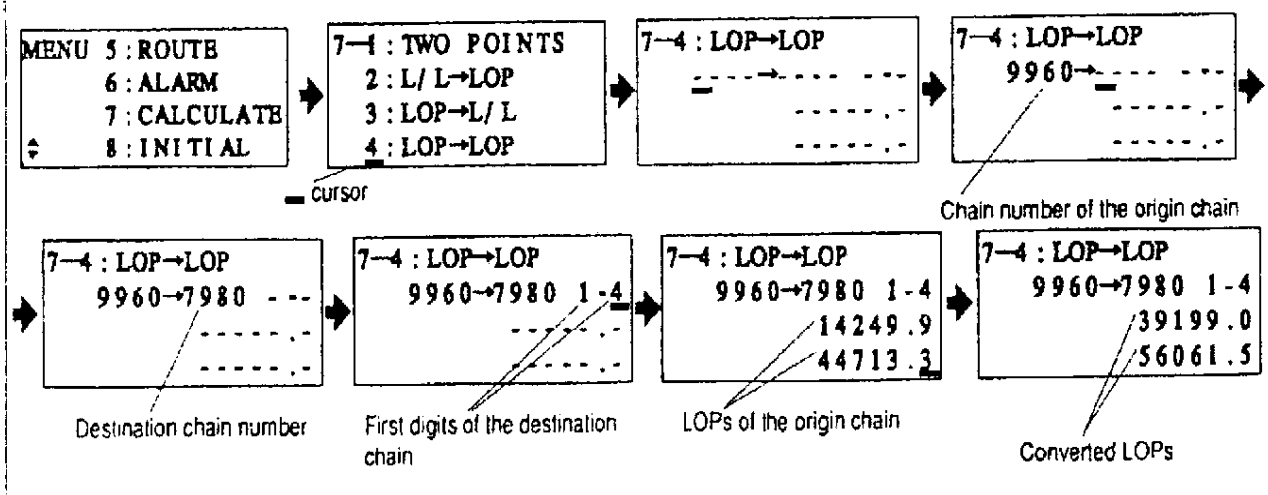




Calculating Loran C LOPs in different chains based on LOPs in chain in use

This operation allows you to convert LOPs from one chain (origin) to another destination chain.





Operation as a GPS navigator

Be sure the GPS receiver module is properly connected before turning on the navigator.

This Loran C navigator also works as a GPS navigator if an optional GPS receiver module (GPS-10 or GPS-6) is attached and setup for following parameters.

- Change of positioning system from Loran C to GPS.
- Selection of GPS receiver module between normal and differential ready.
- Selection of geodetic datum.
- Selection of positioning system between 2D (two dimension) and 3D (three dimension)

Displays when a GPS receiver module is not connected.

```
3 : GPS
    No Connection
```

```
8—1 No Connection
  2 : 2D/3D     2D
  3 : ANT.H   0000
  4 : DATUM     02
```

A GPS receiver module, other than specified above, may be interfaceable with the navigator if it transmitts NMEA-0183 GGA sentence. However, initial parameter setting should be taken care of at the GPS receiver module side. In this case, only position information is used at the navigator. When both GPS receiver module and a differential beacon receiver are connected, disconnect the beacon receiver while setting GPS receiver module parameters. Parameters set once are retained by backup memory.

How to change to GPS

(Initial: LR)

MENU ⇨ ▲ ⇨ 9 ⇨ 2/N ⇨ SEL ⇨ ENT

- Press to display Menu options 1 to 4.
- Press to display Menu options 9.
- Press to select 9: DISPLAY.
- Press to select 9-2: POSITION.
- Press to select GPS.
- Press to enter.

Position source selection sequence. →LR→GPS→

```
9—1 : DISPLAY    LOP
  2 : POSITION   LR
  3 : LOP.CONV   OFF
```

cursor

```
9—1 : DISPLAY    L/L
  2 : POSITION   GPS
  3 : LOP.CONV   OFF
```

Selecting GPS receiver module

(Initial: DGPS)

Depending on the type of GPS receiver module, selection of the type is required.

MENU ⇨ ▼ ⇨ 8/S ⇨ 4/W ⇨ 1 ⇨ SEL ⇨ ENT

- Press to display Menu options 1 to 4.
- Press to display Menu options 5 to 8.
- Press to select 8: INITIALIZE.
- Press to select 8-4: GPS SET.
- Press to select 8-1: GPS set.
- Press to display NORM or DGPS. DGPS for GPS-10.
- Press to set.

GPS receiver module selection sequence. →NORM→DGPS→

```
MENU 5 : ROUTE
     6 : ALARM
     7 : CALCULATE
     8 : INITIAL
```

```
8—1 : AVERAGE 3
  2 : UNIT     nm
  3 : FORMAT
  4 : GPS SET
```

cursor

```
8—1 : GPSset   DGPS
  2 : 2D/3D      2D
  3 : ANT.H    0000
  4 : DATUM      02
```

Setting antenna height (above sea level)

(Initial: 0 m)

Enter the antenna height (above sea level) as accurately as possible. It determines the positioning accuracy. The antenna height error must be less than 5 meters. The antenna height can be set in either metric or standard (feet) system (see page 29 for unit switching)

MENU ⇨ ▼ ⇨ 8/S ⇨ 4/W ⇨ 3 ⇨ ( ) ( ) ( ) ( ) ⇨ ENT

- Press to display Menu options 1 to 4.
- Press to display Menu options 5 to 8.
- Press to select 8: INITIALIZE.
- Press to select 8-4: GPS SET.
- Press to select 8-1: GPS set.
- Enter a (4-digit) antenna height above sea level using numeric keys. An example of "0010" for 10 meters high.
- Press to set the antenna height

Correction of input error	◄ ► Locate _ cursor onto incorrect number and enter correct one.	CLR Press to clear incorrect input. You can reenter numeric data

```
MENU 5 : ROUTE
     6 : ALARM
     7 : CALCULATE
     8 : INITIAL
```

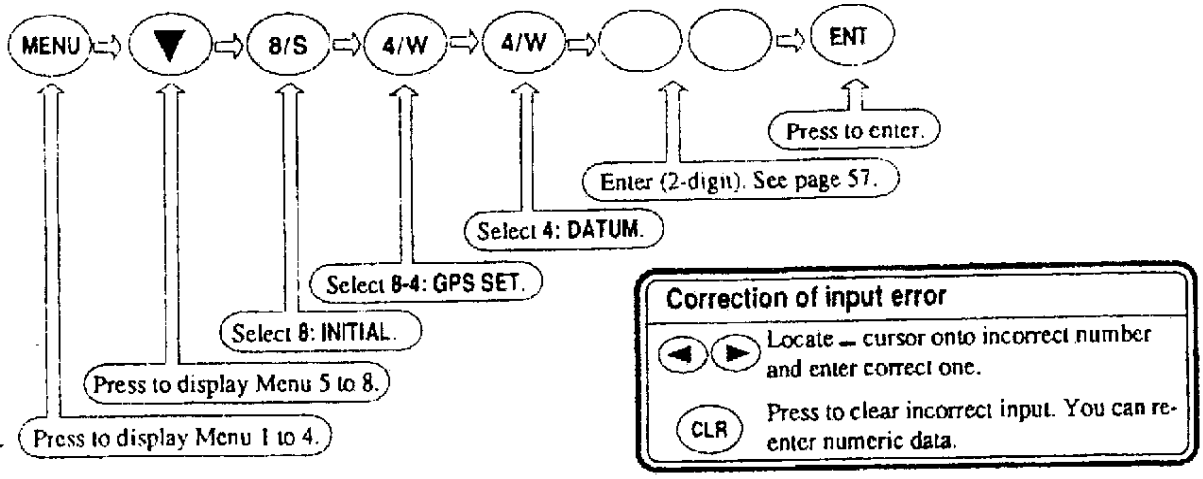
```
8—1 : AVERAGE 3
  2 : UNIT     nm
  3 : FORMAT
  4 : GPS SET
```

```
8—1 : GPSset   DGPS
  2 : 2D/3D      2D
  3 : ANT.H    0000
  4 : DATUM      02
```

cursor

Selecting a geodetic datum

The latitude and longitude are calculated based on the WGS-84 with GPS system. However, the charts used in each country are based on different geodetic datum. You can compensate difference from your chart by converting GPS position data into your actual chart system. To select a geodetic datum, see "Geodetic datum list" on page 58.




```
MENU  5 : ROUTE
      6 : ALARM
      7 : CALCULATE
      8 : INITIAL
```

```
8—1 : AVERAGE  3
  2 : UNIT     nm
  3 : FORMAT
  4 : GPS SET
```

