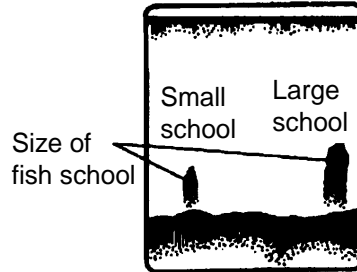### 4.14.3 Fish school echoes

Fish school echoes will generally be plotted between the zero line and the bottom. Usually the fish school/fish echo is weaker than the bottom echo because its reflection property is much smaller compared to the bottom. The size of the fish school can be ascertained from the density of the display.


Fish school echoes

4.14.4 Surface noise/Aeration

When the waters are rough or the boat passes over a wake, surface noise may appear near the zero line. As surface turbulence is acoustically equivalent to running into a brick wall, the bottom echo will be displayed intermittently. Similar noise sometimes appears when a water temperature difference (thermocline) exists. Different species of fish tend to prefer different temperature zones, so the thermocline may be useful to help identify target fish. 200 kHz tends to show shallow thermoclines better than 50 kHz.

In rough waters the display is occasionally interrupted due to below-the-ship air bubbles obstructing the sound path. This also occurs when the boat makes a quick turn or reverses movement. Lowering the picture advance speed may reduce the interruption. However, reconsideration of the transducer installation may be necessary if the interruption occurs frequently.
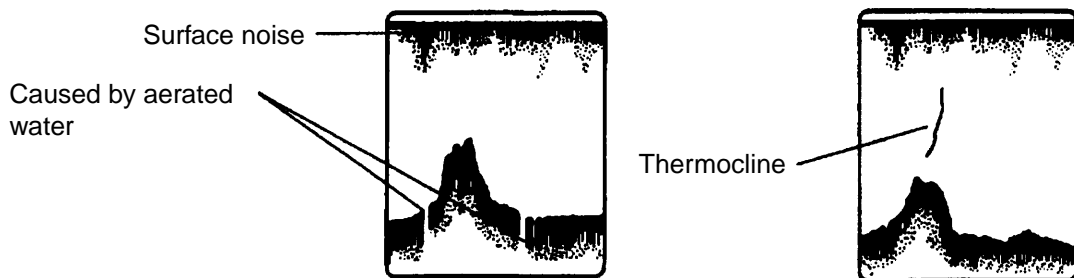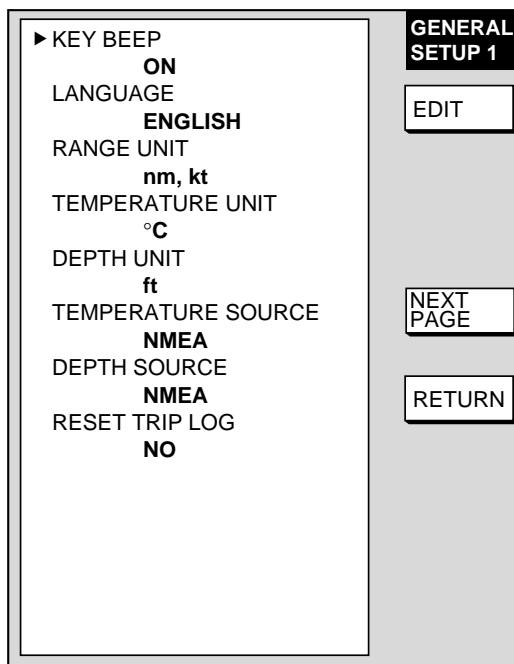

Surface noise/aeration

5. CUSTOMIZING YOUR UNIT

This chapter describes the various options which allow you to set up your unit to suit your needs. For mode specific menus, e.g. radar plotter and sounder, make sure that you select the appropriate display when making changes or viewing menu option.
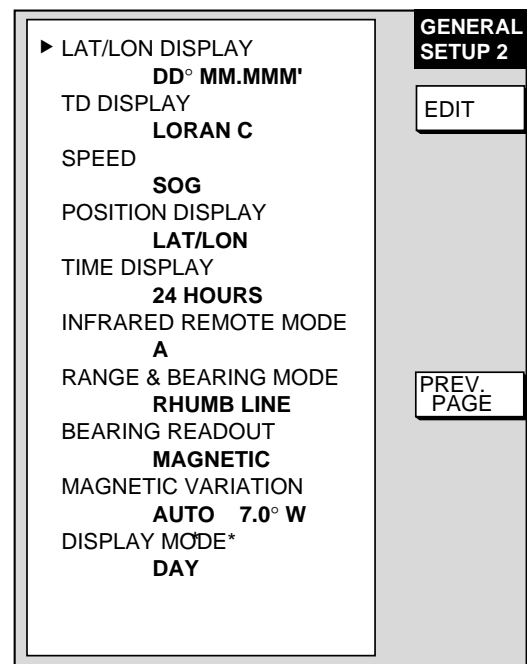
5.1 General Setup

This paragraph shows you how to set up functions common to the plotter, radar and sounder displays. This is done on the GENERAL SETUP menu, which you may display from any mode. These items include data, position and time formats, units of measurement, data sources, etc.

1. Show the any display and press the [MENU] key to display the main menu.
2. Press the SYSTEM CONFIGURATION soft key.
3. Press the GENERAL SETUP soft key.

```
┌─────────────────────────┐  ┌─────────┐
│ ▶ KEY BEEP              │  │ GENERAL │
│        ON              │  │ SETUP 1 │
│ LANGUAGE               │  └─────────┘
│     ENGLISH            │
│ RANGE UNIT             │  ┌─────────┐
│     nm, kt             │  │ EDIT    │
│ TEMPERATURE UNIT       │  └─────────┘
│     °C                 │
│ DEPTH UNIT             │
│     ft                 │
│ TEMPERATURE SOURCE     │
│     NMEA               │  ┌─────────┐
│ DEPTH SOURCE           │  │ NEXT    │
│     NMEA               │  │ PAGE    │
│ RESET TRIP LOG         │  └─────────┘
│     NO                 │
│                        │  ┌─────────┐
│                        │  │ RETURN  │
│                        │  └─────────┘
└─────────────────────────┘
            Page 1
```

```
┌─────────────────────────┐  ┌─────────┐
│ ▶ LAT/LON DISPLAY      │  │ GENERAL │
│      DD° MM.MMM'        │  │ SETUP 2 │
│ TD DISPLAY             │  └─────────┘
│     LORAN C            │
│ SPEED                  │  ┌─────────┐
│     SOG                │  │ EDIT    │
│ POSITION DISPLAY       │  └─────────┘
│     LAT/LON            │
│ TIME DISPLAY           │
│     24 HOURS           │
│ INFRARED REMOTE MODE   │
│     A                  │
│ RANGE & BEARING MODE   │
│     RHUMB LINE         │  ┌─────────┐
│ BEARING READOUT        │  │ PREV.   │
│     MAGNETIC           │  │ PAGE    │
│ MAGNETIC VARIATION     │  └─────────┘
│     AUTO   7.0° W      │
│ DISPLAY MODE*          │
│     DAY                │
└─────────────────────────┘
         *: MODEL1722 series only
     Page 2 (MODEL1722 series)
```

General setup menu

4. Press the NEXT PAGE or PREV. PAGE soft key to switch pages if necessary.
5. Use the cursor pad to select item.
6. Press the EDIT soft key.
7. Use the cursor pad to select option desired and press the ENTER soft key or [ENTER] knob.
8. Press the [MENU] key to close the menu.

Contents of general menu

Item	Description	Settings	Default Setting
Key Beep	Turns key operation beep on/off.	On, Off	On
Language	Chooses menu language.	English, French, German, Italian, Portuguese, Spanish	English
Range Unit	Chooses unit of range and speed measurement.	nm, kt; km, km/h; sm, mph; nm & yd, kt; nm & m, kt; km & m, km/h; sm & yd, mph	nm, kt
Temperature Unit	Chooses unit of water temperature measurement.	°C, °F	°F
Depth Unit	Chooses unit of depth measurement.	ft, m, fa, PB (Passi/Braza)	ft
Temperature Source	Chooses source of water temperature data.	ETR (network sounder), NMEA	NMEA
Depth Source	Chooses source of depth data.	ETR, NMEA.	NMEA
Reset Trip Log	Resets distance run.	Yes, No	No
Lat/Lon Display	Chooses how many digits (or seconds) to display after decimal point in latitude and longitude position.	DD°MM.MM′, DD°MM.MMM′, DD°MM.MMMM′, DD°MM′SS.S″	DD°MM.MMMM′
TD Display	Chooses TD type.	Loran C, Decca	Loran C
Speed	Chooses speed format to display.	SOG (Speed over ground), STW (Speed through water)	SOG
Position Display	Chooses position display format.	LAT/LON, TD	LAT/LON
Time Display	Chooses time notation.	12 hours, 24 hours	24 hours
Infrared Remote Mode	A remote controller can be set exclusively for use with a specific display unit, in the case of multiple NavNet display units. For further details see the Installation Manual.	A, B, C, D	A
Range & Bearing Mode	Chooses how to calculate range and bearing.	Rhumb Line: Straight line drawn between two points on a nautical chart. Great Circle: Shortest course between two points on the surface of the earth.	Rhumb Line
Bearing Readout	Chooses bearing display format for course, course over ground and cursor bearing.	True, Magnetic	Magnetic
Magnetic Variation	The magnetic variations for all areas of the earth are preprogrammed into this unit. The preprogrammed variation is accurate for most instances, however you may wish to manually enter a variation. For manual input, select Manual, hit the EDIT soft key, enter value and hit the ENTER soft key to finish. "AUTO" requires position data.	Auto, Manual	Auto
Display Mode (Monochrome model)	Reverses background (black) and foreground (white) colors.	Day, Night	Day

*Select ETR to show water temperature/depth data fed from the network sounder, and then set the TEMP and DEPTH CALIBRATION of the SENSOR SETUP in the SOUNDER SYSTEM SETUP menu.
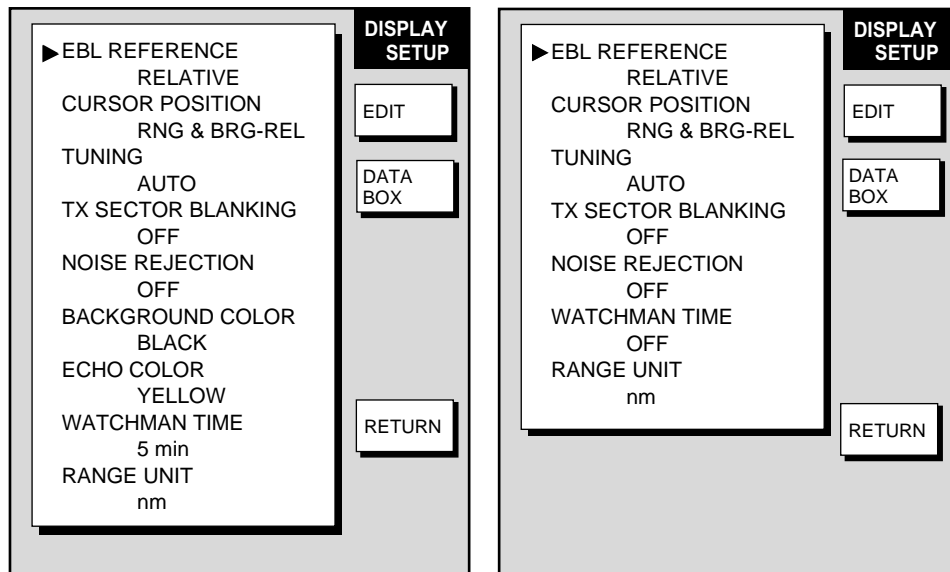
5.2   Radar Setup

This paragraph explains how to customize the radar display to suit your operational needs. Be sure to show the radar display before executing any of the procedures.

5.2.1   Radar display setup

The radar display may be set up from the RADAR DISPLAY SETUP menu, which contains items such as EBL reference and cursor position format.

1. Show the radar display, and press the [MENU] key to show the main menu.
2. Press the RADAR DISPLAY SETUP soft key.

```
┌──────────────────────────┐ ┌───────────┐     ┌──────────────────────────┐ ┌───────────┐
│ ▶EBL REFERENCE           │ │ DISPLAY   │     │ ▶EBL REFERENCE           │ │ DISPLAY   │
│         RELATIVE         │ │  SETUP    │     │         RELATIVE         │ │  SETUP    │
│  CURSOR POSITION         │ │ ┌───────┐ │     │  CURSOR POSITION         │ │ ┌───────┐ │
│         RNG & BRG-REL    │ │ │ EDIT  │ │     │         RNG & BRG-REL    │ │ │ EDIT  │ │
│  TUNING                  │ │ └───────┘ │     │  TUNING                  │ │ └───────┘ │
│         AUTO             │ │ ┌───────┐ │     │         AUTO             │ │ ┌───────┐ │
│  TX SECTOR BLANKING      │ │ │ DATA  │ │     │  TX SECTOR BLANKING      │ │ │ DATA  │ │
│         OFF              │ │ │ BOX   │ │     │         OFF              │ │ │ BOX   │ │
│  NOISE REJECTION         │ │ └───────┘ │     │  NOISE REJECTION         │ │ └───────┘ │
│         OFF              │ │           │     │         OFF              │ │           │
│  BACKGROUND COLOR        │ │           │     │  WATCHMAN TIME           │ │           │
│         BLACK            │ │           │     │         OFF              │ │           │
│  ECHO COLOR              │ │           │     │  RANGE UNIT              │ │           │
│         YELLOW           │ │           │     │         nm               │ │           │
│  WATCHMAN TIME           │ │ ┌───────┐ │     │                          │ │ ┌───────┐ │
│         5 min            │ │ │RETURN │ │     │                          │ │ │RETURN │ │
│  RANGE UNIT              │ │ └───────┘ │     │                          │ │ └───────┘ │
│         nm               │ │           │     │                          │ │           │
└──────────────────────────┘ └───────────┘     └──────────────────────────┘ └───────────┘
      MODEL1722C series                               MODEL1722 series
```

Radar display setup menu

Contents of radar setting menu

Item	Description	Settings	Default Setting
EBL Reference	References EBL bearing, shown in the EBL data box, to North (True) or heading (Relative)	True, Relative (True only for north-up, course-up and true motion mode)	Relative
Cursor Position	Chooses how to display cursor position.	LAT/LON: Lat/Long position of cursor TD: Loran C or Decca TDs RNG & BRG-REL: Range and bearing referenced to ship's heading RNG & BRG-TRUE Range and bearing referenced to North.	RNG & BRG-REL
Tuning	Selects receiver tuning method. For further details see "2.3 Tuning."	Auto, Manual	Auto
TX Sector Blanking	Turns on/off dead sector graphic, which shows area where no echoes are transmitted.	On, Off	Off
Noise Rejection	Electrical noise, appearing on the screen as "speckles," may be suppressed with the noise rejector. Note that some forms of interference cannot be suppressed.	On, Off	**Off**
Background Color (Color model)	Chooses colors of background, range rings and characters. Effective only when HUE soft key is set for "MANUAL."	Black/Green Background: Black Rings: Green Characters: Green Black/Red Background: Black Rings: Green Characters: Red Blue/White Background: Dark Blue Rings: White Characters: White DK Blue/White Background: Dark Blue Rings: White Characters: White White/Green Background: White Rings: Green Characters: Green (Echoes in white)	Black/Green

(Continued on next page)

Contents of radar setting menu (con't from previous page)

Item	Description	Settings	Default Setting
Echo Color (Color model)	Chooses echo color.	Yellow, Green, Multi (Echoes shown in red, yellow or green in order of descending strength.)	Green
Watchman Time	Sets watchman stand-by period. For further details see paragraph 2.23 Watchman.	5, 10, 20 min	5 min
Range Unit	Sets unit of range measurement.	nm, km, sm	nm

5.2.2 Radar range setup

You may choose the radar ranges you wish to use, from the RADAR RANGE SETUP menu. (Available ranges depends on the network radar used.) After choosing the ranges desired change the range with the [RANGE] key to activate range settings.

