GPS NAVIGATOR

GPS-9

OPERATION MANUAL

SI-TEX®

DOC NO GPS- 6-94

Welcome to SI-TEX GPS-9

Thank you for your selecting GPS navigator model GPS-9.
The GPS system is fully operated and maintained by the U.S. Department of Defense (DoD). The GPS navigator receives signals from a group of satellites in space to figure out your position anywhere in the world, 24 hours a day. The constellation consists of 24 satellites orbiting the earth at an altitude about 20,000 km.
Please read this manual carefully before turning the power on, as you will find important information on navigating with your GPS-9.

IMPORTANT

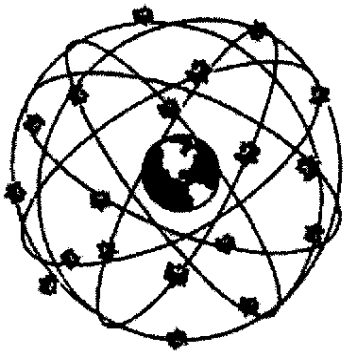
This device is an aid to navigation.
When in actual use, carefully compare data of your GPS navigator with all available navigation sources such as Loran C, Decca, other navigators, charts, visual navigation, depth, water temperature, etc., for good navigation judgment.
Navigation judgment is your responsibility.

Table of Contents

Understanding GPS (Global Positioning System)

Arrangement of GPS satellites

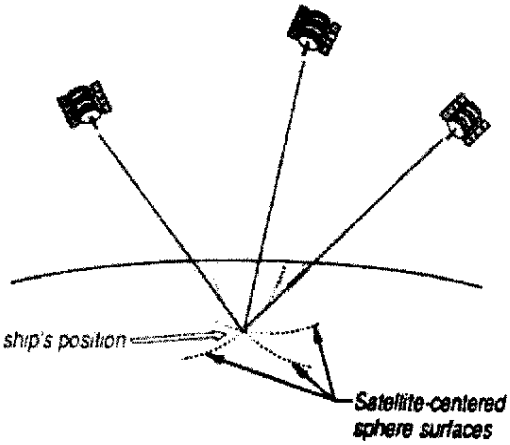
GPS is a navigation system using 24 satellites (21 plus 3 in reserve) orbiting the earth every 11 hours 58 minutes. When all the satellites are in orbit, your location will be accurately determined anywhere in the world 24 hours a day.



Arrangements of GPS satellites

How your position is obtained

Your position is defined by calculating the distance from two satellites to your vessel. Distance is determined by the time it takes a message to go from satellite to receiver. However, it is not practical to have the clock on your vessel synchronized precisely to the clocks on the satellites. Therefore, a third satellite is used to eliminate the time factor from the position fixing formula. The vessel's position is determined as the meeting point of three spheres formed by the three satellites.

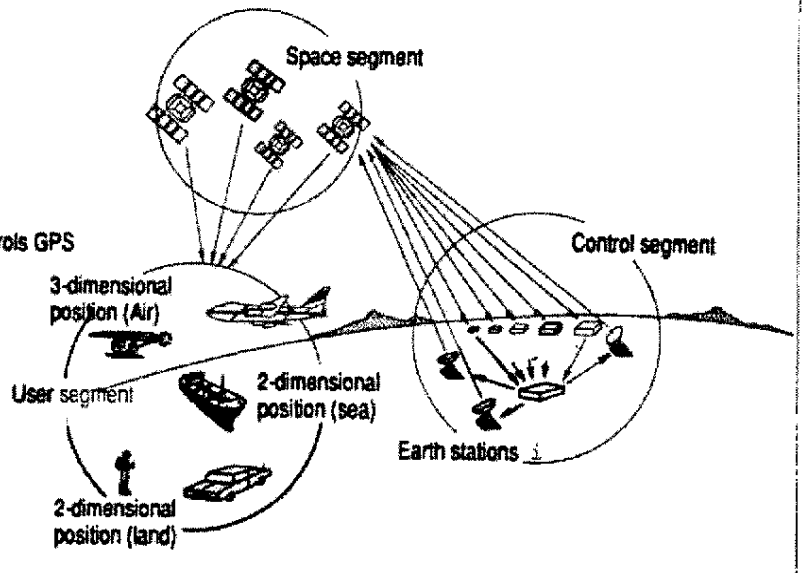


You can fix your exact position (latitude, longitude, and altitude) everywhere in the world with accuracy of 30 to 100 m, while the timing accuracy is maintained in the range of 10^{-7} to 3.3×10^{-7} seconds.

Note 1: The accuracy of measurement by GPS may be subject to change by the policy of the Department of Defense (DoD).
2: GPS system is based on the geodetic system called WGS-84. In conventional world map system, one coordinate system differs from others with region, and this causes the position fix made on the map and GPS measurement to differ to certain extent. For further information, see "Selecting Datum" on Page 29 and "Correcting boat position" on Page 31.

The structure of GPS

- Space segment
  24 satellites (6 orbits x 4 satellites)
  including preliminary satellites
- Control segment
  Control station which monitors and controls GPS satellites from the earth.
- User segment
  GPS receiver owned by users.



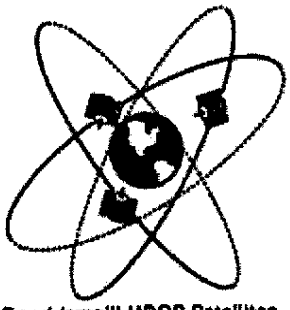
For Proper Operation

(Please read carefully)

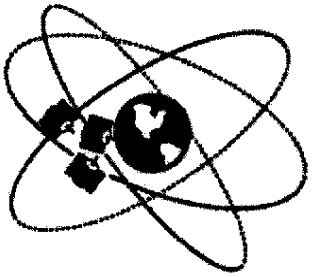
GPS signal reception

The accuracy of GPS is determined by the total system integrity and the position of the satellites.

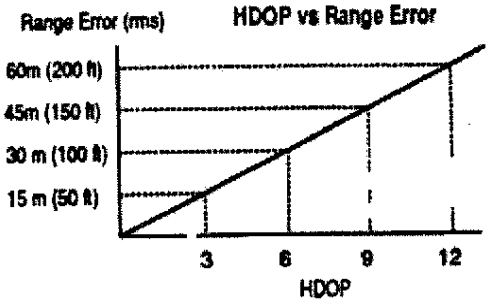
- At present the accuracy of measurement varies depending on time because all satellites are not orbiting yet.
- Special coefficient, denoted HDOP (Horizontal Dilution Of Precision), has been adopted in GPS, that indicates integrity of reception in a particular area. In the following figures, good (small) and bad (large) HDOP satellite arrangements are shown, plus, relation between HDOP and range error is also shown.



Good (small) HDOP Satellites Arrangement



Bad (large) HDOP Satellites Arrangement



- The position is determined based on the antenna height manually entered in 2-dimensional positioning mode. If this antenna height is actually different from the present altitude, the positioning error in horizontal direction will be as HDOP times as altitude difference.
- The value of HDOP changes with time because all satellites move in orbit. As a result, even if the GPS receiver is fixed to a certain point, the value measured by the system is not always fixed. And when the satellites are positioned near the horizon (low elevation), you cannot receive the GPS signal because of the interruption by mountains, buildings, etc.
- The GPS signal reception is not possible within a room. Please make sure to put the antenna in open site, away from any obstacles.
- The bearing data obtained from the GPS navigation system is referred to the true north.

Time to fix position

It takes more time to fix position in following cases.

- When you use your GPS receiver for the first time.
- When the stored orbit data is not suitable for the satellite available, or purged due to lengthy storage.
- When you use it after moving a long distance.

GPS-9 shortens position calculating time by storing the orbit data sent from the available satellites. When you first switch on the receiver, it may take about 30 minutes before the first fix is made.
From the second operation, the receiver can fix your position within a minute because stored satellite data from the previous operation.
When it takes more than 15 minutes, carry out the following operations:
(1) Press the **OFF** key to turn off the power.
(2) Press and hold the **POWER/DIM** key to turn on the power again.
(3) Press the **ENT** key while "Checking" is displayed.
(4) Move the cursor to "**1. INITIALIZE**" and press **ENT** key.

Tips for mounting GPS Receiver

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.

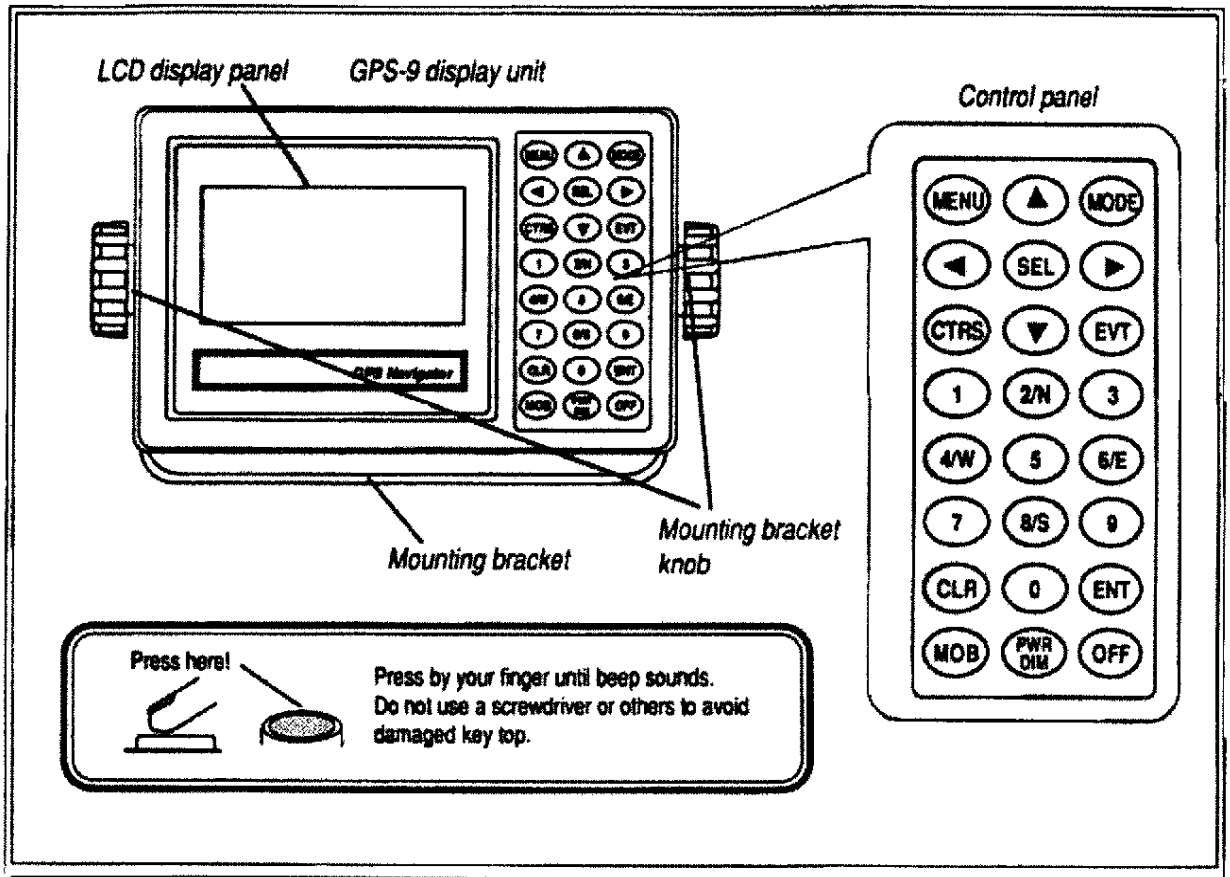
When the GPS-9 is damaged or out of order, please contact your local agent or authorized SI-TEX dealer for service.

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.

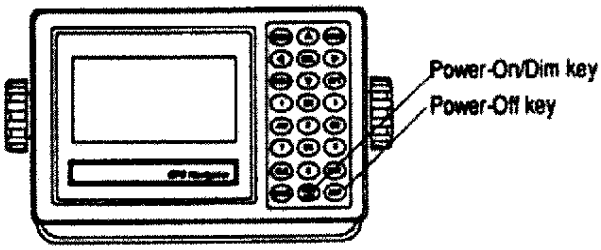
Display Unit



Screen switching (MODE)	Switches over between NAV1, NAV2 and NAV3 screens.	Emergency (MOB)	Activates MOB (Man Over Board) function.
Menu (MENU)	Recalls the menu.	Power/dimmer (PWR DIM)	Turns your system On and dims the back lights (in 2 levels).
Clear (CLR)	Clears a numeric or optional parameter or stop alarm sound temporarily.	Power-Off (OFF)	Turns your system Off.
Entry (ENT)	Enters a numeric or optional parameter.	(1) (2/N) (3) (4/W) (5) (6/E) (7) (8/S) (9) (0)	Numeric keypad 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 keys (▲) (◀) (▶) (▼)	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 an optional parameters.		

Getting Started

Your GPS-9 always keeps orbit data of satellite position to allow quick position fixing. (Your system does not contain this data for the first operation.)
When you first use your GPS-9, it must first receive the orbit data from satellites and it may take approximately 15 minutes to display your position. Once this step is completed, your ship's position is displayed immediately any time you wish.
To make your GPS-9 operational (to store orbit data of GPS satellites in system memory), use the following steps.



PWR DIM Press this key to turn your GPS-9 on.

Dim the display:

PWR DIM Use this key to dim the screen in two brightness levels.

Change the contrast:

CTRS Use this key to change the LCD contrast (intensity) in eight levels.

Power off:

OFF Press this key to turn your GPS-9 off. All data before power-off is kept in memory for later use.

What is failure of positioning?
If your GPS-9 cannot receive signals from three or more satellites, it fails to position your ship.

On-screen messages change in the following sequence when your GPS-9 receives satellite signals and displays latitude/longitude data.

```
GPS
ROM No. KM-945
checking
```

Initial message during power-on

```
GPS
ROM No. KM-945
check OK
```

Message after check of GPS receiver and display has completed.

N (or S) and E (or W) blink.

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

Display when GPS-9 is searching GPS satellites. N and E also blink during interruption.

Blinking stops.

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

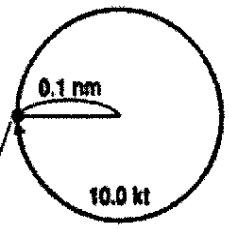
When GPS-9 receives signals from 3 or more satellites, it displays present latitude and longitude position with solid N and E.

```
NAV1   °  .
       °  .
SPEED     . kt
COURSE      . °
```

If positioning data is not available:
The data from previous operation is displayed. However, if you have initialized GPS-9, the memory data is erased and no positioning data is shown after power-on.

Operation by built-in simulator

The built-in simulator helps you practice operations of your unit to get familiar even before your first sail out with it. Only power source is required to turn on the unit without antenna. You just enter the start point position of the simulated navigation at point number 150 in Lat/Long referring to "Storing Waypoints" (page 11). Turn the unit off after the above. Turn the unit on by pressing PWR/DIM key again and press "4" key while "CHECK OK" is displayed on the screen. Your position draws a circle from the position in point number 150 at 10.0 kt speed with 0.1 nm radius. It takes about 3 min. 40 seconds for each circle. You can try every function of the unit as if in practical operation.
You simple turn the power off to get back to normal operation.



Start position entered at point number 150.

Switching screens

NAV1 screen

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

Lines 3 and 4 are updated.

NAV1 screen NAV1 → NAV2 screen NAV2 → NAV3 screen NAV3 → NAV1 screen NAV1

MODE

Switches the screen each time pressed.

NAV3 screen

```
NAV3  30  23:59:59
TIME      :05h59m
VMG       J:15.0kt
CMG       :100.0°
```

The screen is switched in arrow direction each time you press the MODE key.

NAV2 screen

```
NAV2
OFF
 15.0kt     359.9°
```

Display-Off screen

```
NAV2       0.00
W107       :00:
WPT 107=POINT 1
 15.0kt     359.9°
```

Waypoint screen

```
NAV2       0.00
W132       :00:
RTE 01 =005 /014
 15.0kt     359.9°
```

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

Anchor watch screen

SEL

Operation of NAV1 screen

Data on line 3 and 4 are independently selected.

```
NAV1   27°54.008N
W107   82°41.613W
SPEED      15.0kt
COURSE     359.9°
```

- Lines 1 and 2 for present position display
- Indicated during WPT or route navigation.
- Line 3: Selectable display column
- Line 4: Selectable display column

SEL — Locate cursor onto desired line using cursor shift keys and press this key to switch the message in the following sequence.

```
COURSE      359.9°
```

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

```
SPEED       15.0kt
```

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

```
STG         192.7°
```

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

```
DIST        27.3nm
```

Distance to WPT
The distance from present position to waypoint and the total distance to the final waypoint can be switched and displayed.

```
TTG         02h21m
```

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

```
0.00
```

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

SEL

How to Find Out Your Position

You can find your position by simply reading the present latitude and longitude on the screen.

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

Note: Positioning Interruption
If GPS-9 has failed to receive signals from GPS satellites, it shows speed of zero (0) but keeps the last LAT/LONG and course data.

NAV1 screen

```
NAV1    27°54.005N
        82°44.824W
SPEED      15.0kt
COURSE     359.9°
```

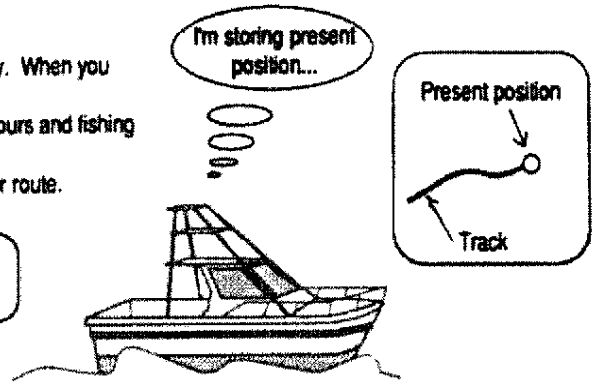
Blinks if positioning is interrupted.

Present position (See Note.)
North or South latitude
East or West longitude
Speed in knots (See Note.)
Bearing in degrees (See Note.)

- Present position can also be shown as Loran C LOPs (see Page 30 for Loran C LOPs display).
- Speed can be shown in different units (see Page 29).

Storing present position (Store events)

You can store up to 20 points (point number 001 to 020) 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 20 points, and then the oldest data will be replaced with a new one in numerical order.

```
EVT     27°38.145N
        82°43.280W
001     27°54.008N
        82°41.613W
```

Latest event point number is shown

Ship's position data is shown.

EVT key precedes any other key on any screen except Menu.
You can also store the present position (memory number 000) using MOB key.

When you press MOB key, your present position is stored in memory number 000.

Recalling event or MOB position

MENU ⇨ 1 ⇨ ( ) ( ) ( )

Press until Menu options 1 to 4 appear.

Select 1: WAYPOINT.

Enter an event number (one of point number 000 to 020) you wish to recall. Point number 000 contains the position data when you have pressed MOB key.

Specified event point number is shown.

Event or MOB positionis recalled.

```
WPT 001=
        27°38.145N
        82°43.280W
```

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

MOB (Man OverBoard) function

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

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     27°54.005N
        82°44.824W
2.7     27°54.008N
270     82°41.613W
```

Present position

Point where you pressed MOB key

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

MODE

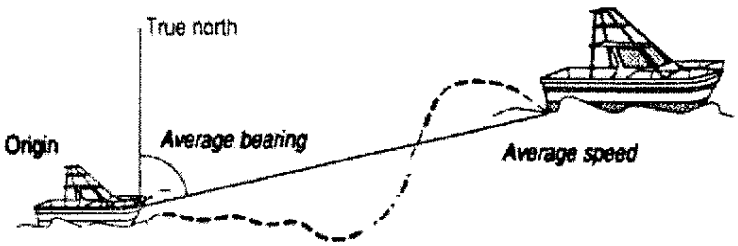
Press until NAV3 screen appears.

CLR Press to reset the elapsed time.

Current date and time
(An example of 30th, 23 hours, 59 minutes, 59 seconds)

```
NAV3  30  23:59:59
TIME      :05h59m
VMG       J:15.0kt
CMG       :100.0°
```

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 has reset the elapsed time) to the present position. The average bearing is an average of true bearing from origin to present position.



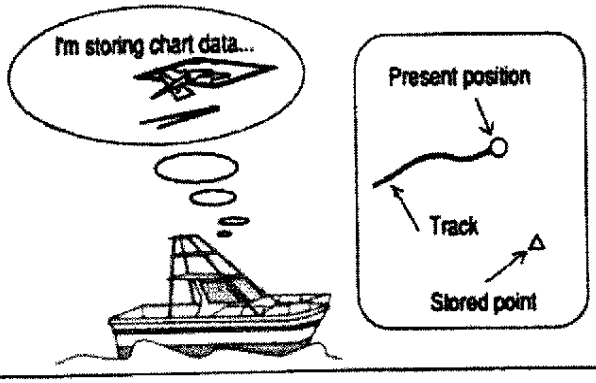
This display is also be available during both WPT and route navigation.

How to Get Distance and Bearing to WPT

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

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

It makes it easy and economical to navigate to a waypoint.
You can store up to 130 points (numbers 021 to 150).



Actual 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 latitude and longitude data of waypoints.
3. Create a route by using a combination of stored position 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 6 for operation.

Store event
"A buoy! Store this position."

See Page 8 for storage.

Setup
"We'll sail to point 072 today.
Set it as waypoint."

See Page 17 for setup.

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

Waypoint 072

Course line

Route navigation

Route navigation — See Page 15 to store route. See Page 20 to select route navigation.

Point switching range during route navigation — See Page 26 to set proximity alarm.

126 108 107 109

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

Storing waypoints (LAT/LONG or LOPs data)

Store a new position

You can store up to 130 points in memory.

Adding a comment

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

Point number (021 to 150)

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

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

Press until Menu options 1 to 4 appear.

Press to select the Add Comment mode.

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

A single character or symbol is added at a time. You can enter up to 8 characters by repeating these steps.

Enter point number (021 to 150) using numeric keys.

Press to backspace ▬ cursor to correct an input error.

⇨ ENT ⇨ ▼ ⇨

The ▬ cursor moves to Longitude field automatically, when entire 7-digit data is entered.

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

Enter a 7-digit data (90°00.000' maximum).

Press to backspace ▬ cursor to correct an input error.

Enter N for North or S for South latitude.

Longitude ⇨ ○○○ ° ○○.○○○ ' ⇨ 4/W or 6/E ⇨ ENT

Enter an 8-digit data using numeric keys (180°00.000' 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 107=_
 ABCDEFGHIJKLMNO
 PQRSTUVWXYZabcd
 efghijklmnopqrs
```

Comment field

```
MENU 1:WAYPOINT
     2:D.GPS
     3:GPS
     4:COMP
```

```
WPT 107=_
   __°__'____
   ___°__'____
```

```
WPT 107=_
 tuvwxyz',.()<>:
 ;?!=@$%&+-/=*
```

```
WPT 107=POINT10
      37°54.005N
      82°44.824W
```

Storage position (latitude and longitude)

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

To store in Loran C LOPs mode, see the "Switch between LAT/LONG and LOPs mode" (page 31).

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

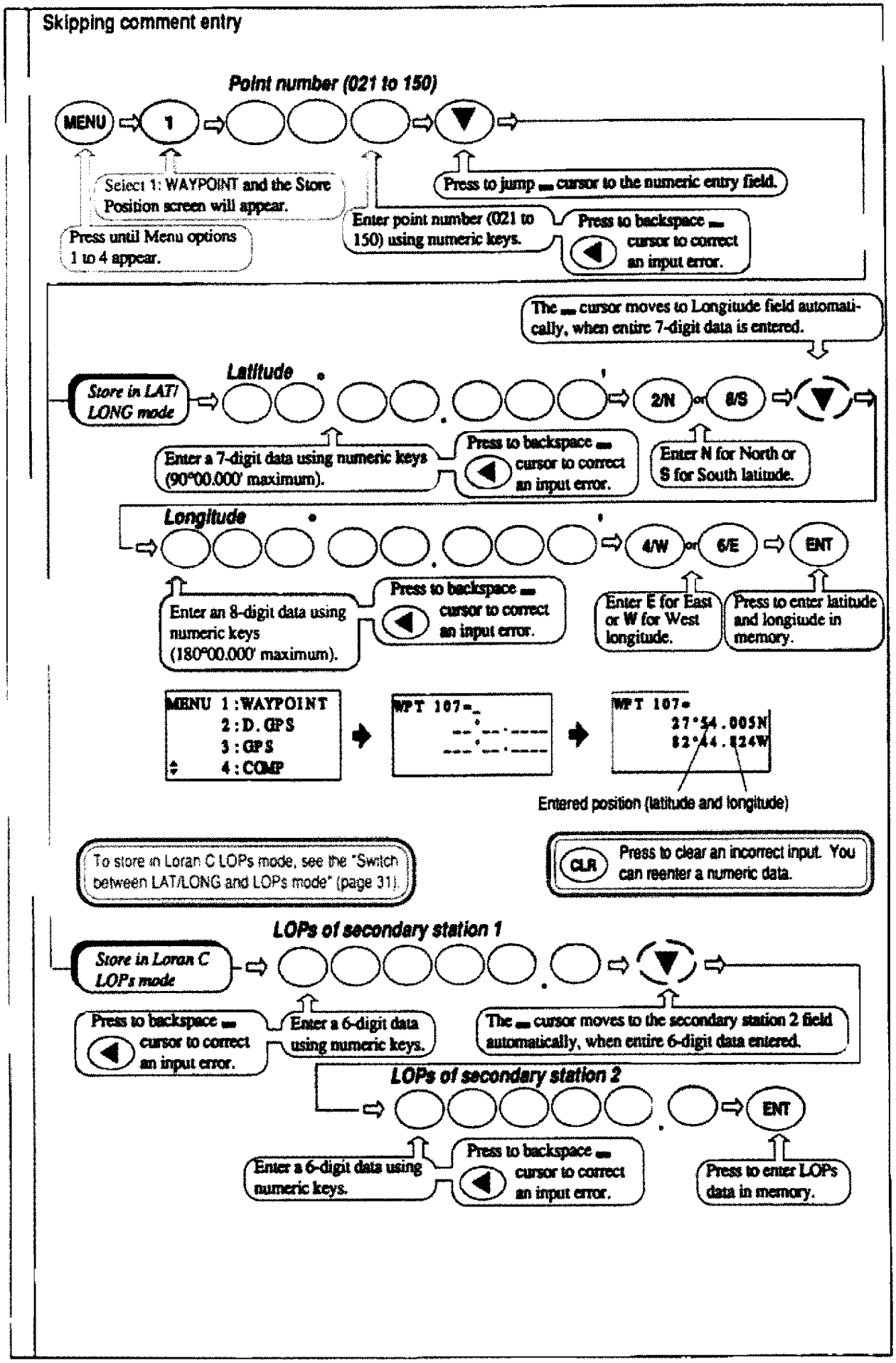
Enter a 6-digit data using numeric keys.

Press to backspace ▬ cursor to correct an input error.

Press to enter LOPs data in memory.

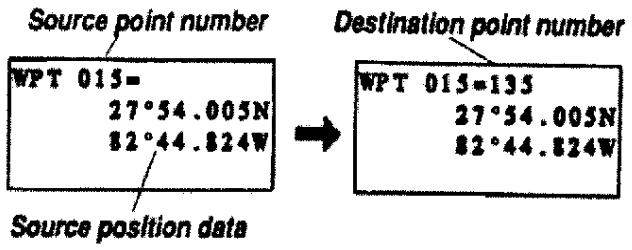
CLR Press to clear an incorrect input. You can reenter a numeric data.