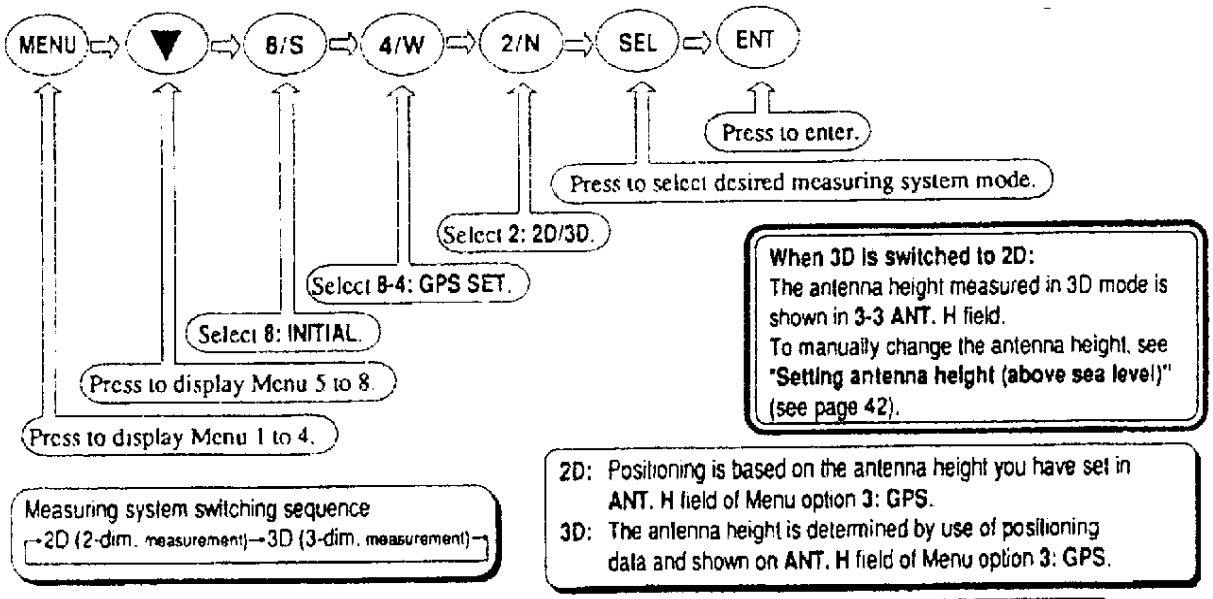
```
8—1 : GPSset  DGPS
  2 : 2D/3D     2D
  3 : ANT.H   0000
  4 : DATUM     02
```

_ cursor

Selecting a measuring system mode

(Initial setup: 2D)

If there is no height difference (such as a ship on the sea), use the 2D (two-dimensional measurement) mode. The DOP value is small and the measuring accuracy increases.
If you cannot receive signals from four satellites or if the PDOP value has exceeded the limit, the 3D (three-dimensional measurement) mode is automatically switched to the 2D mode.




```
MENU  5 : ROUTE
      6 : ALARM
      7 : CALCULATE
      8 : INITIAL
```

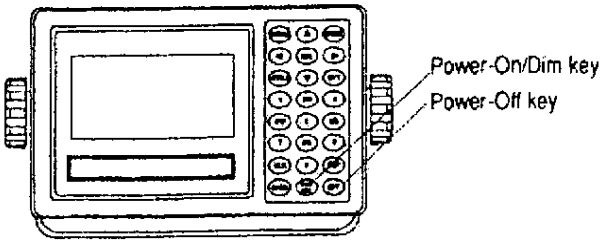
```
8—1 : AVERAGE  3
  2 : UNIT     nm
  3 : FORMAT
  4 : GPS SET
```

```
8—1 : GPSset  DGPS
  2 : 2D/3D     2D
  3 : ANT.H   0000
  4 : DATUM     02
```

_ cursor

Getting started (as a GPS navigator)

When you first use NAVIGATOR, it must first receive the orbital data from satellites and it may take approximately 15 minutes to display your position (COLD START). Once this step is completed, your position is displayed immediately any time you wish. To make NAVIGATOR operational (to store orbital data of GPS satellites in system memory), use the following steps.
Functions not mentioned in this section are common to indicated Loran C section.



PWR DIM — Press to turn NAVIGATOR on.

Dim/bright the display:

PWR DIM — Press to dim/bright the screen.

Change the contrast:

CTRS — Press to change the LCD contrast (intensity) in 8 levels.

Power off:

OFF — Press for 2 seconds to turn NAVIGATOR off. All data before power-off is kept in memory for later use.

What is failure of positioning?
If signals from three or more satellites are not received your position cannot be fixed.

On-screen messages change in the following sequence when NAVIGATOR receives satellite signals and displays latitude/longitude data.

```
LORAN
ROM No. KM-A00
checking
```

Initial message during power-on.

```
LORAN
ROM No. KM-A00
check OK
```

Message to indicate checking of GPS receiver and display has been completed.

Blinking.

```
NAV1   27°54.008N
       82°41.613W
SPEED     15.0kt
COURSE    359.9°
```

Blinks when NAVIGATOR is searching GPS satellites. N (or S) and W (or E) blinks during interruption of position.

No blinking

```
NAV1   27°54.008N
       82°41.613W
SPEED     15.0kt
COURSE    359.9°
```

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).

LAT/LONG positions are down to 1/1000 minutes digit.

Monitoring GPS satellite signal reception

You can monitor the signal monitor status from GPS satellites
The receiver receives signals from 3 satellites during two-dimensional positioning, but it receives signals from 4 or more satellites during three-dimensional positioning.

H: HDOP value (for 2-dimensional positioning)
P: PDOP value (for 3-dimensional positioning)
The system stops positioning if DOP has exceeded the limit. When this value is large, the positioning accuracy is degraded.

MENU ⇒ 3

Select 3: GPS MON.

Press to display Menu options 1 to 4.

```
3:GPS      H 02.1
   02 32 20 14
SN 15 10 12 10
EL 12 74 30 10
```

Satellite PRN number
PRN: PseudoRandom Noise

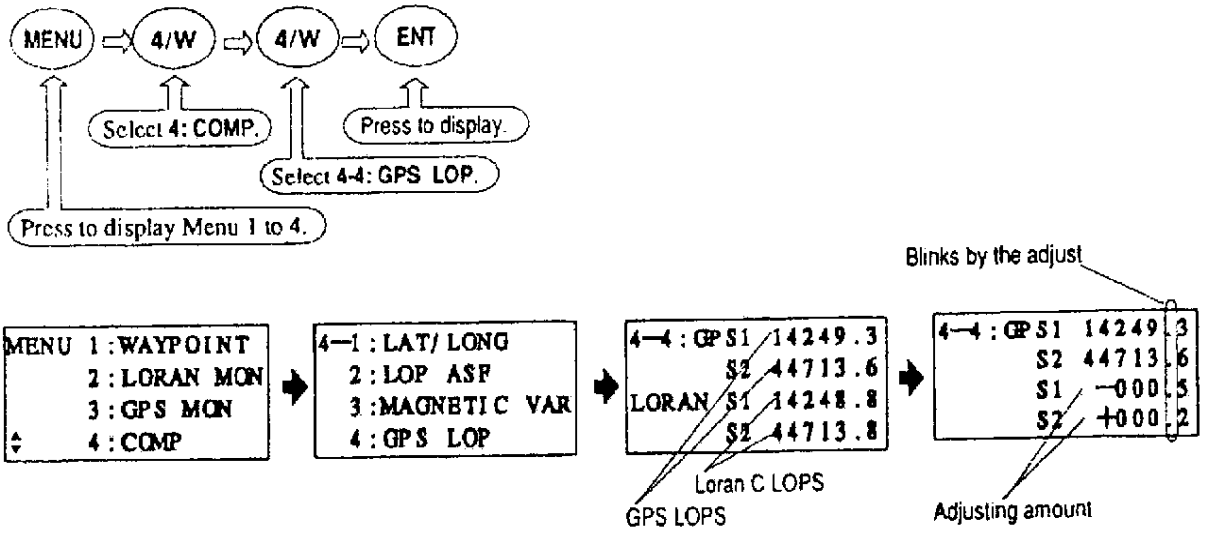
Satellite signal S/N
The S/N usually shows 10 to 20 when elevation angle is above 10 degrees

Elevation angle of satellite
The angle of satellite from horizon

This function is available only when the navigator is interfaced with a GPS -10 or GPS-6.

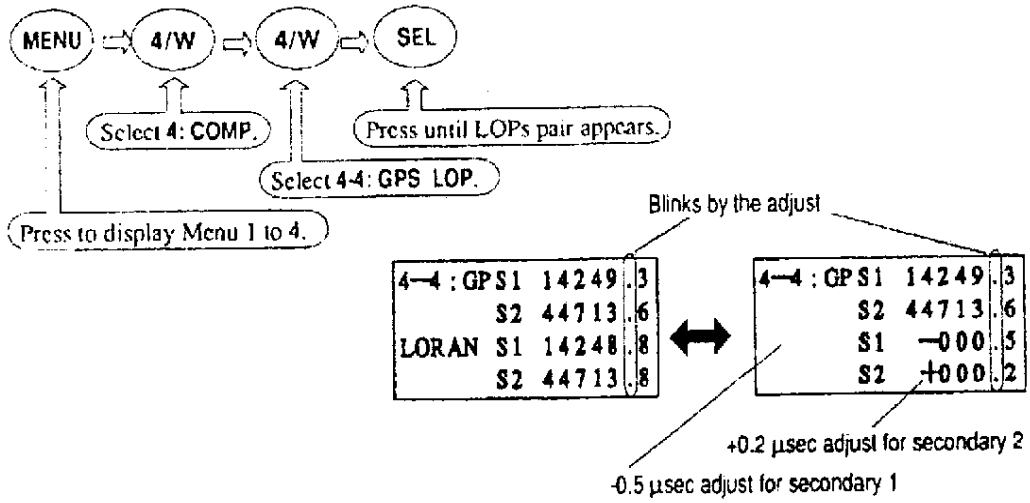
Adjusting LOPs from GPS position to Loran C LOPs

This function adjusts LOPs by GPS to Loran C LOPs if they don't match each other.