At least two ranges (excluding maximum range) must be turned on. When less than two ranges are turned on, you cannot escape from the range setup menu. Note that the previous setting returns to the default setting when you change the unit type.

1. Press the [MENU] key to show the main menu.
2. Press the RADAR RANGE SETUP soft key to show the RADAR RANGE SETUP menu.

0.125nm	ON		**RANGE SETUP**
0.25nm	ON		
0.5nm	ON		ON/OFF
0.75nm	ON		
▶ 1nm	OFF		
1.5nm	ON		
2nm	OFF		
3nm	ON		
4nm	OFF		
6nm	ON		
8nm	OFF		
12nm	ON		
16nm	OFF		
24nm	ON		
36nm	ON		RETURN
48nm	OFF		
64nm	OFF		
MAXIMUM RANGE XXnm*			

0.25km	ON		**RANGE SETUP**
0.5km	ON		
0.75km	ON		ON/OFF
1km	OFF		
▶ 1.5km	ON		
2km	OFF		
3km	ON		
4km	OFF		
6km	ON		
8km	OFF		
12km	ON		
16km	OFF		
24km	ON		
36km	ON		RETURN
48km	OFF		
64km	OFF		
MAXIMUM RANGE XXnm*			
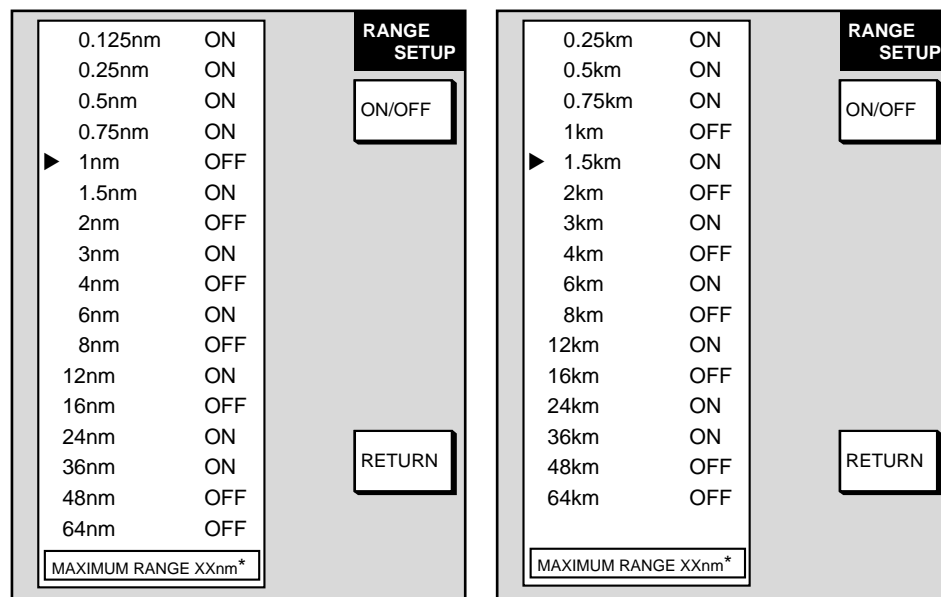
* = Max. range depends on network radar used and is set on the network radar at installation.

Range unit: nm   Range unit: km

Radar range setup menu

3. Use the cursor pad to select the range which you want to turn on or off.
4. Press the ON/OFF soft key to turn the range on or off as appropriate.
5. Press the RETURN soft key to register the setting.
6. Press the [MENU] key to close the menu.

	Max. range	
MODEL1722/1722C	24 nm	24 km
MODEL1732/1732C	36 nm	36 km
MODEL1742/1742C	36 nm	36 km
MODEL1752/1752C		
MODEL1762/1762C	48 nm	48 km

5.2.3 Function key setup

The function keys provide one-touch call up of a desired function. The default radar function key settings are as shown in the table below.

Function Key	Default Function	Function Key Label
1	Turn heading line off.	HL
2	Turn range rings on/off.	RNG
3	Turn echo trail on/off.	TRL
4	Turn display offcenter on/off.	SFT
5	Select radar source.	RSR

If the above settings are not to your liking you may change them as follows:

1. Press the [MENU] key.
2. Press the FUNCTION KEY SETUP soft key.
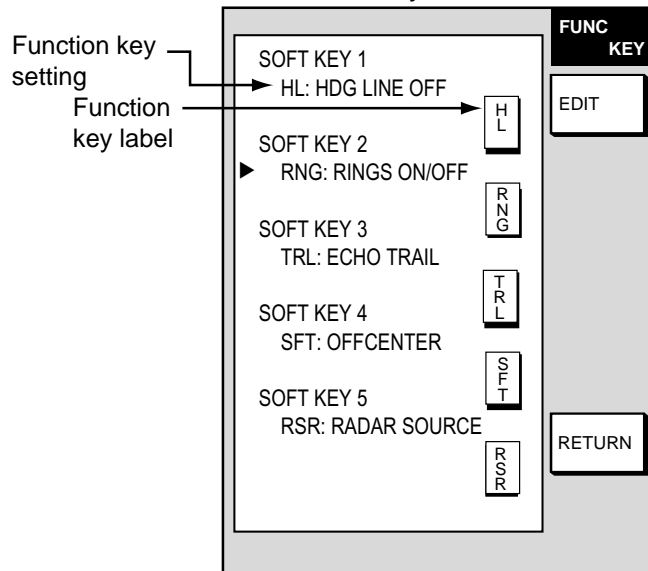
Radar function key menu

3. Select the function key you want to program and press the EDIT soft key.
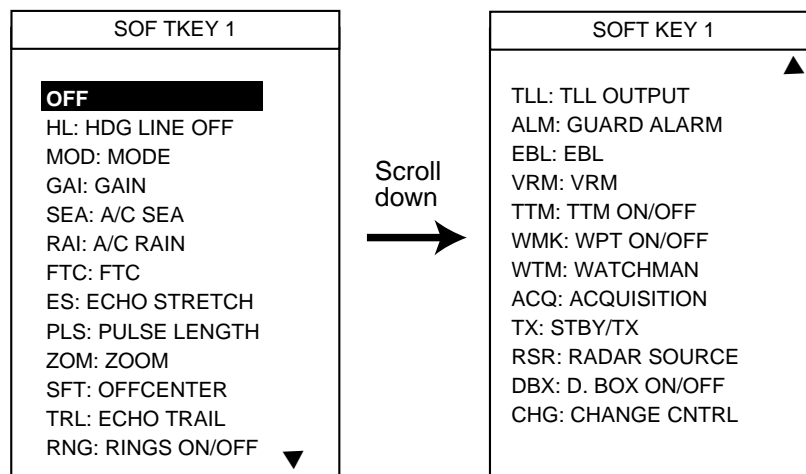
Radar function key options

5-7

4. Select function desired with the cursor pad or [ENTER] knob and press the ENTER soft key or [ENTER] knob to register your selection.
5. Press the [MENU] key to close the menu.

Radar function keys

| Menu Item	Function	Function Key Label
OFF	Assigns no function.	—
HL: HDG LINE OFF	Turns heading line off.	HL
MOD: MODE	Selects presentation mode.	MOD
GAI: GAIN	Shows gain sensitivity adjustment window.	GAI
SEA: A/C SEA	Shows manual or A/C SEA adjustment window.	SEA
RAI: A/C RAIN	Shows A/C RAIN adjustment window.	RAI
FTC: FTC	Displays FTC window. Adjust FTC with the [ENTER] knob.	FTC
ES: ECHO STRETCH	Turns echo stretch on/off.	ES
PLS: PULSE LENGTH	Sets pulselength (long or short).	PLS
ZOM: ZOOM	Turns zoom on/off.	ZOM
SFT: OFFCENTER	Press to shift display center to cursor location. Press again to turn shift off and return cursor to display center.	SFT
TRL: ECHO TRAIL	Starts/stops echo trails.	TRL
RNG: RINGS ON/OFF	Turns range rings on/off.	RNG
TLL: TLL OUTPUT	Outputs cursor position, in NMEA format, to navigator.	TLL
ALM: GUARD ALARM	Displays alarm soft keys.	ALM
EBL: EBL	Switches control between EBL1 and EBL2 with each press.	EBL
VRM: VRM	Switches control between VRM1and VRM2 with each press.	VRM
TTM: ON/OFF	Turns TTM (Tracked Target (Message) data on/off.	TTM
WMK: WPT ON/OFF	Turns waypoint marker on/off.	WMK
WTM: WATCHMAN	Turns watchman on/off.	WTM
ACQ: ACQUISITION	Acquires and tracks cursor-selected target.(Requires ARP-equipped Model 1833/1833C series network radar.)	ACQ
TX: STBY/TX	Toggles between standby and transmit.	TX
RSR: RADAR SOURCE	Selects source for radar picture.	RSR
DBX: D. BOX ON/OFF	Turns data boxes on/off.	DBX
CHG: CHANGE CNTRL*	Changes display control in combination display.	CHG

*: When selecting CHG on a display, use the same soft key number on all display for CHG.

5.3 Plotter Setup

This paragraph provides the information necessary for setting up the plotter display.

5.3.1 Navigation options

Navigation options, for example, waypoint switching method, may be set on the plotter setup menu.

1. Show the plotter display and press the [MENU] key open the main menu.
2. Press the PLOTTER SETUP soft key.

```
► WAYPOINT SWITCHING          PLOTTER
            ARRVL ALM CRCL     SETUP
   COURSE VECTOR
            LINE              ┌────────┐
   SET GOTO METHOD            │  EDIT  │
            1POINT            └────────┘

                             ┌────────┐
                             │ D. BOX │
                             └────────┘

                             ┌────────┐
                             │ RETURN │
                             └────────┘
```
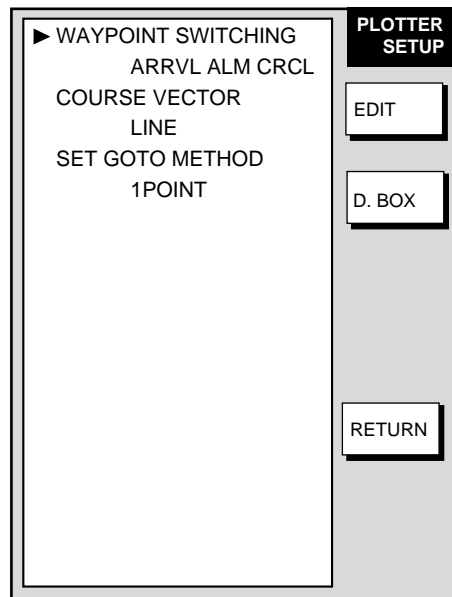
Display option menu

<u>*Contents of display option menu*</u>

Item	Description	Settings	Default Setting
Waypoints Switching	Chooses waypoint switching method. See "switching waypoints" on page 3-51.	Perpendicular, Arrvl Alm Crcl, Manual	Arrvl Alm Crcl
Course Vector	You may extend a line from the own ship position to show ship's course. It may be a vector (length depends on ship's speed) or a simple line (course bar)	Line, Vector, Off	Line
Set GOTO Method	Sets the method by which to navigate to a quick point. See paragraph "3.10.1 Navigating to a quick point."	1 Point, 35 Points, 35 Pts/Port Service	1 Point
D. BOX (soft key)	Sets up data boxes. See paragraph 5.5.		

5.3.2   Function key setup

The function keys provide one-touch call up of a desired function. The default plotter function key settings are as shown in the table below.

Function Key	Default Function	Function Key Label
1	Start/stop recording/plotting own ship's track.	TRK
2	Edit mark/line.	EML
3	Ruler (measure range and bearing between two points).	RUL
4	Add new waypoint.	ADD
5	Alphanumeric waypoint list.	ALP

If the above settings are not to your liking you may change them as follows:

1. Press the [MENU] key.
2. Press the FUNCTION KEY SETUP soft key.
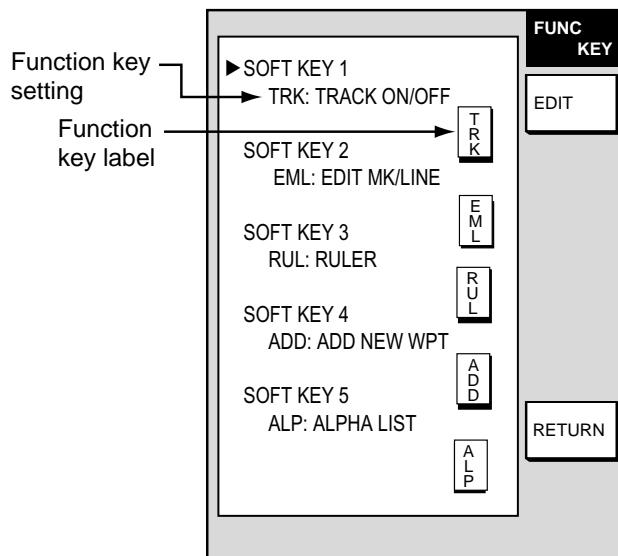
Plotter function key menu

3. Select the soft key you want to program and press the EDIT soft key. A menu shows the functions available and the current selection is highlighted.
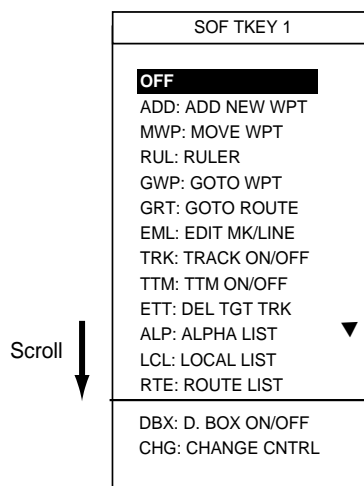
Plotter function key options

4. Select function desired with the cursor pad or [ENTER] knob and press the ENTER soft key or [ENTER] knob to register your selection.
5. Press the RETURN soft key.
6. Press the [MENU] key to close the menu.

Plotter function keys

Menu Item	Function	Function Key Label
OFF	Assigns no function.	—
ADD: ADD NEW WPT	Registers waypoint at cursor position. Place cursor for waypoint location then press function key.	ADD
MWP: MOVE WPT	Moves selected waypoint to different position. Select waypoint then press function key.	MWP
RUL: RULER	Measures range and bearing between two points. Press START POINT soft key to change starting point if necessary. Range and bearing between two points appears at the top of the screen.	RUL
GWP: GOTO WPT	Specify waypoint to set as destination. Enter number in window and press the ENTER soft key.	GWP
GRT: GOTO ROUTE	Specify route to follow. Enter number in window and press the ENTER soft key.	GRT
EML: EDIT MK/LINE	Displays mark & line menu. Press appropriate soft key to access menu item.	EML
TRK: TRACK ON/OFF	Each pressing stops or starts recording of own ship track.	TRK
TTM: TTM ON/OFF	Turns TTM (target track) display on/off.	TTM
DTT: DEL TGT TRACK	Erases all TTM track.	DTT
ALP: ALPHA LIST	Displays waypoint alphanumeric list.	ALP
LCL: LOCAL LIST	Displays waypoint local list.	LCL
RTE: ROUTE LIST	Displays route list.	RTE
DBX: D. BOX ON/OFF	Shows/hides data boxes.	DBX
CHG: CHANGE CNTRL*	Changes control in combination screen.	CHG

*: When selecting CHG on a display, use the same soft key number on all display for CHG.

5.4   Chart Setup

This paragraph shows you how to setup digital charts, from offsetting chart position to turning chart attributes on or off.

5.4.1   Chart offset

In some instances position may be off by a few seconds. For example, the position of the ship is shown to be at sea while it is in fact moored at a pier. You can compensate for this error by offsetting chart position as shown in the procedure below. You can execute the procedure from any display mode.