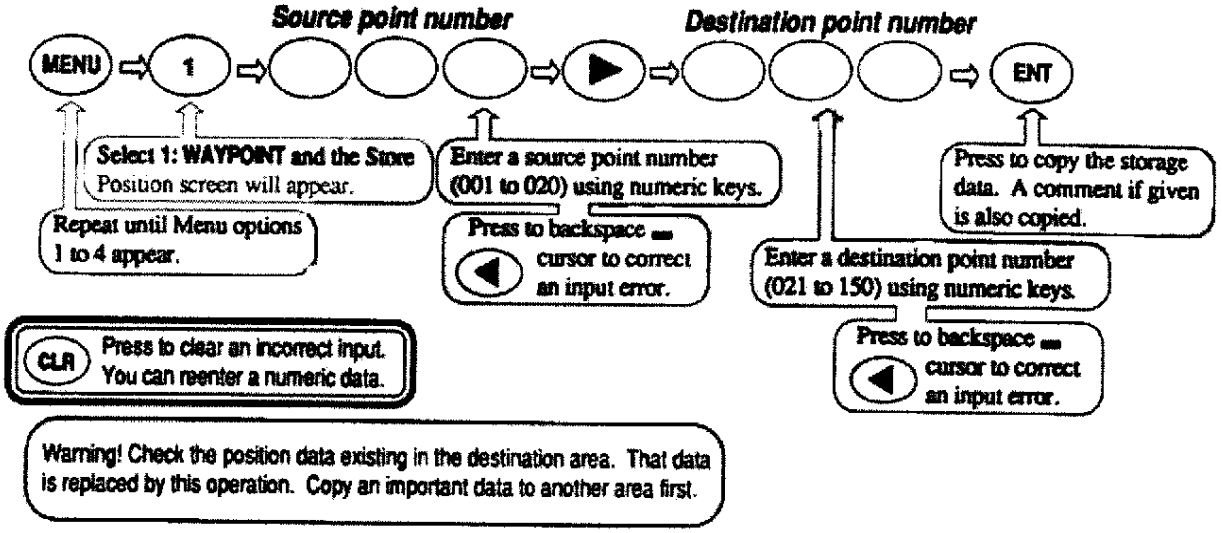
Skipping comment entry



Copying between memory areas

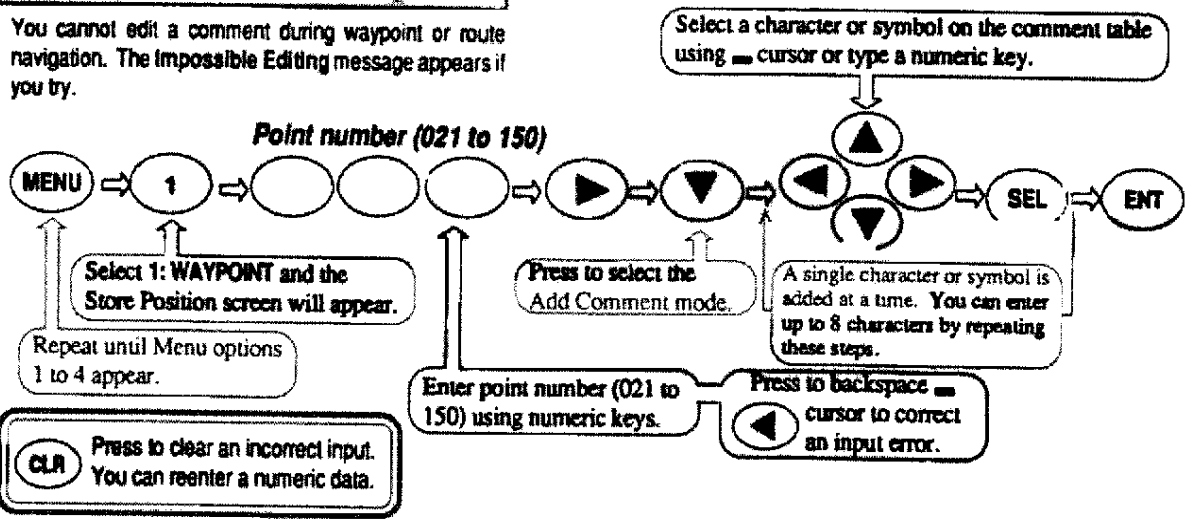
You can store up to 20 event points in memory by event function. When you store more points, the old points are overwritten by new points. However, you can copy important data to Mark Storage areas (point numbers 021 to 150) in Mark Storage mode and keep them permanently. Also, you can copy the position data of 021 to 150 to another area and edit it at the destination.

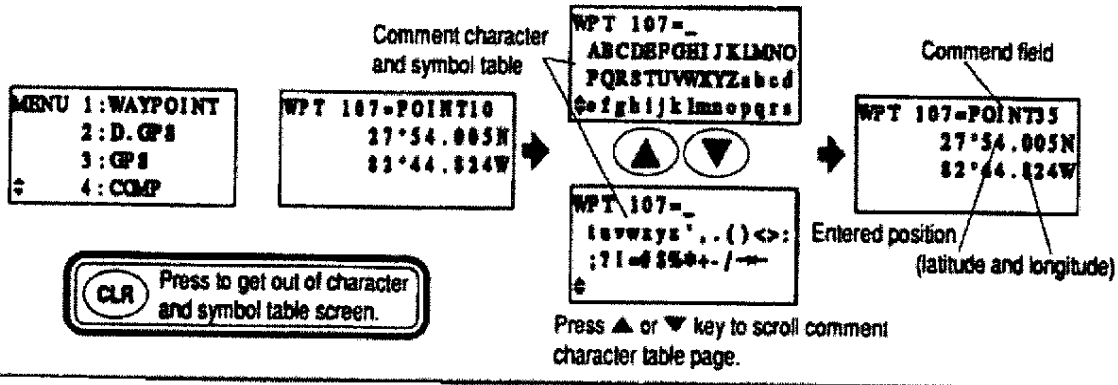




Changing a comment of storage data

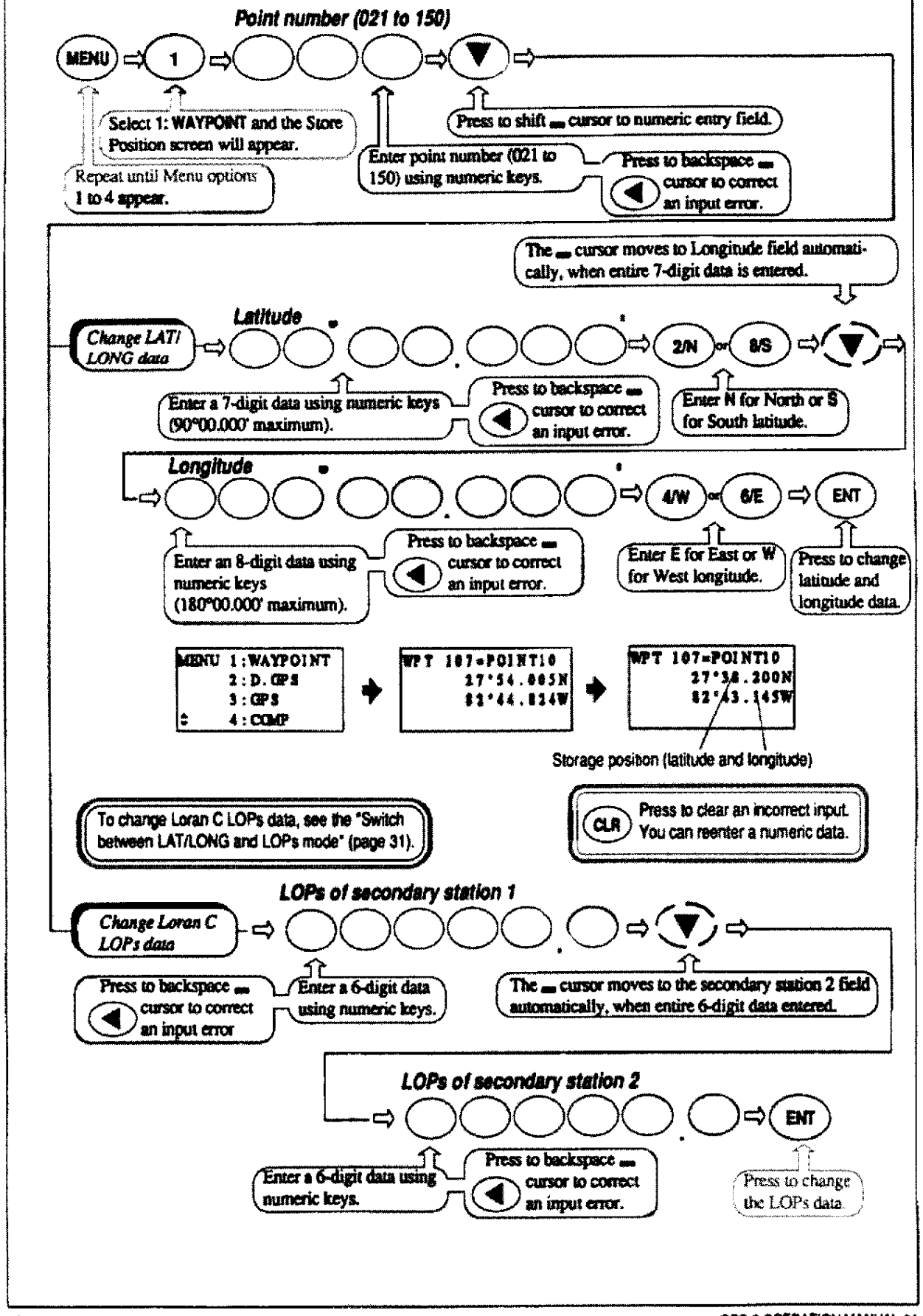
You cannot edit a comment during waypoint or route navigation. The Impossible Editing message appears if you try.





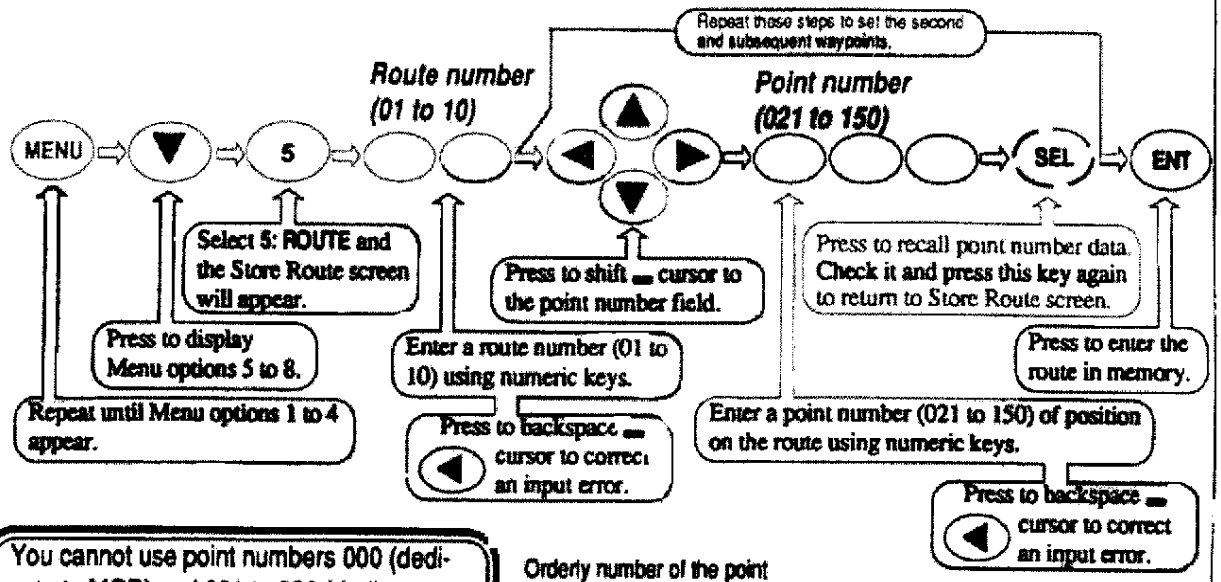
Changing LAT/LONG data

You cannot edit a storage data during waypoint or route navigation. The Impossible Editing message appears if you try.

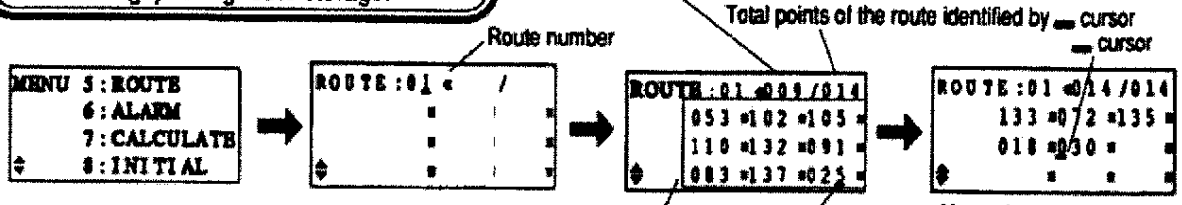


Storing navigation route

You can use up to 130 points on up to 10 routes (01 to 10), or you can store all 130 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 000 (dedicate to MOB) and 001 to 020 (dedicate to event storage) during route storage.



After point 10, the page is scrolled when 9 points are shown.

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

Erasing a single point of position data

CLR Press to cancel erasing.

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

Repeat until Menu options 1 to 4 appear.

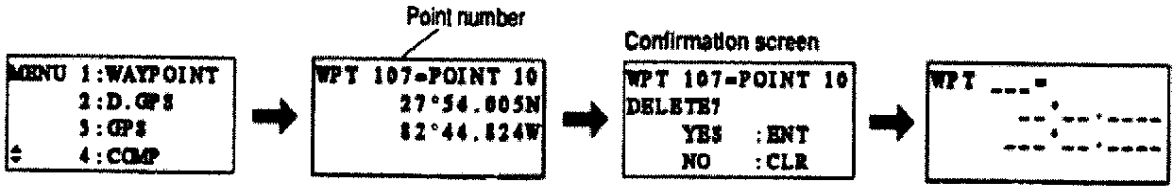
Make sure that cursor is in the correct number field and press this key. Data of the specified number is erased from memory.

A confirmation screen appears.

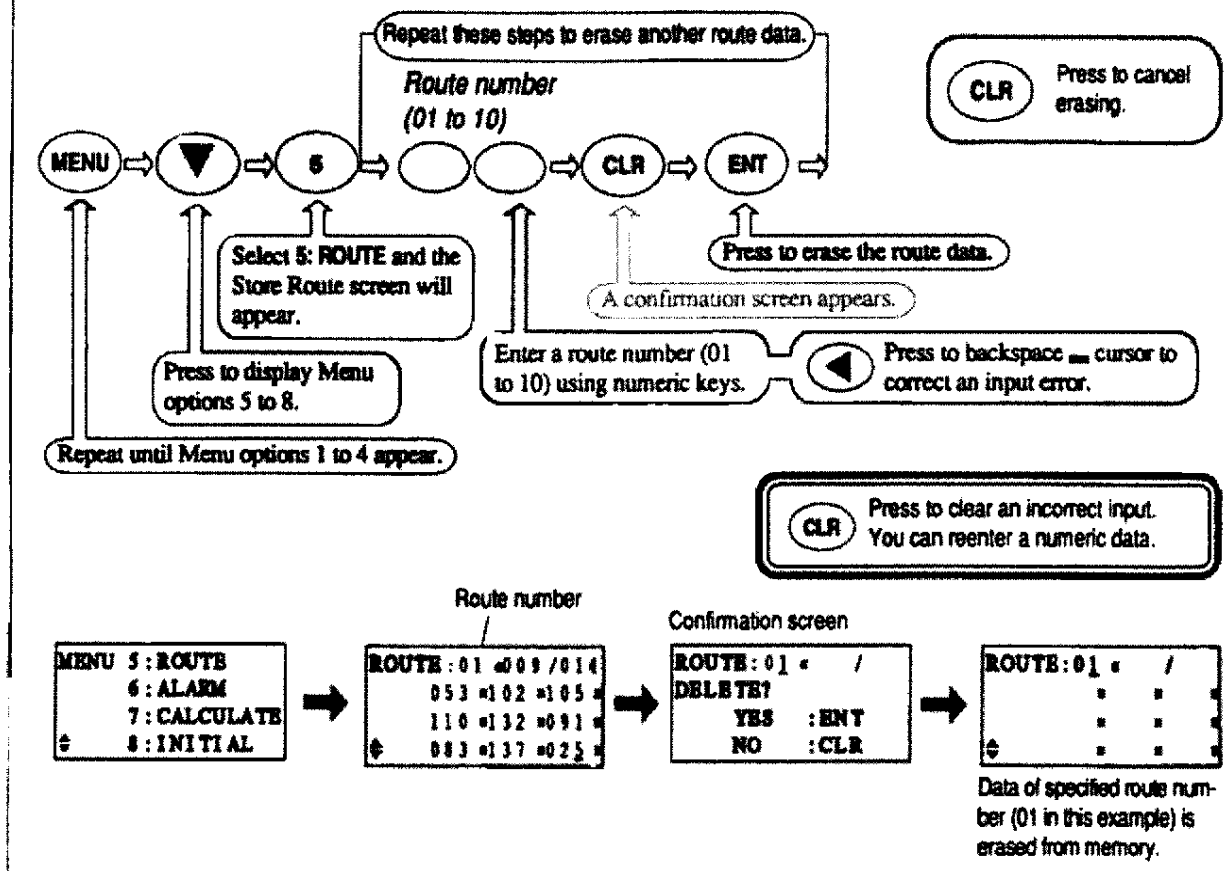
Enter a point number (021 to 150) of data to change using numeric keys.

Press to backspace cursor to correct an input error.

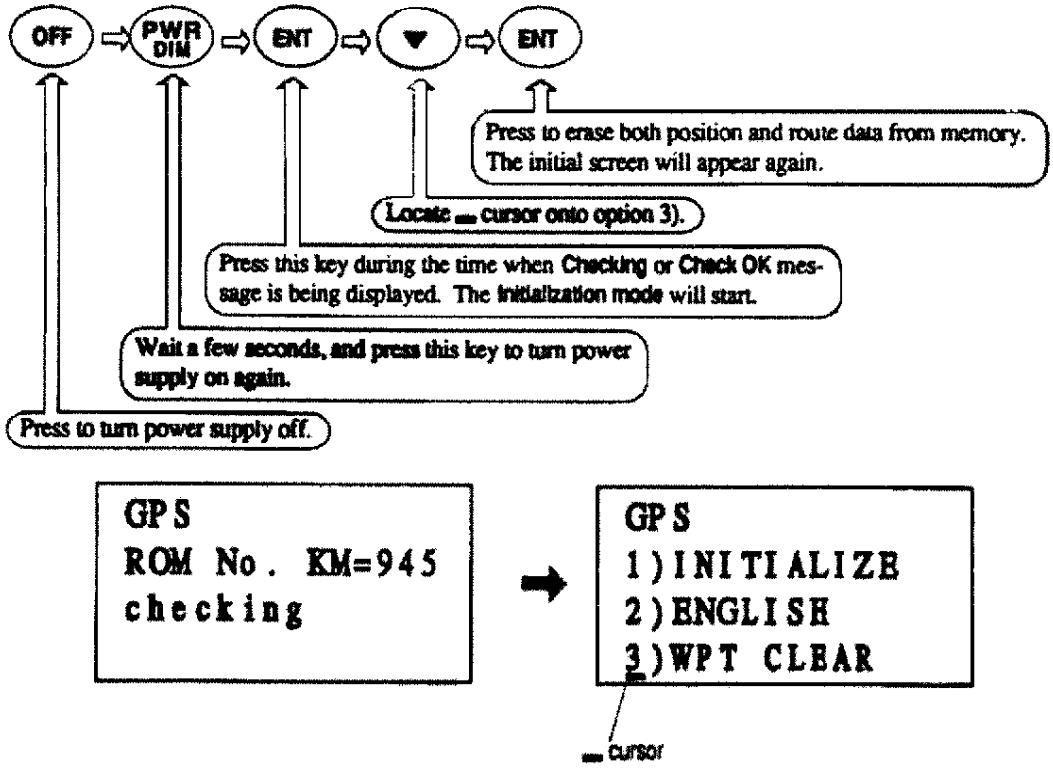
CLR Press to clear an incorrect input. You can reenter a numeric data.



Erasing a single route of data



Erasing entire data from memory



Setup of Waypoints

You need to store waypoint data as it is used for setup during waypoint navigation. Specify the point number from the menu of NAV2 screen and you can set the waypoint.

Point number (107)

```
NAV1  27°54.008N
107   82°41.613W
SPEED      15.0kt
COURSE     359.9°
```

NAV1 screen

Point number (107)

```
NAV2       0.00
107        :00:
WPT 107=POINT 1
 15.0kt    359.9°
```

NAV2 screen

Setting a waypoint navigation

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

Waypoint

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 (000 to 150) 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
        :  :
WPT 107=POINT 1
 15.0kt    359.9°
```

➡

Waypoint number

```
NAV2       0.00
107        :00:
WPT 107=POINT 1
 15.0kt    359.9°
```

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

Point number

MENU ⇨ 1 ⇨ ( ) ( ) ( )

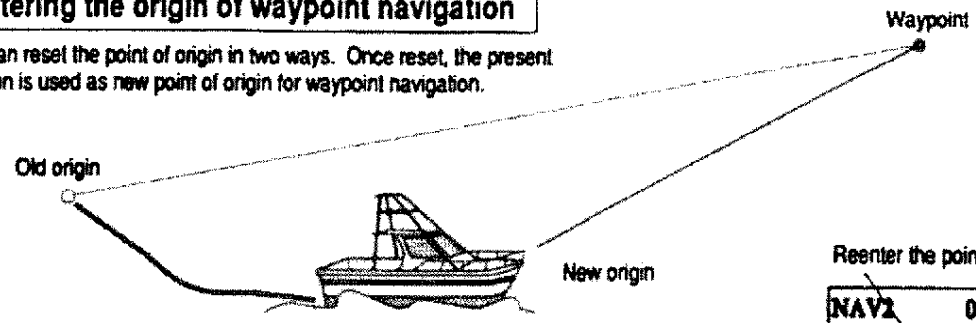
- MENU: Press until Menu options 1 to 4 appear.
- 1: Select 1:WPT.
- ( ) ( ) ( ): Enter a point number (000 to 150) using numeric keys.

WPT position

```
WPT 107=POINT10
27°54.005N
82°44.824W
```

Reentering the origin of waypoint navigation

You can reset the point of origin in two ways. Once reset, the present position is used as new point of origin for waypoint navigation.



Reenter the point number.

```
NAV2      0.00
W107      :00:
WPT [107]=POINT 1
 15.0kt    359.9°
```

MODE ⇨ SEL ⇨ ENT

Press to set the point as WPT.

Press until WPT= appears.

Press until NAV2 screen appears.

Canceling a waypoint navigation

To cancel waypoint navigation, turn WPT to OFF on NAV2 screen. To select a waypoint navigation again, go to Step 1 or 2 above of this page. Waypoint navigation will start from the present position.

MODE ⇨ SEL ⇨ ENT

Press to set the specified point as WPT.

Press to turn WPT to OFF.

Press until NAV2 screen appears.

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

"OFF" message appears.

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

"WP" and number are cleared.

```
NAV1   27°54.005N
       82°44.824W
SPEED     15.0kt
COURSE    359.9°
```

NAV1 screen during waypoint navigation

A message indicating the differential GPS navigation (It blinks during failure of DGPS positioning.)

Waypoint number

```
NAV1D 27°54.005N
W
P107  82°44.824W
SPEED     15.0kt
COURSE    359.9°
```

Present position (LAT/LONG or Loran C LOPs)

They blink during positioning interruption

Speed

Course

You can select from the course, speed, bearing to WPT, distance to WPT, time to go, and XTE on NAV1 screen (see Page 7).

For average speed, averagecourse, and elapsed time setup, see page 9.

NAV2 screen during waypoint navigation

Cross track error (XTE) (See page 19.)

Course deviation angle (See page 19.)

Waypoint number

Point number used as the waypoint

Speed

```
NAV2      0:72>>>
W
P107      :   :31
WPT 107=POINT 1
 0.2kt    329.2°
```

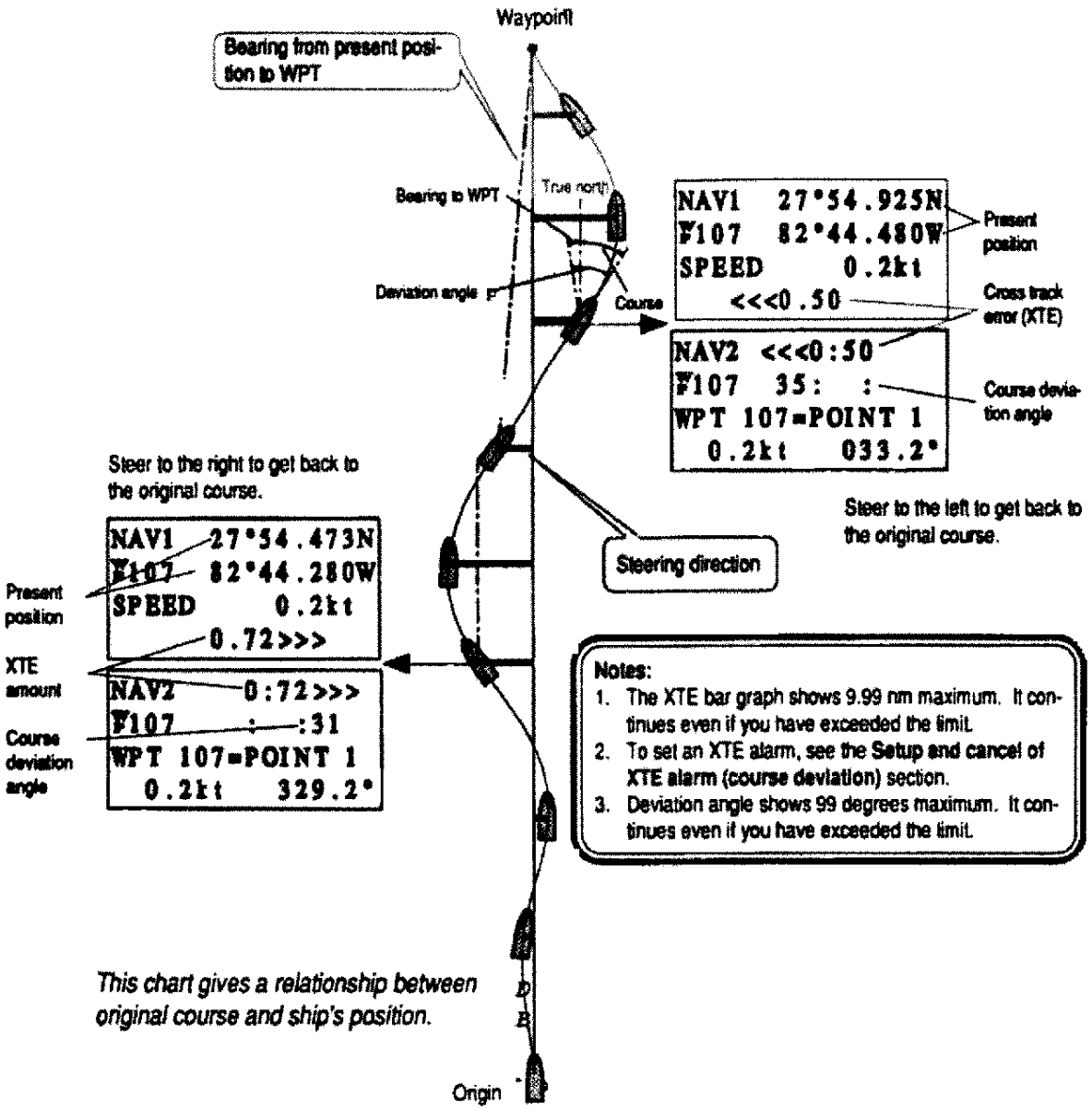
Comment

Course

For average speed, average course, and elapsed time setup, see page 9.

Cross track error and course deviation angle

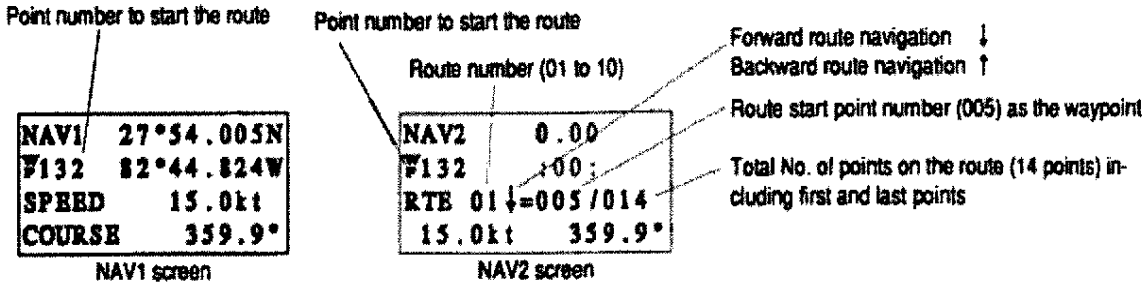
Check the cross track error (XTE) and course deviation angle together with the distance and bearing to the waypoint during navigation. You have to set the waypoint or route navigation to utilize these navigational informations.



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>>>>

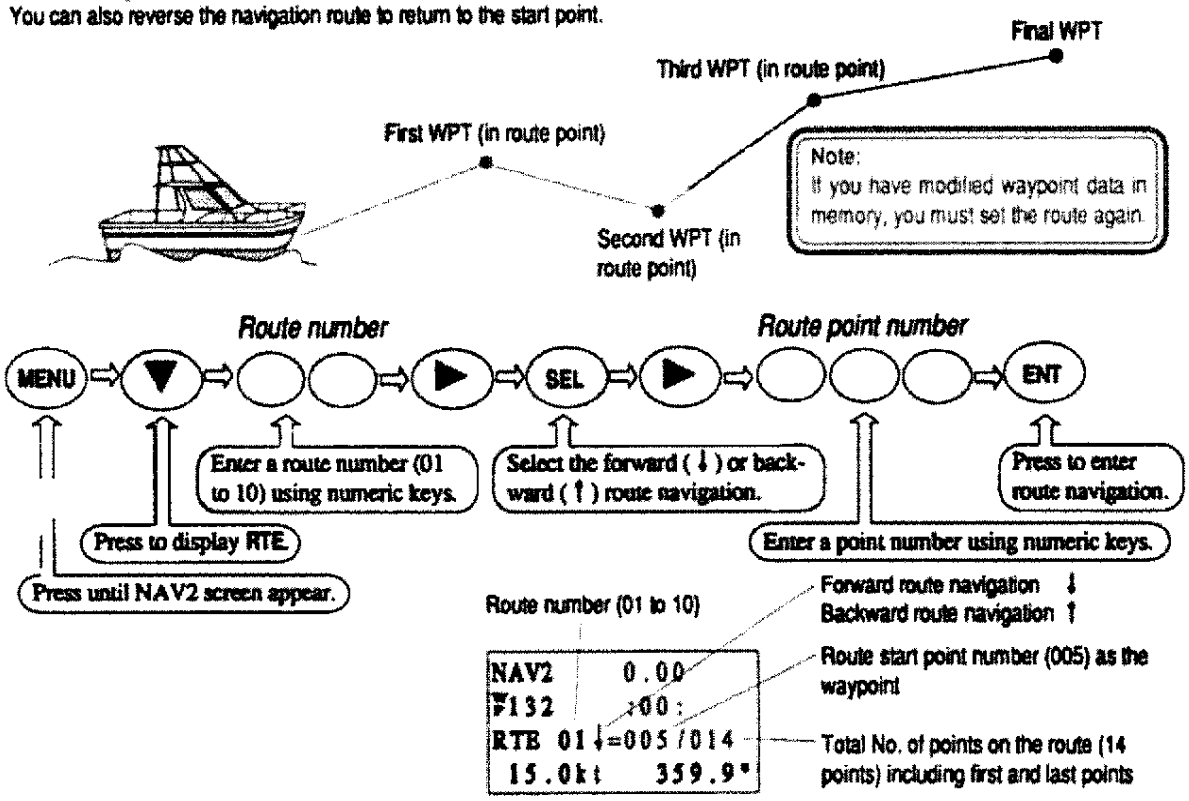
Route Setup

Following procedure shows how to activate route navigation providing route entry is previously completed. If you want to trace back the route, direction of navigation can be reversed.
You can activate a route by entering a route number and a route point number as the first waypoint in NAV2 screen, provided entire route point numbers are already stored.

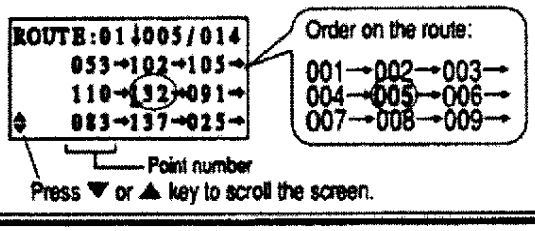


Selecting a route navigation

You can navigate on a route by automatically updating in route points.
You can also reverse the navigation route to return to the start point.



What is the route point number?



The route point number is the orderly number of points in a route previously entered.

Route point numbers during forward and reverse navigation