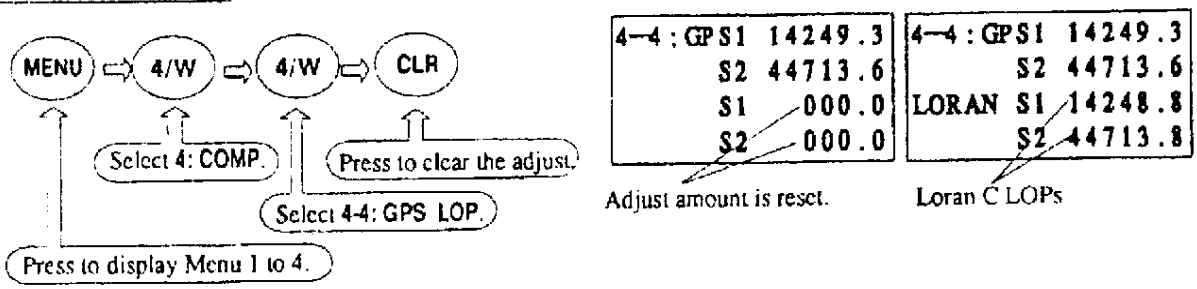


Loran C LOP		GPS LOP		Adjusting amount	
Secondary station 1	14248.8 µsec	Secondary station 1	14249.3 µsec	Secondary station 1	- 000.5 µsec
Secondary station 2	44713.8 µsec	Secondary station 2	44713 6 µsec	Secondary station 2	+000.2 µsec

Comparing GPS LOPs and Loran C LOPs



Cancel of adjust



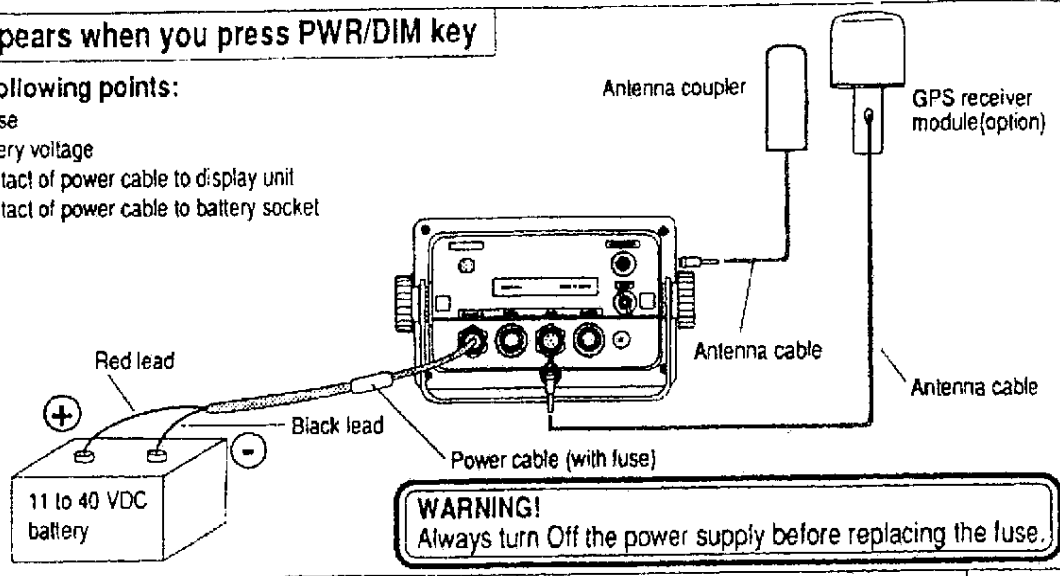
Troubleshooting Guide

If NAVIGATOR does not function properly, check the following points. If the problem continues, call for service.

Nothing appears when you press PWR/DIM key

Check the following points:

- Blown fuse
- Low battery voltage
- Poor contact of power cable to display unit
- Poor contact of power cable to battery socket

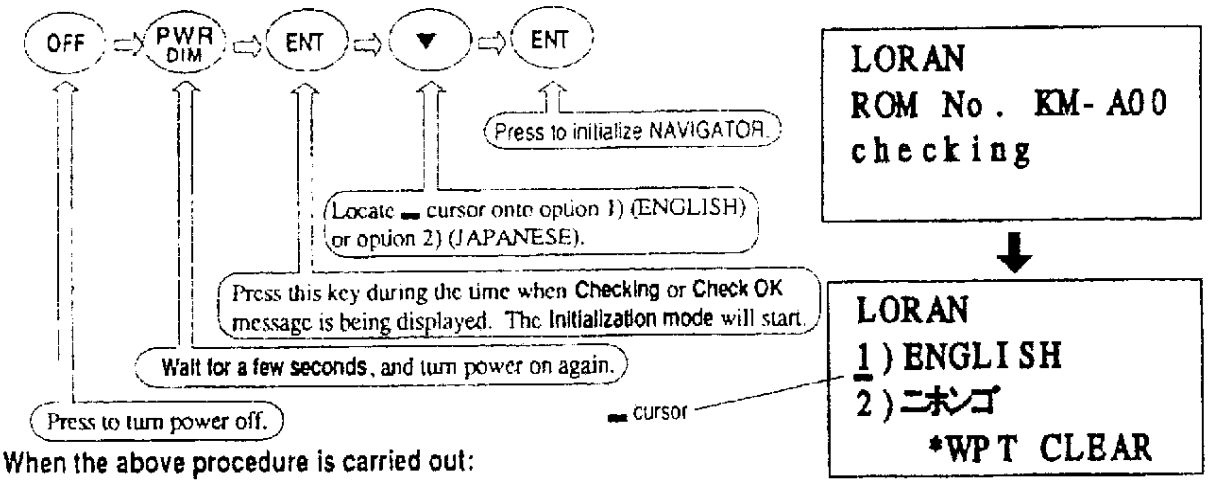


WARNING!
Always turn Off the power supply before replacing the fuse.

No information appears on the screen (during initial setup) and language selection

Check the following points.

- The antenna cable may not be connected securely between the antenna and receiver.
- If signals not received, or key operation not effective, try the following steps.



When the above procedure is carried out:

- The stored position data is lost even when you perform these steps.
- The present positioning data is erased and NAVIGATOR returns to the initial setup.
- All setup parameters are initialized and you need to set them again.

Error message appears at power on (Self-test function)

The following messages continue one or two seconds during power on.

```
LORAN
ROM No. KM-A00
check ERROR
```

Error display

- If you have replaced the ROM chip, the **ROM changed** message may appear. In this case, turn on the power switch again.
- If an ERROR display continues and nothing changes on the screen, call for service.

Nothing appears but buzzer sounds during power-on

- The receiver CPU has failed.
- Call for service.

Unstable signal reception | Loran C navigator

MENU ⇨ 2/N

Select 2: LORAN MON.

Press to display Menu options 1 to 4.

```
MENU 1:WAYPOINT
     2:LORAN MON
     3:GPS MON
     4:COMP
```

```
2:LORAN 7980 1-4
 MASTER     068 O
 14248.8    059 O
 44693.8    001 X
```

1. If there is an obstacle around the antenna, NAVIGATOR cannot receive Loran C signals. You must change the antenna position.

2. Monitoring Loran C signals reception
   Acceptable if 0 or 1 is displayed.
   It may show number bigger than 2 in the vicinity of the station.
   Acceptable if 1 to 9 is displayed.
   Better with bigger number
   Acceptable if bigger than the left number.

X: No good CS
O: Good CS

Unstable signal reception | GPS navigator

MENU ⇨ 3

Press to display Menu options 1 to 4.

Select 3: GPS MON.

```
MENU 1:WAYPOINT
     2:LORAN MON
     3:GPS MON
     4:COMP
```

```
3:GPS      H 02.1
   02 32 20 14
SN 15 10 12 10
EL 12 74 30 10
```

1. Check the DOP of satellites.
   H: HDOP value (for 2-dimensional positioning)
   P: PDOP value (for 3-dimensional positioning)
   If the HDOP has exceeded 20, NAVIGATOR stops positioning. Also, its positioning accuracy drops if HDOP gets larger in value.

HDOP value	Accuracy
1 to 6	Normal
7 to 12	Acceptable
13 to 20	Low

Satellite PRN number
PRN: Pseudo Random Noise

Elevation angle of satellite
The angle of satellite from horizon

2. Check the S/N of each satellite signal.
   If elevation angle is 10 degrees or more, the S/N values may be 10 to 20 normally.

3. If there is an obstacle between the antenna and satellites, NAVIGATOR cannot receive GPS satellite signals. You must change the antenna position.

Checking frequency deviation of the crystal oscillator

MODE ⇨ 3

Press until NAV 1 screen appears.

Press to display Xtal.
Press it again to turn its display off.

Frequency deviation
Allowable range: - 20 to + 20.

```
NAV1 xtal  14248.8
W 17 -04   44713.8
P
SPEED      15.0kt
COURSE     359.9°
```

When frequency deviation is not displayed

Menu 9: DISPLAY

```
9-1:DISPLAY   LOP
  2:POSITION  LR
  3:LOP.CONV  OFF
```

Display LOP.
Display LR.

Specifications

Major Specifications

* Specifications subject to change without notice.

Loran C receiver section	
Receiving frequency	100 kHz
Acquisition	Automatic
Tracking	Automatic
Setting time	Approximately three minutes
Signal level	110 dB μV/m maximum
Tracking speed	80 knots maximum
Notch filter	Preset : 4
Tracking station	Master and five secondary stations

GPS receiver section: GPS receiver module GPS-10 (optional)		
Receiving frequency		1575.42 MHz ±1 MHz
Receiving channel		Digital 6-channel parallel
Receiving code		C/A code
Sensitivity		Better than -130 dBm (elevation angle: 5° or over)
Tracking speed		200 knots maximum
Accuracy	Position	15 meters RMS (without SA), 100 meters 2DRMS (with SA)
(PDOP≦3)	Velocity	0.1 knot RMS (without SA)
Note: Accuracy is subject to change in accordance with DoD civil GPS user policy.		