1. Show the plotter display and press the [MENU] key followed by the CHART SETUP and CHART OFFSET soft keys.
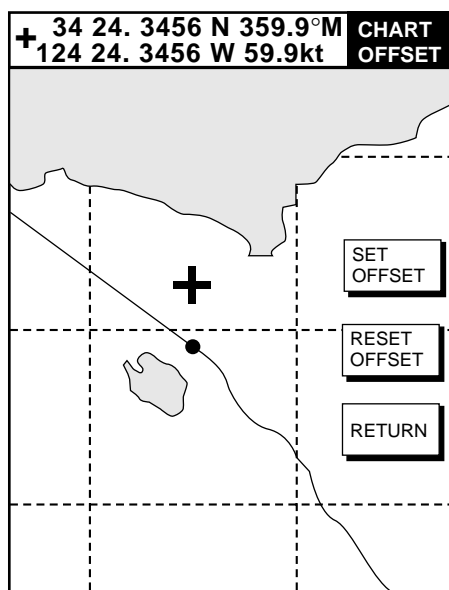
Plotter display, chart offset selected

2. Use the cursor pad to place the cursor at correct latitude and longitude of own ship position.
3. Press the SET OFFSET soft key.
4. Press the [MENU] key to close the menu. The "chart offset icon" (⌗) appears.

To cancel chart offset, press the RESET OFFSET soft key at step 3 in the above procedure.

5.4.2 FURUNO, Nav-Charts™ chart attributes

Charts attributes may be turned on or off from the CHART DETAILS menu, which you may display as follows:

1. Press the [MENU] key.
2. Press the CHART SETUP and CHART DETAILS soft keys.

▶LAT/LON GRID				▶LAT/LON GRID	
GREEN	CHART DETAILS			ON	CHART DETAILS
TEXT INFORMATION				TEXT INFORMATION	
ON	EDIT			ON	EDIT
WAYPOINTS				WAYPOINTS	
LARGE	CNTOUR LINE			LARGE	CNTOUR LINE
WAYPOINT NAMES				WAYPOINT NAMES	
ON				ON	
CHART BORDER LINES				CHART BORDER LINES	
ON				ON	
LANDMASS				LANDMASS	
BRT YELLOW				ON	
BACKGROUND				NAVAIDS	
BLACK				ON	
NAVAIDS	RETURN			LIGHT SECTOR INFO	RETURN
ON				ON	
LIGHT SECTOR INFO				OTHER SYMBOLS	
ON				OFF	
OTHER SYMBOLS				MARKS SIZE	
WHITE				LARGE	
MARKS SIZE					
LARGE					
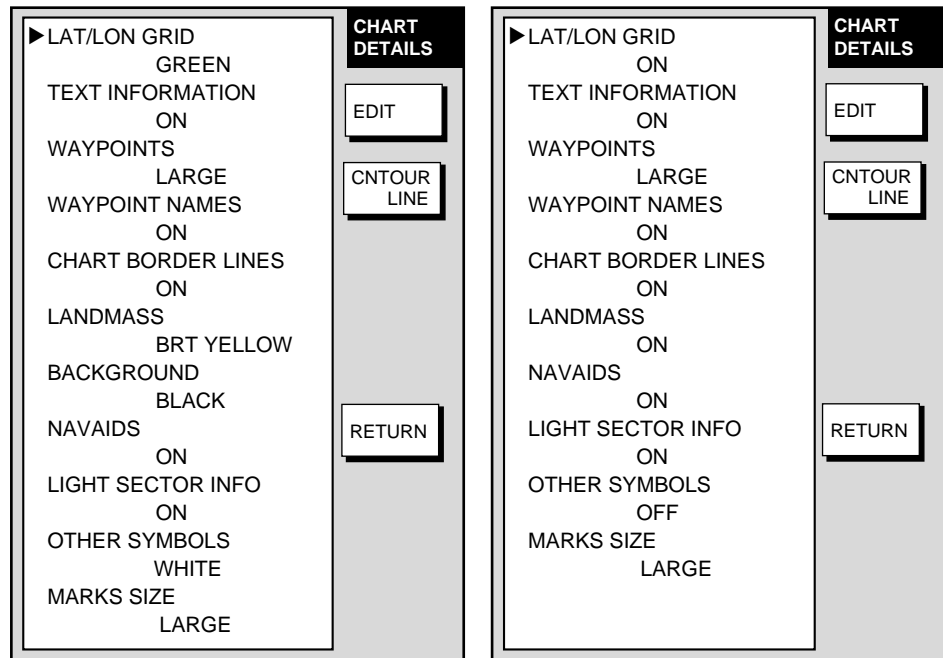
MODEL1722C series   MODEL1722 series

Chart details menu (FURUNO, Nav-Charts™)

Contents of chart details menu (FURUNO, NavCharts™)

Item	Description	Settings	Default Setting	Settings	Default Setting
		MODEL1722C series		MODEL1722 series	
Lat/Lon Grid	Latitude and longitude grids	Red, yellow, green, light-blue, purple, blue, white. Off	Green	On, Off	On
Text Information	Geographic place, name	On, Off	On	On, Off	On
Waypoints	Waypoint size	Large, Small, Off	Large	Large, Small, Off	Large
Waypoint Names	Waypoint name	On, Off	On	On, Off	On
Chart Border Lines	Border lines (indices)	On, Off	On	On, Off	On
Landmass	Landmass brilliance (monochrome model), color (color model)	Brt, Dim: Red, yellow, green, light-blue, purple, blue, white. Off	Brt Yellow	Brt, Dim, Off	Brt
Background	Chart background color	White, Black	Black	—	
Navaids	Navaid data on Nav-Charts™; lighthouse data on FURUNO charts	On, Off	On	On, Off	On
Light Sector Info	Lighthouse viewing sector	On, Off	On	On, Off	On
Other Symbols	Other map symbols	Red, yellow, green, light-blue, purple, blue, white. Off	White	On, Off	On
Marks Size	Mark size	Large, Small	Large	Large, Small	Large
CNTOUR LINE soft key (Depth contours for depths at right)*	< 10 m	Same as Other Symbol	On, Red	On, Off	On
	10 m	Same as Other Symbol	On, Yellow	On, Off	On
	> 10 m	Same as Other Symbol	On, Light-blue	On, Off	On
	Depth Info	Same as Other Symbol	On, Red	On, Off	On

* = Depth contour color for MODEL1722C series available in, red, yellow, green, light-blue, purple, blue, and white.

CNTOUR LINE soft key

1. Press the [MENU] key.
2. Press the CHART SETUP and CHART DETAILS soft keys.
3. Press the CNTOUR LINE soft key.

▶DEPTH < 10m	CNTOUR
RED	LINE

```
┌─────────────────────────┐  ┌──────────┐
│▶DEPTH < 10m             │  │ CNTOUR   │
│          RED            │  │  LINE    │
│ DEPTH = 10m             │  ├──────────┤
│          YELLOW         │  │ ┌──────┐ │
│ DEPTH > 10m             │  │ │ EDIT │ │
│          LIGHT BLUE     │  │ └──────┘ │
│ DEPTH INFORMATION       │  │          │
│          RED            │  │          │
│                         │  │          │
│ 10m: APPROX. 30ft OR 5fa│  │          │
│          OR 6pb         │  │          │
└─────────────────────────┘  │ ┌──────┐ │
                             │ │RETURN│ │
                             │ └──────┘ │
       MODEL1722C series     └──────────┘
```
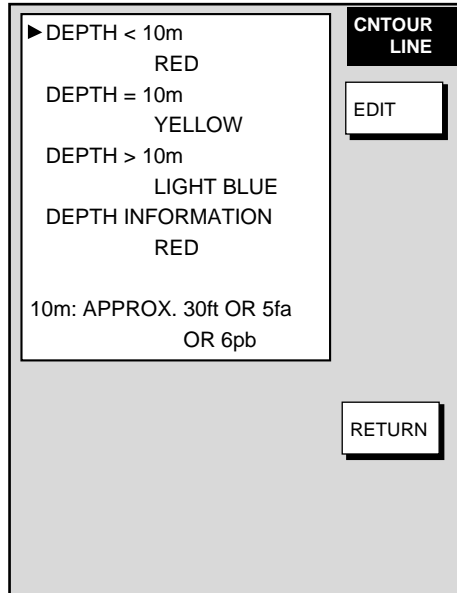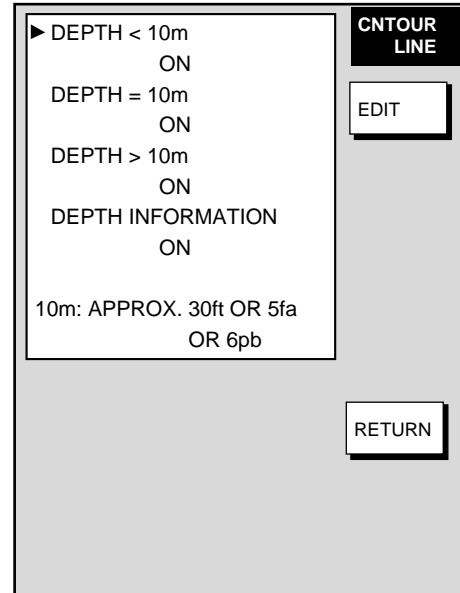
```
┌─────────────────────────┐  ┌──────────┐
│▶DEPTH < 10m             │  │ CNTOUR   │
│          ON             │  │  LINE    │
│ DEPTH = 10m             │  ├──────────┤
│          ON             │  │ ┌──────┐ │
│ DEPTH > 10m             │  │ │ EDIT │ │
│          ON             │  │ └──────┘ │
│ DEPTH INFORMATION       │  │          │
│          ON             │  │          │
│                         │  │          │
│ 10m: APPROX. 30ft OR 5fa│  │          │
│          OR 6pb         │  │          │
└─────────────────────────┘  │ ┌──────┐ │
                             │ │RETURN│ │
                             │ └──────┘ │
       MODEL1722 series      └──────────┘
```

Contour line menu (FURUNO, Nav-Charts™)

5-15

5.4.3 C-MAP chart attributes

Charts attributes may be turned on or off from the CHART DETAILS menu, which you may display as follows:

1. Press the [MENU] key.
2. Press the CHART SETUP and CHART DETAILS soft keys.

Color

Page 1

```
► WAYPOINT
      ON
  WAYPOINT NAME
      PLOTTER/OVERLAY
  LAT/LON GRID
      PLOTTER/OVERLAY
  CHART BORDER LINE
      PLOTTER/OVERLAY
  BACKGROUND
      BLACK
  PORT & SERVICE
      PLOTTER/OVERLAY
  ATTENTION AREA
      PLOTTER/OVERLAY
  NAV LANE
      PLOTTER/OVERLAY
  LIGHT
      PLOTTER/OVERLAY
  BUOY & BEACON
      PLOTTER/OVERLAY
  SIGNAL
      PLOTTER/OVERLAY
  CARTOGRAPHIC OBJECT
      PLOTTER/OVERLAY
```

CHART DETAILS

EDIT

DEPTH INFO

NEXT PAGE

RETURN

Page 2

```
► PLACE NAME
      PLOTTER/OVERLAY
  COMPASS
      PLOTTER/OVERLAY
  TIDE & CURRENT
      PLOTTER/OVERLAY
  NATURAL FEATURE
      PLOTTER/OVERLAY
  RIVER & LAKE
      PLOTTER/OVERLAY
  CULTURAL FEATURE
      PLOTTER/OVERLAY
  LANDMARK
      PLOTTER/OVERLAY
  CHART GENERATION
      PLOTTER/OVERLAY
  NEW OBJECT
      PLOTTER/OVERLAY
  COMPLEX OBJECT ICON
      MULTIPLE
  INFORMATION LEVEL
      BASIC
```

CHART DETAILS

EDIT

DEPTH INFO

PREV. PAGE

Mono

Page 1

```
► WAYPOINT
      ON
  WAYPOINT NAME
      ON
  LAT/LON GRID
      ON
  CHART BORDER LINE
      ON
  PORT & SERVICE
      ON
  ATTENTION AREA
      ON
  NAV LANE
      ON
  LIGHT
      ON
  BUOY & BEACON
      ON
  SIGNALS
      ON
  CARTOGRAPHIC OBJECT
      ON
```

CHART DETAILS

EDIT

DEPTH INFO

NEXT PAGE

RETURN

Page 2

```
► PLACENAME
      ON
  COMPASS
      ON
  TIDE & CURRENT
      ON
  NATURAL FEATURE
      ON
  RIVER & LAKE
      ON
  CULTURAL FEATURE
      ON
  LANDMARK
      ON
  CHART GENERATION
      ON
  NEW OBJECT
      ON
  COMPLEX OBJECT ICON
      MULTIPLE
  INFORMATION LEVEL
      BASIC
```

CHART DETAILS

EDIT

DEPTH INFO

PREV. PAGE

Chart details menu (C-map)

Contents of chart details menu (C-map)

Item	Description	Settings	Default Setting	Settings	Default Setting
		MODEL1722C series		MODEL1722 series	
Waypoints	Waypoint display	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Waypoint Names	Waypoint name	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Lat/Lon Grid	Latitude and longitude grids	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Chart Border Lines	Border lines (indices)	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Background	Chart background color	White, Black	Black	—	
Port & Service	Port services icon display	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Attention Area	Attention area icon display	Plotter/Overlay, Plotter, Plotter/ Contour, Off	Plotter/Overlay	On, Contour, Off	On
Nav Lane	Navigation lanes	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Light	Lighthouse icon, sector	Plotter/Overlay, Plotter, Plot/No Sector, Off	Plotter/Overlay	On, No Sector, Off	On
Buoy & Beacon	Buoys, beacons display	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Signal	Signals category icon	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Cartographic Object	Cartographic objects category icon	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Place Name	Geographic names	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Compass	Compass category icons	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Tide & Current	Tide display	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Natural Feature	Land outline	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
River & Lake	Rivers and lakes	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Cultural Feature	Cultural features icons	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Landmark	Landmarks category icons	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On

Contents of C-MAP chart details menu (continued from previous page)

Item	Description	Settings	Default Setting	Settings	Default Setting
		MODEL1722C series		MODEL1722 series	
Chart Generation	Chart generation category icons	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
New Object	New object category icons	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
Complex Object Icon	Single or multiple icon for object composed of several icons	Multiple, Single	Multiple	Multiple, Single	Multiple
Information Level	Basic or detailed data for objects	Basic, Detailed	Basic	Basic, Detailed	Basic
DEPTH INFO (soft key) See illustration on next page	Bathymetric Line	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
	Spot Sounding	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
	Bottom Type	Plotter/Overlay, Plotter, Off	Plotter/Overlay	On, Off	On
	Depth Areas Limit	0-99999ft (m, fa, PB)	20,164ft (6, 50m, 3, 27 fa, 4, 30PB)	0-99999ft (m, fa, PB)	20ft (6m, 3fa, 4PB)
	Bathymetric Range	0-99999ft (m, fa, PB)	0-33ft (0-10m, 0-6fa, 0-6PB)	0-99999ft (m, fa, PB)	0-33ft (0-10m, 0-6fa, 0-6PB)

Settings description

Basic: Shows basic characteristics of objects.
Detailed: Shows detailed characteristics of objects.
Multiple: Shows multiple icons for complex objects
Off: Turns item off.
On: Turns item on.
Plotter: Shows item on plotter display:
Plot/No Sector: Sector not shown on track display.
Plotter/Contour: Shows contour on track display.
Plotter/Overlay: Shows item on plotter and overlay displays.
Single: Shows single icon for complex objects.