```
ROUTE:01↓005/014
     053→102→105→
     110→132→091→
     083→137→025→
```

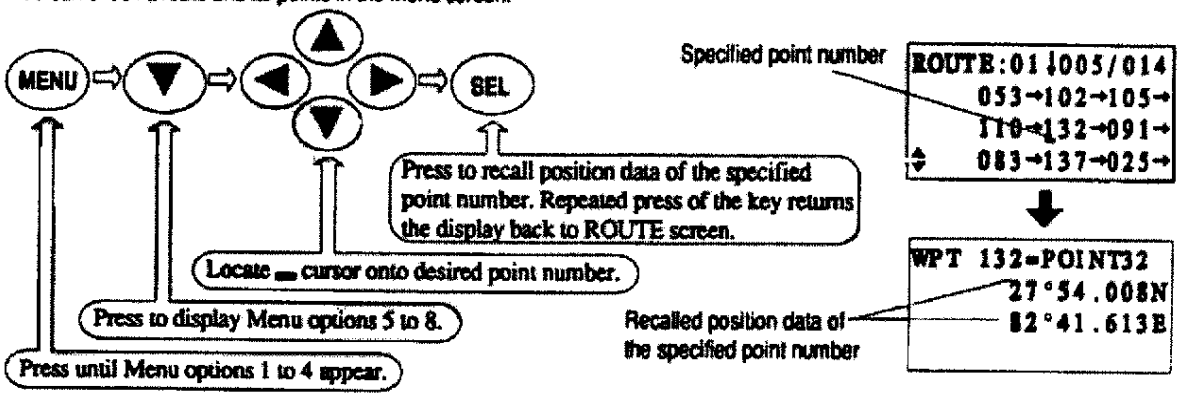
WPT numbers during route setup
053→102→105→110→132→091→
083→137→025→(Continued to next screen page)

If you activate a route at point number 132 (route point number 005), the forward (↓) and backward (↑) navigation are as follows:

Forward (↓) navigation	Backward (↑) navigation
132→091→083→137→025→ (Continued to next screen page)	132→110→105→102→053

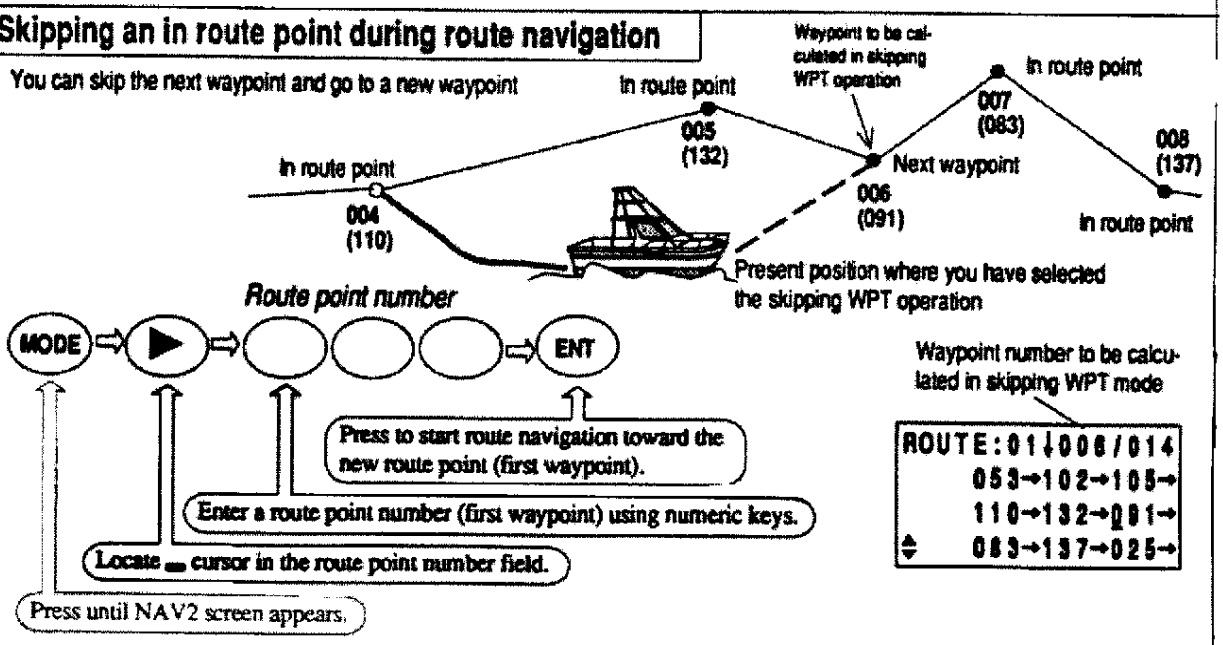
Checking a route position or a route point position

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

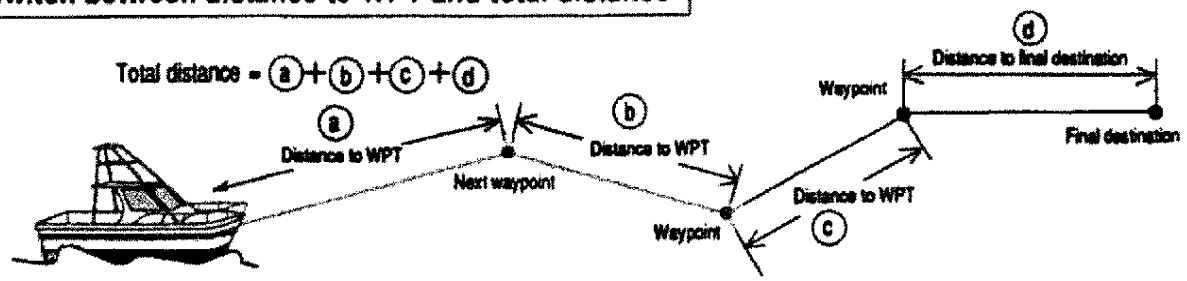


Skipping an in route point during route navigation

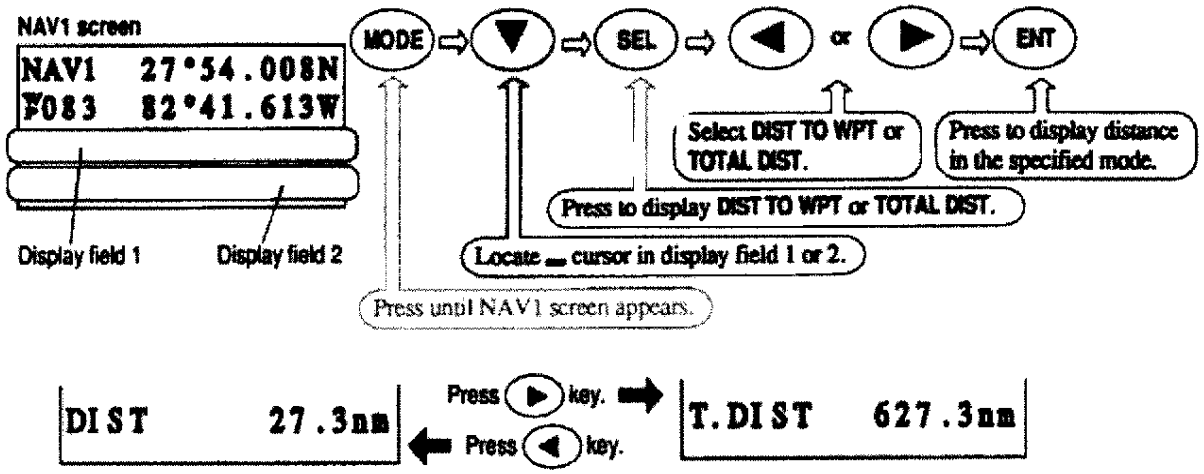
You can skip the next waypoint and go to a new waypoint



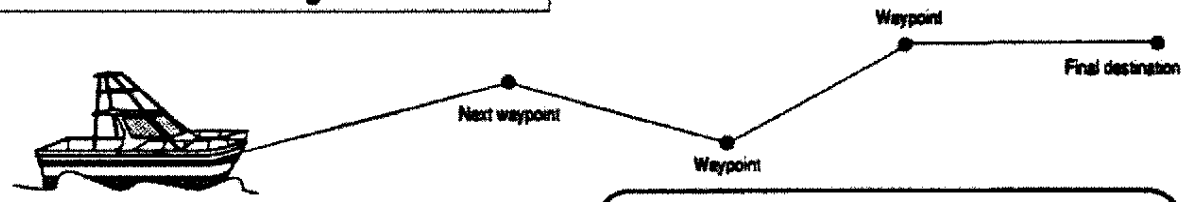
Switch between distance to WPT and total distance



To switch the display between the distance to the next waypoint and the total distance to the final destination:

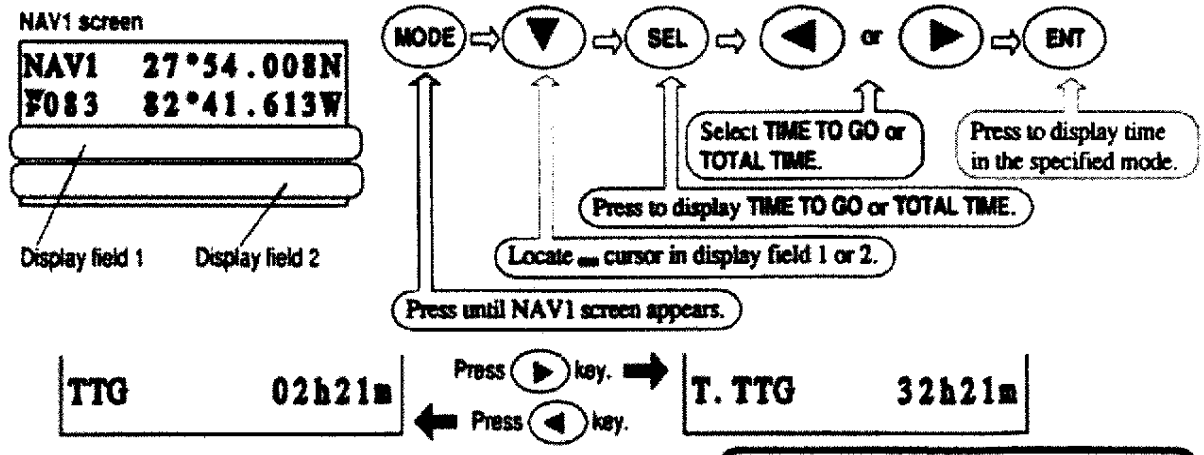


Switch between time to go and total time



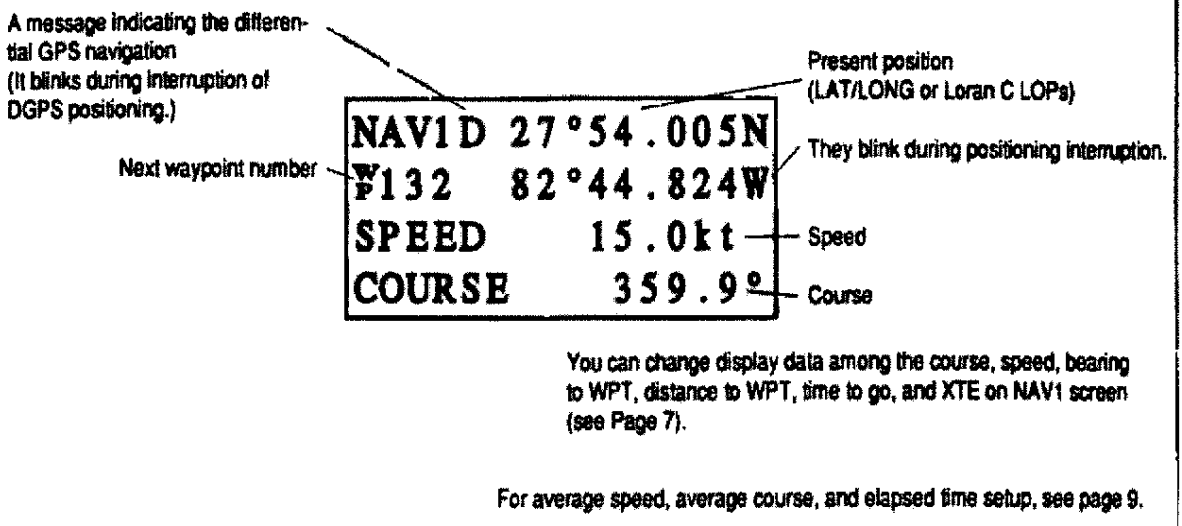
To switch the display between the time to go to the next waypoint and the total time required to arrive the final destination:

When "TIME TO GO" is shown:
The time to go to the next waypoint is shown.
When "TOTAL TIME" is shown:
The total time required to arrive the final destination is shown (999 hours maximum).



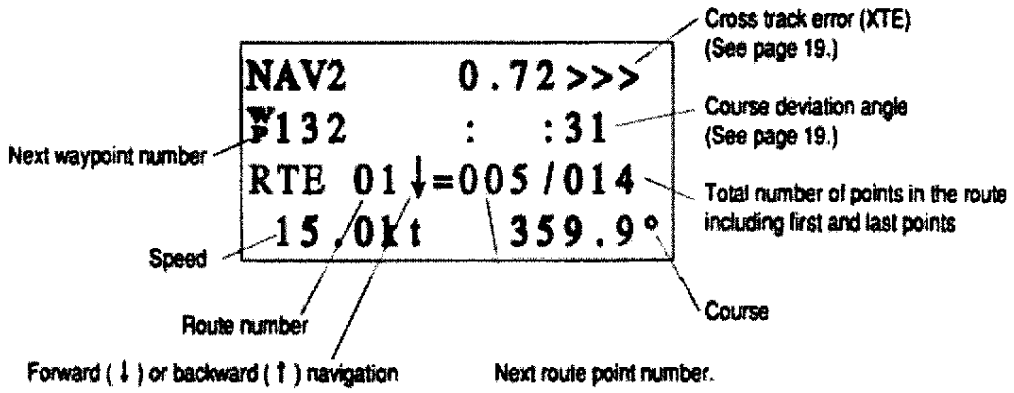
99:99	Positioning has failed or the required time has exceeded 999 hours.

NAV1 screen during route navigation



For average speed, average course, and elapsed time setup, see page 9.

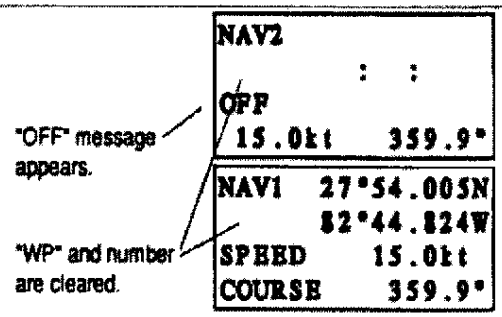
NAV2 screen during route navigation



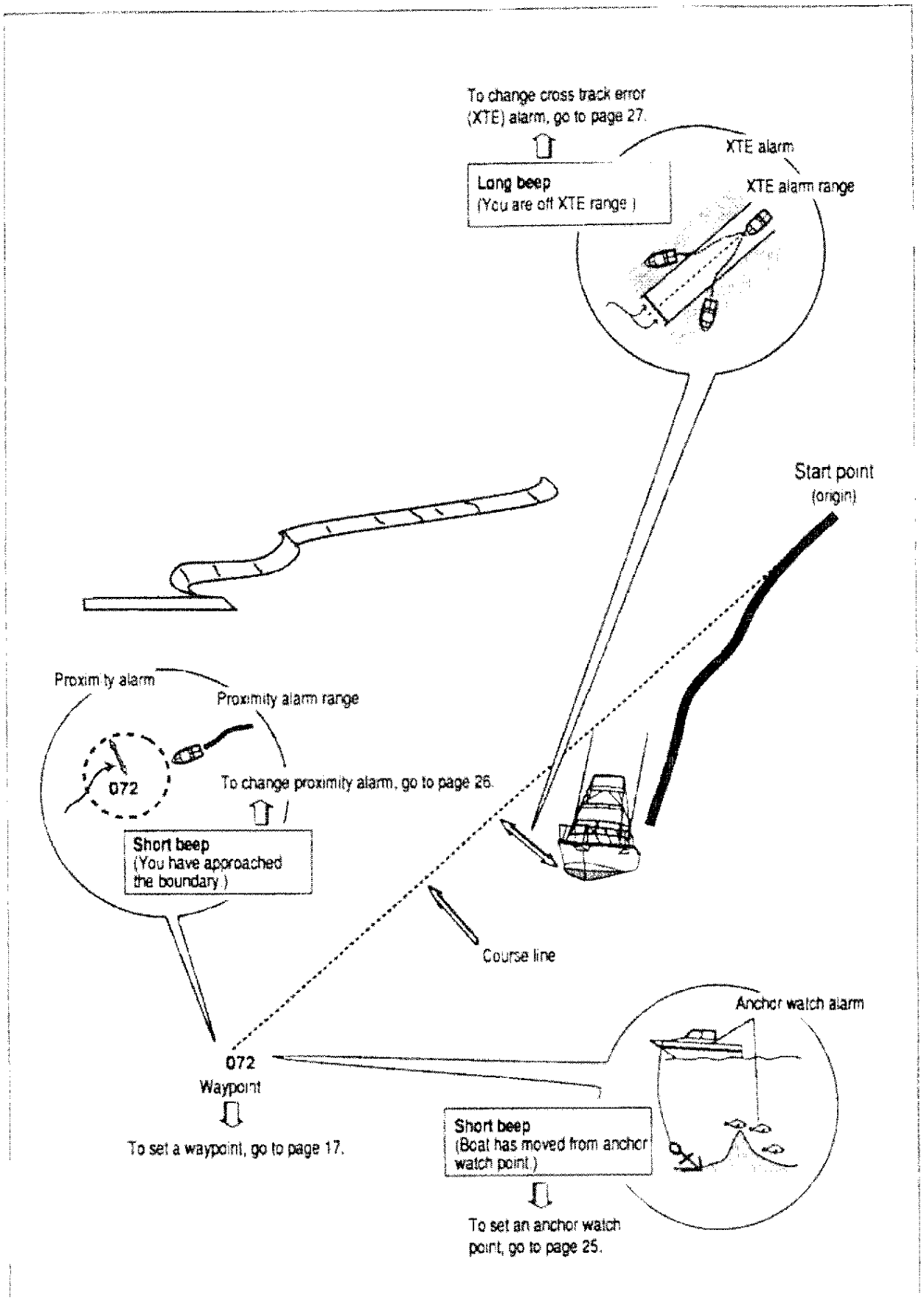
For average speed, average course, and elapsed time setup, see page 9.

Canceling the route navigation

To cancel waypoint navigation, turn NAV2 screen Off. Then, redisplay ROUTE and press the ENT key to restart route navigation.



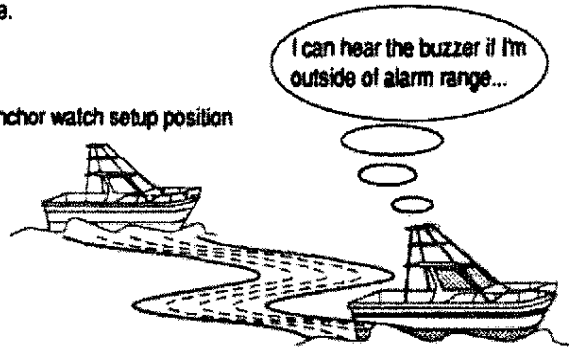
Alarms

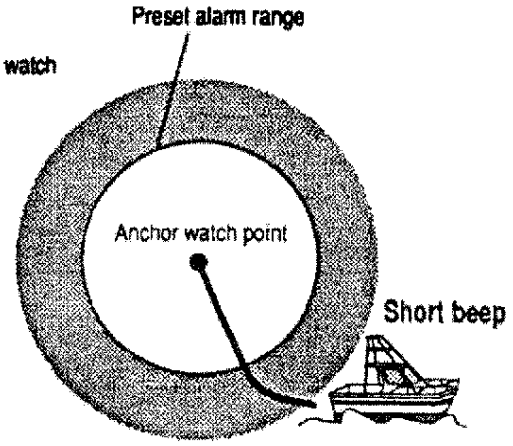

To change cross track error (XTE) alarm, go to page 27.
Long beep
(You are off XTE range.)
XTE alarm
XTE alarm range
Start point
(origin)
Proximity alarm
Proximity alarm range
072
To change proximity alarm, go to page 26.
Short beep
(You have approached the boundary.)
Course line
Anchor watch alarm
072
Waypoint
To set a waypoint, go to page 17.
Short beep
(Boat has moved from anchor watch point.)
To set an anchor watch point, go to page 25.

Setting and Cancelling an Anchor Watch Alarm

What is an anchor watch alarm?

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

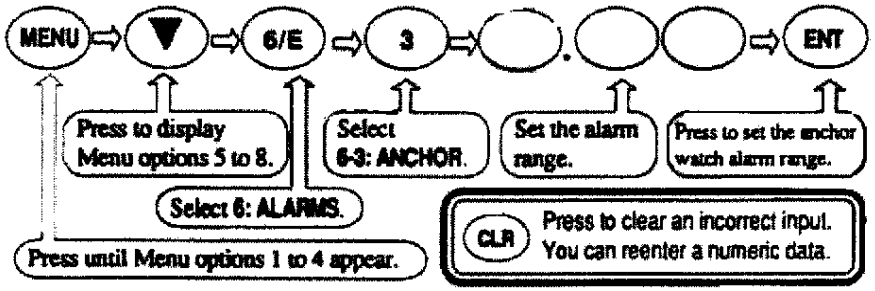


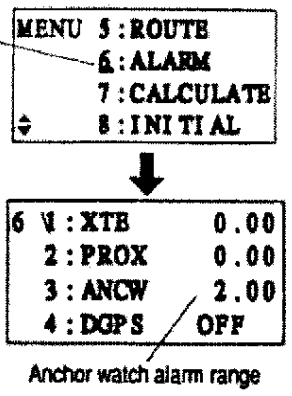


Setting an anchor watch alarm range

(Alarm range: 0.00 to 9.99)

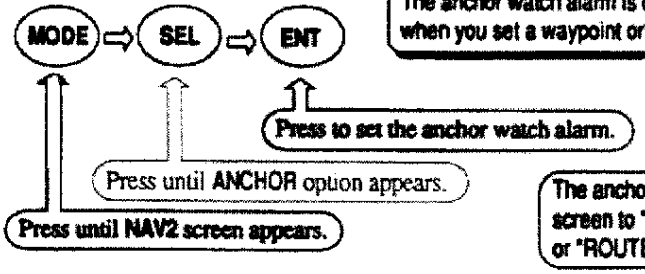
To set the anchor watch alarm range so that the buzzer sounds when you leave the range.

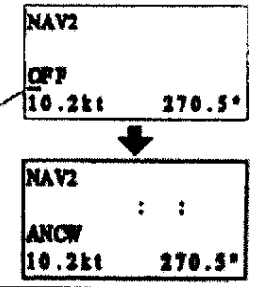




Setting the anchor watch alarm

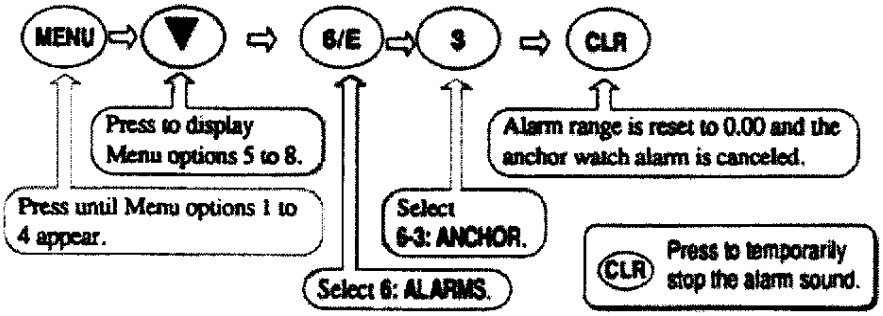
To set the present position as the anchor watch alarm point.

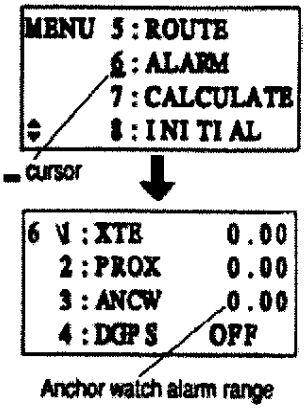




The anchor watch alarm is canceled when you change the NAV2 screen to "OFF" mode, "WPT" mode for waypoint navigation setup, or "ROUTE" mode for route navigation setup.

Canceling the anchor watch alarm



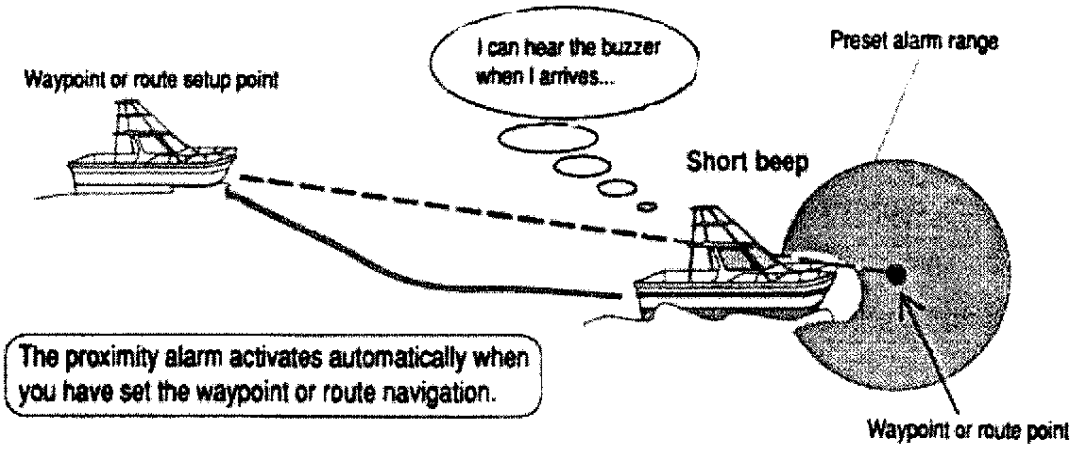


When a proximity alarm or an XTE alarm is set, the anchor watch alarm is canceled automatically.

Setting and Canceling a Proximity Alarm

Understanding proximity alarm

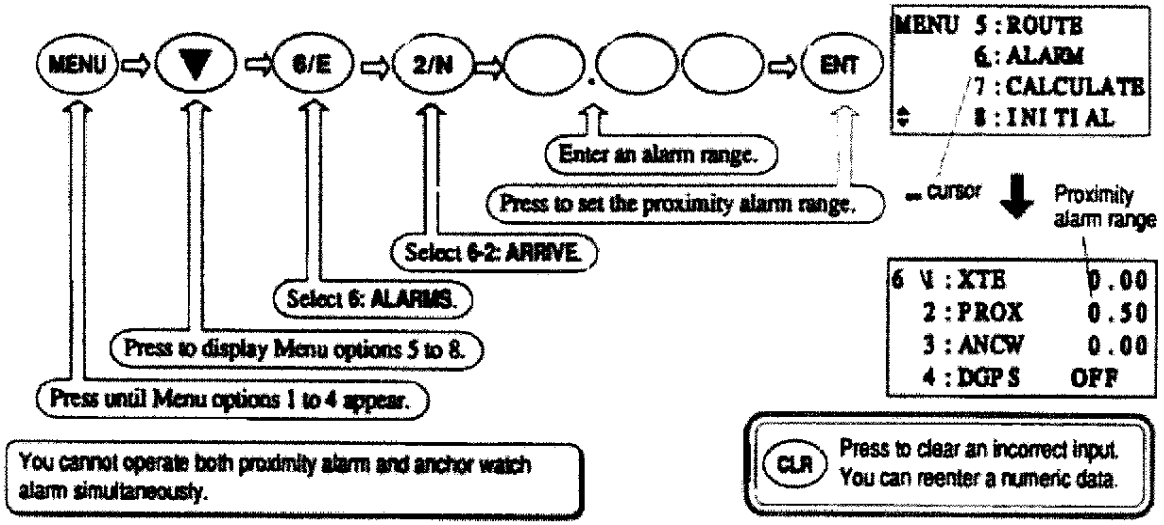
The proximity alarm sounds the buzzer when you have arrived at the waypoint during waypoint or route navigation. This alarm is set automatically when you have selected the waypoint or route navigation. However, the proximity alarm does not operate if its alarm range is set to 0.00 or if an anchor watch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



The proximity alarm activates automatically when you have set the waypoint or route navigation.

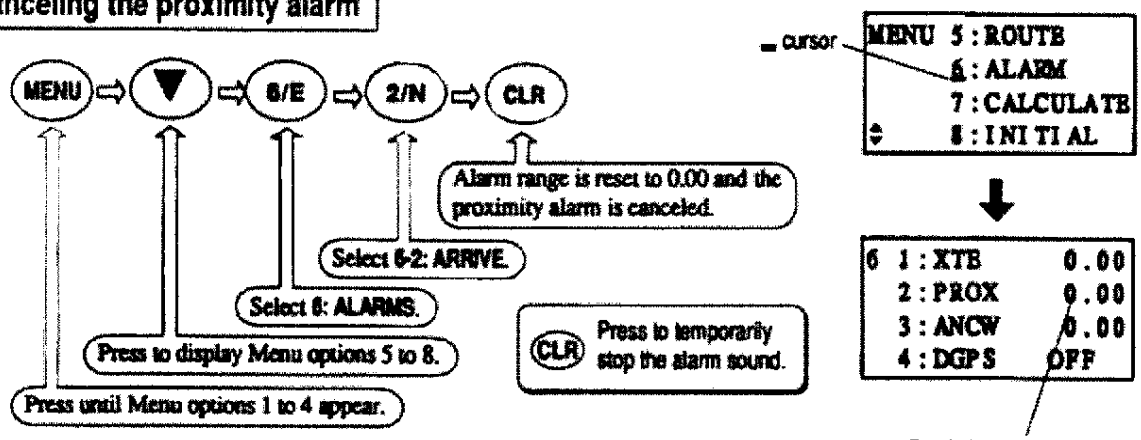
Setting an proximity alarm range

(Proximity alarm range: 0.00 to 9.99)



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

Canceling the proximity alarm

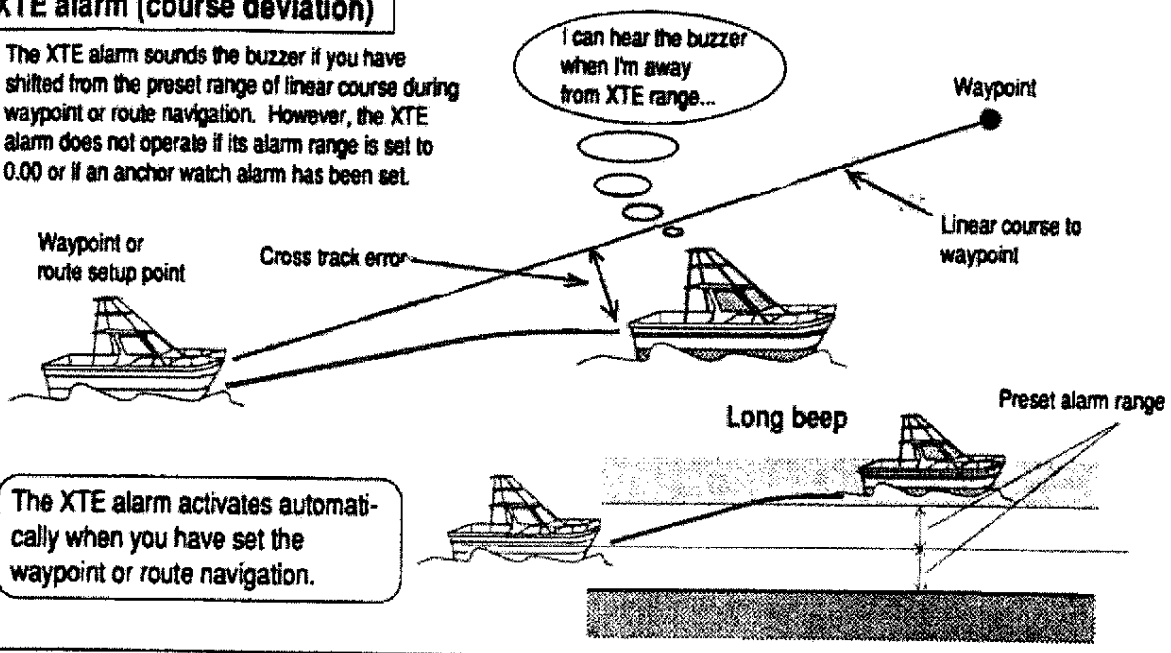


When you set an anchor watch alarm, the proximity alarm is canceled automatically.

Setting and Canceling an XTE Alarm

XTE alarm (course deviation)

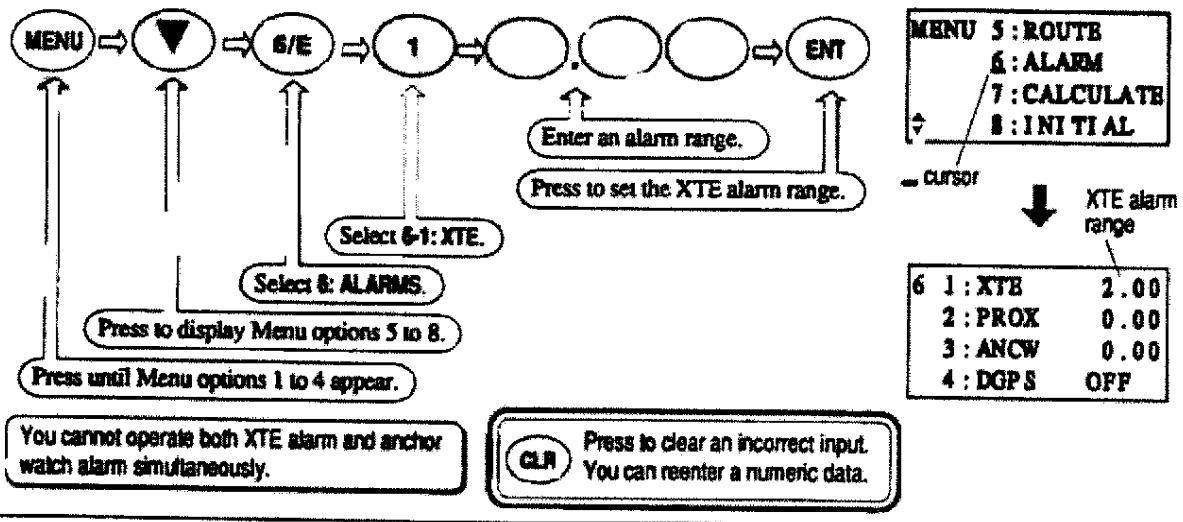
The XTE alarm sounds the buzzer if you have shifted from the preset range of linear course during waypoint or route navigation. However, the XTE alarm does not operate if its alarm range is set to 0.00 or if an anchor watch alarm has been set.



The XTE alarm activates automatically when you have set the waypoint or route navigation.

Setting an XTE alarm range

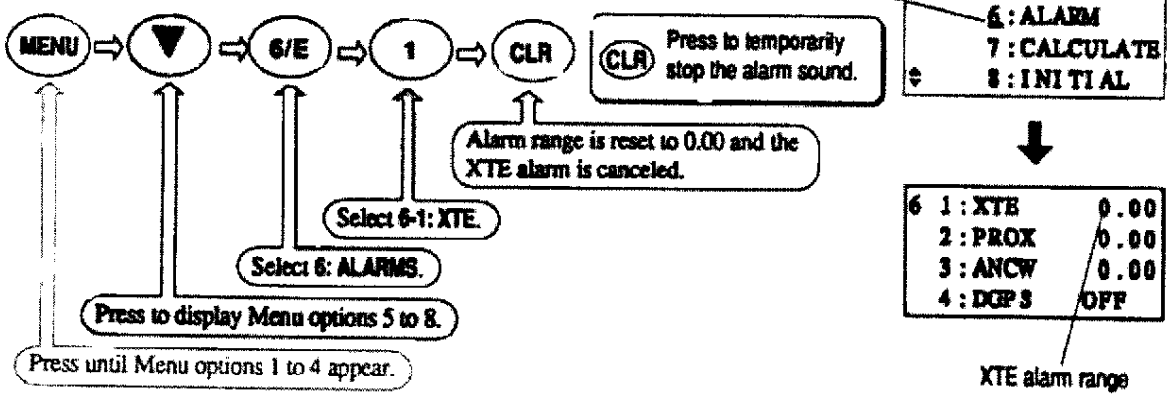
(XTE alarm range: 0.00 to 9.99)



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

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

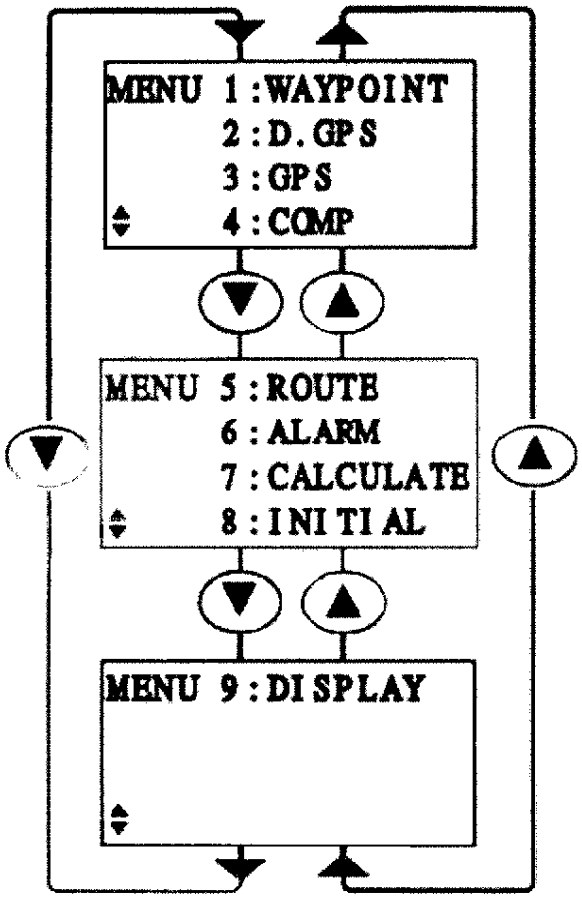
Canceling the XTE alarm



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

Setup Procedure

Menu options