Loran C/GPS display section	
Display	LCD with backlight (16 x 4 characters, usual picture area: 85 x 42 mm)
Display mode	NAV1, NAV2, NAV3, MOB (Man Over Board), MENU
Position data display	Loran C LOPs (0.1μsec) or converted Latitude/longitude in increments of 1/100 minute
Navigational display	Speed, course, velocity made good/course made good/elapsed time, distance/bearing/cross track error/course deviation/time to go to waypoint, total time to go and distance on route, distance/bearing between two points, MOB display GPS (optional): altitude, DOP value, satellite status
Instant (event) memory	10 points
Waypoint memory	89 points (usable as waypoint)
Route memory	10 routes (Max. 89 waypoints) with reverse trail
Alarm	Proximity, cross track error, anchor watch
Position compensation	Loran C LOPs, latitude/longitude, Datum (GPS navigator)
Magnetic compensation	Auto or manual
Parameters	Latitude/longitude conversion, memory of position marks and comment (up to 8 letters), selection of measuring unit (nm,sm,km), averaging (smooth) factor GPS (optional): antenna height , position mode (2D or 3D automatic selection)
Input data format	NMEA-0183 (GGA, VTG, PKODA, PKODG 1): GPS only
Output data format	KODEN 717, NMEA-0182, NMEA-0183 (AAM, BOD, BWC, GGA*, GLL, GTD, SGR, VTG, WDC, and XTE) *:GGA is GPS only output.
Data output interval	Approx. 4.5 seconds (KODEN 717), approx. 3.0 seconds (NMEA-0182), and 1 to 10 seconds selectable (NMEA-0183)
Memory protection	By built-in battery
Power supply	11 to 40 VDC
Power consumption	5 W or less (24 VDC)
Environmental condition	Display unit: 0° to +50°C (32° to 122°F) Antenna unit: -30° to +70°C (-22° to 158°F)

Standard equipment list

No.	Article	Type	Remarks	Weight/length	Quantity
1	Display unit	LR-792/XJ-9	With mounting bracket and vinyl cover	0.9 kg (1.9 lbs)	1
2	Receiving antenna	RA-14	2.45 m whip	0.3 kg (0.6 lb)	
3	Antenna coupler	AC-21	With antenna cable	1.0 kg (2.2 lbs)	1
	Antenna cable	CW-191A	Connected to AC-21/ BNC connector	10 m (32.8 ft)	1
4	DC power cable	CW-219	With a connector	1.8 m (5.9 ft)	1
5	Fuse	F-7161, 1A	For spare		1
6	Truss tapping screw	TPT M5 X 20U	For mounting bracket		2
7	Operation manual				1

Options

No.	Article	Type	Remarks	Weight/length
1	Remote display	UR-7	With power and connecting cable	
2	GPS receiver module	GPS-10	With cable (10 m.32.8 ft)	0.45 kg (1.0 lb)
3 -1	Receiving antenna	RA-14	2.45 m whip	0.3 kg (0.6 lb)
-2		RA-16	4 m whip	1.0 kg (2.2 lbs)
4 -1	Antenna holder	RAH-20	For receiving antenna (RA-16)	
-2		RAH-22A	For antenna holder (RAH-20) mounting	
-3		RAH-26		
5	Terminal adapter	TJ-1	For receiving antenna (RA-16)	
6	Antenna adapter	KCAD-02		
7	Hose band	738-1015	For antenna coupler	
8 - 1	Connecting cable	CW-326	With 6-pin and BNC connectors	5 m (16.4 ft)
- 2		CW-327	With 6-pin connectors	5 m (16.4 ft)
- 3		CW-328	With 6-pin connector and lugs	5 m (16.4 ft)
9	Power rectifier	PS-003A	With two 5A fuses	
10	AC power cable	VV-2D8	Both ends plain, for power rectifier	3 m (9.8 ft)
11	Flush mount kit	FMK-1	Flush mount frame with screws	

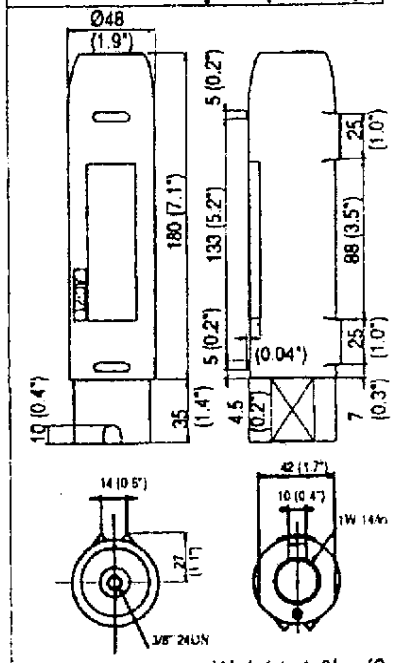
Latitude/longitude convertible chains

5930	CANADIAN EAST COAST	8290	NORTH CENTRAL U.S.
5970	COMMAND LION	8930	NORTHWEST PACIFIC
5990	CANADIAN WEST COAST	8940	FRENCH
7170	SOUTH SAUDI ARABIA	8970	GREAT LAKES
7270	NEWFOUNDLAND EAST COAST	8990	SAUDI ARABIAN NORTH
7930	LABRADOR SEA	9610	SOURTH CENTRAL U.S.
7950	CHAYKA EASTERN ASIA	9940	U.S. WEST COAST
7960	GULF OF ALASKA	9960	NORTHEAST U.S.
7970	NORWEGIAN SEA	9970	NORTHWEST PACIFIC
7980	U.S. EAST COAST	9980	ICELANDIC
7990	MEDITERRANEAN SEA	9990	NORTH PACIFIC
8000	CHAYKA EUROPEAN		

Outline and Dimensions

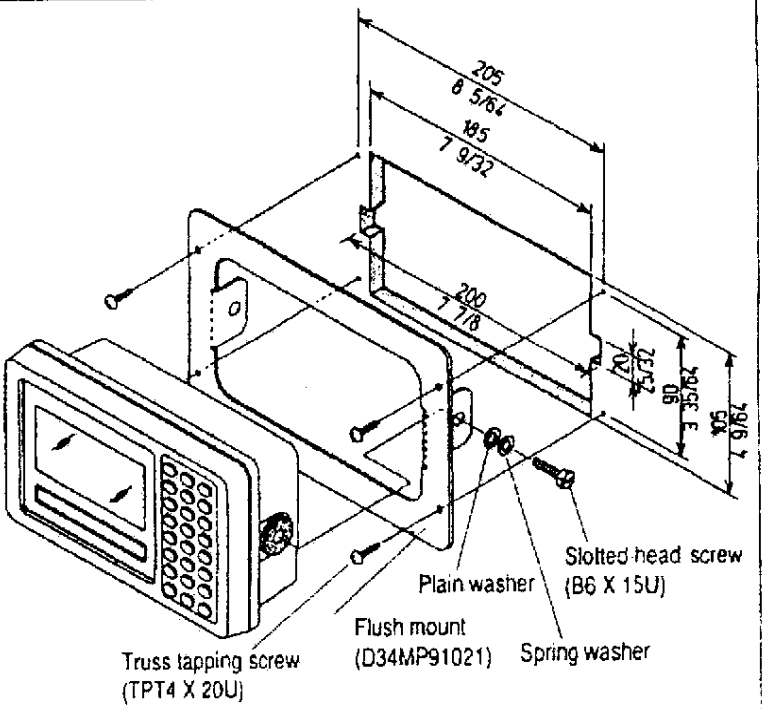
Scale differs among drawings.

Antenna coupler (AC-21)

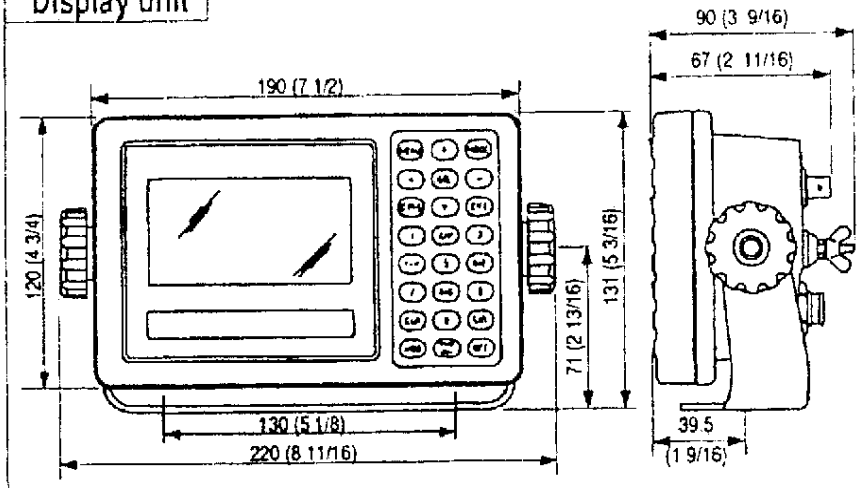


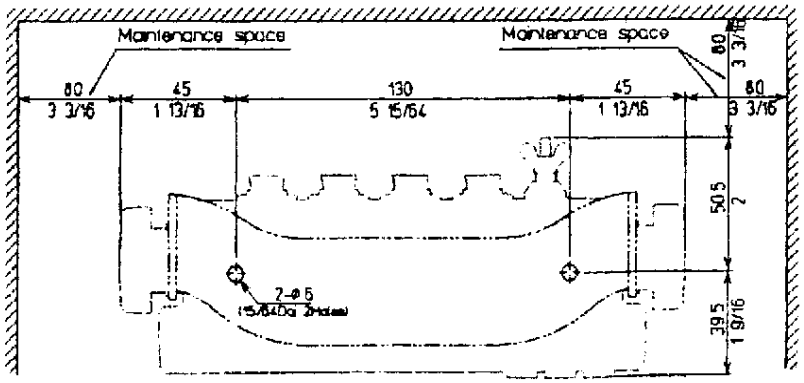
Weight: 1.0kg (2.2 lbs)
Excluding cable

Mounting of Flush mount kit (FMK-1)