DEPTH INFO soft key

1. Press the [MENU] key.
2. Press the CHART SETUP and CHART DETAILS soft keys.
3. Press the DEPTH INFO soft key.

▶ BATHYMETRIC LINE
   PLOTTER/OVERLAY
SPOT SOUNDING
   PLOTTER/OVERLAY
BOTTOM TYPE
   PLOTTER/OVERLAY
DEPTH AREA LIMIT
   00020, 00164ft
BATHYMETRIC RANGE
   00000 - 00033ft
	DEPTH INFO
	
	EDIT
	
	RETURN
		▶ BATHYMETRIC LINE
		   PLOTTER/OVERLAY
		SPOT SOUNDING
		   PLOTTER/OVERLAY
		BOTTOM TYPE
		   PLOTTER/OVERLAY
		DEPTH AREA LIMIT
		   33 ft
		BATHYMETRIC RANGE
		   00000 - 00033ft
			DEPTH INFO
			
			EDIT
			
			RETURN
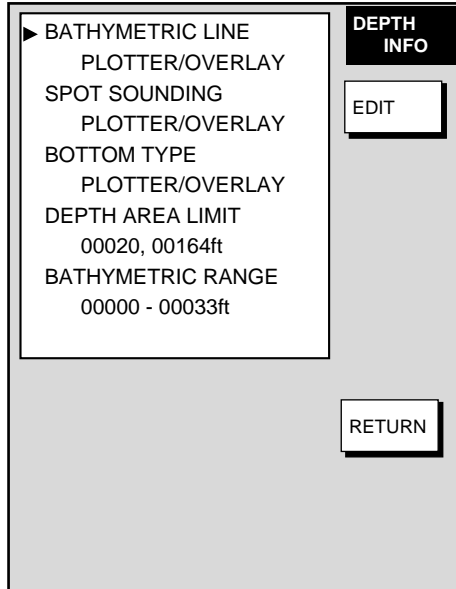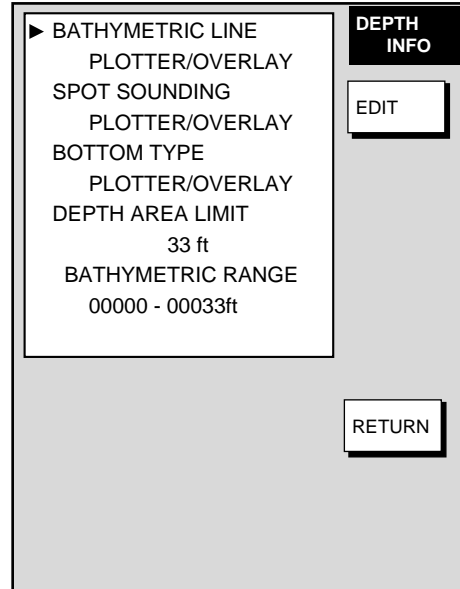
MODEL1722C series		*MODEL1722 series*	

Depth info menu (C-map)

5.5 Data Boxes Setup

You may select the data to show in the data boxes for the plotter, radar and sounder displays. Six boxes may be displayed in case of small size data box and two for large size data box.

1. Display the plotter, radar or sounder display, whichever you want to set.
2. Press the [MENU] key to open the main menu.
3. Press one of the following sets of soft keys depending on the display selected at step 1.

   Radar mode: RADAR DISPLAY SETUP, D. BOX

   Plotter mode: PLOTTER SETUP, D. BOX

   Sounder mode: SOUNDER MENU, D. BOX

```
►DATABOX SIZE                      DATA
              SMALL                    BOX
    POSITION        ON
    WAYPOINT        OFF            ┌────────┐
    COG             ON             │ EDIT   │
    SOG             ON             └────────┘
    STW             OFF
    BEARING         OFF
    RANGE           OFF
    TIME TO GO      OFF
    ETA             OFF
    TEMPERATURE     OFF
    DEPTH           OFF
    TRIP LOG        ON
    DATE            OFF            ┌────────┐
    TIME            OFF            │ RETURN │
    WIND            OFF            └────────┘
```
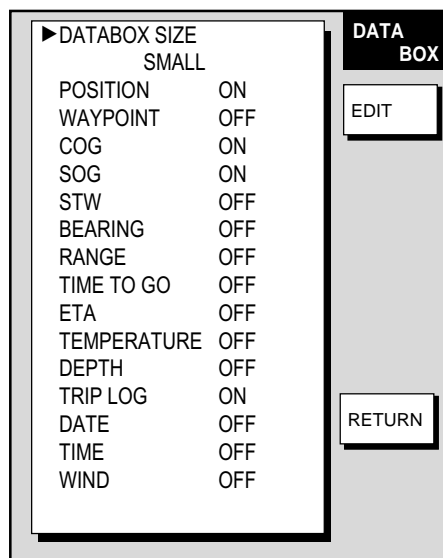
Data box menu

4. Use the cursor pad to select an item and then press the EDIT soft key.
5. Select ON or OFF as desired.
6. Press the ENTER soft key or the [ENTER] knob to register your selection. Six items may be set to ON for small data boxes; two for large data boxes.
7. Repeat steps 4-6 to turn other items on or off.
8. Press the [MENU] key to close the menu

5.6   Hot Page Setup

Five user-arrangeable hot pages are provided for quick selection of desired display.

1. Press the [MENU] key followed by pressing the SYSTEM CONFIGURATION, SYSTEM SETUP, HOT PAGE & NAV DISP SETUP and HOT PAGE SETUP soft keys in that order.
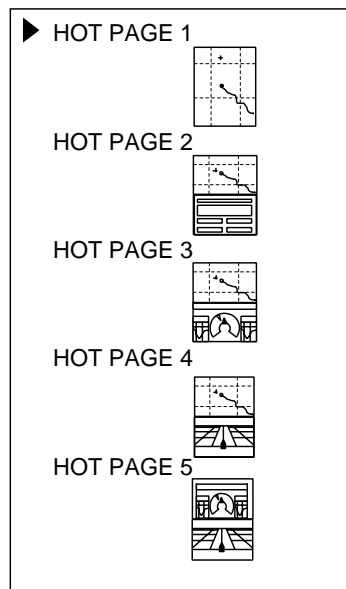
Hot page setup menu

2. Use the cursor pad to select the hot page number to set and then press the EDIT soft key. The full-screen selection window appears.
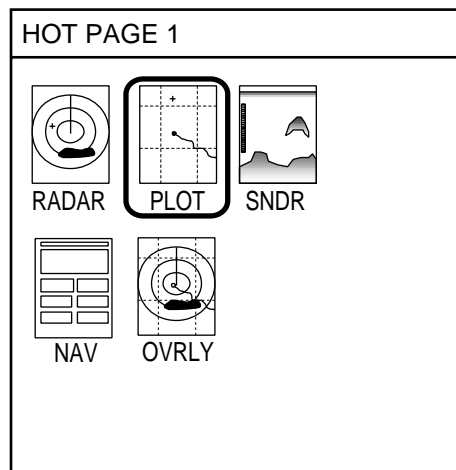
Full-screen selection window ("OVRLY" for color model only)

3. Rotate the [ENTER] knob to select the full-screen picture desired and push the [ENTER] knob. A set of combination screens, corresponding to the full-screen selected, appears.
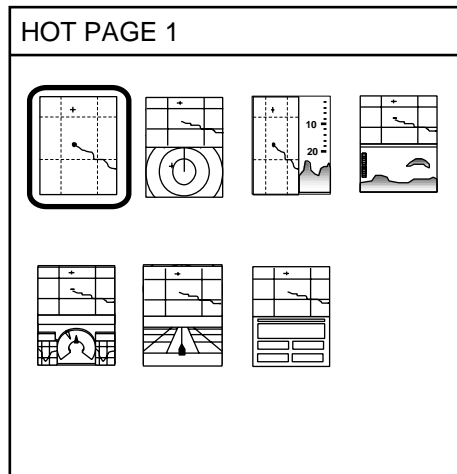
Combination screen selection window

4. Rotate the [ENTER] knob to select the full screen or combination screen desired and push it to set.

5.7 Navigator Setup

This section provides the information necessary for selecting the type of navigator connected to your plotter.

5.7.1 Navigation data source

The NAV SETUP menu mainly selects the source of nav data. For GPS receiver other than the GP-310B, speed averaging and local time offset (to use local time) are also available. Press the [MENU] key followed by the SYSTEM CONFIGURATION, NAV OPTION and NAV SOURCE SETTINGS soft keys to display this menu.

```
►POSITION SOURCE          NAV
     ALL                  SETUP
  SPEED AVERAGING*
     0060                 ┌──────┐
  LOCAL TIME OFFSET*      │ EDIT │
     +00:00               └──────┘
  TEMP CALIBRATION
     00°F
  DEPTH CALIBRATION
     00ft


                          ┌────────┐
                          │ RETURN │
                          └────────┘
```
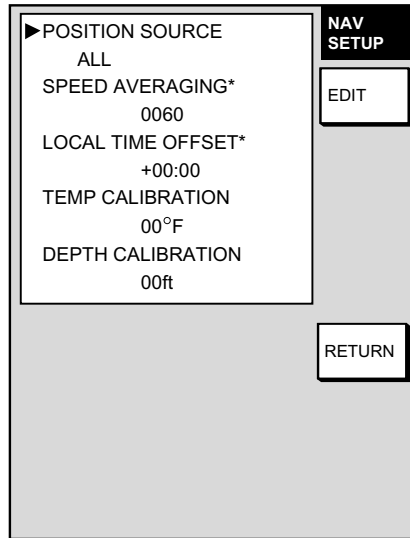
* For GPS receiver other than GP-310B.

Nav setup menu

Contents of nav setup menu

Item	Description	Settings	Default Setting
Position Source	Chooses source of position data.	**FURUNO BB GPS:** GPS Receiver GP-310B **GP:** GPS navigator (via NETWORK or NMEA connector) **LC:** Loran C navigator (via NETWORK or NMEA connector) **All:** Multiple navaid connection (via NETWORK or NMEA connector)	ALL
Speed Averaging	Calculation of ETA is based on average ship's speed over a given period. If the period is too long or too short, calculation error will result. Change this setting if calculation error occurs. The default setting is suitable for most conditions.	0-9999 sec	60 sec
Local Time Offset	GPS uses UTC time. If you would rather use local time, enter the time difference between it and UTC. Use the +<-->- soft key to switch from plus to minus and vice versa.	-13:30 to +13:30	00:00
Temp Calibration	Offsets NMEA water temperature data.	-40°F - + 40°F	0°F
Depth Calibration	Offsets NMEA depth data.	-15 - +90 ft	0 ft

5.7.2   GPS receiver setup (Set equipped with GP-310B)

The GPS SETUP menu sets up the GPS Receiver GPS-310B. Press the [MENU] key followed by the SYSTEM CONFIGURATION, NAV OPTION and GPS SENSOR SETTINGS soft keys to display this menu.

```
► LOCAL TIME OFFSET          GPS
          +00:00             SETUP
   GEODETIC DATUM
          WGS-84           ┌────────┐
   POSITION SMOOTHING       │  EDIT  │
          000 second(s)     └────────┘
   SPD/CSE SMOOTHING
          005 second(s)    ┌────────┐
   GPS SPEED AVERAGING      │  GPS   │
          060 second(s)     │ STATUS │
   LATITUDE OFFSET          └────────┘
          0.000'N
   LONGITUDE OFFSET
          0.000'E
   DISABLE SATELLITE
        _ _  _ _  _ _
   LATITUDE
          38  00.000' N
   LONGITUDE                ┌────────┐
          123  00.000' E    │ RETURN │
   ANTENNA HEIGHT           └────────┘
          005 m
   GPS FIX MODE
          2D/3D
   COLD START
          NO
```
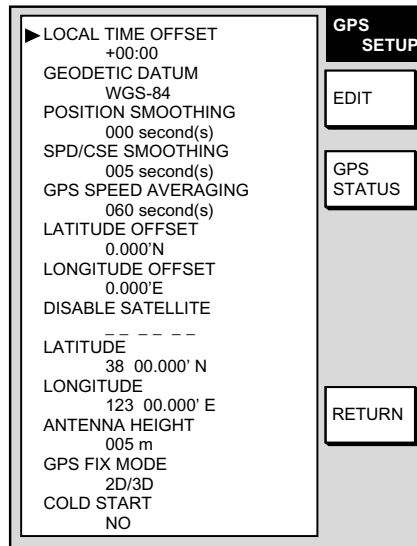
GPS sensor setup menu

Contents of GPS setup menu

Item	Description	Settings	Default Setting
Local Time Offset	Lets you use local time (instead of UTC time). Enter time difference between local time and UTC time. Set this item when using the GPS-310B.	-13:30 to +13:30 hours	00:00
Geodetic Datum	Note: Geodetic Datum is a reference for geodetic survey measurements consisting of fixed latitude, longitude and azimuth values associated with a defined station of reference. You must have the correct Geodetic Datum selected in your plotter so that it will reference the correct point on the chart for a given lat / lon. Although WGS-84 is now the world standard, other categories of charts still exist. refer to Appendix for a full list of geodetic datum.	See Appendix for full list.	WGS-84
Position Smoothing	When the DOP or receiving condition is unfavorable, the GPS fix may change greatly, even if the vessel is not moving in water. This change can be reduced by smoothing the raw GPS fixes. A setting between 000 to 999 is available. The higher the setting, the more smoothed the raw data. If the setting is too high, the response time required to show a change of Lat and LON will be too long. this is especially noticeable if the vessel is moving fast. This is especially noticeable at high ship' speeds. Increase the setting to increase the amount of averaging applied to the GPS fix.	0-999 sec	0 sec (no position smoothing)

(Continued on next page)

Contents of GPS sensor setup menu (con't from previous page)

Item	Description	Settings	Default Setting
Spd/Cse Smoothing	During position fixing, ship's velocity (speed and course) is directly measured by receiving GPS satellite signals. The raw velocity data may vary too much depending on receiving conditions and other factors. You can reduce this variance by increasing the smoothing. Like with latitude and longitude smoothing, the higher the speed and course smoothing the higher the smoothing setting, the more the raw data will be averaged. If this setting is high, the response to speed and course changes will slow. For no smoothing, enter all zeros.	0-999 sec	5 sec
GPS Speed Averaging	Calculation of ETA is based on average ship's speed over a given period. If the period is too long or too short, calculation error will result. Change this setting if calculation error occurs. The default setting is suitable for most conditions.	0-999 sec	60 sec
Latitude, Longitude Offset	Offsets latitude position to further refine position accuracy. Use the N<– –>S soft key to switch coordinate.	0.001'S – 9.999'N 0.001'E – 9.999'W	0.0' (no offset)
Disable Satellite	Every GPS satellite is broadcasting abnormal satellite number(s) in its Almanac, which contains general orbital data about all GPS satellites, including those which are malfunctioning. Using this information, the GPS receiver automatically eliminates any malfunctioning satellite from the GPS satellite schedule. However, the Almanac sometimes may not contain this information. If you hear about a malfunctioning satellite from another source, you can disable it manually. Enter satellite number (two digits, max. 3 satellites) with the trackball and [ENTER] knob and press the ENTER soft key.		None
Latitude	Sets initial latitude position after cold start. Use the N< – –>S soft key to switch coordinate.	—	45°35.000'N
Longitude	Sets initial longitude position after cold start. Use the W< – –>E soft key to switch coordinate.	—	125°00.000'W
Antenna Height	Enters the height of the GPS antenna unit above sea surface. For further details refer to the installation manual.	0-99 m	5 m
GPS Fix Mode	Chooses position fixing method: **2D** (three satellites in view), 2D/3D (three or four satellites in view whichever is greater).	2D, 2D/3D	2D/3D
Cold Start	Clears the Almanac to receive the latest Almanac.	No, Yes	No
GPS STATUS (soft key)	Displays GPS satellite status display. Requires GPS Receiver GP-310B or GPS navigator outputting the data sentence GSA or GSV. For further details see the chapter on Maintenance.		

5.7.3   TD display setup

The TD SETUP menu sets which Loran C or Decca chain to use to display TD position. (Connection of a Loran C or Decca navigator is not necessary to display TD position.)