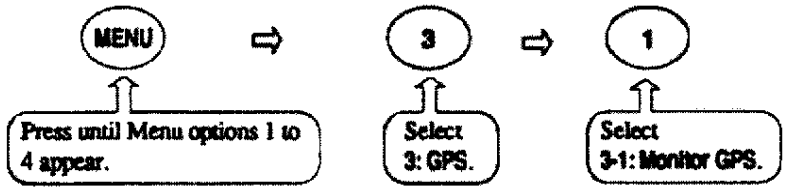


1. **Waypoints**
   Store, edit, copy, and erase waypoints.
   (see pages 11 to 20).
2. **Differential GPS (DGPS)**
   Select DGPS mode.
   Set DGPS timeout.
   Select DGPS signal baud rate.
   Monitor DGPS data.
3. **GPS**
   Display GPS satellite status.
   Switch (2- and 3-dimensional) positioning modes.
   Set antenna height (above sea level).
   Select measuring system.
4. **Select or release correction.**
   Position correction (LAT/LONG or Loran C LOPs)
   Compass correction
   Set the time difference.
5. **Route**
   Store, set, cancel, and erase a route
   (see pages 11 to 16 and 21 to 24).
6. **Alarm**
   Enter alarm range and inhibit alarms
   XTE alarm
   Proximity alarm
   Anchor watch alarm
   DGPS alarm
7. **Calculation**
   Distance and bearing between two points
   LAT/LONG into LOPs data conversion
8. **Initial value setup**
   Set average constants.
   Select distance, speed, and altitude units.
   Select and edit the output format.
9. **Display**
   Select the position indication (LAT/LONG or Loran C LOPs).

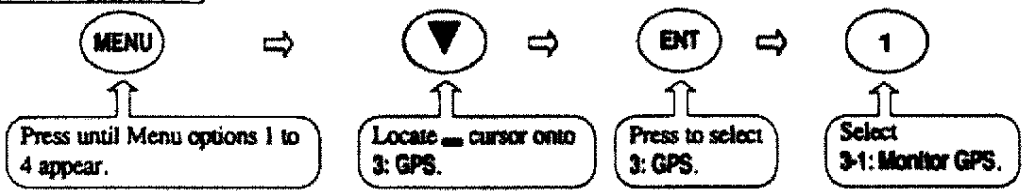
Selecting a Menu option

You can select an option on the Menu screen in two ways: by direct numeric number entry and by selection using ▬ cursor. This manual 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 check the GPS satellite signal monitor status (page 29) as an example:

Numeric number entry

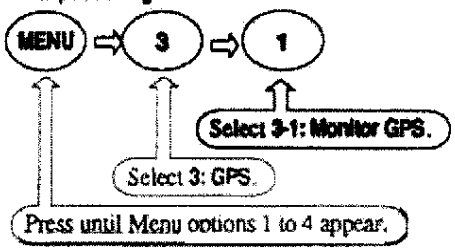


▬ cursor selection



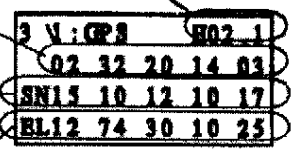
Monitoring GPS satellite signal reception

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 degrated.

Satellite PRN number

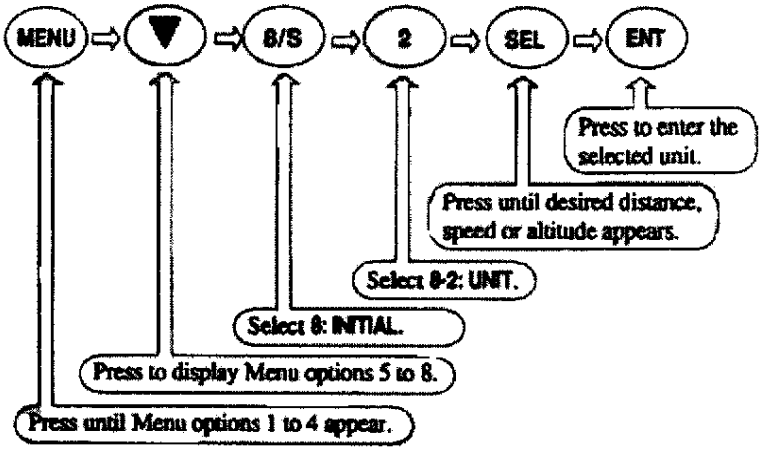


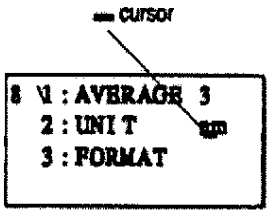
Satellite signal S/N
The S/N usually shows to 10 to 20 when elevation angle is above 10 degrees.

Elevation angle of satellite
The angle of satellite from horizontal level

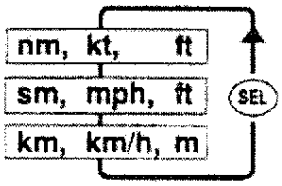
Changing the distance, speed or altitude unit

You can change the measuring unit of distance to WPT (or total distance), speed and antenna height.





Unit switching sequence

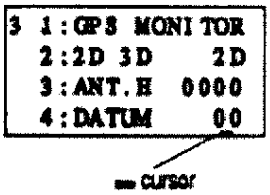


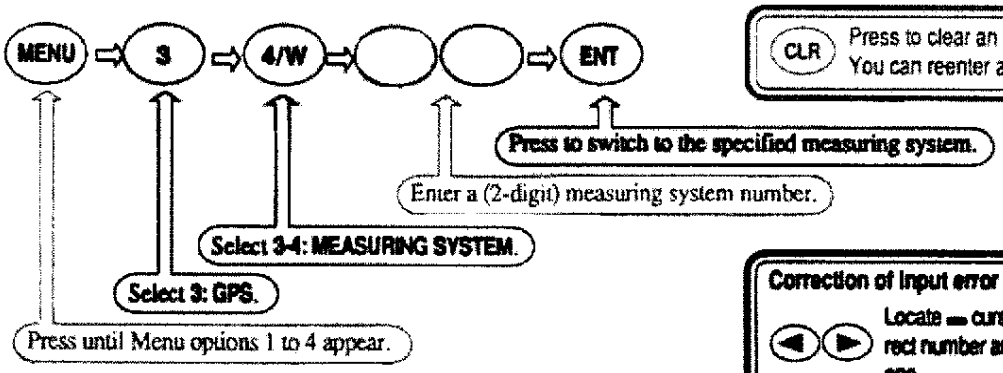
Unit conversion

1 nm (nautical mile)	= 1.852 km
1 sm (shore mile)	= 1.609 km
1 ft (feet)	= 0.3048 m

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 50.



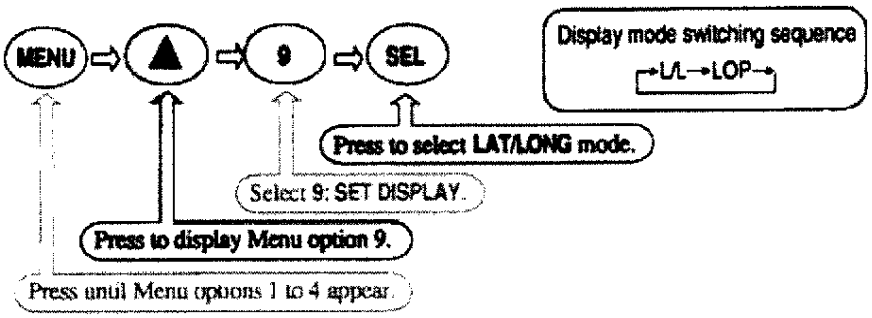


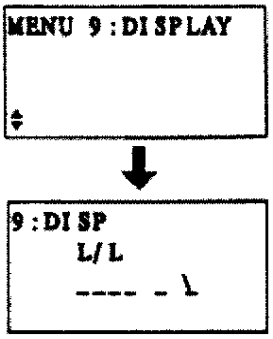
CLR Press to clear an incorrect input. You can reenter a numeric data.

Correction of input error
Locate cursor onto incorrect number and enter correct one.

Displaying position data in LAT/LONG

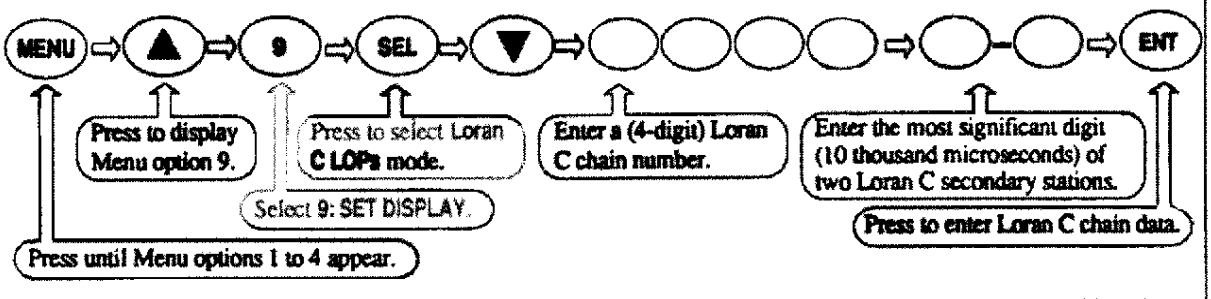
You can select the LAT/LONG or Loran C LOPs mode for position display.





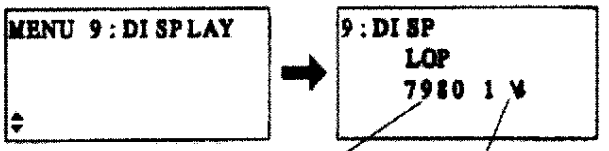
Displaying position data in Loran C LOPs

You can convert both your present position given by GPS and stored position data (mark data and event data) from LAT/LONG into Loran C LOPs.



Correction of input error

Locate _ cursor onto incorrect number and enter correct one.



Chain number

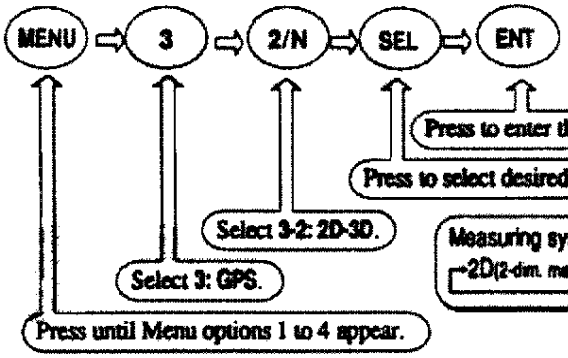
Highest order digit of two secondary stations

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

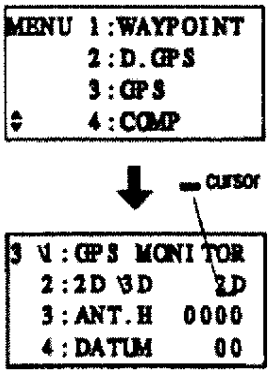
Selecting a measuring system mode

(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.



Measuring system switch sequence
2D(2-dim. measurement)→3D(3-dim. measurement)

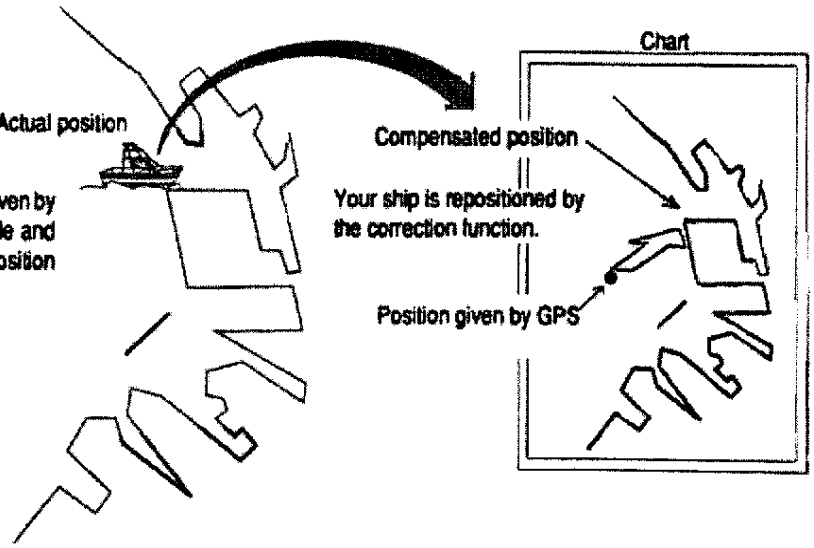


2D: Positioning is based at the antenna height you have set in ANTENNA HEIGHT field of Menu option 3: GPS.
3D: The antenna height is determined by use of positioning data and shown on ANTENNA HEIGHT field of Menu option 3: GPS.

When 3D is switched to 2D:
The antenna height measured in 3D mode is shown in 3-3 ANTENNA HEIGHT field.
To manually change the antenna height, see the Set antenna height section.

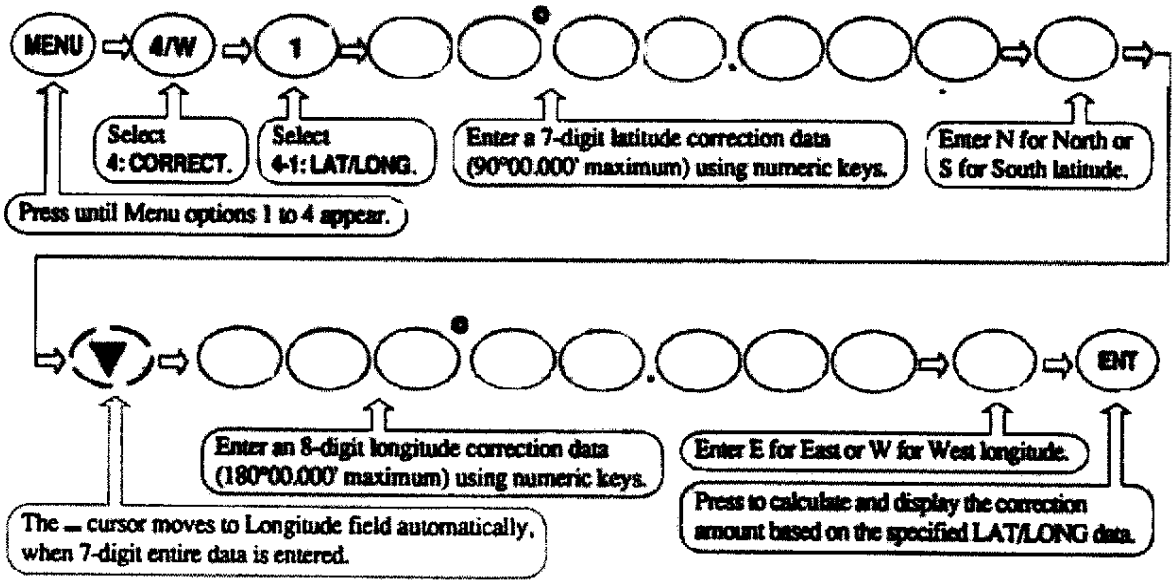
Correcting your position

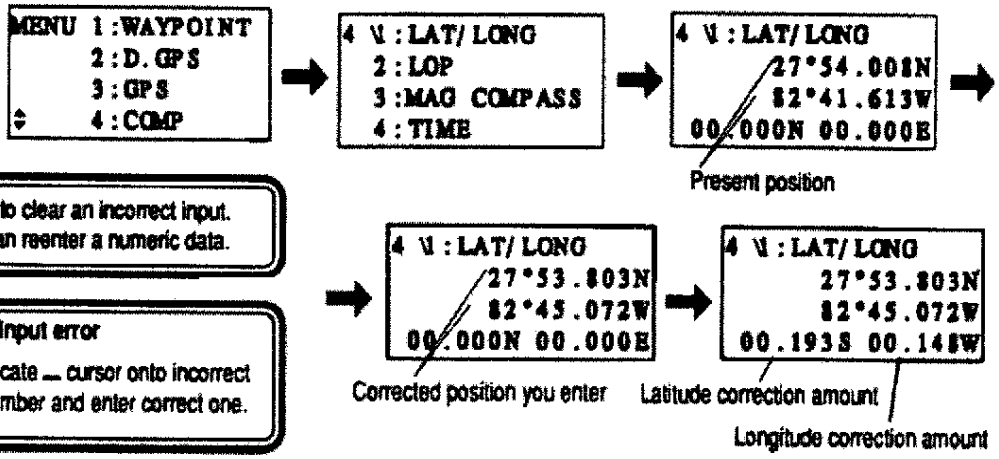
You can compensate your present position given by GPS as follows. To do so, enter the latitude and longitude (or Loran C LOPs) of your actual position using numeric keys.



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.

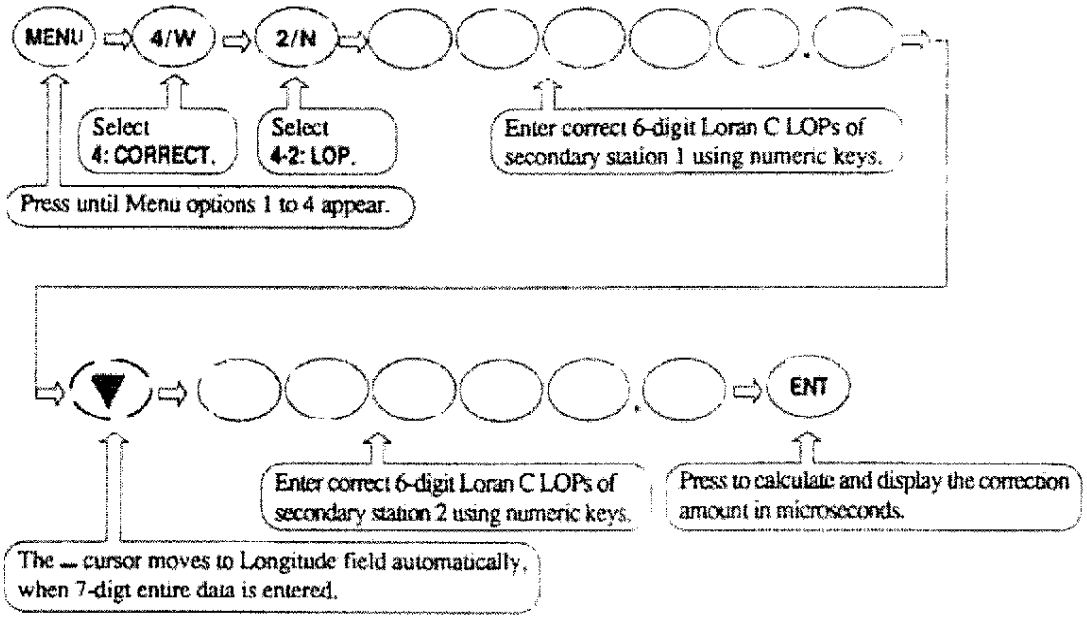


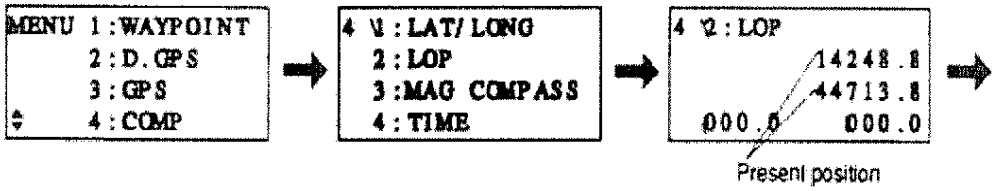


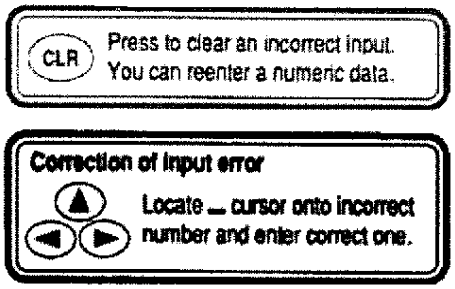
Present position			Entered position			Correction amount		
Latitude	N	27° 54.008	Latitude	N	27° 53.803	Latitude	S	0° 00.193
Longitude	W	82° 41.613	Longitude	W	82° 45.072	Longitude	W	0° 00.148

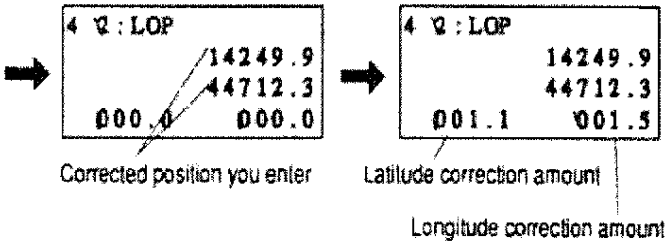
Correction by Loran C LOPs data entry

When your present position is indicated in Loran C LOPs mode, you can correct it by entering the Loran C LOPs correction amount.







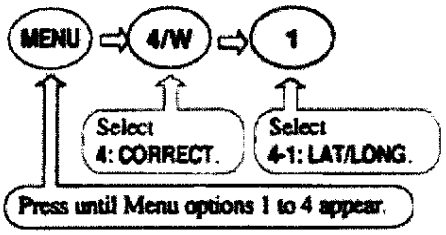


Present position		Entered position	Correction amount
Chain	7980		
Combination of secondary stations	1-4		
Secondary station 1	14248.8 µsec	Secondary station 1 14249.9 µsec	Secondary station 1 +001.1 µsec
Secondary station 2	44713.8 µsec	Secondary station 2 44712.3 µsec	Secondary station 2 −001.5 µsec

Check the correction amount

You can check the correction amount as follows:

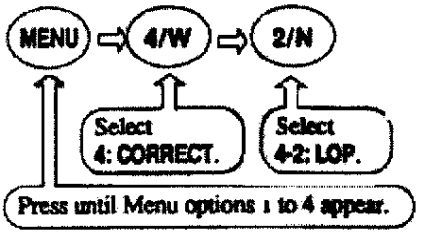
LAT/LONG mode