Display unit



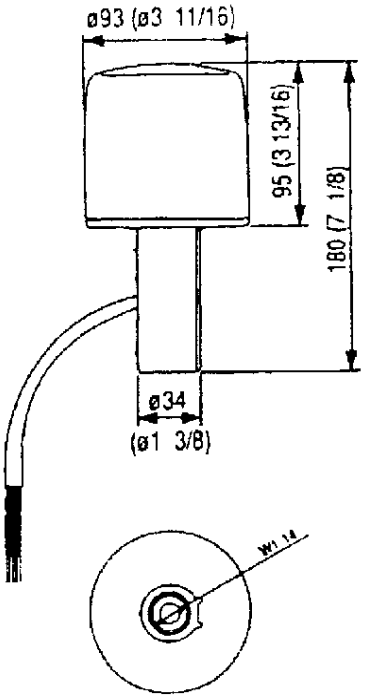


FRONT

Mounting dimensions

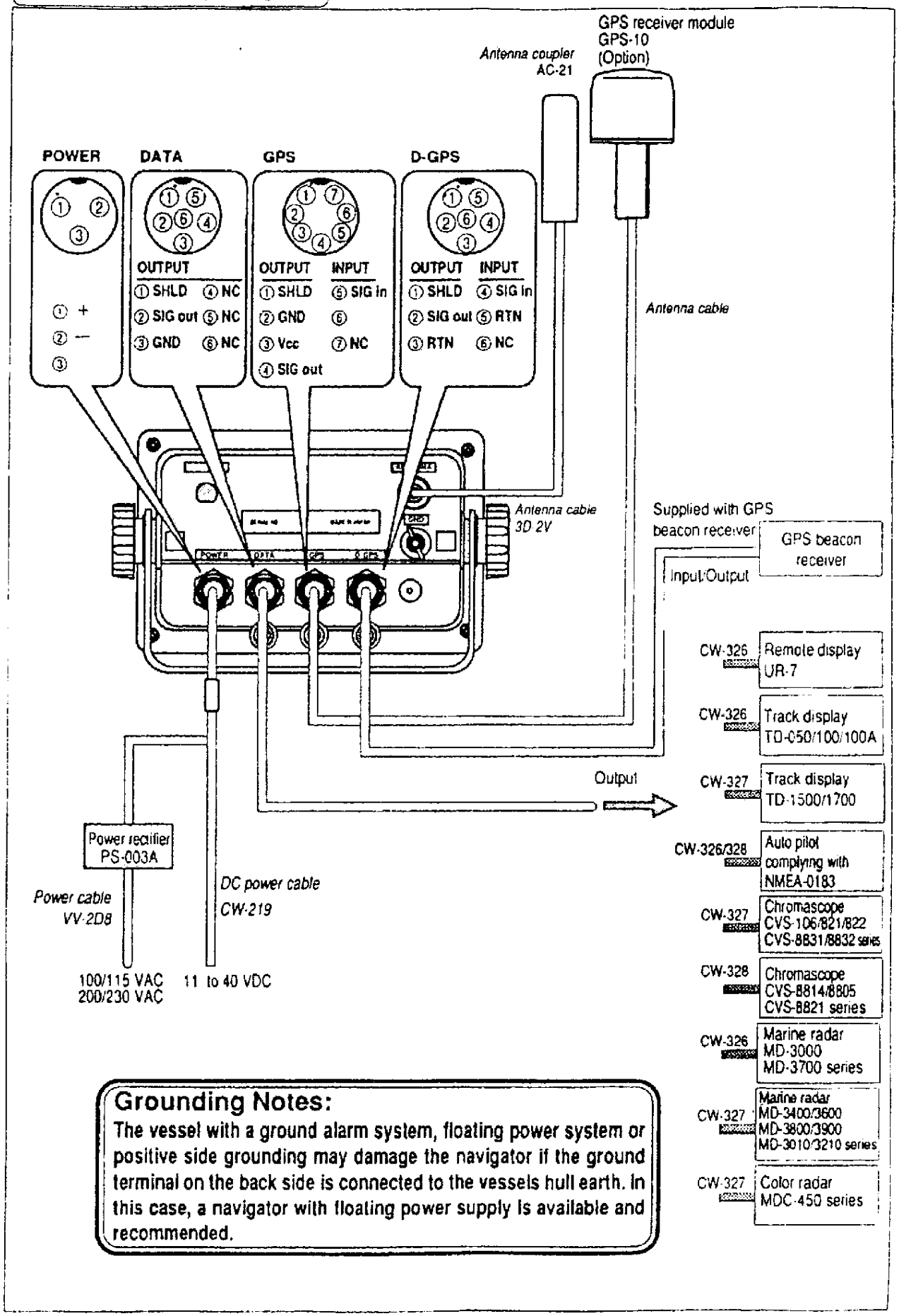
Weight: 0.9 kg (1.9 lbs)
Unit: mm (inch)

GPS receiver module (GPS-10)



Weight: 0.45 kg (1.0 lb)
Excluding cable

Interconnecting Diagram



Grounding Notes:

The vessel with a ground alarm system, floating power system or positive side grounding may damage the navigator if the ground terminal on the back side is connected to the vessels hull earth. In this case, a navigator with floating power supply is available and recommended.

Installation (Loran C navigator)

Positions of antenna and its coupler

Install the antenna and its coupler at the highest position on the vessel. Even if it has inevitably to be installed at a low position, do not mount it under or inside a place where metal is collected. A metallic object which intervenes between the transmitting station and antenna might not allow a reception even within the service area.

Notice for installation

As an installation site, select a place free from any metallic objects.
Install the antenna coupler at least one meter away from the receiver or remote display. An appropriate installation position for the antenna and coupler is as follows according to different types of vessels.

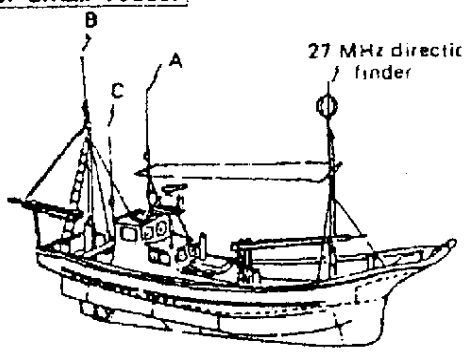
- On a yacht, an insulated aft stay is usable as an antenna.
- In case of central cabin vessel, install the coupler on a side or top of the cabin.
- On a motor boart, install the coupler on a bridge passage, on the top or side of the cabin.

Select a place where the antenna can be mounted vertically.
Install the coupler as far away from other antennas, particularly transmitting antennas of intermediate or high frequency as possible. Keep away from TV set and receiving antenna.

Reference diagrams

Select an optimum position.

For small vessel

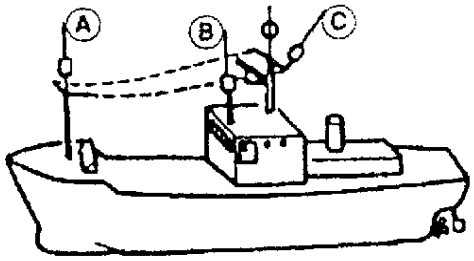


Position A (above radar mast)
A short antenna cable suffices. The installation is available at an elevated place.

Position B (on mast)
Installation is possible at an elevated position, but the antenna cable length may fall short.

Position C (bridge)
A short antenna cable suffices. However, installation at an elevated place is impossible, and a reinforcement is troublesome.

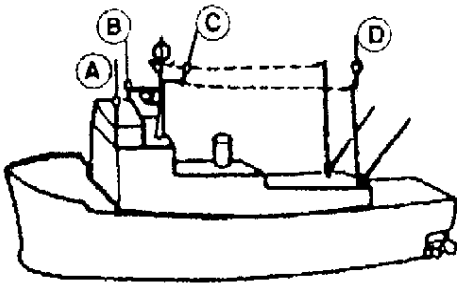
For medium to large sized fishing boarts



Position A
Mount the antenna at least one meter above the yard and as far away from the transmitting antenna as possible

Position B
Mount the antenna on the end of the bridge and as far away from the transmitting antenna as possible. Mount the antenna coupler so the horizontal antenna element will be positioned below the middle of the whip antenna

Position C
Tilt the antenna outward at least two meters away from the loop antenna. Even this may slightly affect the bearing measurement on the two MHz band.

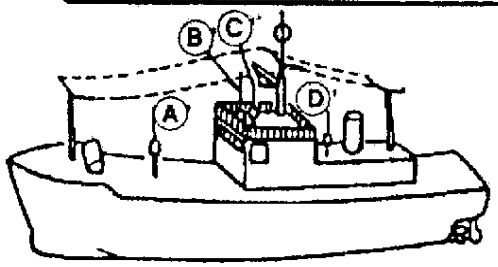


Position A and B
Mount on the bridge and as far away from the transmitting antenna as possible.

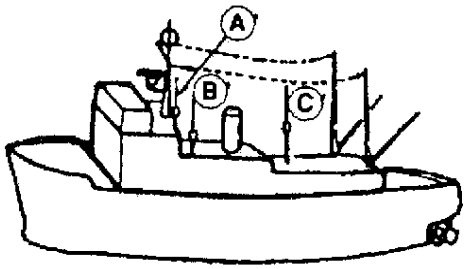
Position C
Mount at least one meter above the yard and as far away from the transmitting antenna as possible.
Tilt outward at least two meters away from the loop antenna. Even this may slightly affect the bearing measurement on the two MHz band

Position D
Mount at least one meter above the yard and as far away from the transmitting antenna as possible.

If no position is available matching the above conditions and when the operation is made only where the Loran signal is strong enough, refer to the following.