1. Press the [MENU] key.
2. Press the SYSTEM CONFIGURATION, NAV OPTION and TD SETUP soft keys to display the TD SETUP menu.

```
            LORAN-C          TD
 ►GRI                      SETUP
         9940:11-27        ┌──────┐
     U.S. WEST COAST       │ EDIT │
 CORRECTION 1              └──────┘
         +000.0 µs
 CORRECTION 2
         +000.0 µs

            DECCA
 CHAIN
        01   R-G
     S BALTIC
 CORRECTION 1             ┌────────┐
         +00.00 lane      │ RETURN │
 CORRECTION 2             └────────┘
         +00.00 lane
```
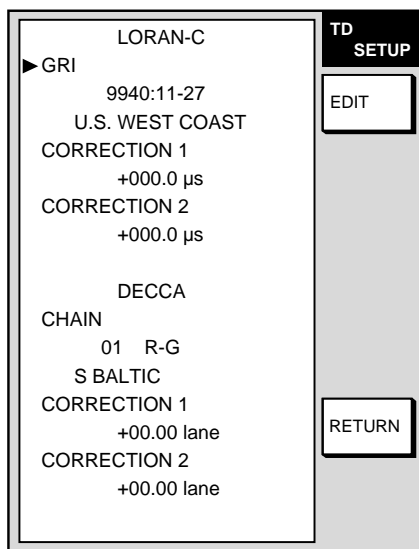
TD setup menu

Displaying Loran C TDs

1. Select GRI and press the EDIT soft key to show the GRI & station pair window.

```
      GRI & STATION PAIR

              ▲
      9940  ►  11-27
              ▼

   U.S. WEST COAST
```
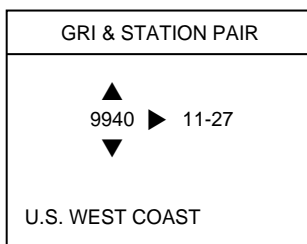
Loran GRI & station pair window

2. Use ▲ or ▼ on the cursor pad to select GRI code.
3. Press ► to enable selection of station pair.
4. Use ▲ or ▼ on the cursor pad to select station pair.

```
      GRI & STATION PAIR

                 ▲
      9940  ◄  11-27
                 ▼

   U.S. WEST COAST
```
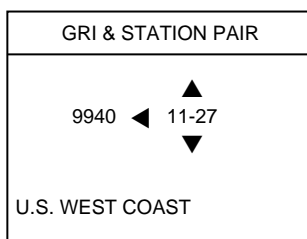
Loran GRI & station pair window

5. Press the ENTER soft key to register your selection.
6. If necessary, you may enter a position offset to refine Loran C position accuracy. Select (GRI) CORRECTION 1 or CORRECTION 2 and press the EDIT soft key. Enter correction value with the cursor pad and [ENTER] knob and then press the ENTER soft key or the [ENTER] knob. Use the +<– –>- soft key to switch from plus to minus and vice versa.
7. Press the RETURN soft key twice.
8. Press the GENERAL SETUP soft key.
9. Press the NEXT PAGE soft key.
10. Select "LORAN C" from "TD DISPLAY", "TD" from "POSITION DISPLAY" and press the ENTER soft key.
11. Press the RETURN soft key followed by the [MENU] key to close the menu.

Displaying DECCA TDs

1. Select CHAIN and press the EDIT soft key to show the chain & station pair window.
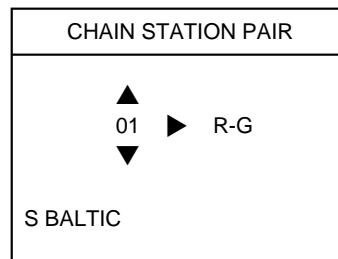
Decca chain and station pair window

2. Use ▲ or ▼ on the cursor pad to select Decca chain number.
3. Press ► to enable selection of lane.
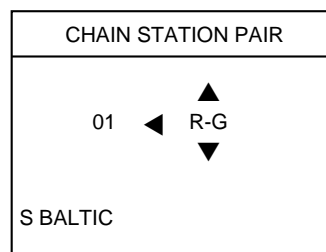
4. Use ▲ or ▼ on the cursor pad to select lane pair (R: red, G: green and P: purple).
5. Press the ENTER soft key to register your selection.
6. If necessary, you may enter position offset to refine Decca position. Select (CHAIN) CORRECTION 1 or CORRECTION 2 and press the EDIT soft key. Enter correction value with the cursor pad and [ENTER] knob and then press the ENTER soft key or the [ENTER] knob. Use the +<– –>- soft key to switch from plus to minus and vice versa.
7. Press the RETURN soft key twice.
8. Press the GENERAL SETUP soft key followed by the NEXT PAGE soft key.
10. Select "DECCA" from "TD DISPLAY", "TD" from "POSITION DISPLAY" and press the ENTER soft key.
11. Press the RETURN soft key followed by the [MENU] key to close the menu.

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5.8   Nav Data Display Setup

The nav data display provides various navigation data, fed from a navigator, network equipment, etc. You may select the data to display and where to display it, on the NAV DATA menu.

1. Press the [MENU] key to open the main menu.
2. Press the SYSTEM CONFIGURATION, SYSTEM SETUP, HOT PAGE & NAV DISP SETUP and NAV DATA DISPLAY SETUP soft keys.
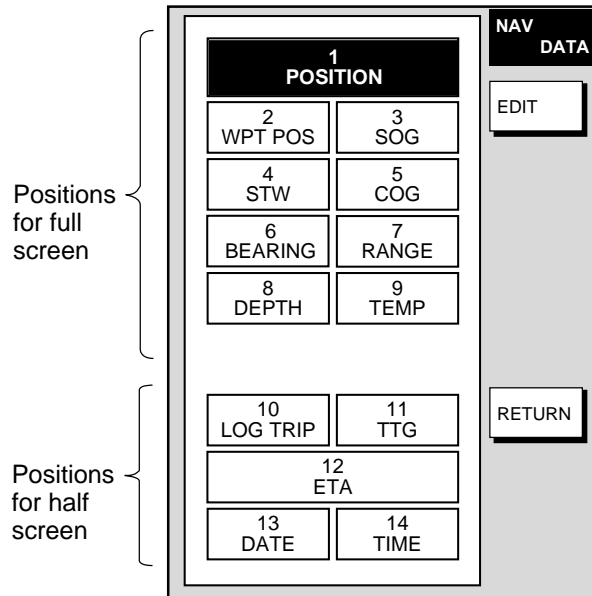
Nav data setup screen

3. Use the cursor pad to select a location
4. Press the EDIT soft key. The following display appears.
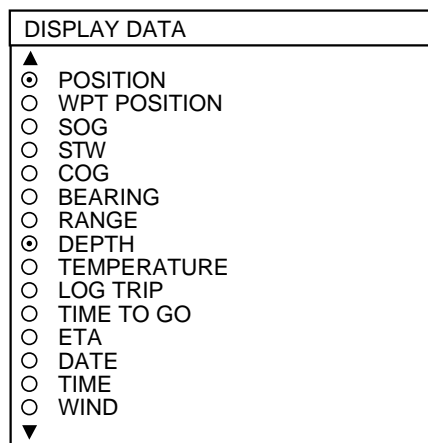
Nav data setup window

5. Select the data to display and press the ENTER soft key or [ENTER] knob to register your selection.
6. Press the RETURN soft key.
7. Press the [MENU] key to close the menu.

5.9   Sounder Setup

This section shows you how to customize your sounder to your liking. You can set fish alarm sensitivity, fine tune sensor data, etc.

5.9.1   System setup

1. Show the sounder display and press the [MENU] key.
2. Press the SOUNDER SYSTEM SETUP soft key.

```
► FISH ALARM LEVEL          SYSTEM
         MEDIUM             SETUP
TRANSMISSION
         ON                EDIT
TVG 200 kHz
         3
TVG 50 kHz                 SENSOR
         3                 SETUP
ECHO OFFSET 200 kHz
         +00
ECHO OFFSET 50 kHz
         +00
BOTTOM LEVEL 200kHz
         +000
BOTTOM LEVEL 50kHz
         +000
KP PULSE
         INTERNAL          RETURN
SMOOTHING
         SM3
TLL OUTPUT
         ON
```
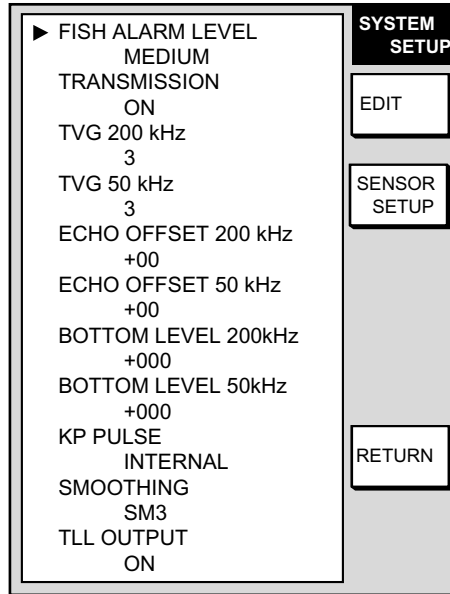
Sounder system setup menu

Sounder system setup menu description

Item	Description	Settings	Default Setting
Fish Alarm Level	Sets the fish alarm sensitivity; that is the minimum echo strength which will trigger the fish and fish (B/L) alarms.	**High:** Orange and stronger echoes (strongest echoes on monochrome model) trigger the alarm.* **Medium:** Yellow and stronger echoes (medium strength echoes on monochrome model) trigger the alarm.* **Low:** Green and stronger echoes (weak echoes on monochrome mode) trigger the alarm.* * = 8-color display	Medium
Transmission	Turns TX power on/off.	On, Off	On

(Continued on next page)

Sounder system setup menu description (con't)

Item	Description	Settings	Default Setting
TVG (50 kHz, 200kHz)	TVG (Time Varied Gain) compensates for propagation attenuation of the ultrasonic waves. It does this by equalizing echo presentation so that fish schools of the same size appear in the same density in both shallow and deep waters. In addition, it reduces surface noise. Note that if the TVG level is set too high short range echoes may not be displayed.	0-9	3 (both 50 kHz and 200 kHz)
Echo Offset (50 kHz, 200 kHz)	If the on-screen echo level appears to be too weak or too strong and the level cannot be adjusted satisfactorily with the gain control, adjust echo offset to compensate for too weak or too strong echoes. The default setting for both 200 kHz and 50 kHz is zero.	-50 - +50	0 (both 50 kHz and 200 kHz)
Bottom Level (50 kHz, 200 kHz)	If the depth indication is unstable in automatic operation or the bottom echo cannot be displayed in reddish-brown by adjusting the gain control in manual operation, you may adjust the bottom echo level detection circuit, for both 50 kHz and 200 kHz, to stabilize the indication. Note that if the level is set too low weak echoes may be missed and if set too high the depth indication will not be displayed.	-100 - +100	0 (both 50 kHz and 200 kHz)
KP Pulse	Selects source of keying pulse.	Internal, External (See installation manual.)	Internal
Smoothing	Smooths echoes to present stable display. The higher the setting the greater the smoothing.	SM1-SM4, OFF	SM3
TLL Output	Outputs cursor position to external equipment.	ON, OFF	ON
SENSOR SETUP (soft key)	Offsets speed, depth and water temperature indications and speed of sound.	See next section for details.	

5.9.2   Sensor setup

The sensor setup menu lets you further refine speed, temperature and depth data fed from the network sounder.

1. Show the sounder display and press the [MENU] key.
2. Press the SOUNDER SYSTEM SETUP and SENSOR SETUP soft keys to show the SENSOR SETUP menu. The current ship's speed, water temperature, depth and speed of sound are shown at the bottom of the menu.

```
▶ SPEED CALIBRATION        SENSOR
      + 00%                 SETUP
   TEMP  CALIBRATION
      + 0°F                 EDIT
   DEPTH CALIBRATION
      +0.0ft
   ASCTC SPD CALIBRATION
      + 000m/s




                           RETURN
 SPEED          TEMP
 12.3kt         78.8°F
 DEPTH          ACSTC SPD
 125.0ft         1500m/s
```
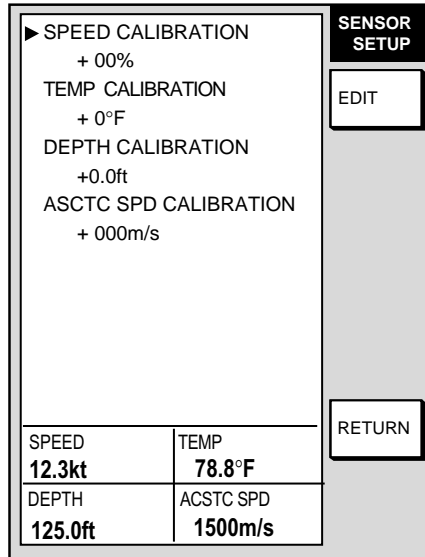
Sensor setup menu

3. Select item to adjust and press the EDIT soft key.
4. Use the cursor pad to display appropriate value as below.

    Speed and temperature calibrations: Enter plus or minus value. For example, if the water temperature readout is 77°F but the actual water temperature is 75°F, enter –2(°F).

    Depth calibration: If you desire the depth readout to show the distance between ship's draft and bottom (rather than transducer and bottom), set ship's draft here. Enter a plus or minus value.

    Acoustic speed calibration: Sets the speed of sound used by the network sounder. Note that this is only used if water salinity is at an extreme level. Under normal circumstances, do not adjust.

Sensor setup menu settings

Item	Settings	Default Setting
Speed Calibration	-50 -+50%	0 (no offset)
Temperature Calibration	-40°F - +40°F	0 (no offset)
Depth Calibration	-5 - +60 (any unit of measurement)	0 (no offset)
Acoustic Speed Calibration	-500 - +500 m/s	0(m/s)

5. Press the RETURN soft key followed by the [MENU] key to close the menu.

5-31

5.9.3 Sounding range, zoom range, bottom lock range

This paragraph shows you how to set custom ranges for basic range, zoom range (marker and bottom zoom) and bottom lock range. All default basic ranges are restored whenever the unit of depth measurement is changed. Therefore, change the depth unit before changing the basic ranges.

1. Show the sounder display and press the [MENU] key to open the main menu.
2. Press the SOUNDER RANGE SETUP soft key to show the SOUNDER RANGE SETUP menu.

```
▶ RANGE 1                    RANGE
          15 ft               SETUP
  RANGE 2
          30 ft              ┌──────┐
  RANGE 3                    │ EDIT │
          60 ft              └──────┘
  RANGE 4
          120 ft
  RANGE 5
          200 ft
  RANGE 6
          400 ft
  RANGE 7
          1000 ft
  RANGE 8
          4000 ft           ┌──────┐
  ZOOM RANGE                │RETURN│
          10 ft             └──────┘
  BOTTOM LOCK RANGE
          10 ft
```
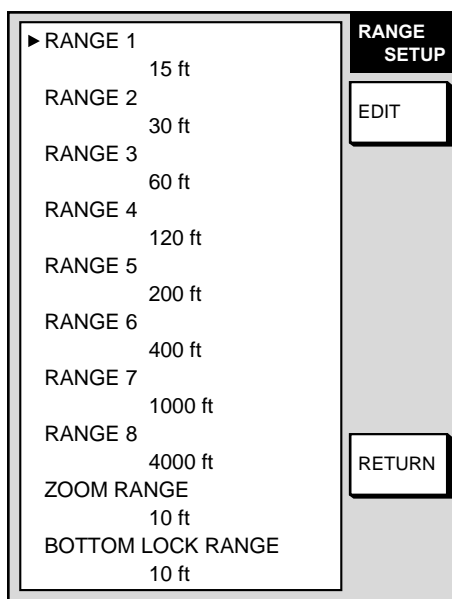
Sounder range setup menu

3. Select the range to change and press the EDIT soft key. Available settings are as below. For sounding range, set depth from lowest to highest; a range cannot be higher than its succeeding neighbor.
4. Use the cursor pad to set range desired, then press the RETURN soft key.
5. Press the [MENU] key to finish.