```
4 1 : LAT/ LONG
        27°53.803N
        82°45.072W
 00.193S 00.148W
```

The correction amount of 0.193' southward and 0.148' westward are shown.

Loran C LOPs mode




```
4 2 : LOP
          14249.9
          44712.3
  001.1     001.5
```

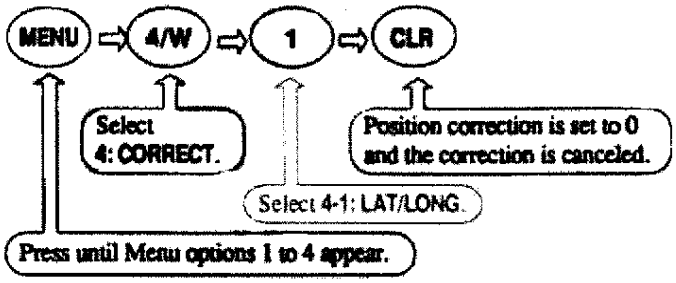
Your position has been corrected by 1.5 microseconds to the secondary.

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

Cancel the position correction

You can cancel the position correction as follows:

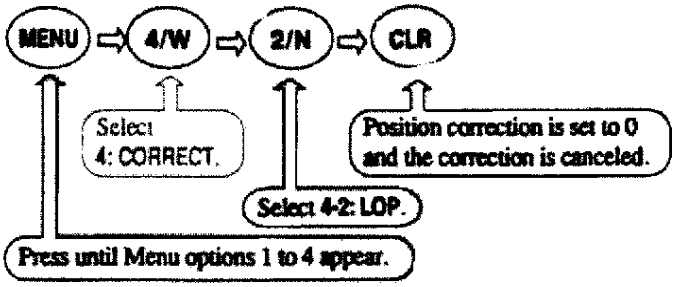
LAT/LONG mode




```
4 1 : LAT/ LONG
        27°54.008N
        82°41.613W
 00.000N 00.000E
```

Position correction has been cleared.

Loran C LOPs mode

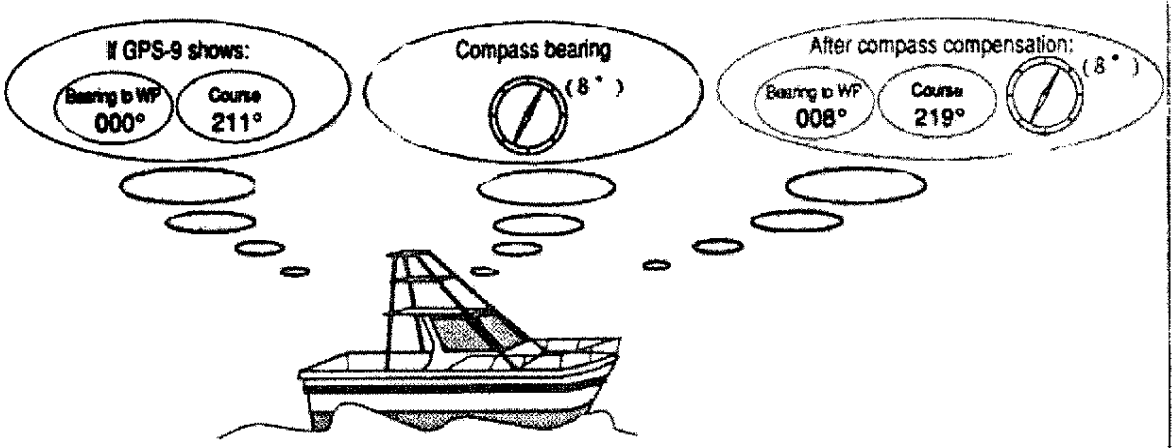



```
4 2 : LOP
          14248.8
          44713.8
  000.0     000.0
```

Position correction has been cleared.

Compensation of compass

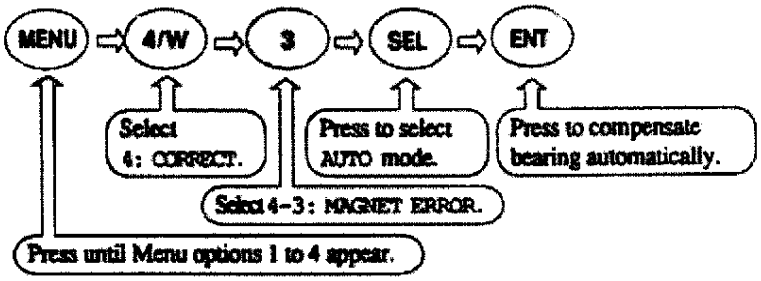
The course and bearing to waypoint are shown in true bearing. You can adjust the GPS true bearing to the magnetic compass bearing.



1 Automatic compensation

(Initial setup: **Auto**)

In the Auto mode, the magnetic compass is compensated based on the built-in global magnetic variation maps. However, avoid to use 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. Correct it manually.



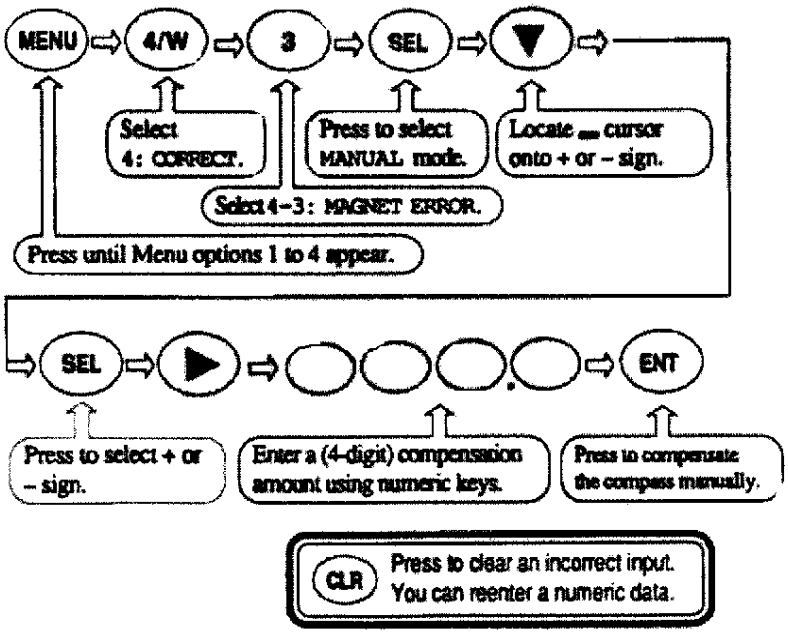

```
4 \3 :MAG COMPASS
     AUTO
     008.0
```

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

Compass compensation sequence
→Auto→Manual→

2 Manual compensation

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




```
4 \3 :MAG COMPASS
     MANUAL
     000.0
```

↓

```
4 \3 :MAG COMPASS
     MANUAL
     008.0
```

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

Correction of input error
◄ ► Locate cursor onto incorrect number and enter correct one.

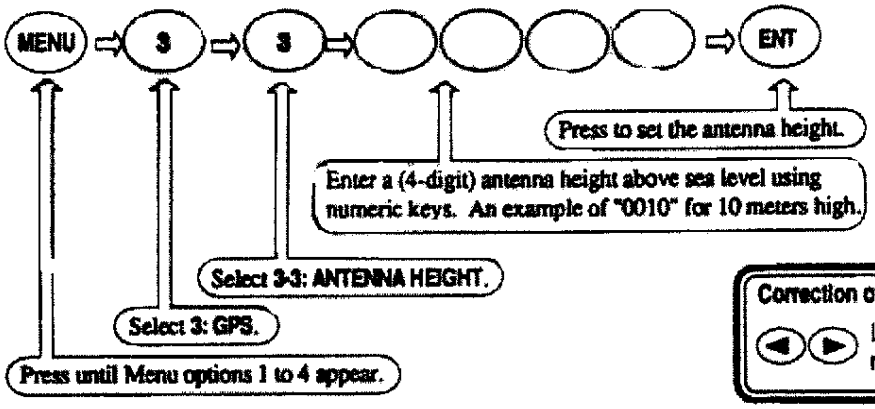
CLR Press to clear an incorrect input. You can reenter a numeric data.

Setting antenna height (above sea level)

(Initial height: 0 m)

Enter the antenna height (above sea level) accurately as it affects on the positioning accuracy. The antenna height error must be less than 5 meters. You can set the antenna height in either metric or standard (feet) system (see page 30 for unit switching).

```
MENU 1 :WAYPOINT
     2 :D.GPS
     3 :GPS
     4 :COMP
```




```
3-1 : GPS MONITOR
  2 : 2D-3D     2D
  3 : ANT.H   0000
  4 : DATUM     00
```

_ cursor

Correction of input error

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

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

Setting average constants (measuring position, speed and course)

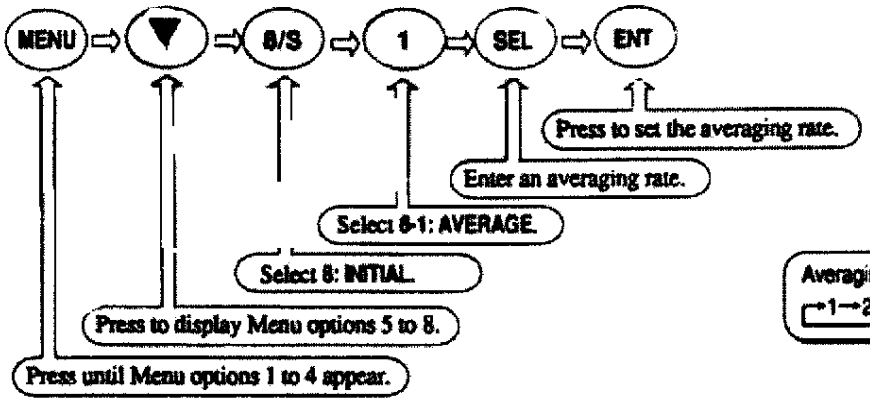
(Initial setup: 3)

You can use the averaging function to sum GPS sensor signals several times and get their average. This can stabilize the measured position (latitude and longitude), speed and course data. The maximum averaging rate is 9 and the minimum rate is 1. When you select a larger value, data is averaged more times and the display data have small variation. 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
```

_ cursor



Averaging rate selection sequence

→1→2→3→4→5→6→7→8→9→

Note: You can have more the stable position, speed and course by increasing the averaging rate. However, they may have delay for updating.
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.

Displaying local time

(Initial setup: 00:00)

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

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

Time difference from GMT is +09:00 in Japan

MENU ⇒ 4/W ⇒ 4/W ⇒ SEL ⇒ ◯◯:◯◯ ⇒ ENT

- Press until Menu options 1 to 4 appear.
- Select 4 : CORRECT
- Select 4-4 : TIME.
- Press to enter positive (+) or negative (−) sign.
- Enter time difference from GMT using numeric keys.
- Press to set the time difference.

Correction of input error

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

```
MENU 1 :WAYPOINT
     2 : D.GPS
     3 : GPS
     4 : COMP
```

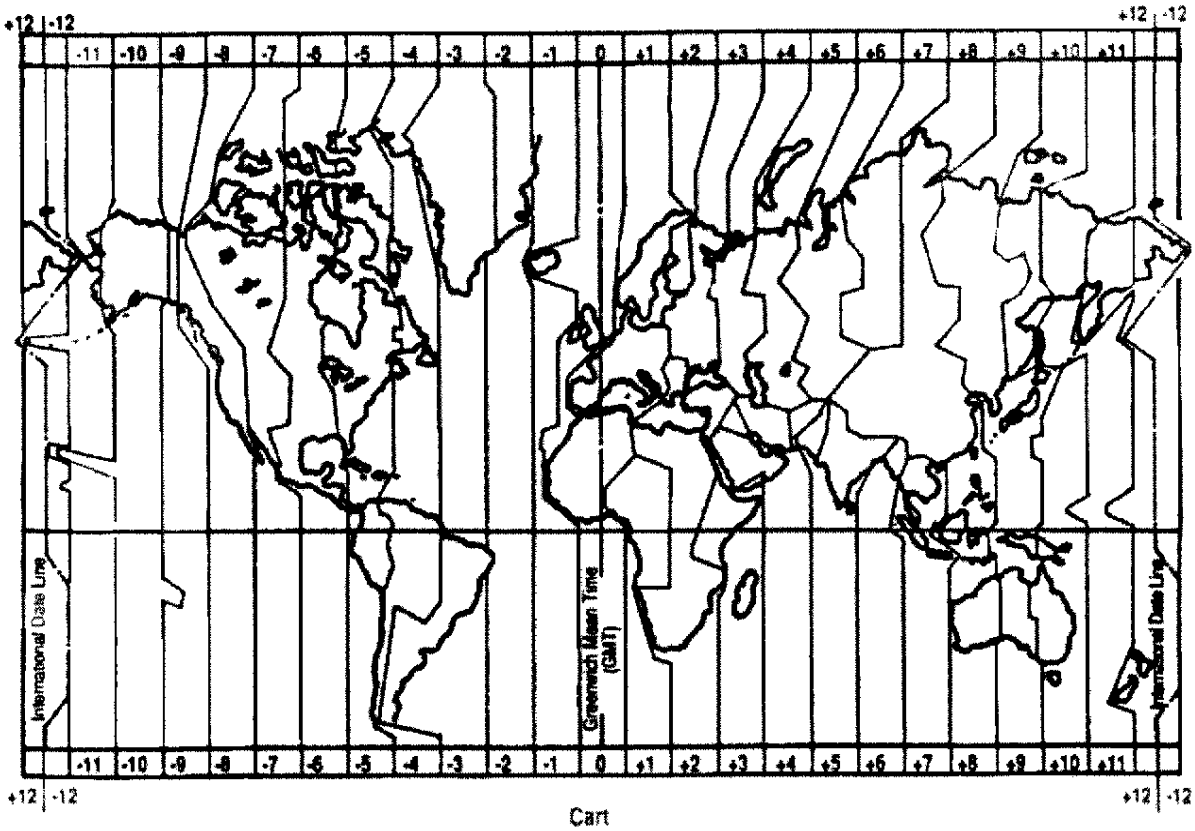
➡

```
4-4 : TIME
    ±00:00
```

➡

```
4-4 : TIME
    -05:00
```

▬ cursor



Cart

Displaying differential GPS (DGPS)

A correction data output device (usually, a DGPS beacon receiver) connected to your GPS-9 is necessary for differential GPS measurement.

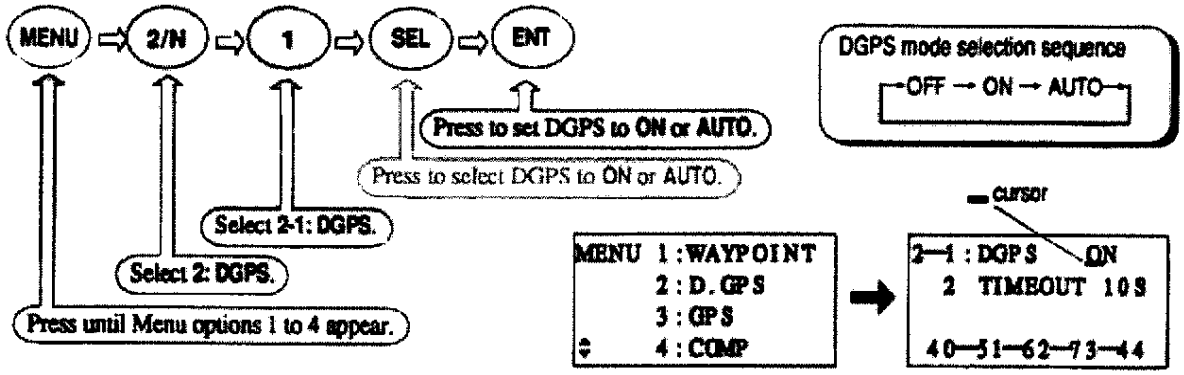
DGPS display
Lights when DGPS position correction is valid.
Blinks if DGPS position correction is invalid.
Goes out when DGPS correction is turned OFF.

```
NAV1 D 27°54.005N
W
P107   82°44.824W
SPEED      15.0kt
COURSE     359.9°
```

Accepts only a beacon receiver outputs data at 4800 baud in RTCM-104 format.

DGPS measurement

Use the following steps for differential GPS measurement in RTCM-104 format. Set the DGPS mode to "ON", and the DGPS measurement will start if the DGPS position correction data is effective. If it fails, the DGPS character blinks. When you set the DGPS mode to "AUTO", the DGPS measurement is selected DGPS correction is made automatically but the GPS correction is dropped when correction data becomes invalid . When you set the DGPS mode to "OFF", no DGPS measurement takes place.

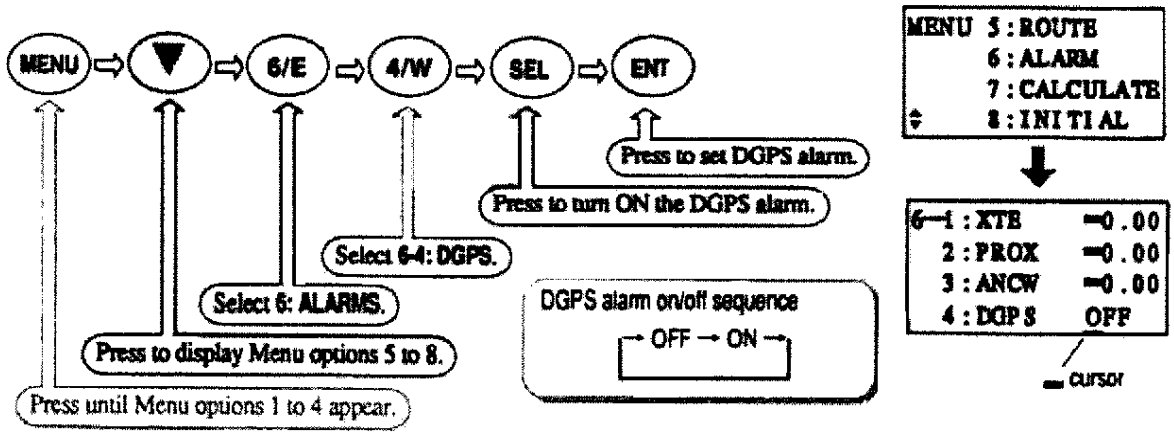


When you set the differential GPS mode to ON or AUTO, the DATA1 connector at the display rear panel functions as DGPS data input (in RTCM format) only.

Setting DGPS alarm

(Initial setup: OFF)

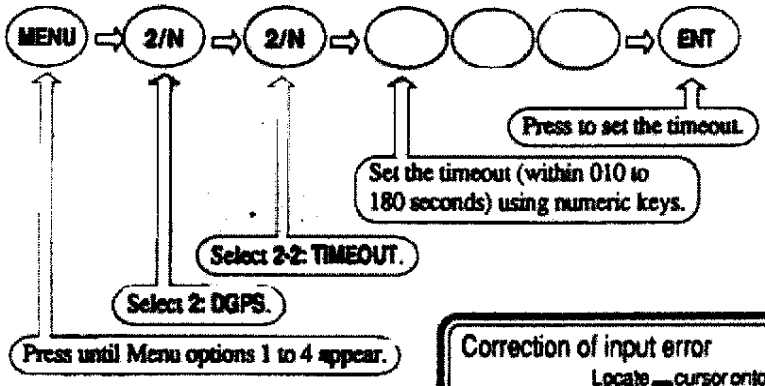
When you turn ON the DGPS alarm, the buzzer sounds when the DGPS is activated and inactivated.



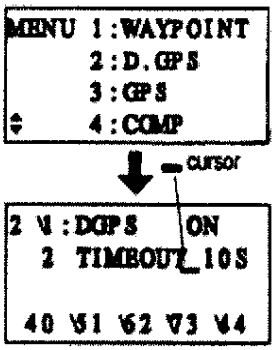
Setting a DGPS timeout

(Initial time: 10 sec)

If the correction data is invalid or if it cannot be received, your GPS-9 holds the last correction data. You can set this hold time. However, if the correction data updating time is too long, the DGPS measurement accuracy drops. Usually set it from 10 to 12 seconds. When the correction data is not updated within the set time, the DGPS measurement is stopped and the DGPS alarm sounds if turned on.



Note: Timeout can be set from 010 to 180 seconds.

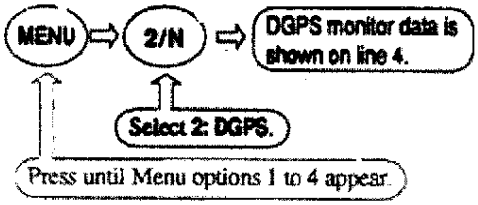


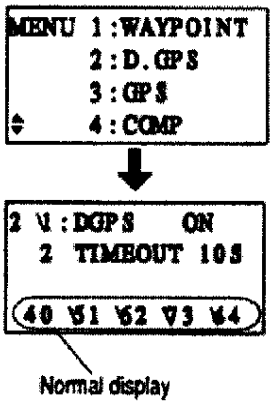
Correction of input error

Locate cursor onto incorrect number and enter correct one.

Monitoring DGPS measurement

You can monitor RTCM-104 format data sent from beacon receiver. If the communication fails due to baud rate matching error or others, the ERROR message appears.

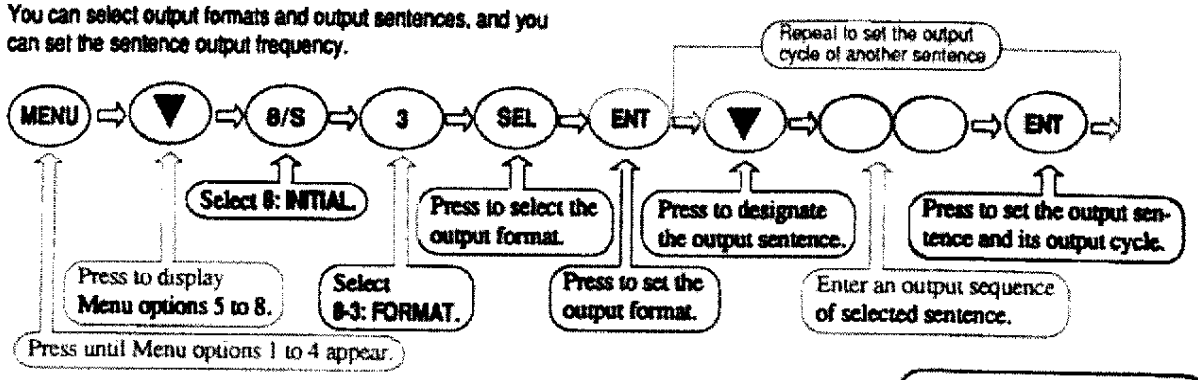


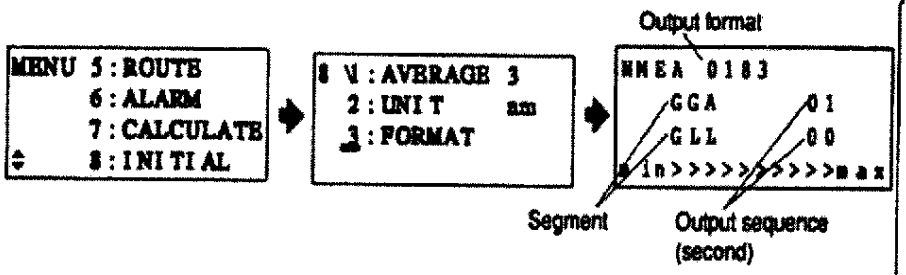


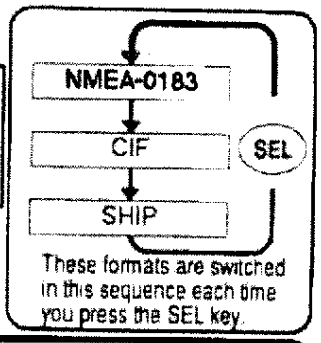
Selecting and editing an output format

Default setup (GGA, GLL, RMC, VTG and ZDA every second)

You can select output formats and output sentences, and you can set the sentence output frequency.