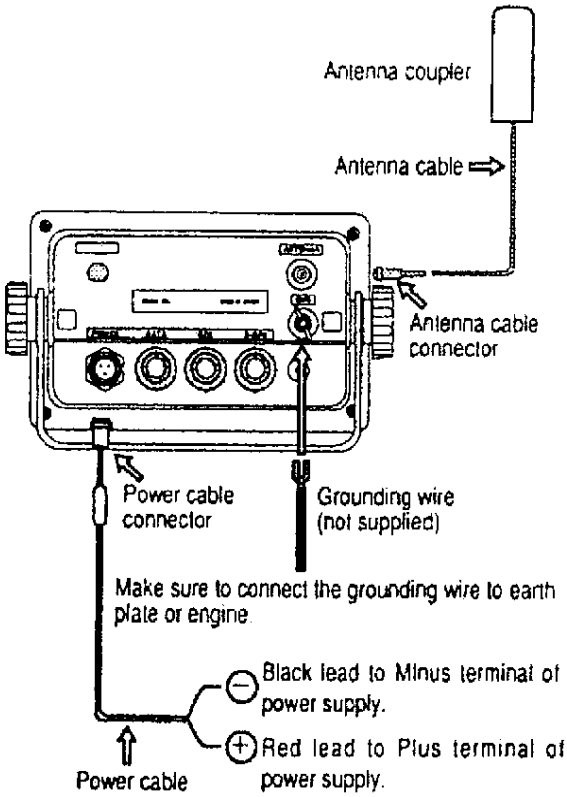


Position (A)
Absolutely avoid a place immediately below the transmitting antenna.
Position (B)
Separate as far away from the transmitting antenna. Mount the receiving antenna so its top end is located above the transmitting antenna. Separate as far away from the radar mast and other obstacles as possible.
Position (C)
Absolutely avoid a place surrounded by obstacles.



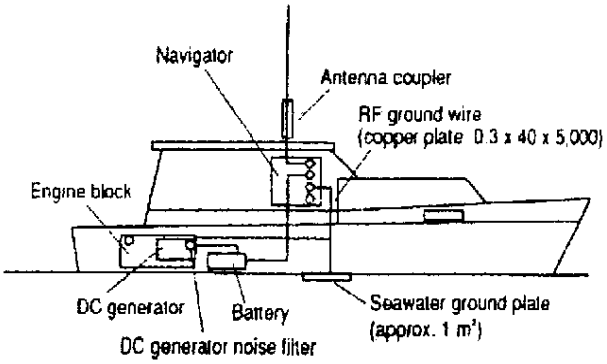
Position (A) and (B)
Separate as far away from the transmitting antenna as possible, and mount the receiving antenna so its top end is located above the transmitting antenna. Separate as far away from the radar mast and other obstacles.
Position (C)
Absolutely avoid a place immediately below the transmitting antenna.

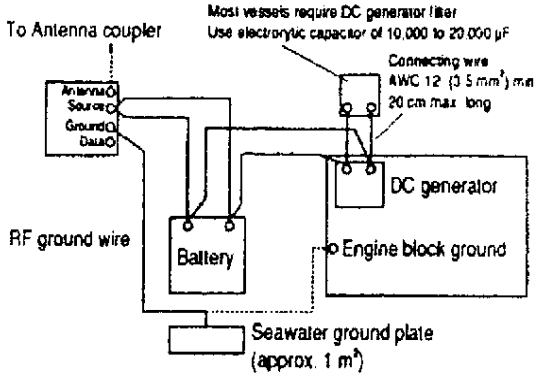
Cable connections



RF ground

In order that Loran receiver operates properly, RF ground may be required. If the grounding status is wrong, an erratic or no operation might occur. The equipment conditions differ from one vessel to another. In case of an engine vessel, extend the ground wire direct to the engine block or engine outer case.

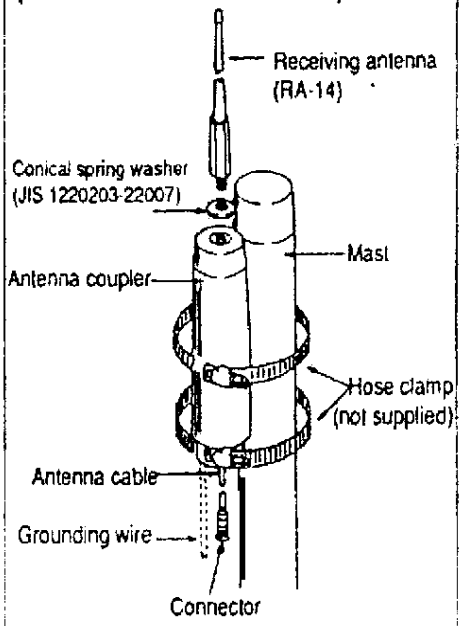




Grounding Notes:
The vessel with a ground alarm system, floating power system or positive side grounding may damage the navigator if the ground terminal on the back side is connected to the vessels hull earth. In this case, a navigator with floating power supply is available and recommended.

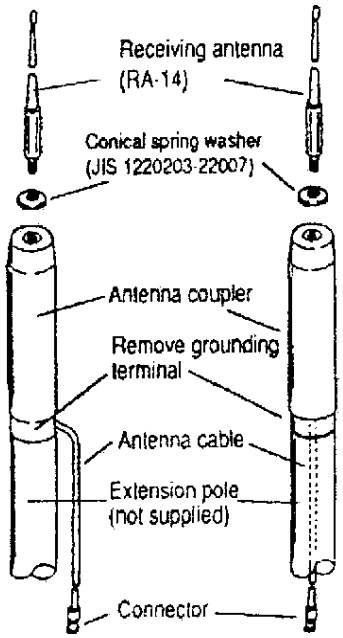
Antenna installation

2.45 m receiving antenna (for wooden and FRP vessel)

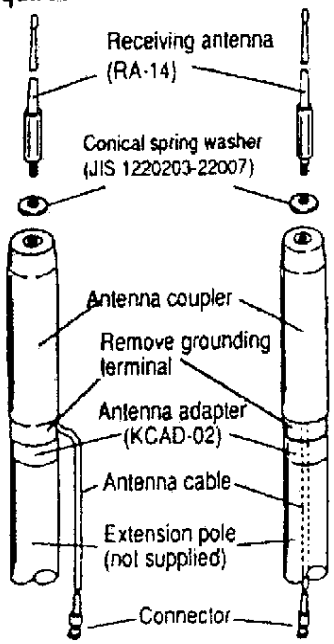


Connect the grounding wire to the ground terminal of the unit or ship's bottom hull steel plate earth.

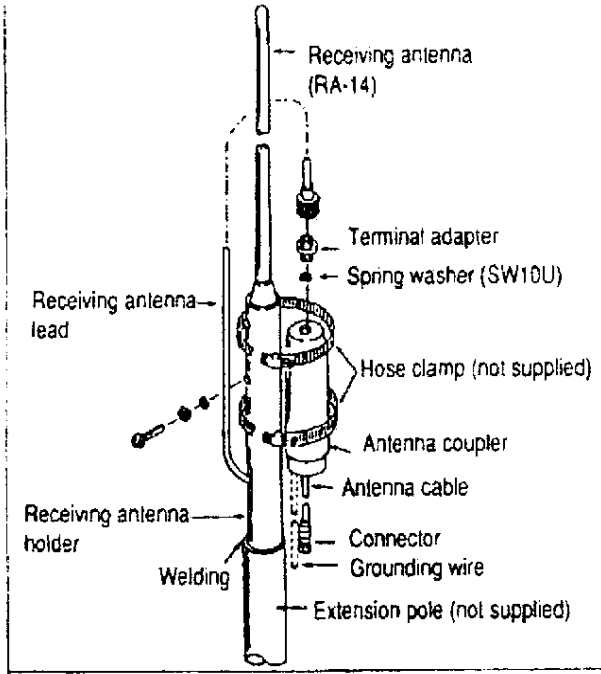
Antenna unit holding pipe (Screw: W1-14 threads)



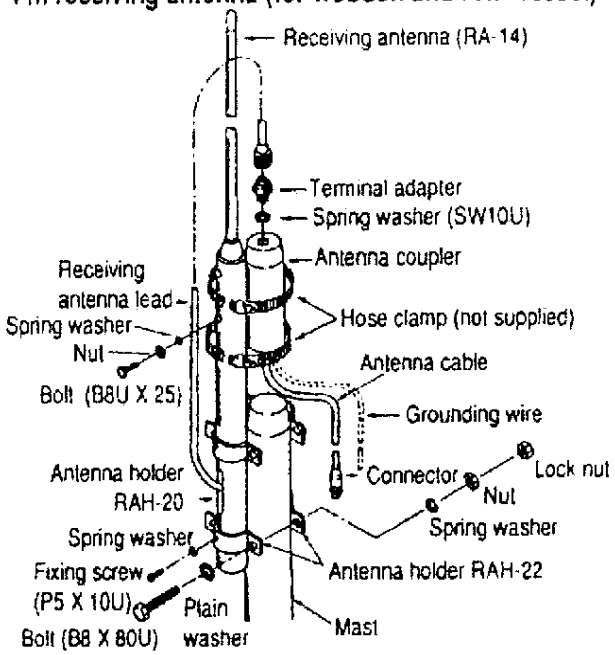
Antenna unit holding pipe (Screw: G3/4) Antenna adapter KCAD-02 is required.