Default ranges

Range 1	Range 2	Range 3	Range 4	Range 5	Range 6	Range 7	Range 8
5 m	10 m	20 m	40 m	80 m	150 m	300 m	1200 m
15 ft	30 ft	60 ft	120 ft	200 ft	400 ft	1000 ft	4000 ft
3 fa	5 fa	10 fa	20 fa	40 fa	80 fa	150 fa	650 fa
3 PB	5 PB	10 PB	30 PB	50 PB	100 PB	200 PB	700 PB

Setting range: 2 m –1200m, 7 ft – 4000 ft, 1 fa – 650 fa, 1 PB – 700 PB

Zoom range and bottom lock ranges

Item	Settings	Default Setting
Zoom Range	2 m – 120 m, 7 ft – 400 ft, 1 fa – 60 fa, 1 PB – 70 PB	10 m, 30 ft, 10 fa, 10 PB
Bottom-lock Range	3 or 6 m, 10 or 20 ft 2 or 3 fa, 2 or 3 PB	6 m, 20 ft, 3 fa, 3 PB

5.9.4   Function key setup

The function keys provide one-touch call up of a desired function. The default sounder function key settings are as shown in the table below.

Function Key	Default Function	Function Key Label
1	Output cursor position	TLL
2	Suppress clutter.	CLT
3	Erase weak signal.	SLV
4	Suppress noise.	NL
5	Set picture advancement speed.	PA

If the above settings are not to your liking you may change them as follows:

1. Show the sounder display.
2. Press the [MENU] key.
3. Press the FUNCTION KEY SETUP soft key.
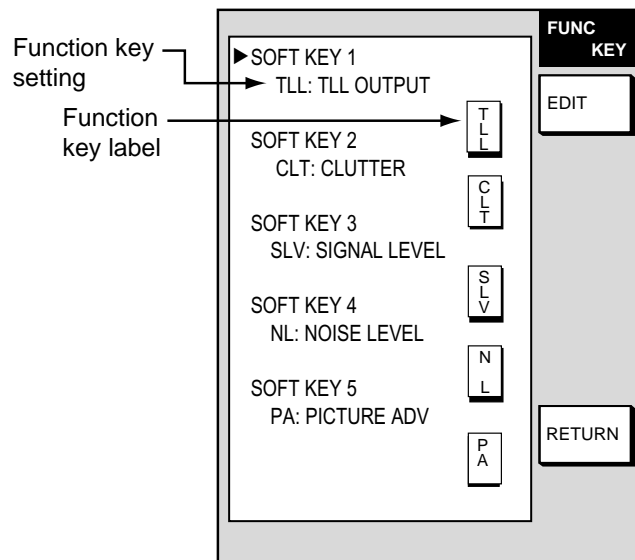
Sounder function key menu

4. Select the function key you want to program and press the EDIT soft key.
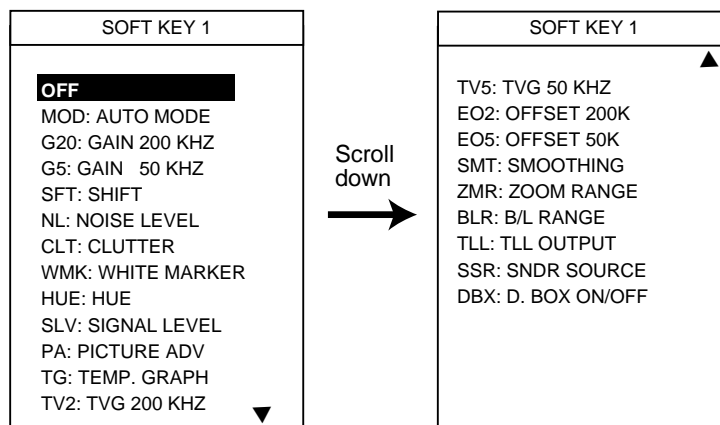
Sounder function key options

5. Select function desired with the cursor pad or [ENTER] knob and press the ENTER soft key or [ENTER] knob to register your selection.
6. Press the ENTER soft key or the [ENTER] knob to register your selection.
7. Press the [MENU] key to close the menu.

Sounder function keys

Menu Item	Function	Function Key Label
OFF	Assigns no function.	
MOD: AUTO MODE	Display automatic mode selection window.	MOD
G20: GAIN 200 KHZ	Displays 200 kHz gain adjustment window.	G20
G5: GAIN 50 KHZ	Displays 50 kHz gain adjustment window.	G 5
SFT: SHIFT	Shifts range in manual operation.	SFT
NL: NOISE LIMITER	Suppresses noise.	NL
CLT: CLUTTER	Suppresses clutter.	CLT
WMK: WHITE MARKER	Sets white marker. (color only)	WMK
HUE: HUE	Sets hue (color model only).	HUE
SLV: SIGNAL LEVEL	Erases weak signals.	SLV
PA: PICTURE ADV	Sets picture advance speed.	PA
TG: TEMP. GRAPH	Turns temperature graph on/off.	TG
TV2: TVG 200 KHZ	Sets TVG for 200 kHz.	TV2
TV5: TVG 50 KHZ	Sets TVG for 50 kHz.	TV5
EO2: OFFSET 200K	Offsets echo strength for 200 kHz.	EO2
E05: OFFSET 50K	Offsets echo strength for 500 kHz.	EO5
SMT: SMOOTHING	Sets echo smoothing rate.	SMT
ZMR: ZOOM RANGE	Sets zoom range.	ZMR
BLR: B/L RANGE	Sets bottom-lock range for bottom-lock display.	BLR
TLL: TLL OUTPUT	Outputs current position to plotter. Also inscribes line on sounder and registers position as a waypoint.	TLL
SSR: SNDR SOURCE	Selects source for sounder data. **Do not change this setting.**	SSR
DBX: D. BOX ON/OFF	Turns data boxes on/off.	DBX
CHG: CHANGE CNTRL*	Switches control in combination display.	CHG

*: When selecting CHG on a display, use the same soft key number on all display for CHG.

6. DATA TRANSFER

This chapter provides information for saving and replaying data to and from memory cards, and uploading and downloading data.

6.1 Memory Card Operations

The memory cards function to store data, and the following data can be saved:

- Marks/lines
- Waypoints/routes
- Track
- Setting data

6.1.1 Formatting memory cards

Before you can use a memory card it must be formatted. This prepares the card for use with the system. Note that formatting a memory card erases all saved data.

1. Insert a blank memory card into the card slot.
2. Press the [MENU] key followed by the SYSTEM CONFIGURATION, DATA TRANSFER, UPLOAD/DOWNLOAD DATA and SAVE DATA TO MEMORY CARD soft keys to show the SAVE DATA menu.


```
                              SAVE
                              DATA
 ▶TRACKS
         OFF
   MARKS & LINES            EDIT
         OFF
   WAYPOINTS & ROUTES
         OFF                SAVE
   SETTING DATA
         OFF


                            FORMAT

                            RETURN
```
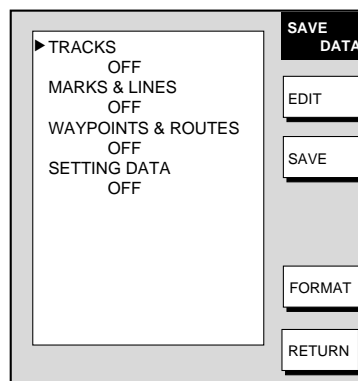
Save data menu

3. Press the FORMAT soft key. You are asked if you are ready to format the memory card.
4. Push the [ENTER] knob to format (or press the [CLEAR] key to escape). "NOW FORMATTING MEMORY CARD" appears. Do not remove the card while it is being formatting. When the formatting is completed, "FORMAT COMPLETED. PUSH ENTER KNOB TO CONTINUE." appears.
5. Push the [ENTER] knob to continue.

Note: If the memory card was not inserted correctly, the message "FAILED to FORMAT MEMORY CARD." appears.

6.1.2 Saving data to a memory card

1. Insert a formatted memory card into the slot.
2. Press the [MENU] key followed by the CONFIGURATION, DATA TRANSFER, UPLOAD/DOWNLOAD DATA and SAVE DATA TO MEMORY CARD soft keys to show the SAVE DATA menu.

```
                                    SAVE
                                    DATA
  ► TRACKS
            OFF
   MARKS & LINES                  EDIT
            OFF
   WAYPOINTS & ROUTES
            OFF
   SETTING DATA*                  SAVE
            OFF



                                  FORMAT


                                  RETURN
```
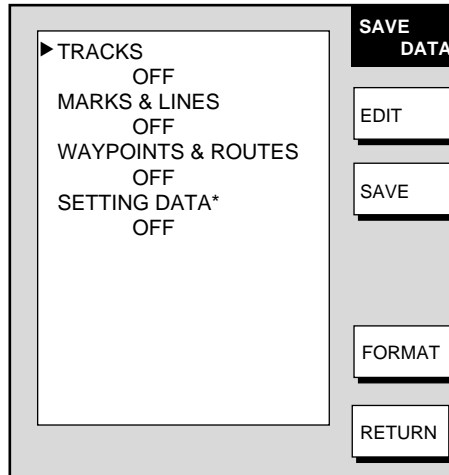
* = Plotter data only

Save data menu

3. Use the cursor pad to select item to save.
4. Press the EDIT soft key.
5. Use the cursor pad to select ON.
6. Press the ENTER soft key.
7. Repeat steps 3 to 6 to choose other data to save if desired.
8. Press the SAVE soft key. The message "NOW SAVING DATA TO MEMORY CARD. DO NOT TURN OFF THE DISPLAY UNIT UNTIL COMPLETED." appears.

When saving is completed, "COMPLETED SAVING DATA. PUSH ENTER KNOB TO CONTINUE." appears. Push the [ENTER] knob to continue.

Memory card messages

Various memory card messages appear to alert you to memory card-related error. These are tabulated below.

Memory card messages

Message	Reason	Remedy
Memory card is not inserted. Please insert card. Push ENTER knob to continue.	Memory card not inserted.	Push the [ENTER] knob to return to the SAVE DATA display and then insert card.
Memory card is not formatted. Push ENTER knob to continue.	Unformatted memory card.	Push the [ENTER] knob to return to the SAVE DATA display. Format the card referring to page 6-1.
Wrong card is inserted. Please insert correct memory card. Push ENTER knob to continue.	Chart card inserted instead of memory card.	Remove chart, and insert memory card, and then push the [ENTER] knob to continue.
Overwrite data OK? (Track) (Mark) (WPT) (Config)	Data type to be recorded exists on memory card. (Two or more of same type of data cannot be recorded.)	Push the [ENTER] knob to overwrite same data type on the card, or press the [CLEAR] key to escape.

6.1.3 Playing back data from a memory card

Data (track, marks, lines, waypoints, routes and setting data) can be loaded from a memory card and displayed on the screen. This feature is useful for observing past data and setting up the equipment for a specific purpose with "setup data."

1. Press the [MENU] key followed by the SYSTEM CONFIGURATION and DATA TRANSFER soft keys.
2. Press the UPLOAD/DOWNLOAD DATA soft key.
3. Press the LOAD DATA FROM MEMORY CARD soft key to show the LOAD DATA menu.
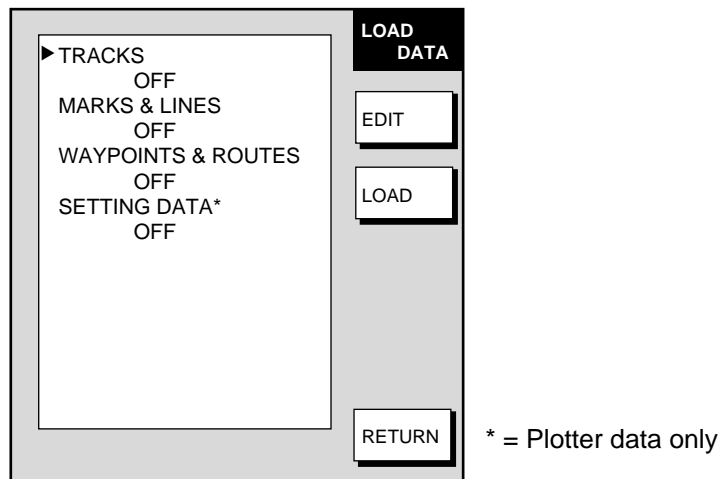
Load data menu

4. Use the cursor pad to select item to load.
5. Press the EDIT soft key.
6. Use the trackball to select ON. (Select OFF to not load selected data.) Press the ENTER soft key. If the memory card does not contain the item selected, the buzzer sounds and ON cannot be selected.
7. After you select all items desired, press the LOAD soft key to load data. The message "NOW LOADING DATA FROM MEMORY CARD." appears.
8. After loading is completed, the message "COMPLETED LOADING DATA. PUSH ENTER KNOB TO CONTINUE." appears. Push the [ENTER] knob to continue.

Notes on loading data

Tracks: Since loaded track data is added to internal track, oldest track will be entered when the track memory capacity is exceeded.

Waypoints & routes: The loaded data substitutes for previously stored.

Marks & lines: The loaded data is added to internal data. When the mark/line memory becomes full no marks may be entered.

Setting data: The loaded data replaces current configuration settings. If the memory card is ejected while loading or data could not be loaded, push the [ENTER] knob to restart with default settings. Note that track memory capacity is not saved or loaded. To use loaded setting data turn the power off and on again.

6.2 Uploading, Downloading Data

You can upload waypoint and route data from a PC and download like data to a PC, through the DATA 3 port at the rear of the display unit. Note that sounder and radar data cannot be uploaded or downloaded.

6.2.1 Setting communication software on the PC

Set communication software on the PC as follows:

Baud Rate: 4800 bps
Character Length: 8 bits
Stop bit: 1 bit
Parity: Even
X Control: XON/XOFF (fixed)

The following data can be downloaded/uploaded between a personal computer and this equipment:

- Waypoint data (In alphanumeric order)

- Route data (In order of route number)

- End of sentence

Note 1: There are two kinds of data for route data: route data and route comment data.
Note 2: Wiring information appears on the UPLOAD or DOWNLOAD menu.

6.2.2 Uploading or downloading data

1. Connect the PC to the equipment.
2. Press the [MENU] key to show the main menu.
3. Press the SYSTEM CONFIGURATION soft key.
4. Press the DATA TRANSFER soft key.
5. Press the UPLOAD/DOWNLOAD DATA soft key.
6. Press the DOWNLOAD WPT/RTE DATA TO PC or UPLOAD WPT/RTE DATA FROM PC soft key.
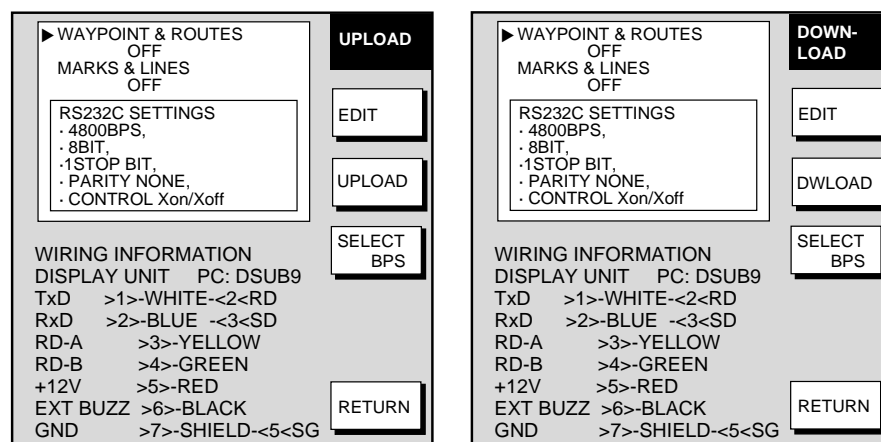
7. To change the baud rate, press the SELECT BPS soft key.

```
     BAUD RATE
▲
 ⊙   4800 bps
 ○   9600 bps
 ○   19200 bps
▼
```
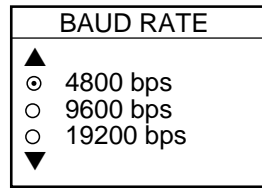
Baud rate window

8. Select baud rate and press the ENTER soft key.

    Note: Select the speed among 4800, 9600 and 19200 bps.
9. Press the DWLOAD or UPLOAD soft key. You are asked if you are ready to download or upload waypoints and routes.
10. Push the [ENTER] knob to download or upload data.