↳AAM→APB→BOD→BWC→GGA→GLL→GSA→GSV→GTD→
→RMB→RMC→SGR→VTG→WDC→WPL→XTE→ZDA→

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

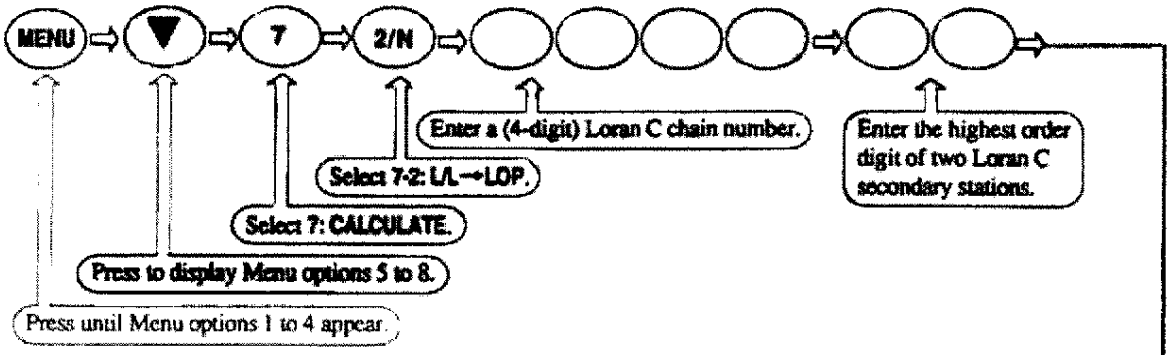
Enter data sequence in seconds for required sentences. Enter 00 as sequence for unnecessary sentences.
If NMEA-0183 format is selected, ">" marks show the ratio of total data amount required to send out selected sentences at the lowest sequential time, to the maximum transmitting capacity. (a ">" mark represents approx. 10%). Select sentences so that marks do not reach MAX. Sequence time will be longer than specified beyond the capacity.

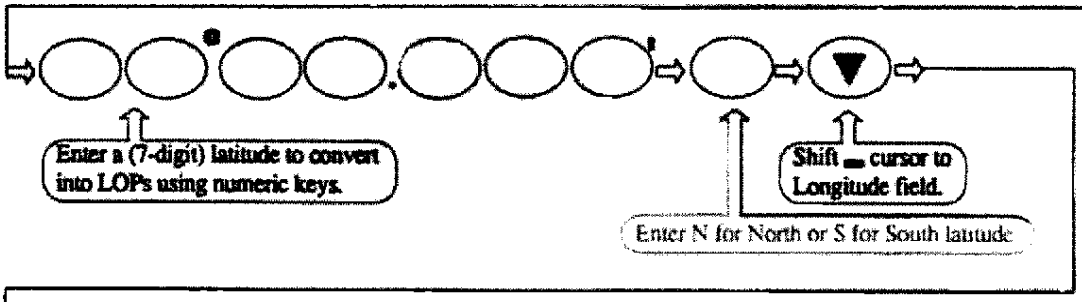
Output data

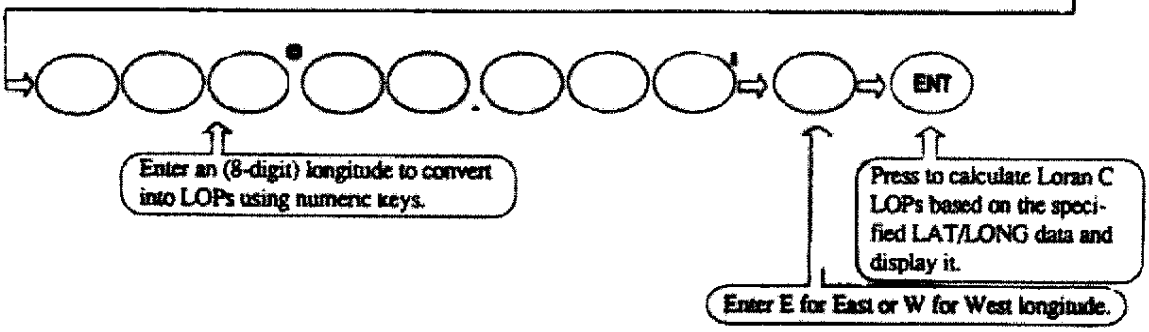
NMEA-0183	AAM	waypoint arrival alarm.
	APB	Autopilot sentence "B"
	BOD	Bearing, origin to destinations
	BWC	Bearing & distance to waypoint
	GGA	Global positioning system fix data
	GLL	Geographic position latitude/longitude.
	GSA	GPS DOP and active satellites
	GSV	GPS satellites in view
	GTD	Loran C LOPs
	RMB	Recommended minimum navigation information
	RMC	Recommended minimum specific GPS/TRANSIT data
	SGR	Loran C GRI
	VTG	Track made good and ground speed.
	WDC	Distance to waypoint
	WPL	Waypoint location
	XTE	Cross track error measured
	ZDA	Time & data
CIF		Lat/long position, ground speed, heading ,Loran C LOPs
SHIP		Lat/long position (SHIPMATE 0183)

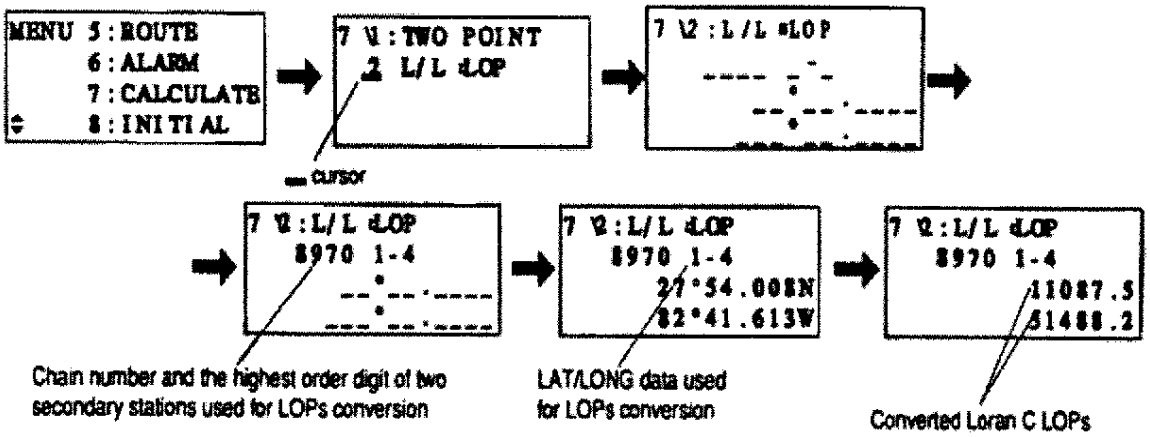
Calculating Loran C LOPs based on LAT/LONG data

When you enter a Loran C chain number and the most significant digit of two secondary stations, your GPS-9 calculates the Loran C LOPs based on the specified LAT/LONG data and displays the result.





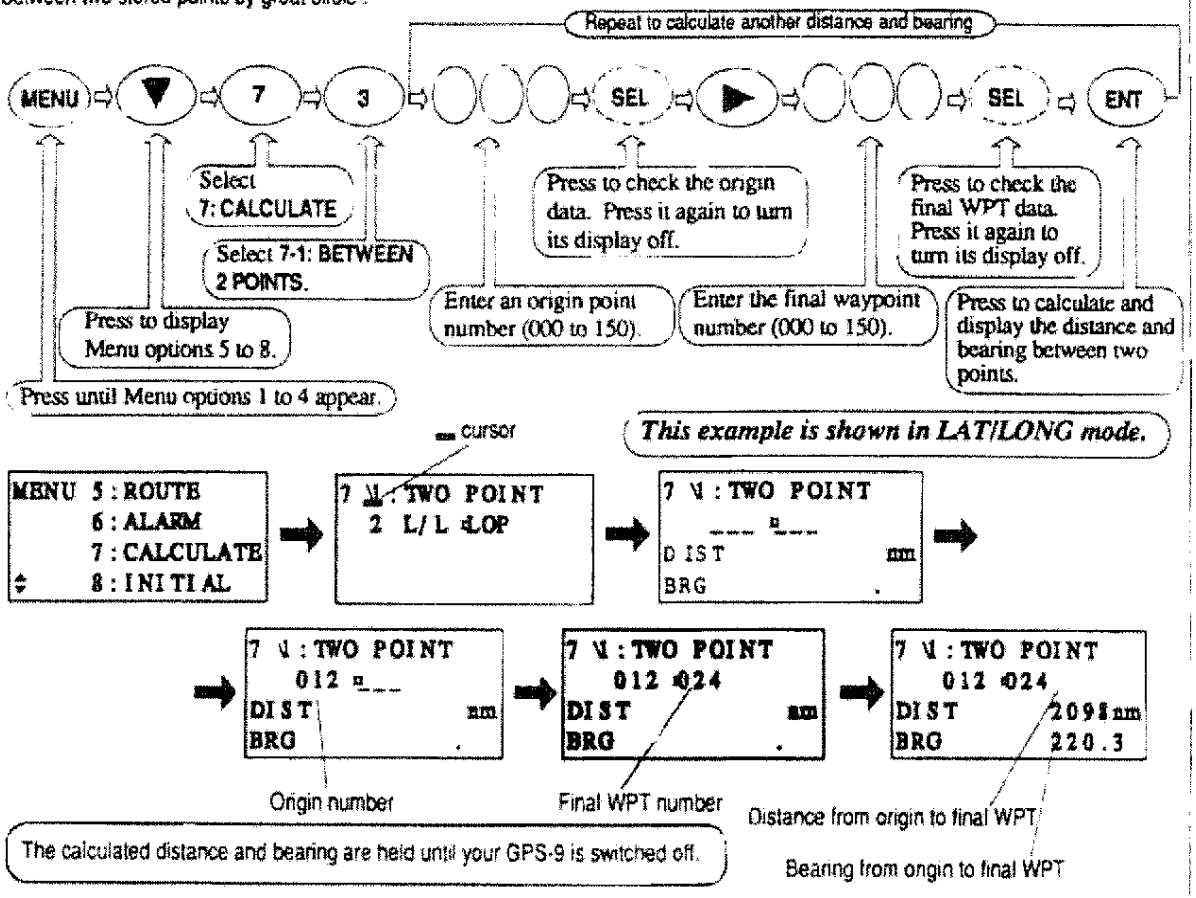




The calculated Loran C LOPs are held until your GPS-9 is switched off.

Calculating the distance and bearing between two points

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



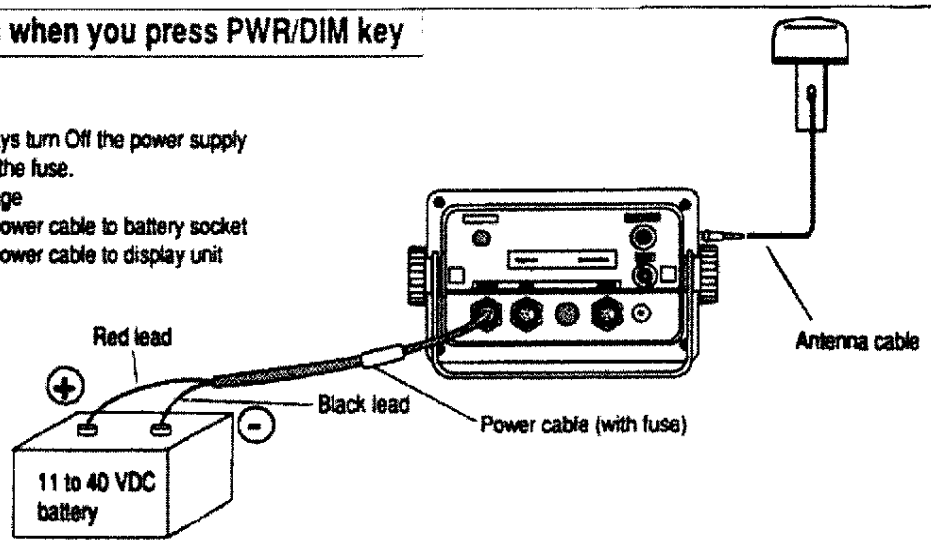
Troubleshooting Guide

If your GPS-9 GPS does not work well, check the following points. If the problem continues, call for the service.

Nothing appears when you press PWR/DIM key

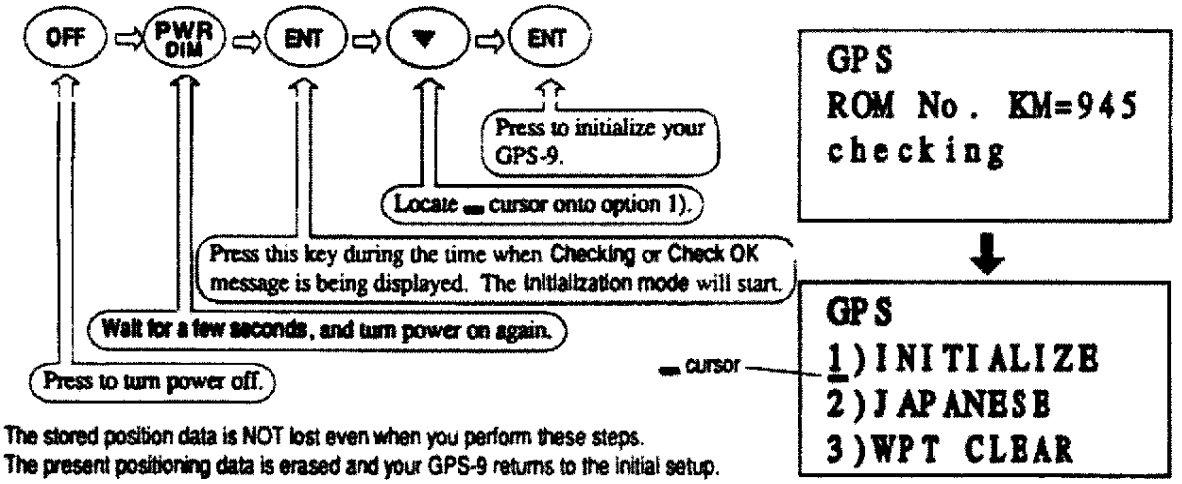
Possible causes:

- Blown fuse
  WARNING! Always turn Off the power supply before replacing the fuse.
- Low battery voltage
- Poor contact of power cable to battery socket
- Poor contact of power cable to display unit



No information appears on the screen (during initial setup)

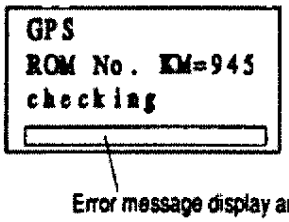
- The antenna cable may not be connected securely between the antenna and receiver.
- If no signals can be received or if the display does not change when you press keys, use the following steps.



The stored position data is NOT lost even when you perform these steps.
The present positioning data is erased and your GPS-9 returns to the initial setup.
All setup parameters are initialized and you need to set them again.

Error message appears at you power on

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



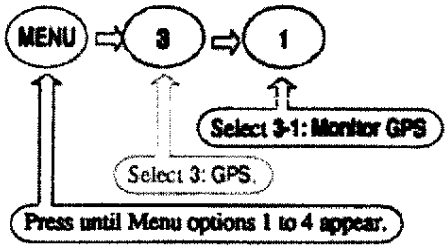
Error message list	
BACKUP ERROR	An error has occurred in backup RAM.
ROM changed	A checksum error has occurred.
CHECK START	Initialization has started.
END checksum	Initialization has completed.
RAM ERROR	A RAM error has occurred.
ERR RAM adrs	An error has occurred in backup RAM.
ERR RAM data	Mismatching between write and read data has occurred.
ERR LST	An KCD-48 internal error has occurred.
RTC ERROR	An RTC operation error has occurred.

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

Nothing appears but buzzer sounds during power-on

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

Unstable signal reception




```
3 \1 : GPS MONITER
  2 : 2D \3D     2D
  3 : ANT.H   0000
  4 : DATUM     02
```

1. *Check the HDOP of satellites.*
   If the HDOP has exceeded 20, your GPS-9 stops positioning. Also, its positioning accuracy drops if HDOP is large.

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

```
3 \1 : GPS      H02.1
  02 32 20 14 03
SN15 10 12 10 17
EL12 74 30 10 25
```

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

3. If there is an obstacle between the antenna and satellites, your GPS-9 cannot receive GPS satellite signals. You must change the antenna position.

Specifications

Major Specifications

GPS receiver section

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 m RMS (without SA), 100 m 2DRMS (PDOP ≦3, with SA)
(HDOP≦3)	**Velocity**	0.1 knot RMS (without SA)
Note: Accuracy is subject to change in accordance with DOD civil GPS user policy.		

GPS display section

Display	LCD with backlight (16 x 4 characters, picture area: 112 x 85 mm)
Display mode	NAV1, NAV2, NAV3, MENU, MOB (Man Over the Board)
Position data display	Latitude/longitude increments of 1/1000 minute or converted Loran C LOPs
Differential	ON, OFF, AUTO
Navigational display	Speed, course, velocity made good/course made good, distance/bearing/cross track error/course deviation/time to go to waypoint, total time to go and distance on route, DOP value, present time (UTC or LTC), satellite status, MOB display
Instant (event) memory	20 points
Permanent memory	130 points
Route memory	10 routes (Max. 130 waypoints) with reverse trail
	Every one second
	Proximity, cross track error, anchor watch, DGPS
	latitude/longitude, Loran C LOPs, Datum
	Auto or manual
	Datum (84 selections), position mode (2D or 3D automatic selection), averaging (smooth) factor, unit of measure (nm, km, sm), antenna height
Input data format	RTCM-104 (for DGPS: 4800 boadrate)
Output data format	NMEA-0183 (AAM, APB, BOD, BWC, GGA, GLL, GSA, GSV, GTD, RMB, RMC, SGR, VTG, WDC, WPL, XTE, and ZDA), others
Memory protection	By built-in battery
Power supply	9 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)

* Specifications subject to change without notice.

Standard equipment list

No.	Article	Type	Remarks	Weight/length	Quantity
1	Display unit		With vinyl cover and mounting bracket	0.9 kg (1.9 lb)	1
2	Antenna unit	GA-06	With antenna cable	0.3 kg (0.6 lb)	1
3	Antenna cable	CW-191A	Connected to GA-06/ 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	Spare parts	F-7161, 1A	Fuse		1
6	Installation material				1 set
7	Operation manual				1

Installation materials

No.	Article	Type	Remarks	Quantity
1	Hose band	738-1015	Antenna unit	2
2	Truss tapping screw	TPT M5 X 20U	Display unit	2

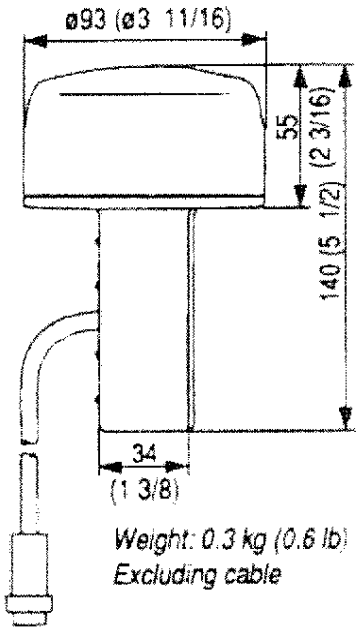
Options

No.	Article	Type	Remarks	Weight/length
1	Remote display	UR-7	With power and connecting cable	
2	Flush mount kit	FMK-1	Flush mount frame with screws	
3	Connecting cable	CW-326	With 6-pin and BNC connectors	5 m (16.4 ft)
		CW-327	With 6-pin connectors	5 m (16.4 ft)
		CW-328	With 6-pin connector and lugs	5 m (16.4 ft)
4	AC power cable	VV-2D8	Both end plain	3 m (9.8 ft)
5	Power rectifier	PS-003A	With two 5A fuses	

Outline and Dimensions

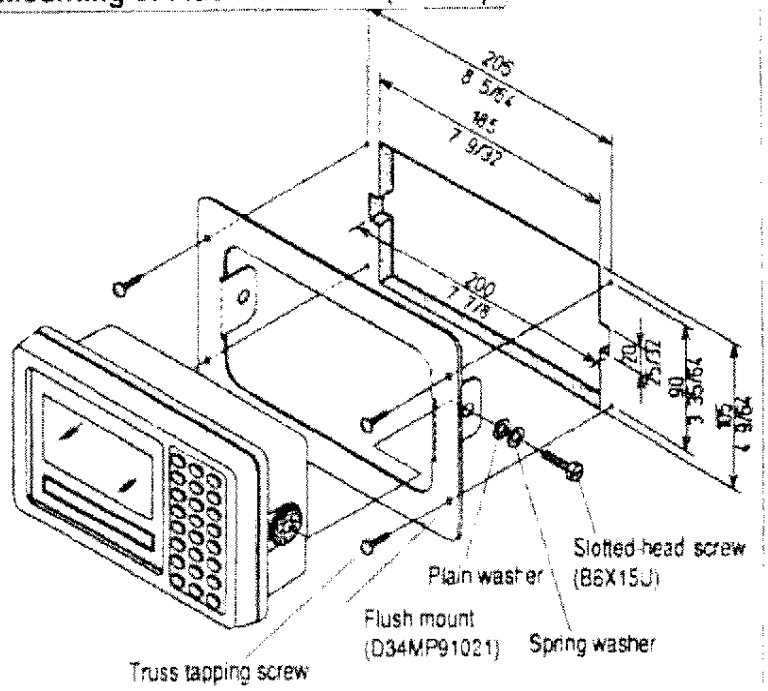
Scale differs among drawings.

Antenna unit (GA-06)

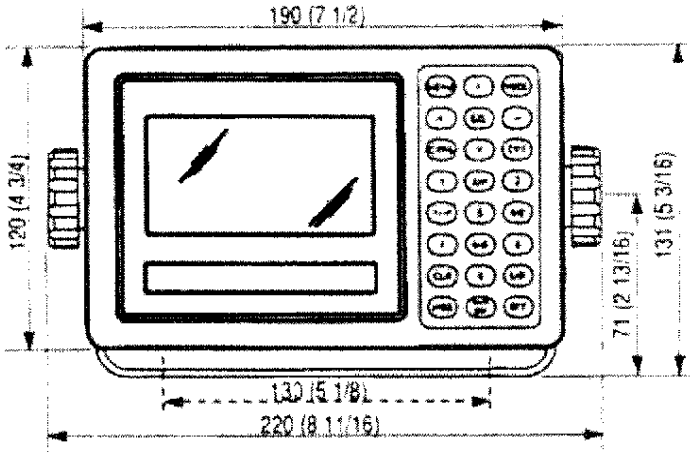


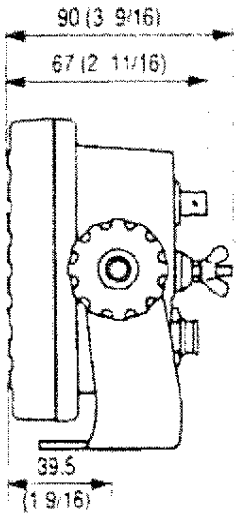
Weight: 0.3 kg (0.6 lb)
Excluding cable

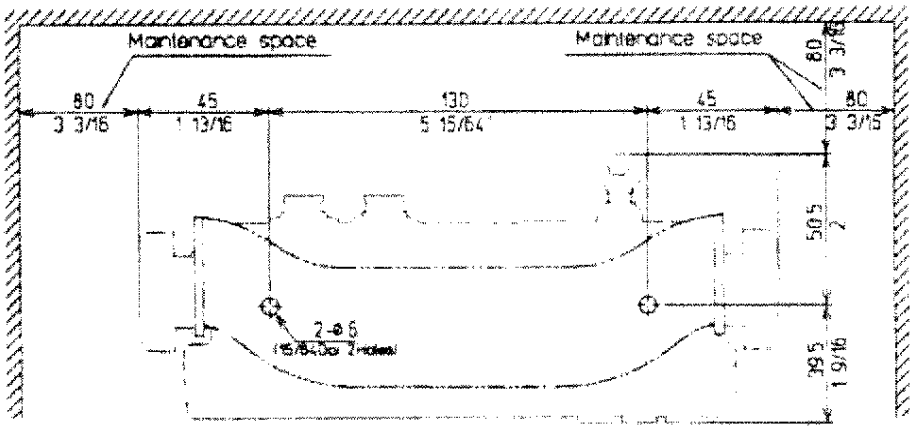
Mounting of Flush mount kit (FMK-1)



Display unit





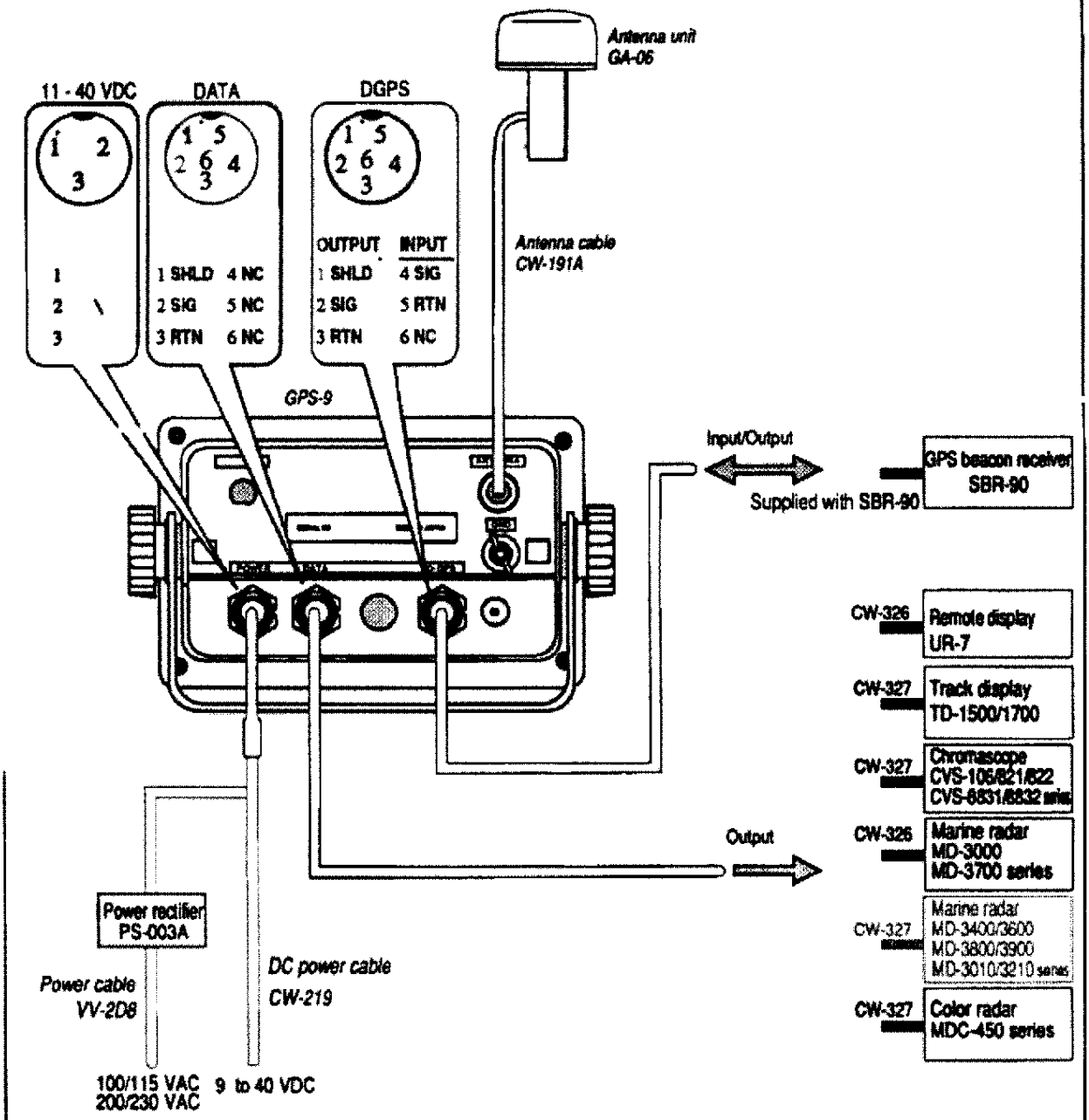


Weight: 0.9 kg
Unit: mm

FRONT

Mounting dimensions

Interconnection Diagram



Notice

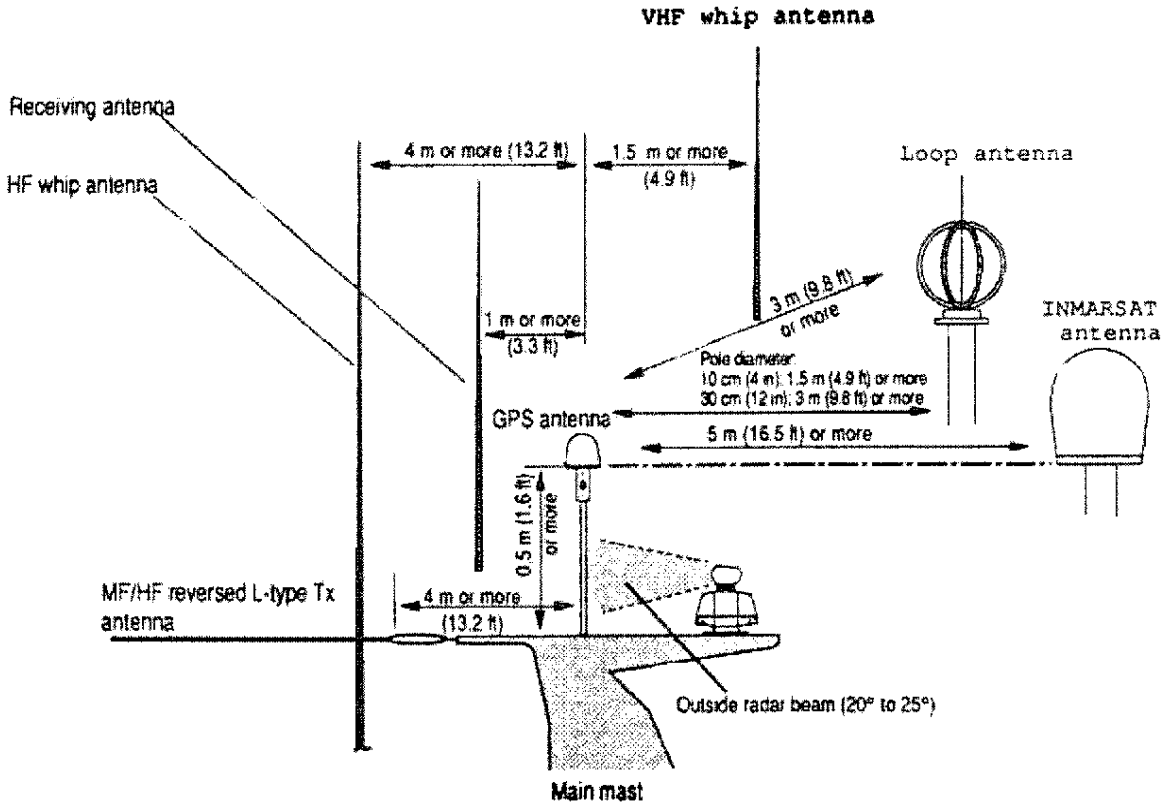
The negative side of the power source is connected to the ground of internal circuit.
Do not connect the ground terminal at the rear panel to the vessel ground if a power leakage detector is equipment.