4 m receiving antenna (for steel vessel)

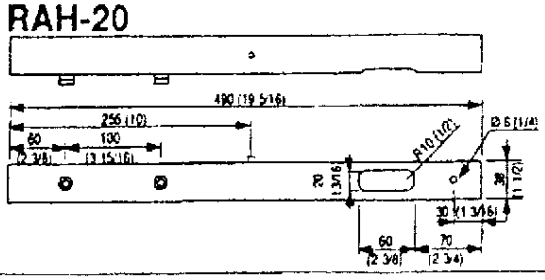


4 m receiving antenna (for wooden and FRP vessel)



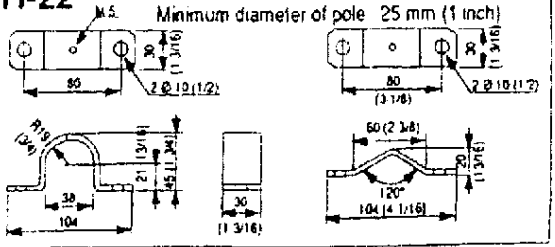
Antenna holder

RAH-20



RAH-22

Maximum diameter of pole 70 mm (2 3/4 inches)
Minimum diameter of pole 25 mm (1 inch)



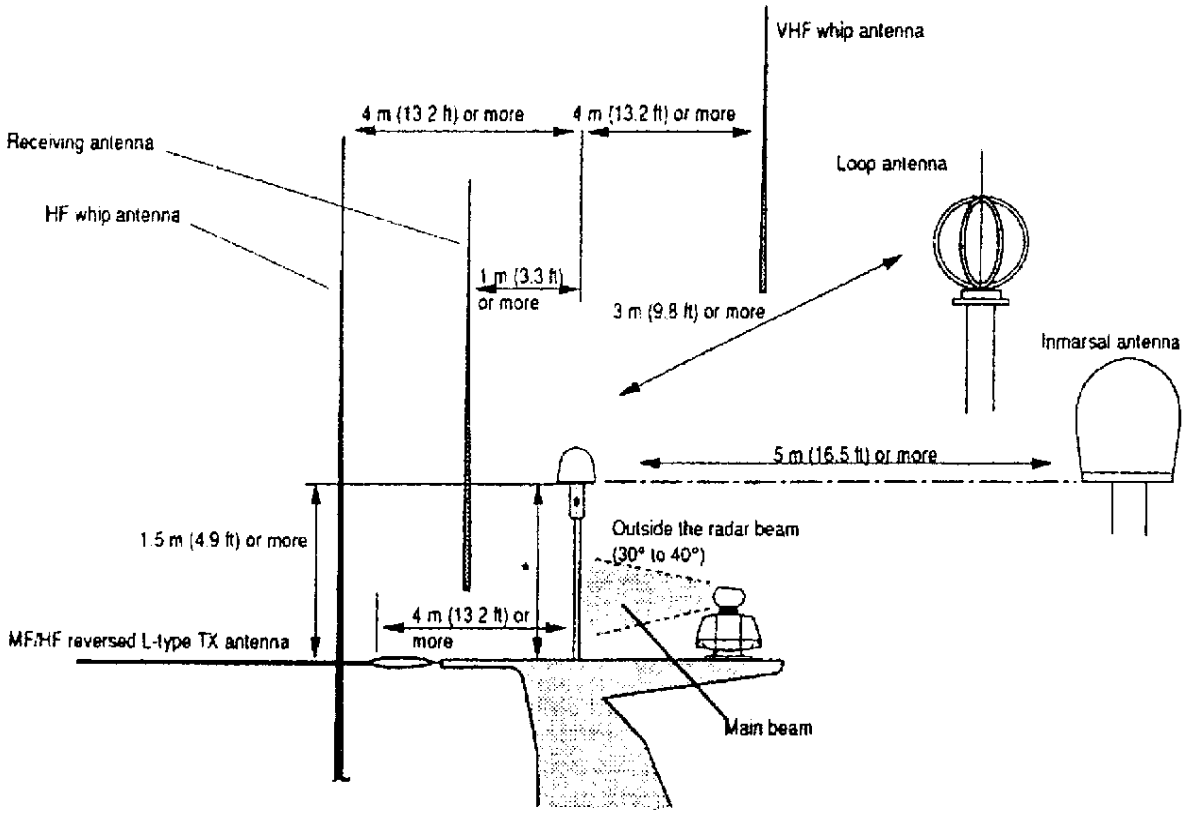
Installation (GPS navigator)

Installation site

Scale differs among drawings.

Make sure to install the GPS receiver module with a clear view of the horizon.
Objects placed above the GPS receiver module or too close to the GPS receiver module may cause signal to noise ratio degradation and shorten measuring time.
If possible, allow the following separations.

(1) As far away from the metallic object 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 5 meters (16.5 feet) away from the Inmarsat antenna.
(7) At least 3 meters (9.8 feet) away from the loop antenna.
(8) At least 0.5 meters (1.6 feet) above the large metal surface.

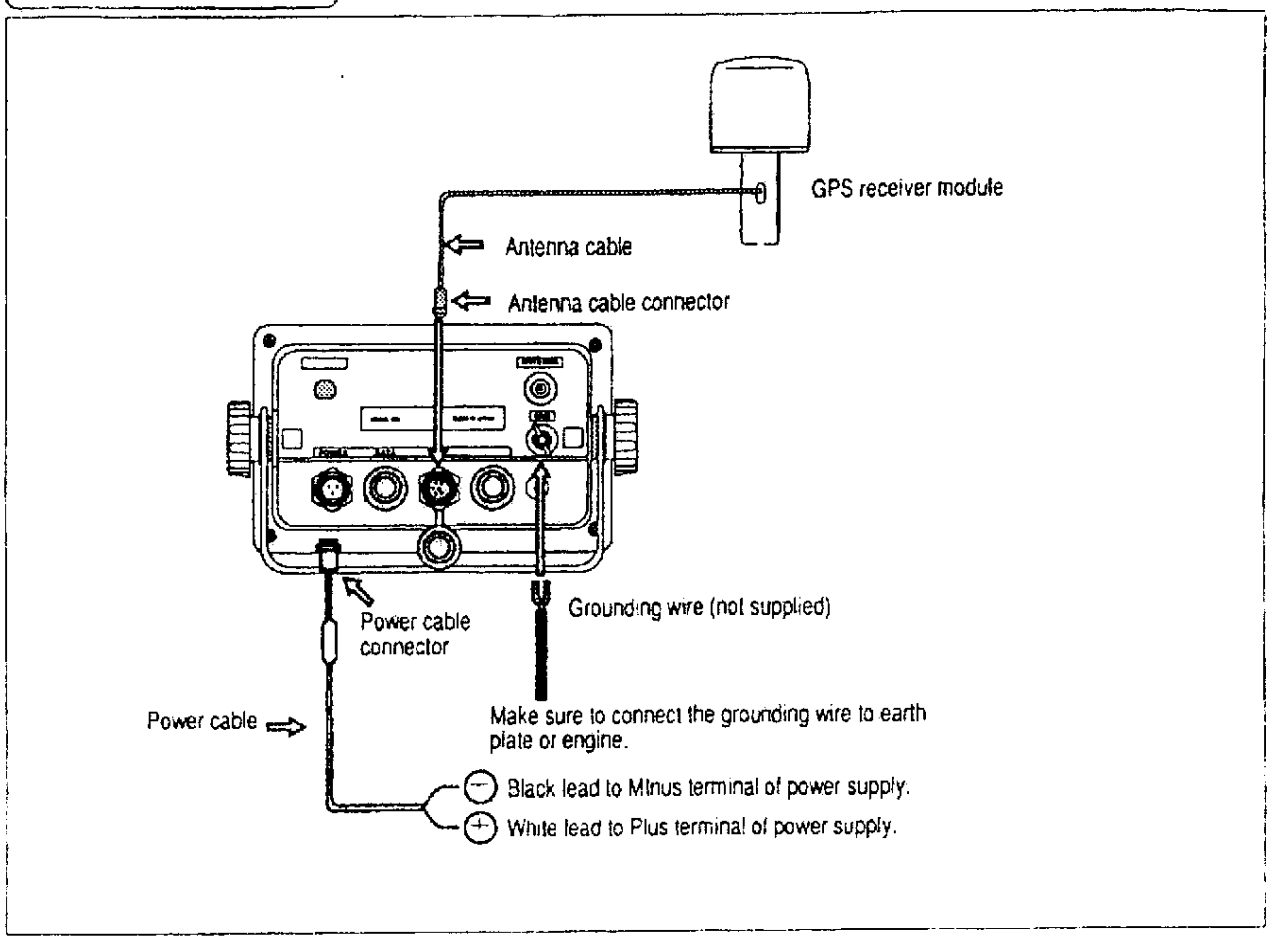


* At least 0.5 meters (1.6 feet) above the large metal surface.

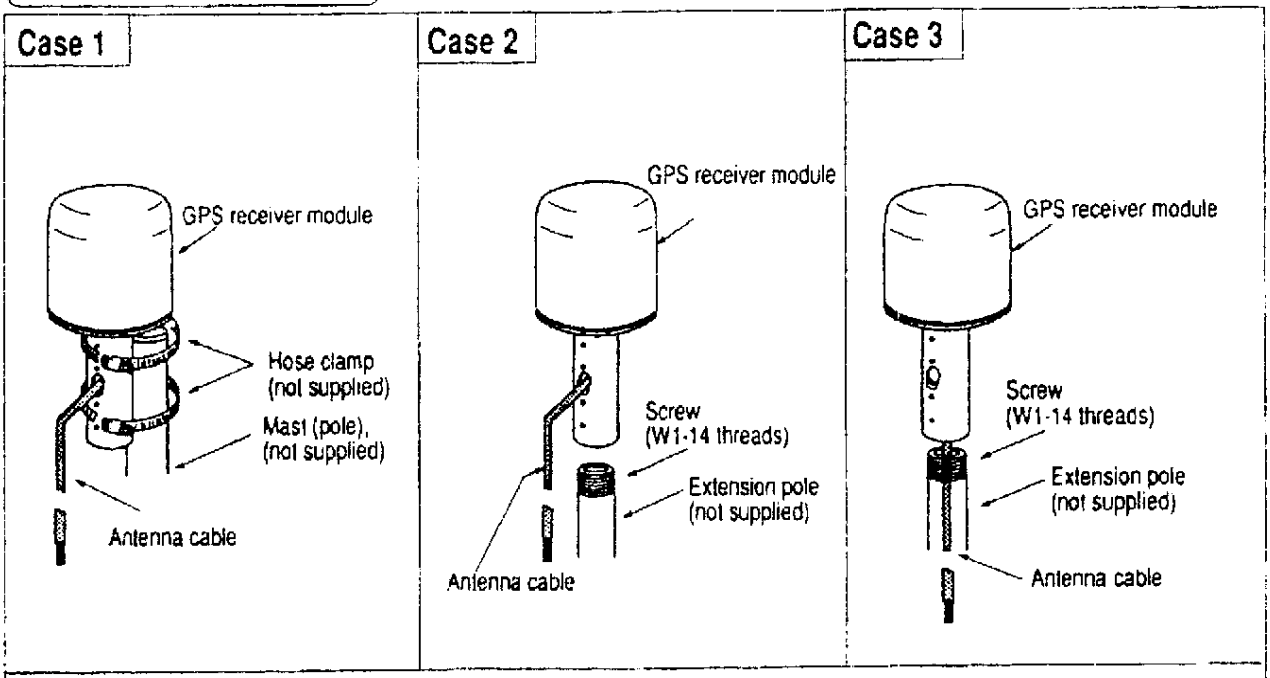
Should you find no place is available under the conditions as described in (1) through (8), then find the largest metal object and set up the antenna as far away as possible.