Waypoint data format

```
PFEC, GPwpl, llll.llll,  a, yyyyy.yyy,  a, c----c, c, c----c, a <CR><LF>
            1    2      3      4      5    6   7     8
```

Waypoint data format

1: Waypoint latitude
2: N/S
3: Waypoint longitude
4: E/W
5: Waypoint name (Number of characters is fixed to 6 and space code is placed when the number of characters are less than 6.)
6: Waypoint color
7: Waypoint comment (1 byte for mark code + 13 characters of comment.)
   1st byte of mark code: Fixed to "@".
   2nd byte of mark code: Internal mark code. See Note 1.
8. Information of marking waypoint. Always set to "A".
   "A": Displayed
   "V": Not displayed
Note 1: Following characters can be used for comments:
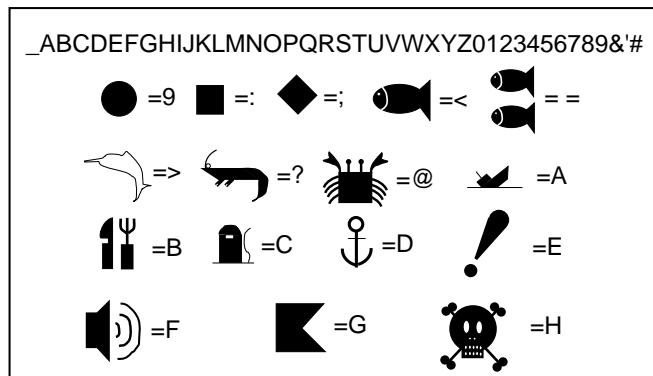
Characters available for comment

Route data menu

```
$PFEC, GPrtc,   xx,  c----c <CR><LF>
                 ‾    ‾‾‾‾
                 1      2
```

Route data format

1: Number of sentences required for one complete route data (1 to 4). See Note 2.
2: Number of sentences currently used (1 to 4)
3: Message mode (Always set to C)
4: Route No. (001 to 300, 3 digits required)
5 through 12: Waypoint name (Max. 8 names, length of each waypoint name is fixed to 7 byte)

Note 2: A route can may contain 35 waypoints, and the GPRTE sentence for one route data may exceed 80 byte limitation. In this case, route data is divided into several GPRTE sentences (Max. 4 sentences). This value shows the number of sentences the route data has been divided.

Route comment data format

```
$GPRTE, x, x, a, ccc, c----c,  c----c, … ,  c----c <CR><LF>
        ‾  ‾  ‾  ‾‾‾   ‾‾‾‾‾‾    ‾‾‾‾‾‾        ‾‾‾‾‾‾
        1  2  3   4      5         6            12
```

Route comment format

1: Route No. (01 to 200, 3 digits required)
2: Route comment (Max. 16 characters, variable length)

The same characters of the comment for waypoint comment can be used.

End of sentence

```
$PFEC, GPxfr,   CTL, E <CR><LF>
```

End of sentence

6.3   Loading Waypoint Data from Yeoman

Waypoint data can be loaded from a Yeoman to this equipment. Connect the Yeoman to any DATA port on this equipment and then follow the procedure below.

1. Press the [MENU] key.
2. Press the SYSTEM CONFIGURATION key.
3. Press the DATA TRANSFER soft key.
4. Press the RECEIVE YEOMAN DATA soft key.
5. You are asked if you are sure to receive waypoint data from Yeoman equipment. Push the [ENTER] knob to receive the data.

   The message "NOW RECEIVING YEOMAN DATA. PUSH SOFTKEY 'STOP' TO STOP RECEIVING." Is displayed. If waypoint capacity is reached the message "WAYPOINTS FULL. NO MORE WAYPOINT CAN BE RECEIVED. PUSH ANY KEY TO STOP." appears.

6. To stop receiving, press the STOP soft key.
7. After waypoints have been received, press the [MENU] key to close the menu.

6.4　Receiving Data Via Network Equipment

You can receive waypoints, routes, marks and lines from NavNet equipment.

1. Press the [MENU] key.
2. Press the SYSTEM CONFIGURATION soft key.
3. Press the DATA TRANSFER soft key.
4. Press the RECEIVE DATA VIA NETWORK soft key.

```
┌─────────────────────────┐┌─────────┐
│ ▶ HOST NAME             ││ RECEIVE │
│                         ││  DATA   │
│      - - - - - - - -    │└─────────┘
│   MARKS & LINES         │┌─────────┐
│        OFF              ││ EDIT    │
│   WAYPOINTS & ROUTES    ││         │
│        OFF              │└─────────┘
│                         │┌─────────┐
│                         ││ RCV     │
│                         ││         │
│                         │└─────────┘
│                         │
│                         │
│                         │
│                         │┌─────────┐
│                         ││ RETURN  │
└─────────────────────────┘└─────────┘
```
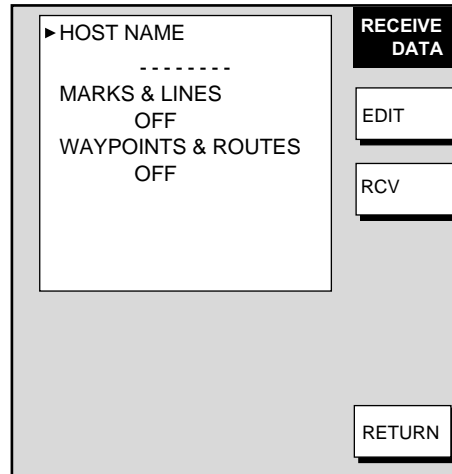
Receive data menu

5. Select HOST NAME and press the EDIT soft key.

```
┌─────────────────────┐
│ HOST NAME           │
│                     │
│ █------             │
│                     │
│                     │
└─────────────────────┘
```
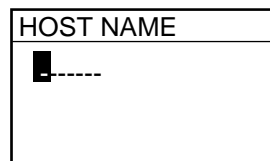
Host name window

6. Use the cursor pad and the alphanumeric keys to input host name then push the [ENTER] knob.
7. Select the data you wish to receive and press the EDIT soft key. For example, select MARKS & LINES.

```
┌─────────────────────┐
│ MARKS & LINES       │
│    ▲                │
│    ○  ON            │
│    ⊙  OFF           │
│    ▼                │
└─────────────────────┘
```
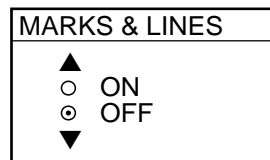
Marks & lines window

8. Select ON or OFF as appropriate and press the ENTER soft key.
9. Turn WAYPOINTS & ROUTES on or off as appropriate.

10. Press the RCV soft key to receive data.

    The message "NOW RECEIVING DATA." is displayed. IF no data could be found the message "(HOST NAME)' IS NOT FOUND." appears.

11. When the transfer is completed, the message "DATA TRANSFER COMPLETED. PUSH ENTER KNOB TO CONTINUE." appears. Push the [ENTER] knob.

12. Press the [MENU] key to close the menu.

6.5   Outputting Data Through the Network

Follow the procedure below to output data through the network.

1. Press the [MENU] key to open the menu.
2. Press SYSTEM CONFIGURATION, SYSTEM SETUP, PORT SETUP and OUTPUT THROUGH NETWORK soft keys.

SELECT SENTENCE		SELECT SNTNC
▶ AAM	--	
APB	--	ON/OFF
BOD	--	
BWR	--	
DPT	--	
GGA	--	
GLL	--	
GTD	--	
MTW	--	
RMA	--	
RMB	--	
RMC	--	RETURN
VHW	--	
VTG	--	
WPL	--	
XTE	--	
ZDA	--	
HDT	--	
HDG	--	
MWV	--	
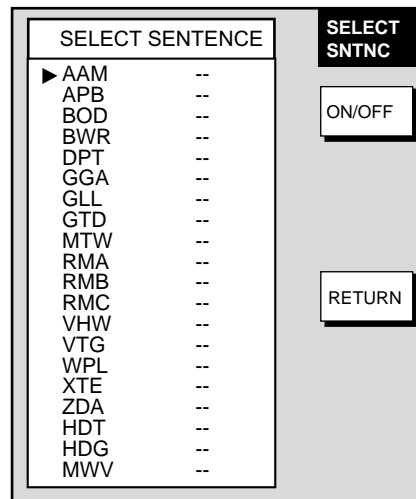
Select sentence menu

3. Select sentence with the cursor pad.
4. Press the ON/OFF soft key to turn sentence on or off.
5. Press the RETURN soft key.
6. Press the [MENU] key to close the menu.

7. MAINTENANCE, TROUBLESHOOTING

This chapter provides information necessary for keeping your unit in good working order and remedying simple problems.

⚠ WARNING

Do not open the equipment.

Hazardous voltage which can cause electrical shock exists inside the equipment. Only qualified personnel should work inside the equipment.
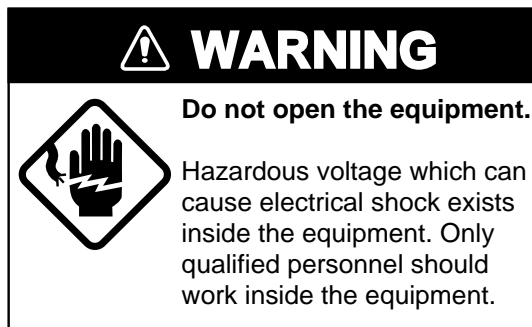
7.1 Preventive Maintenance

Regular maintenance is important for optimum performance. A maintenance schedule should be established and should at least include the items below.

Maintenance program

Item	Check point	Remedy
Display unit connectors	Check for tight connection.	Tighten loosened connectors.
LCD	The LCD will, in time, accumulate a coating of dust which tends to dim the picture. Wipe LCD lightly with soft cloth to remove dust.	Do not use chemical cleaners to clean any part of the display unit; they can remove paint and markings.
Ground terminal	Check for tight connection and corrosion.	Clean or replace ground wire as necessary.

7.2 Replacement of Fuse

The fuse on the power cable protects the equipment from reverse polarity of the ship's mains and equipment fault. If the fuse blows, find out the cause before replacing it. Use the correct fuse (10A for 12 V, 5A for 24 V). Using the wrong fuse will damage the equipment and void the warranty.

┌───┐
│   ⚠ **CAUTION**   │
├───┤
│ **Use the proper fuse.**   │
│   │
│ Use of a wrong fuse can cause fire or   │
│ damage the equipment.   │
└───┘

7.3 Replacement of Battery

A battery fitted on a circuit board inside the display unit preserves data when the equipment is turned off, and its life is about three years. When its voltage is low the battery icon (🔋) appears at the top of the display. When the icon appears, contact your dealer to request replacement of the battery.

Parts Name	Type	Code No.
Lithium battery	CR2450-F2 ST2	000-133-495

7.4 Simple Troubleshooting

This section provides simple troubleshooting procedures which the user can follow to restore normal operation. If you cannot restore normal operation do not attempt to check inside the unit. Any trouble should be referred to a qualified technician.

7.4.1 General

General troubleshooting

If...	Then...
you cannot turn on the power	▪ check for blown fuse. ▪ check that the power connector is firmly fastened. ▪ check for corrosion on the power cable connector. ▪ check for damaged power cable. ▪ check battery for proper voltage output (10.8 to 31.2 V).
there is no response when a key is pressed	▪ turn off and on the power. If there still is no response the key may be faulty. Request service.

7.4.2   Radar

Requires a network radar.

Radar troubleshooting

If...	But...	Then...
you pressed the [POWER/BRILL] key and the RADAR TX soft key to show the radar picture	nothing appears on the display	• check that the signal cable between the display unit and the antenna is firmly fastened. • Check that radar source is correct.
marks, legends appear	no echo appears	• check in the power cable. If it is blown, replace it.
picture not updated or picture freezes	—	• check signal cable. • turn the display unit off and on again.
tuning is adjusted	sensitivity is poor	• Magnetron may need to be replaced. Contact your dealer.
range changed	radar picture does not change	• try to hit the [+] and [-] keys again. • turn the display unit off and on again.
poor discrimination in range	—	• adjust A/C SEA. • Check heading and speed data for input.
true motion presentation not working properly	—	• reselect true motion mode.
range rings are not displayed	—	• Hit the RADAR DISPLY and RINGS soft keys to display them.

7.4.3   Plotter

Requires GPS Receiver GP-310B.

Plotter troubleshooting

If...	Then...
position is not fixed within three minutes	・ check that antenna connector is firmly fastened. ・ Check the satellites numbers received, on the GPS status display (GPS SENSOR SETTINGS menu, GPS STATUS key see page 7-11).
position is wrong	・ check that the correct geodetic chart system is selected, on the GPS SENSOR SETTINGS menu. ・ enter position offset on the GPS SENSOR SETTINGS menu.
track is not plotted	・ plotting has been stopped. ("H" icon appears at the top of the display.) Press the TRACK HALT soft key on the TRACKS & MARKS CONTROL menu to start plotting again.
bearing is wrong	・ check that correct magnetic variation is entered, on the GENERAL SETUP menu.
Loran C (or Decca) TDs do not appear	・ check that LORAN C (or DECCA) is selected at TD DISPLAY on the GENERAL SETUP menu. Also, check that proper Loran C (Decca) chains codes are entered, on the TD SETUP menu.
Loran C TDs are wrong	・ enter TD offset on the TD SETUP menu.
ship's speed indication is not zero after the ship is stopped	・ try to decrease speed/course smoothing on the GPS SENSOR SETTINGS menu.

7.4.4 Sounder

Requires Network Sounder ETR-6/10N.

Sounder troubleshooting

If...	But...	Then...
If you selected a sounder display with the DISP key	no sounder display appears	▪ check that the signal cable between the network sounder and this equipment is firmly fastened. ▪ check that the network sounder is plugged in. The LED of the network sounder should flash every second. ▪ Check that sounder source is correct.
marks and characters appear	picture does not appear	▪ check for loosened transducer connector.
picture appears	zero line does not appear	▪ the picture is shifted. confirm the shift setting
picture sensitivity is too low	—	▪ check gain setting, if using manual operation. ▪ marine life or air bubbles may be clinging to transducer face. ▪ bottom may be too soft to return a suitable echo.
depth is not displayed	—	▪ adjust gain to display the bottom echo (in reddish brown on the color model), if you are using the manual sounder mode. ▪ correctly display bottom echo on the display, if you are using manual sounder mode.
noise or interference shows on the display	—	▪ check to be sure the transducer cable is not near ship's engine. ▪ check the ground. ▪ other video sounders of the same frequency as yours may be operating near you.
water temperature graph appears but wrong or no readout	—	▪ check that sensor cable is tightly fastened.

7.5   Diagnostics

This paragraph provides the procedures for testing the equipment for proper operation. Four tests are provided: Memory I/O test, Keyboard test, Remote controller test, and Test pattern.

7.5.1   Memory I/O test

The memory I/O test provides for individual testing of the display unit, GPS receiver GP-310B, network sounder ETR-6/10N and ARP, displaying program number and checking for proper operation.