Installing Antenna

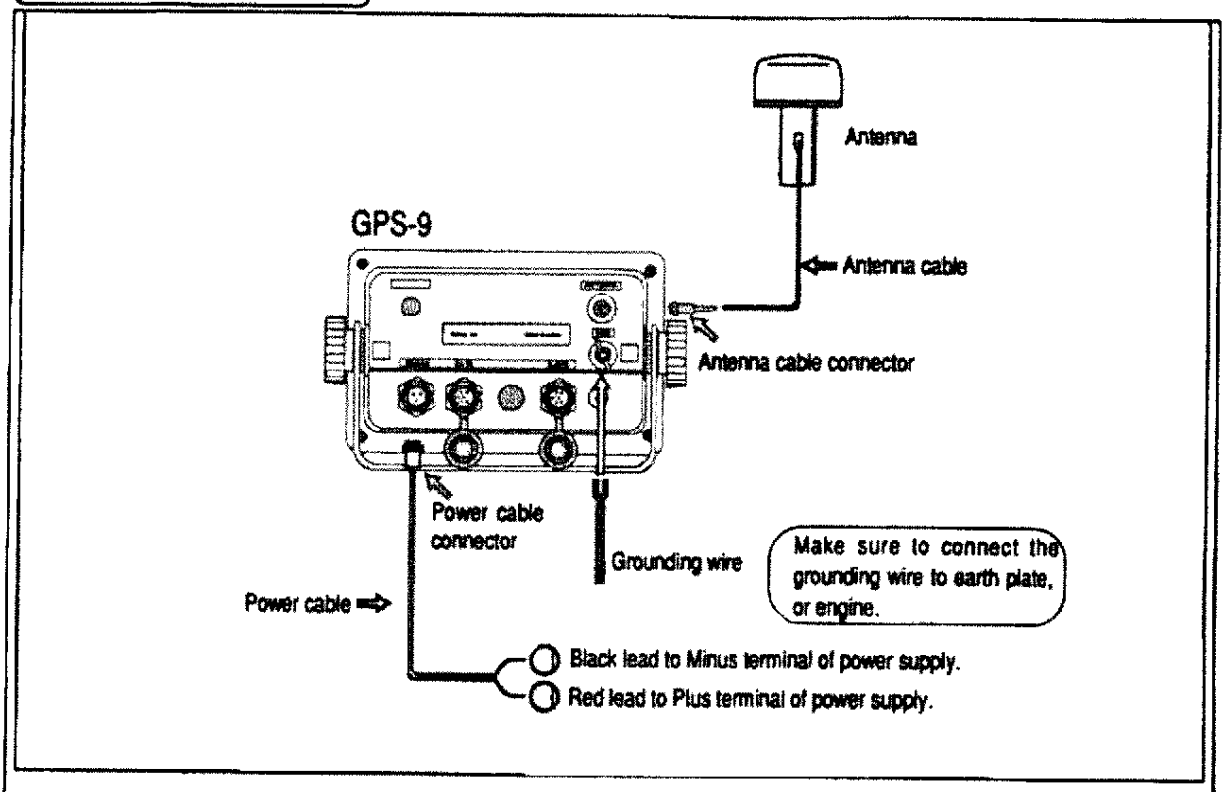
Locating Antenna

Make sure to install antenna at the highest point on the ship where the minimum interruption of view above the horizon is achieved.
Objects placed above antenna or too close to the antenna can cause signal degradation and shorten the fix period.

Install the antenna:
(1) As far away from metallic objects as possible.
(2) At least 4 meters (13 feet) away from the VHF/HF/MF transmitter antenna.
(3) Outside radar transmitting beam.
(4) At least 5 meters (16.5 feet) away from the Inmarsat antenna.
(5) At least 3 meters (9.8 feet) away from the loop antenna.

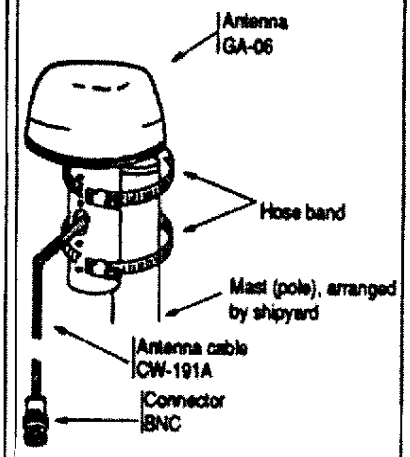


Cable Connections

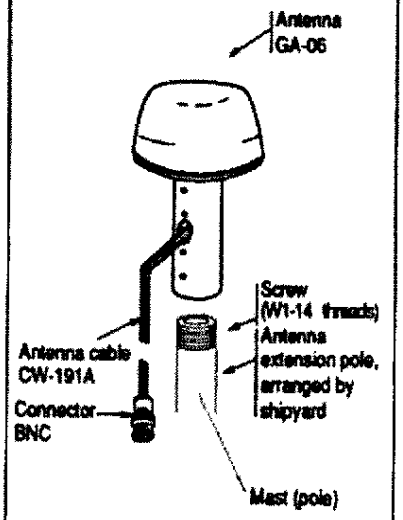


Antenna Installation (GA-06)

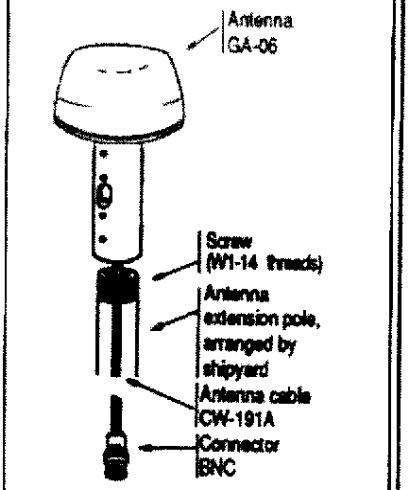
Case 1



Case 2



Case 3



KGP-913D/931D OPERATION MANUAL SUPPLEMENT KODEN

KM-B04K

Following change is made in the manual.

Table of DGPS reference stations

Station No	ID No	Country	Station name	Applicat name	Latitude	Longitude	Frequency (kHz)	Baud rate (bps)	Coverage (nm)
31	686	JAPAN	Tsurugizaki	TURUGIZK	35°08'N	139°41'E	309	200	100
32	692		Daiozaki	DAIOZAKI	34°17'N	136°54'E	288	200	100
33	680		Kinkazan	KINKAZAN	38°17'N	141°35'E	316	200	100
34	682		Inubousaki	INUBOUZK	35°42'N	140°52'E	295	200	100
35	688		Hachijoujima	HACHIJOU	33°05'N	139°51'E	302	200	100
36	694		Murotomisaki	MUROTOMI	33°15'N	134°11'E	295	200	100
37	706		Toimisaki	TOIMISAK	31°22'N	131°20'E	309	200	100
38	704		Oosesaki	OOSESAKI	32°37'N	128°36'E	302	200	100
39	702		Wakamiya	WAKAMIYA	33°52'N	129°41'E	295	200	100
40	670		Hamada	HAMADA	34°53'N	132°02'E	305	200	100
41	696		Esaki	ESAKI	34°36'N	135°00'E	320.5	200	100
42	698		Oohama	OOHAMA	34°05'N	132°59'E	321	200	100
43	700		Seto	SETO	33°26'N	132°13'E	320	200	100
44	660		Kusirozaki	KUSIRO	43°04'N	145°09'E	288	200	100
45	662		Abasiri	ABASIRI	44°00'N	144°18'E	309	200	100
46	664		Souyamisaki	SOUYA	45°31'N	141°56'E	295	200	100
47	666		Syakotanmisaki	SYAKOTAN	43°22'N	140°28'E	316	200	100
48	668		Matumae	MATUMAE	41°25'N	140°05'E	309	200	100
49	674		Hekurazima	HEKURA	37°51'N	136°55'E	295	200	100
50	676		Sakata	SAKATA	38°57'N	139°50'E	288	200	100
51	678		Siriyazaki	SIRIYA	41°26'N	141°28'E	302	200	100
52	672		Tango	TANGO	35°47'N	135°48'E	316	200	100
53	684		Urayasu	URAYASU	35°37'N	139°54'E	321	200	100
54	690		Nagoya	NAGOYA	35°02'N	136°51'E	320	200	100
56	710		Gesaji	GESAJI	26°36'N	128°09'E	288	200	100
57	712		Miyakojima	MIYAKOJI	24°44'N	125°26'E	316	200	100
58	708		Tokaranakanosima	TOKARA	29°49'N	129°55'E	320.5	200	100
59		BELGUIM	Oostende Phare	OOSTENDE	51°14'N	002°55'E	311.5	100	50
61	705	DENMARK	Blaavandshuk	BLAAVAND	55°33'N	008°05'E	296.5	100	100
62	715		Faroefslands	FAROE	62°00'N	006°45'W	287	100	50
63	700		Hammer Odde	HAMMER	55°18'N	014°46'E	289	100	100
64	710		Skagen	SKAGEN	57°45'N	010°36'E	298.5	100	100
65	530	ESTONIA	Ristna	RISTNA	58°56'N	022°04'E	307	200	110
67	401	FINLAND	Mantyluoto	MANTYLUO	61°36'N	021°28'E	298	200	140
68	404		Turku	TURKU	60°26'N	022°13'E	304	200	60
69	403		Outokumpu	OUTOKUMP	62°41'N	026°01'E	293.5	200	40
70	400		Porkkala	PORKKALA	59°58'N	024°23'E	285	200	140
71	402		Puumala	PUUMALA	61°24'N	028°14'E	301.5	200	40
72	468	FRANCE	Cap Bear	CAP BEAR	42°03'N	003°08'E	304.5	100	100
73	466		Cap Ferret	C FERRET	44°39'N	001°15'W	287	100	100
74			Saint Mathieu	MATHIEU	48°20'N	004°46'W	291.5	100	100
75	460		Gatteville Phare	GATTEVIL	49°42'N	001°16'W	297.5	100	100
76	464		Les Baleines	BALEINES	46°15'N	001°34'W	299.5	100	100
77	469		Porquerolles	PORQUERO	42°59'N	006°12'E	314.5	100	100
78	463		Phare de Pen Men	PEN MEN	47°39'N	003°30'W	298	100	100
79	492	GERMANY	Hergoland	HELGLAND	54°11'N	007°54'E	313	200	140
80	491		Wustrow	WUSTROW	54°20'N	012°23'E	314.5	200	100
81	824		Kobblenz	KOBLENZ	50°22'N	007°35'E	287	200	100
83	412	ICELAND	Bjargtangar	BJARGTAN	65°30'N	024°31'W	289	100	170
84	415		Djupivogur	DJUPIVOG	64°39'N	014°17'W	295.5	100	170
85	414		Raufarhofn	RAUFARHN	66°27'N	015°57'W	301.5	100	170
86	411		Reykjanes	REYKJANE	63°49'N	022°42'W	292.5	100	170
87	413		Skagata	SKAGATA	66°07'N	020°06'W	304.5	100	170
88	416		Skardsfjara	SKARDSFA	63°31'N	017°59'W	313	100	170
91		LATVIA	Ventspils	VENTSPIL	57°22'N	021°31'E	308.5	100	
92	428	NETHERLAND	VLIELAND	VLIELAND	53°27'N	005°37'E	299.5	200	120
93	650	HOLLAND	Hoek VanHolland	HOEK VAN	51°59'N	04°07'E	287.5	200	120
94	655		Ameland	AMELAND	51°59'N	004°07'E	299.5	100	120
95	515	NORWAY	Andenes	ANDENES	69°19'N	016°07'E	284.5	100	30
96	500		Faerder	FAERDER	59°01'N	010°31'E	288	100	90
97	510		Halten	HALTEN	64°10'N	009°24'E	313.5	100	90
98	517		Frubolmen	FRUBLMEN	71°06'N	023°59'E	309.5	100	30
99	530		Lista	LISTA	58°06'N	006°34'E	301	100	90
100	511		Sklinna	SKLINNA	65°12'N	010°50'E	288.5	100	90
101	513		Skomvaer	SKOMVAER	67°24'N	011°52'E	300	100	90
102	506		Svinoey	SVINOEY	62°19'N	005°16'E	293.5	100	90
103	516		Torsvaag	TORSVAAG	70°14'N	019°30'E	291.5	100	90
104	505		Utsira	UTSIRA	59°18'N	004°52'E	307	100	90
105	507		Utvaer	UTVAER	61°02'N	004°30'E	300	100	90
106	520		Vardoe	VARDOE	70°23'N	031°09'E	307	100	90
109		POLAND	Niechorze	NIECHORZ	54°06'N	15°04'E	287.5	100	70
110	482		Rozewie	ROZEWIE	54°49'N	018°20'E	311	100	70
111			Baltiysk	BALTIYSK	54°41'N	019°59'E	298.5	100	
113		SPAIN	Cabo Finisterre	CABOFINI	42°05'N	009°16'W	289	100	
115	500		Estaca de Bares	ESTACA	43°47'N	007°41'W	310	100	180
116			Cabo Gata	CABOGATA	36°43'N	002°11'W	297.5	100	
117			Mallorca	MALLORCA	39°27'N	002°31'E	286	100	

Station No.	ID No.	Country	Station name	Acptac name	Latitude	Longitude	Frequency (kHz)	Baud rate (cps)	Coverage (nm)
118	518		Cabo de Nao	CABONAO	38°44'N	000°14'E	284.5	100	100
119	516		Cabo de Palos	CABOPALO	37°38'N	000°41'W	313.5	100	100
120	502		Cabo Pennas	CABOPENA	43°39'N	005°51'W	297	100	100
121	526		Cabo Salou	CABOSALO	41°03'N	001°10'E	289	100	100
122	528		Cabo San Sebastian	CABOSAN	41°53'N	003°12'E	290.5	100	100
123	524		Castellon	CASTELLO	39°58'N	000°01'E	311	100	100
124	510		Ceuta	CEUTA	35°54'N	005°18'W	311.5	100	100
125	500		Machichaco	MACHICHA	43°27'N	002°45'W	285	100	100
126	522		Mahon	MAHON	39°52'N	004°18'E	292.5	100	100
127	512		Malaga	MALAGA	36°43'N	004°25'W	304.5	100	100
128	508		Rota	ROTA	36°38'N	006°23'W	302.5	100	100
129	532		Tenerife	TENERIFE	28°30'N	016°30'W	287.5	100	100
130			La Entallada	ENTALLAD	28°13'N	013°56'W	292.5	100	100
131	464	SWEDEN	Almagrundet	ALMAGRUN	59°09'N	019°08'E	287	200	100
132	461		Bjuroklubb	BJUROKLB	64°29'N	021°34'E	303.5	200	100
133	467		Hjortons Udde	HJORTONS	58°38'N	012°40'E	297	200	90
134	465		Hoburg	HOBURG	56°55'N	018°09'E	302	200	90
135	466		Kullen	KULLEN	56°18'N	012°27'E	293.5	200	100
136	463		Orskar	ORSKAR	60°32'N	018°22'E	291.5	200	90
137	462		Jarnos	JARNOS	63°29'N	019°39'E	306.5	200	100
138	480	ARABIAN	Bahrain	BAHRAIN	28°07'N	50°39'E	298	200	250
139	283	KUWAIT	Kuwait	KUWAIT	29°07'N	48°08'E	295	200	250
140	142	UAE	Ras Al Khaimah	KHAIMAH	25°59N	56°04'E	292	200	250
141	143		Abu Dhabi	ABUDHABI	24°06'N	052°56'E	314	200	250
143	670	IRELAND	Tory Island	TORY IS	55°16'N	08°15'W	313.5	100	150
144	665		Loop Head	LOOPHEAD	52°34'N	009°56'W	312	100	100
145	681	ENGLAND	Lizard	LIZARD	49°57'N	5°12'W	284	100	100
146	680		St.Catherines	ST.CATHE	50°35'N	001°18'W	293.5	100	100
147	688		North Foreland	NORTH FO	51°23'N	001°27'W	310.5	100	100
148	687		Flamborough	FLAMBORO	54°07'N	0°05'W	302.5	100	100
149	682		Point Lynas	POINT LY	53°25'N	04°17'W	305	100	100
150	689		Nash Point	NASH POI	51°24'N	003°33'W	299	100	100
151	686	SCOTLAND	Girdle Ness	GIRDLE	57°08'N	2°03'W	311	100	100
152	684		Butt of Lewis	BUTT	58°31'N	006°16'W	294	100	100
153	685		Sumburgh Head	SUMBURGH	59°51'N	1°16'W	304	100	115
154	660		Mizen Head	MIZEN	51°27'N	009°49'W	300.5	100	100
156		CHINA	Beitang	BEITANG	39°07'N	117°43'E	310.5	200	100
157			Qing Huang Dao	QINHUAND	39°55'N	119°37'E	287.5	200	100
158			Da San Shan	DASANSHA	38°52'N	121°50'E	301.5	200	100
159			Wang Jia Mai Dao	WANJIAMD	36°04'N	120°26'E	313.5	200	100
160			Bao Hu	BAO HU	20°00'N	110°56'E	310.5	200	100
161			Cheengshanjiao	CHENGSHA	37°00'N	122°00'E	291	200	50
162			Dajishan	DAJISHAN	30°49'N	122°10'E	307	200	100
163			Dinghai	DINGHAI	26°30'N	119°00'E	310	200	100
164			Fangchen	FANGCHEN	19°00'N	108°00'E	287	200	100
165			Haozhigang	HAOZHIGA	31°30'N	122°00'E	287	200	100
166			Luyu	LUYU	23°30'N	117°00'E	317	200	100
167			NaoZhoudeao	NAOZHOUD	21°30'N	110°00'E	301	200	100
168			Sanya	SANYA	18°00'N	109°00'E	295	200	100
169			Sanzzao	SANZAO	22°30'N	113°30'E	307	200	100
170			Shitang	SHITANG	27°30'N	121°00'E	295	200	100
171			Tiandashan	TIANDASH	26°30'N	119°00'E	313	200	100
172			Yanggpu	YANGPU	21°30'N	109°00'E	313	200	100
173			Yanweigang	YANWEIGA	34°30'N	119°00'E	317	200	100
174			Zhenhaijiao	ZHENHAIJ	24°30'N	117°30'E	320	200	100
175		KOREA	Marado	MARADO	33°06'N	126°16'E	290	200	100
176			Ullungdo	ULLUNGDO	37°31'N	130°47'E	319	200	100
177		HONG KONG	Kau Yi Chau	KAUYICHA	22°15'N	114°04'E	289	200	100
178	720	KOREA	Yongdo	YONGDO	35°02'N	129°05'E	300	200	100
179	722		Palmido	PALMIDO	37°21'N	126°30'E	313	200	100
180	724		Komundo	KOMUNDO	34°00'N	127°19'E	287	200	100
181	726		Chumunjin	CHUMUNJI	37°53'N	128°50'E	295	200	100
182	728		Ochongdo	OCHONGDO	36°07'N	125°58'E	295	200	100
184	732		Changgiot	CHANGIGO	36°04'N	129°34'E	310	200	100
185		MALAYSIA	Bintulu	BINTULU	3°11'N	113°00'E	310	200	100
188		EGYPT	Alexandria	ALEXANDR	31°10'N	29°50'E	284	200	100
189			Mersa Matroh	MERSA	31°21'N	027°14'E	307	200	100
190			Port Said	SAID	31°16'N	031°17'E	290	200	100
191			Ras Umm Sid	UMMSID	27°51'N	034°18'E	293.5	200	100
192			Ras Gharib	GHARIB	28°21'N	033°06'E	298	200	100
193			Quseir	QUSEIR	26°08'N	034°15'E	314.5	200	100
194		AUSTRALIA	Cape Schanck	SCHANCK	38°30'S	144°53'E	314	200	100
195	2		Horn Island	HORN IS.	10°36'S	142°18'E	320	200	100
196	1		Karratha	KARRATHA	20°45'S	116°27'E	304	200	100
197			Cape Flattery	CAPEFLAT	14°58'S	145°18'E	304	200	180
198			Mackay	MACKAY	21°06'S	149°12'E	315	200	100
199			Sydney	SYDNEY	33°59'S	150°58'E	308	200	100
200	7		Brisbane	BRISBANE	27°04'S	153°03'E	294	200	100
201	999		Weipa	WEIPA	13°00'S	141°50'E	316	200	
206	6		Gladstone	GLADSTON	24°02'S	151°21'E	313	200	100
207	999		Ingham	INGHAM	20°30'S	148°50'E	306	200	
223		RUSSIA	Baltiysk	BALTIYSK	54°38'N	019°54'E	312.5	100	

Station No.	ID No.	Country	Station name	Applied name	Latitude	Longitude	Frequency (kHz)	Baud rate (bps)	Coverage (nm)
225			Africa	AFRICA	56°11'N	163°21'E	291.5	100	35
226			Alevina	ALEVINA	55°50'N	151°21'E	303.5	100	130
227			Anapsky	ANAPSKY	44°53'N	037°18'E	315.5	100	170
228			Anardea	ANDREA	76°44'N	110°27'E	291.5	100	180
229			Astrahnasky	ASTRAHNA	44°28'N	048°01'E	291.5	100	50
230			Begichev	BEGICHEV	47°31'N	112°15'E	300.5	100	90
231			Camenka	CAMENKA	69°28'N	161°14'E	318.5	100	100
232			Canin-Nose	CANIN	68°38'N	043°18'E	285.5	100	100
233			Caraginsky	CARAGINS	58°33'N	163°33'E	301.5	100	100
234			Corsakovsky	CORSAKOV	46°37'N	142°48'E	312.5	100	100
235			Cotelny	COTELNY	75°59'N	137°53'E	310.5	100	100
236			Crutogorova	CRUTOGOR	55°05'N	155°35'E	300.5	100	100
237			Dedgneva	DEDGNEVA	66°01'N	169°43'E	303.5	100	100
238			Dgedginsky	DGEDGINS	65°13'N	036°49'E	298.5	100	100
239			Elizarova	ELIZAROV	54°25'N	143°43'E	318.5	100	100
240			Enisey	ENISEY	68°25'N	086°18'E	315.5	100	100
241			Gamov	GAMOV	42°33'N	131°13'E	306.5	100	95
242			Indygirsky	INDYGIRS	71°16'N	150°17'E	324.5	100	100
243			Oleniy	OLENIY	72°35'N	077°39'E	294.5	100	90
244			Petropavlovsky	PETROPAV	52°33'N	158°42'E	291.5	100	35
245			Russian Cat	RUSSIAN	64°34'N	178°33'E	315.5	100	100
246			Set.Navolock	NAVOLOCK	69°24'N	033°03'E	318.5	100	100
247			Shepelevskiy	SHEPELEV	59°59'N	029°09'E	298.5	100	100
248			Sterlegov	STERLEGO	75°24'N	088°45'E	318.5	100	100
249			Stolbovoy	STOLBOVO	74°10'N	135°27'E	306.5	100	100
250			Tonky	TONKY	69°51'N	061°06'E	303.5	100	100
251			Van-Der-Linda	LINDA	45°35'N	149°24'E	312.5	100	100
252			Vasilieva	VASILIEV	50°00'N	155°23'E	294.5	100	100
253			Vize	VIZE	79°30'N	076°59'E	294.5	100	100
254			Vrangelia	VRANGELI	70°59'N	178°29'E	309.5	100	100
255			Yarangai	YARANGAI	69°54'N	170°32'E	291.5	100	100
257	940	CANADA	Cape Race	CAPERACE	46°46'N	053°11'W	315	200	280
258	941		Cape Ray	CAPE RAY	47°38'N	059°14'W	290	200	200
259	934		Fox Islanc	FOX IS.	45°19'N	061°04'W	307	200	
260	927		Lauzon	LAUZON	46°48'N	071°09'W	309	200	125
261	925		Moisie	MOISIE	50°12'N	066°07'W	313	200	100
262	939		Partridge Island	PARTRIDG	45°14'N	066°03'W	295	200	75
263	304		Point Atkinson	ATKINSON	49°19'N	123°15'W	320	200	30
264	936		Point Escuminac	ESCUMINC	47°04'N	064°47'W	319	200	
265			Point Patrie	P.PATRIE	43°50'N	077°09'W	303	100	25
266			Port aux Basques	BASQUSE	47°34'N	059°09'W	290	100	
267			Port Weller	P.WELLER	43°14'N	079°13'W	302	100	25
268			Race Rocks	RACEROCK	48°18'N	123°32'W	315	200	130
269	947		Rigolet	RIGOLET	54°15'N	058°30'W	299	200	200
270			Sombra	SOMBRA	42°43'N	082°29'W	306	100	15
271	909		St Jean sur Richelieu	ST.JEAN	45°19'N	073°18'W	296	200	100
272			Triple Island	TRIPLEIS	54°17'N	130°52'W	308	100	
273			Trois Riveres	TROISRIV	46°23'N	072°27'W	321	200	85
274	334		Western Head	W.HEAD	43°59'N	064°39'W	312	200	90
275	300		Alert Bay	ALERTBAY	50°35'N	126°55'W	309	200	450
277	302		Amphitrite Point,B.C	AMPHITRE	48°55'	N 125°32'	W 315.	0 20	0 350
278	306		Sandspit,B C	SANDSPIT	53°14'N	131°48'W	300	200	450
279	919		Cardinal,ON	CARDINAL	44°47'N	075°25'W	306	200	250
280			Bassano,AB**	BASSANO	50°47'N	112°27'W	325	200	250
281	926		Riviere-DU	RIVIERE	47°45'N	069°36'W	300	200	250
282	310		Wiarton,ON	WIARTON	44°44'N	081°06'W	286	200	100
283			Winnipeg,MB	WINNIPEG	49°50'N	097°30'W	312	200	100
284			Watrous,SK*	WATROUS	50°40'	N 105°26'	W 321.	0 20	0 250
285			Cranberry Island	CRANBERY	45°19'N	060°55'W	286	100	
286			East Point	EAST PT.	46°27'N	061°58'W	314	100	
287	944		Pistolet Bay	PISTOLET	51°30'N	055°49'W	310	200	200
297	40	USA	Alexandria,VA	ALEXANDR	38°45'N	077°07'W	305	100	35
298			Alma,WI	ALMA	44°18'N	091°54'W	317	200	130
299	278		Annette Island,AK	ANNETTE	55°04'N	131°36'W	323	100	170
300	32		Aransas Pass,TX	ARANSAS	27°50'N	097°04'W	304	100	180
301			Barber Point,HI	BARBER.P	21°18'N	158°07'W	325	100	
302			Bass Harbor,ME	BASSHAR.	44°13'N	068°20'W	316	100	90
303	1		Brunswick,ME	BRUNSWIK	43°53'N	069°57'W	316	100	115
304			Buffalo,NY	BUFFALO	42°52'N	078°54'W	322	100	130
305	18		Cape Canaveral,FL	CANAVERL	28°27'N	080°32'W	289	100	200
306			Cape Chiniak,AK	CHINIAK	57°37'N	152°10'W	313	100	150
307	10		Cape Henlopen,DE	HENLOPEN	38°46'N	075°05'W	298	200	180
308	12		Cape Henry,VA	C.HENRY	36°56'N	076°00'W	289	100	130
309	288		Cape Hinchenbrook,AK	HINCHNBK	60°14'N	146°39'W	292	100	150
310	270		Cape Mendocino,CA	MENDCINO	40°26'N	124°24'W	292	100	180
311	112		Cheboygan,MI	CHEBOY	45°39'N	084°28'W	292	200	100
312	16		Charleston,SC	CHARLSTN	32°46'N	079°51'W	298	100	150
313	4		Chatham,MA	CHATHAM	41°40'N	069°57'W	325	200	95
314	296		Cold Bay,AK	COLD BAY	55°06'N	162°32'W	289	100	180
315	116		Detroit,MI	DETROIT	42°18'N	083°06'W	319	200	90
316			Duluth,MN	DULUTH	46°47'N	092°05'W	296	100	35
317	24		Egmont Key,FL	EGMONT.K	27°36'N	082°46'W	312	200	210