Guide line		
Object	Size in diameter	Minimum distance
Pole	10 cm (3 15/16 inches)	1.5 m (4.9 ft)
Pole	30 cm (11 13/16 inches)	3.0 m (9.8 ft)

Cable connection



Antenna installation



See the before page for "Installation site".

Appendix ... Local Geodetic Systems

In alphabetical order

Name	No.	Name	No.
ALASKA/CANADA	04	LIBERIA 64	57
ARC 50	29	MAHA 71	58
ARC 60	30	MALAYSIA	23
ARGENTINA	39	MALDIVE	48
ASCENSION	31	MARCUS	35
AUSTRALIAN 84	06	MARSHALL	82
BAHRAIN	27	MASCARENE	73
BERMUDA	37	MIDWAY 61	62
BRAZIL	45	MOROCCO	61
CANARY	68	NAD-27	03
CAYMAN BRAC	56	NAD-83	10
CHATHAM	43	NEW GEORGIA	46
COCOS	28	NEW ZEALAND	13
COLOMBIA	38	NIGERIA	63
CORVO/FLORES	65	OMAN	67
DIEGO GARCIA	52	PARAGUAY	44
DJAKARTA	22	PHILLIPPINES	19
EAST FALKLAND	76	PHOENIX	40
EAST MALAYSIA	79	PITCAIRN	69
EASTER	47	PORTO SANTO	77
EFATE	36	PUERTO RICO	71
EGYPT	66	QATAR	72
ENGLAND	20	ROME 40	15
ERITREA	60	SALVAGE	59
ETHIOPIA	25	SANTA MARIA	75
EUROPEAN 50	05	SANTO	74
EUROPEAN 79	14	SAUDI ARABIA	17
FAIAL	78	SOMALIA	26
FIJI	81	SOUTH AFRICA	16
FLORIDA	41	SOUTH AMERICA	08
GREENLAND	09	SOUTH ASIA	07
GUADAL CANAL	50	SOUTH CHILE	70
GUAM 63	49	SRI LANKA	54
HAWAII	21	ST. HELENA	34
HONG KONG 63	51	SURINAM	83
ICELAND 55	11	TERN	33
IRELAND 65	12	TOKYO	02
INDIAN/NEPAL	18	TRINIDAD	64
IWO JIMA	32	TRISTAN	80
JAPAN	24	TUNISIA	42
JOHNSTON	53	WGS-72	01
KELGUELEN	55	WGS-84	00

In numerical order

No.	Name	No.	Name
00	WGS-84	42	TUNISIA
01	WGS-72	43	CHATHAM
02	TOKYO	44	PARAGUAY
03	NAD-27	45	BRAZIL
04	ALASKA/CANADA	46	NEW GEORGIA
05	EUROPEAN 50	47	EASTER
06	AUSTRALIAN 84	48	MALDIVE
07	SOUTH ASIA	49	GUAM 63
08	SOUTH AMERICA	50	GUADAL CANAL
09	GREENLAND	51	HONG KONG 63
10	NAD-83	52	DIEGO GARCIA
11	ICELAND 55	53	JOHNSTON
12	IRELAND 65	54	SRI LANKA
13	NEW ZEALAND	55	KELGUELEN
14	EUROPEAN 79	56	CAYMAN BRAC
15	ROME 40	57	LIBERIA 64
16	SOUTH AFRICA	58	MAHA 71
17	SAUDI ARABIA	59	SALVAGE
18	INDIAN/NEPAL	60	ERITREA
19	PHILLIPPINES	61	MOROCCO
20	ENGLAND	62	MIDWAY 61
21	HAWAII	63	NIGERIA
22	DJAKARTA	64	TRINIDAD
23	MALAYSIA	65	CORVO/FLORES
24	JAPAN	66	EGYPT
25	ETHIOPIA	67	OMAN
26	SOMALIA	68	CANARY
27	BAHRAIN	69	PITCAIRN
28	COCOS	70	SOUTH CHILE
29	ARC 50	71	PUERTO RICO
30	ARC 60	72	QATAR
31	ASCENSION	73	MASCARENE
32	IWO JIMA	74	SANTO
33	TERN	75	SANTA MARIA
34	ST. HELENA	76	EAST FALKLAND
35	MARCUS	77	PORTO SANTO
36	EFATE	78	FAIAL
37	BERMUDA	79	EAST MALAYSIA
38	COLOMBIA	80	TRISTAN
39	ARGENTINA	81	FIJI
40	PHOENIX	82	MARSHALL
41	FLORIDA	83	SURINAM

CERTIFICATE OF LIMITED WARRANTY

Providing you present a valid proof of purchase, SI-TEX Marine Electronics Inc. warrants all parts of each new product against defect in material and workmanship under normal use and will repair or exchange any parts proven to be defective at no charge for a period of two years for parts and one year for labor from the date of purchase, except as provided below under Limited Warranty Exceptions.

Defects will be corrected during normal working hours by an authorized SI-TEX Marine Electronics Inc. dealer, service center, or at the SI-TEX office in St. Petersburg, Florida. There will be no charge for labor for a period of one year from the date of purchase, except as provided below under Limited Warranty Exceptions.

This Warranty and Proof of Purchase must be made available to the authorized SI-TEX Marine Electronics Inc. service location or dealer at the time of service.

LIMITED WARRANTY EXCEPTIONS

SI-TEX Marine Electronics Inc. will not be responsible for equipment which has been subjected to water or lightning damage, accident, abuse, or misuse nor any equipment on which the serial number label has been removed, altered or mutilated.

SI-TEX Marine Electronics Inc. assumes no responsibility for damage incurred during installation.

This Limited Warranty is effective only with respect to the original purchaser.

Any cost associated with transducer replacement, other than the cost of the transducer itself, is specifically excluded from this Limited Warranty.

Travel cost incurred will not be accepted for SI-TEX Marine Electronics Inc. products.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION OF THE FACE HEREOF.

SPECIFIC EXCLUSIONS

Charges for overtime, stand-by, holiday, and per diem are specifically excluded from the Limited Warranty.

Chart paper, stylus, stylus belt, lamps, and fuses are consumable items and are not covered by this Limited Warranty.

Installation workmanship or materials except as provided directly by SI-TEX Marine Electronics Inc. are not covered by this Limited Warranty.

SI-TEX Marine Electronics Inc. equipment or parts thereof which have been repaired or altered except by an authorized SI-TEX Marine Electronics Inc. dealer or service center are not warranted in any respect.

Transducer, software update, battery, microphone, magnetron, and microwave components and water damage on water resistant VHF radio are items excluded from the two-year warranty and are covered by warranty for a period of one year for both parts and labor.

SI-TEX Marine Electronics Inc. will not, at any time, assume any costs or labor charges for checkout or external line fuse replacement or problems not found to be at fault in equipment itself.

THERE ARE NO WARRANTIES OR GUARANTEES EXPRESSED OR IMPLIED WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY. SI-TEX MARINE ELECTRONICS INC. HAS NO OTHER LIABILITY TO PURCHASE FOR DIRECT OR CONSEQUENTIAL DAMAGE OR ANY THEORY INCLUDING ABSOLUTE LIABILITY, TORT, OR CONTRACT. THIS LIMITED WARRANTY CANNOT BE ALTERED OR MODIFIED IN ANY WAY AND SHALL BE INTERPRETED IN ACCORDANCE WITH THE LAWS OF THE STATE OF FLORIDA. THIS WARRANTY IS LIMITED TO THE CONTINENTAL U.S.A., ALASKA, HAWAII, AND CANADA.

HOW TO OBTAIN SERVICE UNDER THIS WARRANTY

To provide better flexibility, SI-TEX Marine Electronics Inc. gives you the option of obtaining service under this warranty by either:

a) Contacting an authorized SI-TEX Marine Electronics Inc. service station (The closest service station may be found by contacting your dealer of purchase.)

or

b) Shipping your equipment prepaid via UPS or truck with insurance prepaid to SI-TEX Marine Electronics Inc. at the address provided below. SI-TEX Marine Electronics Inc. will, whenever possible, make all repairs covered by Limited Warranty within two weeks of receiving the equipment in Florida and return same to you, freight prepaid.

c) You must present a copy of your Purchase Sales Slip at the time you request warranty service.

Shipping/Mailing Address:

SI-TEX Marine Electronics Inc.
11001 Roosevelt Blvd., Suite 800
St. Petersburg, FL 33716
727-576-5734

SI-TEX Marine Electronics Inc. offers a complete line of quality marine electronics including fishfinders, electronic charting systems, radars, autopilots, GPS/WAAS/Loran receivers, SSB receivers, direction finders, VHF radios, VHF marine & TV antennas, and integrated systems. For more information, contact your SI-TEX dealer or the main office, located in St. Petersburg, Florida.

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NOTES PAGE

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