Station No	ID No.	Country	Station name	Applied name	Latitude	Longitude	Frequency (kHz)	Baud rate (bps)	Coverage (nmi)
318	28		"English Turn,LA"	ENG.TURN	29°53'N	089°57'W	293	200	170
319	14		"Ft Macon,NC"	FT.MACON	34°42'N	076°41'W	294	100	130
320	272		"Ft Stevens,OR"	STEVENS	46°12'N	123°57'W	287	100	180
321	30		"Galveston,TX"	GALVESTN	29°20'N	094°44'W	296	100	180
322	284		"Gustavus,AK"	GUSTAVUS	58°25'N	135°42'W	288	100	170
323	292		"Kenai,AK"	KENAI	60°40'N	151°21'W	310	100	170
324	22		"Key West,FL"	KEY WEST	24°34'N	081°39'W	286	100	110
325	294		"Kodiak,AK"	KODIAK	57°37'N	152°12'W	313	100	180
326	260		"Kokole Pt.,HI"	KOKOLE P	21°59'N	159°46'W	300	200	300
327	152		"Memphis,TN"	MEMPHIS	35°28'N	090°12'W	310	200	100
328	20		"Miami,FL"	MIAMI	25°44'N	080°10'W	322	100	75
329	160		"Miller's Ferry,AL"	MILLERSF	32°05'N	087°24'W	320	200	75
330	106		"Milwaukee,WI"	MILWAUKE	43°00'N	087°53'W	297	100	120
331	26		"Mobile Point,AL"	MOBILE P	30°14'N	088°01'W	300	100	170
332	6		"Montauk Point,NY"	MONTAUK	41°04'N	071°52'W	293	100	130
333	110		"Neebish Island,MI"	NEEBISH	46°19'N	084°09'W	309	200	50
334			"New Castle,LT"	NEW CAST	43°04'N	070°42'W	288	100	
335			"Nikishka,AK"	NIKISHKA	60°44'N	151°22'W	310	100	150
336	266		"Pigeon Pt.,CA"	PIGEON P	37°11'N	122°24'W	287	100	180
337	264		"Point Arguello,CA"	ARGUELLO	34°35'N	120°38'W	321	100	180
338	268		"Point Blunt,CA"	PT.BLUNT	37°51'N	122°25'W	310	200	60
339	262		"Point Loma,CA"	PT.LOMA	32°40'N	117°15'W	302	100	180
340	2		"Portsmouth,NH"	PTSMOUTH	43°04'N	070°43'W	288	100	100
341	290		"Potato Pt.,AK"	POTATO P	61°04'N	146°42'W	298	100	100
342			"Presque Ile,MI"	PRESQUE	45°21'N	083°30'W	293	100	70
343	274		"Robinson Pt.,WA"	ROBINSON	47°23'N	122°22'W	323	200	60
344	114		"Saginaw Bay,MI"	SAGINAW	43°38'N	083°50'W	301	100	70
345	8		"Sandy Hook,NJ"	SANDY HK	40°28'N	074°01'W	286	200	100
346			"San Juan,PR"	SAN JUAN	18°00'N	060°00'W	295	100	100
347			"Seul Choix Pt.,MI"	SEULCHOX	45°55'N	085°55'W	322	200	95
348			St.Davids Head	ST.DAVID	32°22'N	064°39'W	323	100	100
349	154		"St.Louis,MO"	ST.LOUIS	38°37'N	089°46'W	322	200	100
350	104		"Sturgeon Bay,WI"	STURGEON	44°48'N	087°19'W	322	100	95
351	258		"Upolu Pt.,HI"	UPOLU PT	20°15'N	155°53'W	286	100	170
352	102		"Upper Keweenaw,MI"	KEWEENAW	47°14'N	088°38'W	298	100	130
353	150		"Vicksburg,MS"	VICKSBRG	32°20'N	090°55'W	313	200	100
354	276		"Whidbey Is.,WA"	WHIDBEY	48°19'N	122°42'W	302	100	90
355	108		"Whitefish Pt.,MI"	WHITFISH	46°46'N	084°57'W	318	100	70
356	38		"Wildwood,NJ"	WILDWOOD	38°57'N	074°51'W	301	200	75
357	100		"Wisconsin Point,WI"	WISCONSN	46°42'N	092°01'W	296	100	35
358	118		"Youngstown,NY"	YOUNGS.T	43°14'N	078°58'W	322	100	130
359	34		"Isabella,PR"	ISABELLA	18°28'N	067°04'W	295	100	125
360	164		"Kansas city,MO"	KANSAS	39°07'N	095°24'W	305	200	100
361	156		"Rock Island,IL"	ROCK	42°00'N	090°14'W	311	200	150
362	162		"SALLISAW,OK"	SALLISAW	35°22'N	094°49'W	299	200	100
363	158		"St.paul,MN"	ST.PAUL	44°18'N	091°54'W	322	200	115
364			Appleton	APPLETON	45°47'N	121°19'W	300	100	115
366			"Louisville,KY"	LOUISVIL	38°00'N	085°18'W	290	200	115
367			"Omaha,NE"	OMAHA	41°46'N	095°54'W	298	200	115
368			"Reedy Point,DE"	REEDY	39°33'N	075°34'W	309	200	115
378		BRAZIL	Abrolhos	ABROLHOS	17°58'S	38°41'W	290	100	100
379			Santa Marta	MARTA	28°36'S	048°49'W	310	100	100
380			Canivete	CANIVETE	00°30'S	050°24'W	310	100	100
381			Moela	MOELA	24°03'S	046°16'W	305	100	100
382			Sao Marcos"	MARCOS	02°29'S	044°18'W	300	100	100
383			Rio Grande	GRANDE	32°08'S	052°06'W	290	100	100
384			Sao Tom	SAO TOM	22°02'S	041°03'W	300	100	100
385			Calcanhar	CALCANHA	05°09'S	035°29'W	305	100	100
386			Aracaju	ARACAJU	10°58'S	037°02'W	320	100	100
387			Lha Rasa	RASA	26°00'S	043°06'W	315	100	100
392		ARGENTINA	San Carlos Centro C	CARLOS	31°58'S	060°55'W	297.5	200	115
393			Bolivar	BOLIVAR	36°22'S	060°03'W	317.5	200	100

GPS-9 OPERATION MANUAL SUPPLEMENT SI-TEX

Following changes are made in the manual.

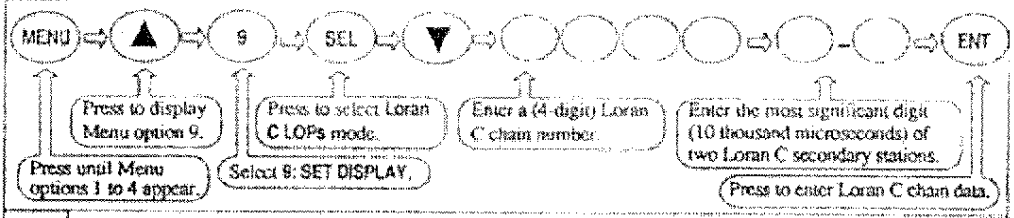
Page	Operation	Content of change
11	**Store a new position**	**Refer to item 1.**
15	**Erasing a single of position data**	CLR: Press to clear an incorrect input. You can reenter a numeric data. → Delete
25	Setting the anchor watch alarm	The anchor watch alarm is canceled when you set a waypoint or a route. → Delete
28	Menu options	Refer to item 2.
29	Selecting a geodetic datum	CLR: Press to clear an incorrect input. You can reenter a numeric data. → Delete
30	Displaying position data in LAT/LONG	Refer to item 3.
30	Displaying position data in Loran C LOPs	Refer to item 4.
31	Correction by LAT/LONG data entry	Refer to right figure.
33	Check the correction amount	Refer to right figure.
33	Cancel the position correction	Refer to right figure.
36	Displaying local time	Refer to right figure.
32	Correction by Loran C LOPs data entry	Refer to right figure and item 5.
34	Automatic compensation	Refer to item 7.
34	Manual compensation	Refer to item 8.
36	DGPS measurement	Refer to item 6.
41	Calculating the distance and bearing between two points	Refer to item 9.

OLD: ⇨ 4/W ⇨ (Select 4: CORRECT.)

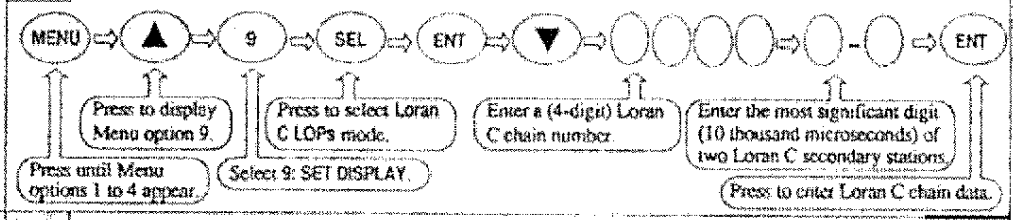
NEW: ⇨ 4/W ⇨ (Select 4: COMP.)

Item	OLD	NEW
1	⇨ ENT ⇨ ▼ ⇨ LAT/LONG mode ⇨ / Loran C LOPs mode ⇨	⇨ ENT ⇨ LAT/LONG mode ⇨ / Loran C LOPs mode ⇨
2	**2. Differential GPS (DGPS)** **Select DGPS mode.** **Set DGPS timeout.** **Select DGPS signal baud rate.** **Monitor DGPS data.**	**2. Differential GPS (DGPS)** **Select DGPS mode.** **Set DGPS timeout.** **Monitor DGPS data.**
3	MENU ⇨ ▲ ⇨ 9 ⇨ SEL Press to select LAT/LONG mode. Select 9: SET DISPLAY. Press to display Menu option 9. Press until Menu options 1 to 4 appear.	MENU ⇨ ▲ ⇨ 9 ⇨ SEL ⇨ ENT Press to select LAT/LONG mode. Select 9: SET DISPLAY. Press to display Menu option 9. Press until Menu options 1 to 4 appear.

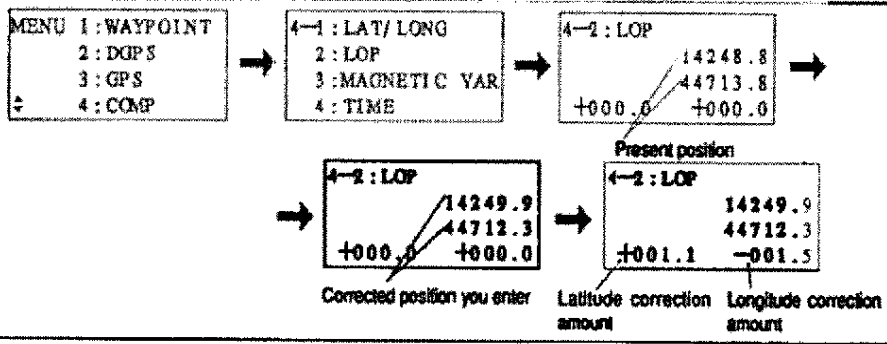
4 OLD



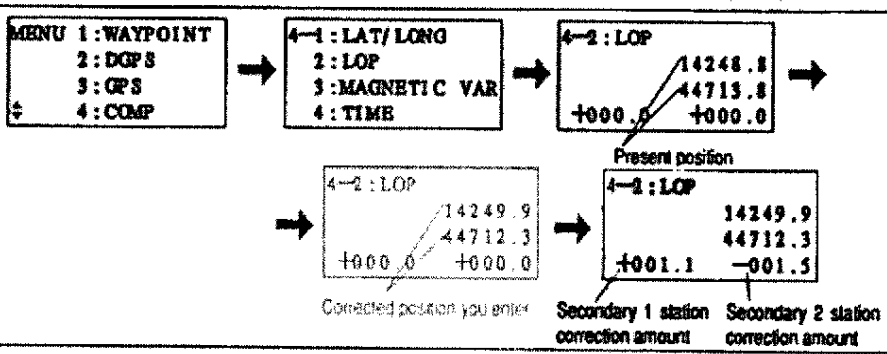
NEW



5 OLD



NEW



6 OLD Use the following steps for differential GPS measurement in RTCM-104 format. Set the DGPS mode to "ON", and the DGPS measurement will start if the DGPS position correction data is effective. If it fails, the DGPS character blinks. When you set the DGPS mode to "AUTO", the DGPS measurement is selected DGPS correction is made automatically but the GPS correction is dropped when correction data becomes invalid. When you set the DGPS mode to "OFF", no DGPS measurement takes place.

When you set the differential GPS mode to ON or AUTO, the DATA1 connector at the display rear panel functions as DGPS data input (in RTCM format) only.

NEW Use the following steps for differential GPS measurement in RTCM-104 format. Set the DGPS mode to "ON", and the DGPS measurement will start if the DGPS position correction data is effective. If it fails, the D character blinks. When you set the DGPS mode to "AUTO", the DGPS measurement is selected DGPS correction is made automatically but the GPS correction is dropped when correction data becomes invalid. When you set the DGPS mode to "OFF", no DGPS measurement takes place.

The DATA1 connector at the display rear panel is exclusively for DGPS data input (in RTCM format).

7

OLD

MENU ⇨ 4/W ⇨ 3 ⇨ SEL ⇨ ENT

- Press until Menu options 1 to 4 appear.
- Select 4: CORRECT.
- Select 4-3: MAGNET ERROR.
- Press to select AUTO mode.
- Press to compensate bearing automatically.

```
4-3 :MAG COMPASS
     AUTO
     +008.0
```

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

NEW

MENU ⇨ 4/W ⇨ 3 ⇨ SEL ⇨ ENT

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

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

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

OLD

MENU ⇨ 4/W ⇨ 3 ⇨ SEL ⇨ ▼ ⇨

- Press until Menu options 1 to 4 appear.
- Select 4: CORRECT.
- Select 4-3: MAGNET ERROR.
- Press to select MANUAL mode.
- Locate ▬ cursor onto + or – sign.

```
4-3 :MAG COMPASS
     MANUAL
     +000.0
```

↓

```
4-3 :MAG COMPASS
     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.

NEW

MENU ⇨ 4/W ⇨ 3 ⇨ SEL ⇨ ▼ ⇨

- Press until Menu options 1 to 4 appear.
- Select 4: COMP.
- Select 4-3: MAGNETIC VAR.
- Press to select MANUAL mode.
- Locate ▬ cursor onto + or – sign.

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

↓

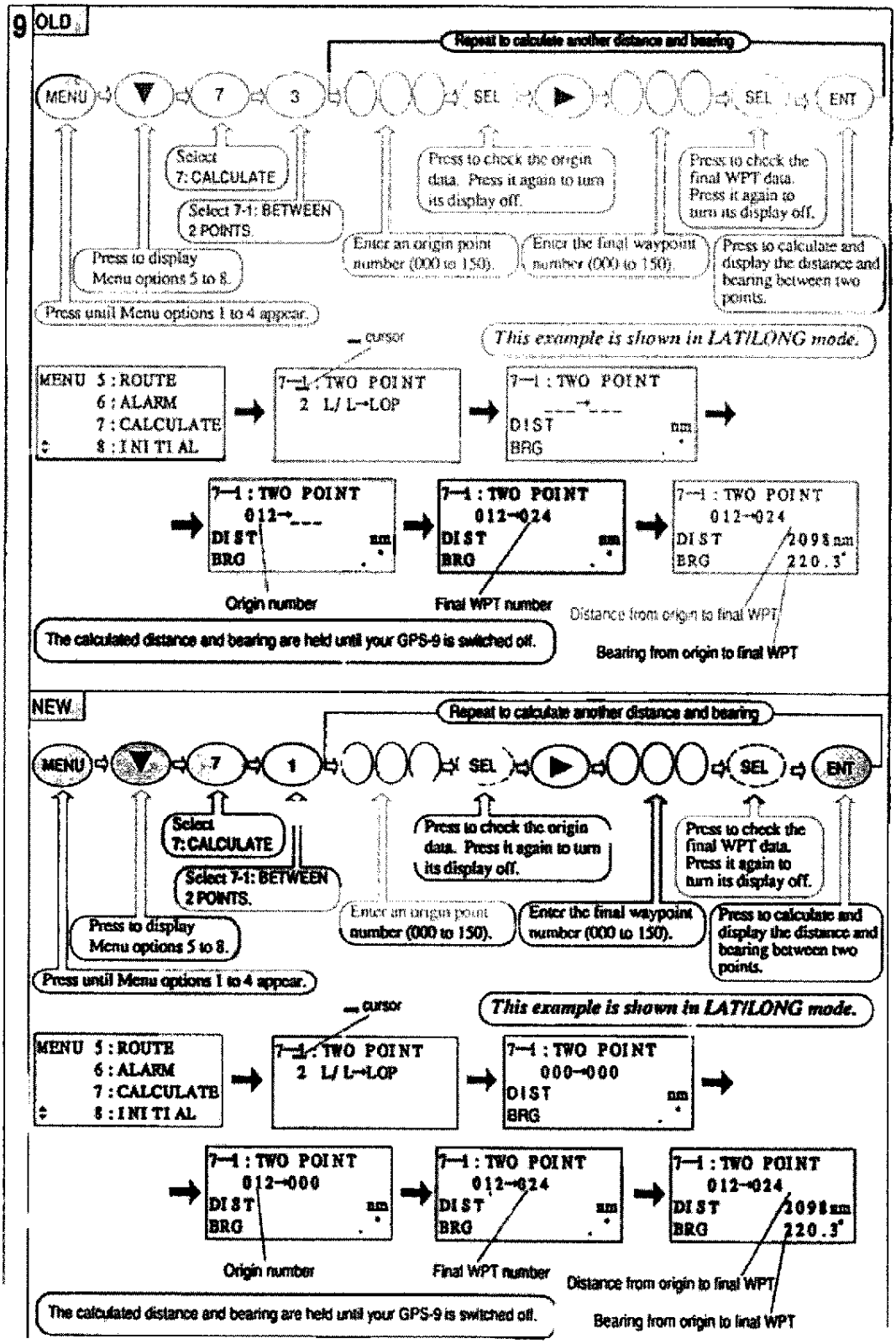
```
4-3 :MAGNETIC VAR
     MANUAL
     +008.0
```

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.

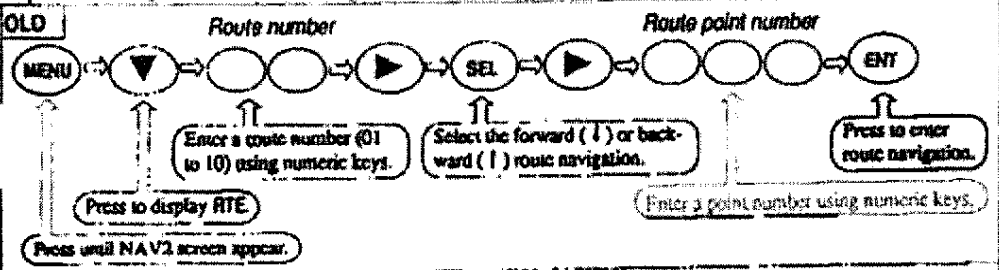
9


OLD
Repeat to calculate another distance and bearing
MENU
7
3
SEL
SEL
ENT
Select 7: CALCULATE
Select 7-1: BETWEEN 2 POINTS.
Press to display Menu options 5 to 8.
Press until Menu options 1 to 4 appear.
Press to check the origin data. Press it again to turn its display off.
Enter an origin point number (000 to 150).
Enter the final waypoint number (000 to 150).
Press to check the final WPT data. Press it again to turn its display off.
Press to calculate and display the distance and bearing between two points.
cursor
This example is shown in LAT/LONG mode.
MENU 5 : ROUTE
6 : ALARM
7 : CALCULATE
8 : INITIAL
7-1 : TWO POINT
2 L/L→LOP
7-1 : TWO POINT
DIST nm
BRG
7-1 : TWO POINT
012→___
DIST nm
BRG
7-1 : TWO POINT
012→024
DIST nm
BRG
7-1 : TWO POINT
012→024
DIST 2098 nm
BRG 220.3°
Origin number
Final WPT number
Distance from origin to final WPT
Bearing from origin to final WPT
The calculated distance and bearing are held until your GPS-9 is switched off.
NEW
Repeat to calculate another distance and bearing
MENU
7
1
SEL
SEL
ENT
Select 7: CALCULATE
Select 7-1: BETWEEN 2 POINTS.
Press to display Menu options 5 to 8.
Press until Menu options 1 to 4 appear.
Press to check the origin data. Press it again to turn its display off.
Enter an origin point number (000 to 150).
Enter the final waypoint number (000 to 150).
Press to check the final WPT data. Press it again to turn its display off.
Press to calculate and display the distance and bearing between two points.
cursor
This example is shown in LAT/LONG mode.
MENU 5 : ROUTE
6 : ALARM
7 : CALCULATE
8 : INITIAL
7-1 : TWO POINT
2 L/L→LOP
7-1 : TWO POINT
000→000
DIST nm
BRG
7-1 : TWO POINT
012→000
DIST nm
BRG
7-1 : TWO POINT
012→024
DIST nm
BRG
7-1 : TWO POINT
012→024
DIST 2098 nm
BRG 220.3°
Origin number
Final WPT number
Distance from origin to final WPT
Bearing from origin to final WPT
The calculated distance and bearing are held until your GPS-9 is switched off.

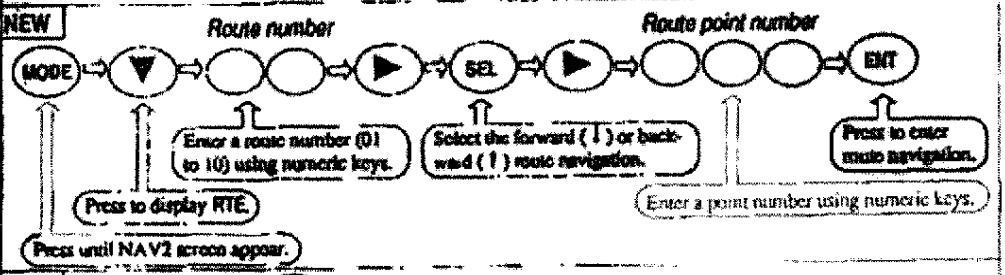
Page	Operation	Content of change
20	Selecting a route navigation	Refer to item 10.
21	Checking a route position or a route point position	Refer to item 11.
28	Menu options	Refer to item 12.
31	Correction by LAT/LONG data entry	Refer to item 13.

10

OLD

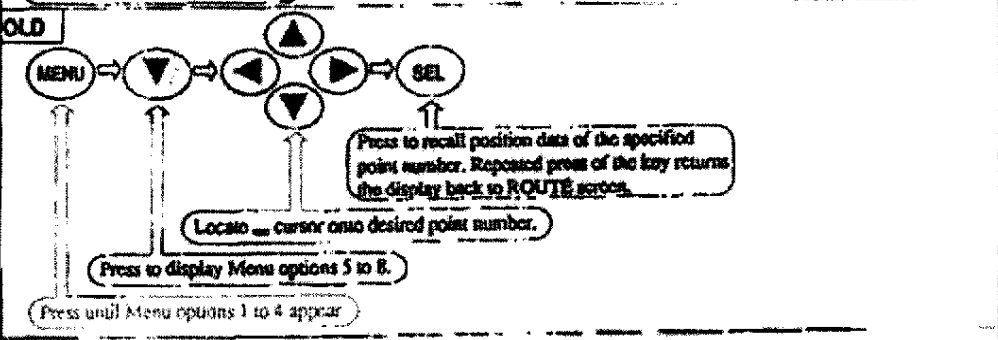


NEW

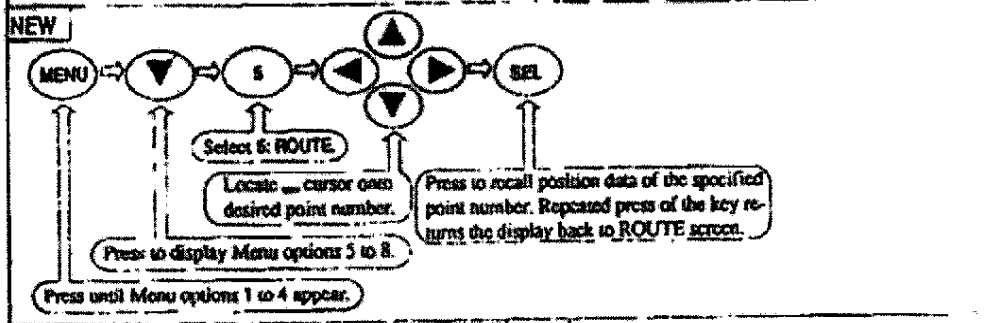


11

OLD



NEW



12

OLD

3. GPS
DISPLAY GPS SATELLITE STATUS.
SWITCH (2- AND 3-DIMENSIONAL) POSITIONING MODES.
SET ANTENNA HEIGHT (ABOVE SEA LEVEL).
SELECT MEASURING SYSTEM.

NEW

1. GPS
DISPLAY GPS SATELLITE STATUS.
SWITCH (2- AND 3-DIMENSIONAL) POSITIONING MODES.
SET ANTENNA HEIGHT (ABOVE SEA LEVEL).
SELECT DATUMS.

13 OLD

```
MENU 1:WAYPOINT
     2:D.GPS
     3:GPS
     4:COMP
```

→

```
4-1:LAT/LONG
  2:LOP
  3:MAG COMPASS
  4:TIME
```

→

```
4-1:LAT/LONG
     27°54.008N
     82°41.613W
00.000N 00.000E
```

Present position

→

```
4-1:LAT/LONG
     27°53.803N
     82°45.072W
00.000N 00.000E
```

Corrected position you enter

→

```
4-1:LAT/LONG
     27°53.803N
     82°45.072W
00.193S 00.148W
```

Latitude correction amount

Longitude correction amount

Present position			Entered position			Correction amount		
Latitude	N	27° 54.008	Latitude	N	27° 53.803	Latitude	S	0° 00.193
Longitude	W	82° 41.613	Longitude	W	82° 45.072	Longitude	W	0° 00.148

NEW

```
MENU 1:WAYPOINT
     2:DGPS
     3:GPS
     4:COMP
```

→

```
4-1:LAT/LONG
  2:LOP
  3:MAGNETIC VAR
  4:TIME
```

→

```
4-1:LAT/LONG
     27°54.008N
     82°41.613W
00.000N 00.000E
```

Present position

→

```
4-1:LAT/LONG
     27°53.803N
     82°45.072W
00.000N 00.000E
```

Corrected position you enter

→

```
4-1:LAT/LONG
     27°53.803N
     82°45.072W
00.205S 03.459W
```

Latitude correction amount

Longitude correction amount

Present position			Entered position			Correction amount		
Latitude	N	27° 54.008	Latitude	N	27° 53.803	Latitude	S	0° 00.205
Longitude	W	82° 41.613	Longitude	W	82° 45.072	Longitude	W	0° 03.459

CERTIFICATE OF LIMITED WARRANTY

Providing you present a valid proof of purchase, SI-TEX 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 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 service location or dealer at the time of service.

LIMITED WARRANTY EXCEPTIONS

SI-TEX 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 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 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, are not covered by this Limited Warranty. SI-TEX equipment or parts thereof which have been repaired or altered except by an authorized SI-TEX 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 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 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 gives you the option of obtaining service under this warranty by either:

a) Contacting an authorized SI-TEX 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 at the address provided below. SI-TEX 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
Koden America, Inc.
11001 Roosevelt Blvd., Suite 800
St. Petersburg, FL 33716
727-576-5734

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For more information, contact your SI-TEX dealer or the main office, located in St. Petersburg, Florida.

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