1. Press the [MENU] key to show the menu.
2. Press the SYSTEM CONFIGURATION soft key.
3. Press the SYSTEM SETUP soft key.
4. Press the TEST & CLEAR soft key.
5. Press the MEMORY I/O TEST soft key.
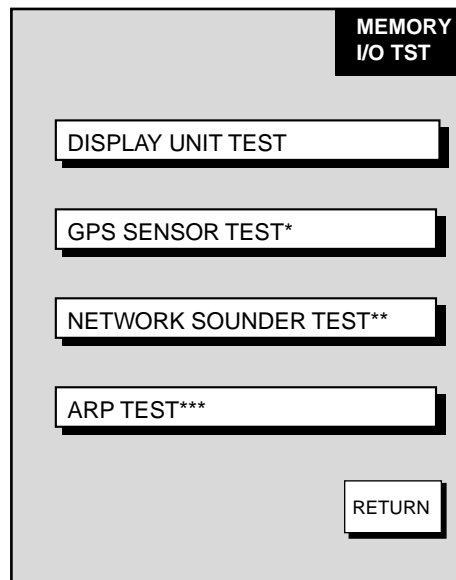

```
                                    MEMORY
                                    I/O TST

        DISPLAY UNIT TEST

        GPS SENSOR TEST*

        NETWORK SOUNDER TEST**

        ARP TEST***

                                    RETURN
```

  * =   Requires GPS Receiver GP-310B.
 ** =   Requires Network Sounder ETR-6/10N.
*** =   Requires ARP-equipped Model
            1833/1833C series network radar.

Test & memory clear menu

6. Then, press appropriate soft key to start a diagnostic test.

Display unit test

Press the DISPLAY UNIT TEST soft key at the MEMORY I/O TEST menu to test the display unit. The equipment displays program version number, checks devices and shows the number of the chart card inserted in the chart slot (if inserted). Results for device checks are shown as OK or NG (No Good). For any NG, request service. Test connector required to check ports. "- -" appears when no test connector is no connected. Press the RETURN soft key to return to the MEMORY I/O TEST menu. Chart number shown for C-MAP cards only.

```
PROGRAM No. 03591731XX
ROM1, 2            : OK
ROM3              : OK
SDRAM             : OK
SRAM              : OK
INT. BATTERY      : OK
PORT
  NMEA IN/OUT     : --
  NMEA IN         : --
  RS232           : --
  HEADING         : --
NETWORK           : --
  CHART NUMBER  :
H. PULSE          : OK  ⎤  No results appear when
B. PULSE          : OK  ⎬  "sub" radar selected as
           (22.5 rpm)   ⎭  radar source.
ON TIME           : 000000.0 h
TX TIME           : 000000.0 h

Machine Status +115
```

XX = Program Version No.

Display unit test results (ex. MODEL1722C series)

GPS sensor test

Press the GPS SENSOR TEST soft key at the MEMORY I/O TEST menu to test the GPS Receiver GP-310B. The equipment displays GPS receiver program version number, and checks the GPS receiver for proper operation, displaying OK or NG (No Good) as the result. For any NG, request service. Press the RETURN soft key to return to the MEMORY I/O TEST menu.

```
PROGRAM No. 4850218XX
GPS UNIT   : OK




Machine Status + 115
```

XX = Program Version No.

GPS receiver test results

Network sounder (ETR-6/10N) test

Press the NETWORK SOUNDER TEST soft key at the MEMORY I/O TEST menu to test the Network Sounder ETR-6/10N. The equipment displays network sounder program version number, checks the ROM and RAM, and displays water temperature (appropriate sensor required) and depth. The results of the ROM and RAM check are shown as OK or NG (No Good). For NG request service. Press the RETURN soft key to return to the MEMORY I/O TEST menu.

```
PROGRAM No. 02523060XX
ROM            : OK
RAM            : OK
TEMPERATURE
           : 77°F
DEPTH
           : 4000ft
Machine Status +115
```

XX = Program Version No.

Network sounder test results

ARP test (Requires ARP-equipped Model 1833/1833C series network radar)

The ARPA test is mainly provided for the service technician. Press the ARP TEST soft key at the MEMORY I/O TEST menu to test the ARP. The results of the ROM and RAM check are shown as OK or NG (No Good). For NG request service. Press the RETURN soft key to return to the MEMORY I/O TEST menu.

```
PROGRAM No. 18590271XX
ARP ROM        : OK
ARP RAM        : OK
SPEED          : OK 12.3kt

COURSE         : OK 359.9°

TRIGGER        : OK
VIDEO          : OK
BEARING PULSE : OK
HEADING PULSE : OK
MINIMUM HIT    : 0003
SCAN-TIME      : 0250
MANUAL ACQ     : 00
AUTO ACQ       : 00
FE-DATA1       : 000
FE-DATA2       : 000

Machine Status +115
```

XX = Program Version No.

ARP test results

7.5.2 Test pattern

The test pattern test checks the display for proper display of colors (MODEL1722C series) or tones (MODEL1722 series).

1. Press the [MENU] key to show the menu.
2. Press the SYSTEM CONFIGURATION soft key.
3. Press the SYSTEM SETUP soft key.
4. Press the TEST & CLEAR soft key.
5. Press the TEST PATTERN soft key to show test pattern.
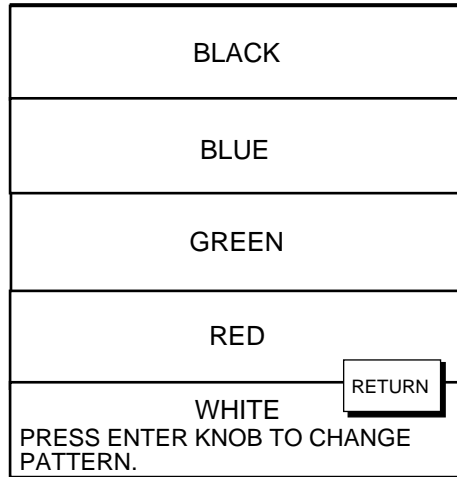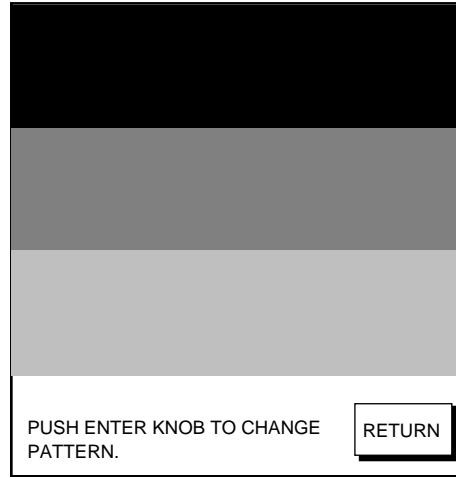
MODEL1722C series	MODEL1722 series

Test patterns

6. **For the MODEL1722C series,** push the [ENTER] knob consecutively to show white, red, green, blue and black colors.
7. Press the RETURN soft key.
8. Press the [MENU] key to close the menu.

7.5.3 Keyboard, remote controller test

The keyboard test checks the controls on the display unit and remote controller for proper operation.

1. Press the [MENU] key to show the menu.
2. Press the SYSTEM CONFIGURATION soft key.
3. Press the SYSTEM SETUP soft key.
4. Press the TEST & CLEAR soft key.
5. Press the KEYBOARD & REMOTE TEST soft key.
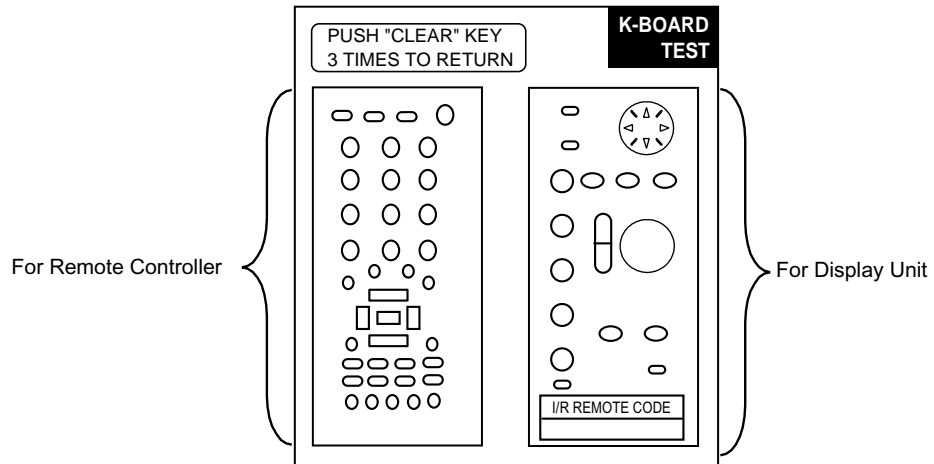
Screen for testing keyboard, remote controller

6. Operate each control on the keyboard and remote controller one by one. A key is functioning properly if its on-screen location "fills" in black (color model) or green (monochrome model) when the key is pressed. For the [ENTER] knob, rotate it to show X-Y position; push it to confirm function.
7. Press the [CLEAR] key on the display unit three times to escape from the test.
8. Press the [MENU] key to close the menu.

7.6 GPS Status Display

The GPS status display provides data about the GPS satellites, and is available with connection of the GPS Receiver GP-310B or a GPS navigator outputting the data sentence GSA or GSV.

1. Press the [MENU] key.
2. Press SYSTEM CONFIGURATION, NAV OPTION and GPS SENSOR SETTINGS soft keys to display the GPS SENSOR SETTINGS menu.
3. Press the GPS STATUS soft key.
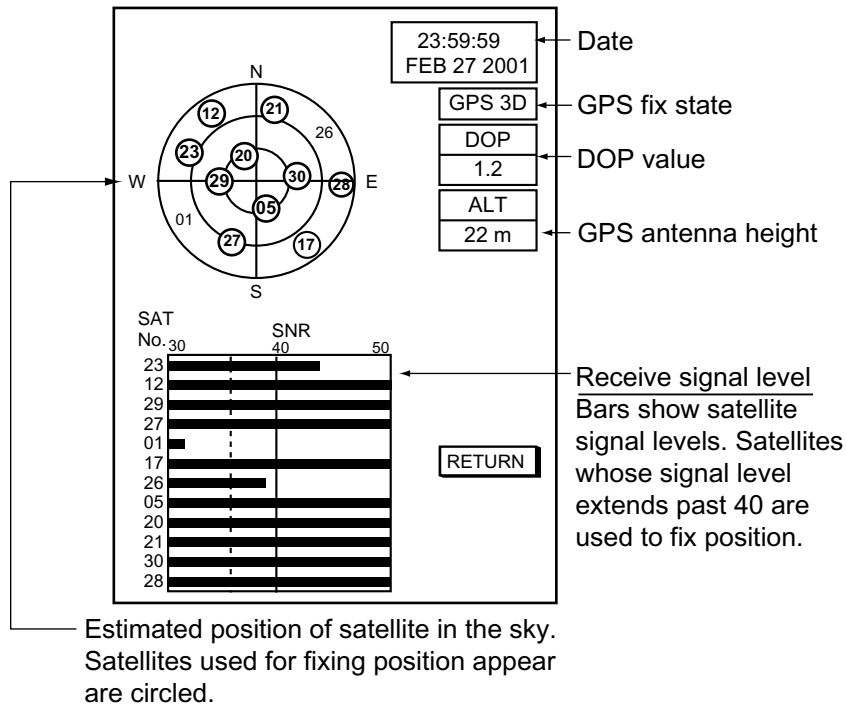
GPS status display

4. Press the RETURN soft key followed by the [MENU] key to finish.

7.7   Clearing Memories

Your equipment has a memory for each of the plotter, radar and sounder sections. These memories can be cleared to restore the unit to default settings.

The following data are not cleared: Heading adjustment, timing adjustment, MBS level, tuning point, tuning indication (short, medium, long), video level, dead sector, antenna height, STC curve, antenna type, on time, TX time.

1. Press the [MENU] key to open the menu.
2. Press the SYSTEM CONFIGURATION soft key.
3. Press the SYSTEM SETUP soft key.
4. Press the TEST & CLEAR soft key.
5. Press the MEMORY CLEAR soft key.

```
┌──────────────────────────────┐  ┌──────────┐
│ ▶ DISPLAY UNIT               │  │ MEMORY   │
│            NO                │  │ CLEAR    │
│    GPS SENSOR                │  ├──────────┤
│            NO                │  │  EDIT    │
│    NETWORK SOUNDER           │  │          │
│            NO                │  └──────────┘
│                              │
│                              │
│                              │
│                              │
│                              │
│                              │  ┌──────────┐
│                              │  │  RETURN  │
│                              │  └──────────┘
└──────────────────────────────┘
```
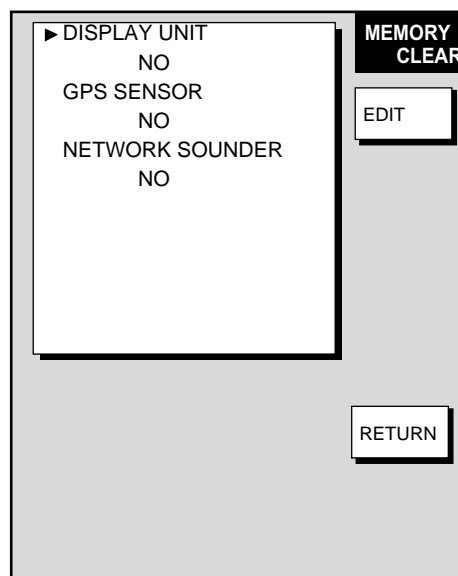
Memory clear menu

6. Use the cursor pad to choose the memory to clear.
7. Press the EDIT soft key.
8. Use the cursor pad to select YES and press the ENTER soft key. One of the following displays appear depending on the selection made at step 6.

ALL SETTINGS EXCEPT SNDR ARE RESET TO DEFAULT. ARE YOU SURE? YES ... PUSH ENTER KNOB NO ... PUSH CLEAR KEY	BEGIN COLD START TO CLEAR GPS MEMORY. ARE YOU SURE? YES ... PUSH ENTER KNOB NO ... PUSH CLEAR KEY	SOUNDER WILL BE SET TO DEFAULT. ARE YOU SURE? YES ... PUSH ENTER KNOB NO ... PUSH CLEAR KEY
Display Unit Clear	GPS Receiver Clear	Network Sounder Clear

Windows for clearing memory

9. Push the [ENTER] knob to clear memory selected.
10. Press the MENU key to close the menu.
11. Turn the power off, and on again.

7.8 Error Messages

In addition to alarm message your equipment also displays equipment status menus.

Equipment status error messages

Error Message	Meaning	Remedy
Connection with the ETR was cut.	Network sounder disconnected.	• Check that display unit where the sounder is connected is turned on. • Check network sounder's cabling.
Connection with the RADAR was cut.	Radar disconnected.	• Check that display unit where the radar is connected is turned on. • Check antenna cable.
Low Voltage! Internal Battery	Voltage of battery on circuit board in display unit is low.	Have a qualified technician replace the battery.
No bearing pulse detected.	No bearing pulse from radar antenna.	Check antenna cable.
No GPS fix!	GPS navigator is turned off or no GPS position data.	Check GPS navigator.
No heading pulse detected.	No heading pulse	Check heading sensor.

APPENDIX

Menu Overview

MENU key

Radar

MENU Key ── RADAR ───── EBL REFERENCE (TRUE, *RELATIVE*)
DISPLAY ── CURSOR POSITION (LAT/LON, TD, *RNG&BRG-REL*, RNG&BRG-TRU)
SETUP ── TUNING (*AUTO*, MAN)
── TX SECTOR BLANKING (ON (FROM SECTOR), *OFF*)
── NOISE REJECTION (*OFF,* LOW, HIGH)
── BACKGROUND COLOR (*BLACK/GREEN*, BLACK/RED, BLUE/WHITE,
    DK BLUE/WHITE, WHITE/GREEN)*
── ECHO COLOR (YELLOW, *GREEN*, MULTI-COLOR)*
── WATCHMAN TIME (*5*, 10, 20 minutes)
── RANGE UNIT (*nm*, km, sm)
── DATA BOX soft key (Same items as on plotter menu.)

── RADAR ───── nm & sm range
RANGE (0.125/0.25/0.5/0.75/1/1.5/2/3/4/6/8/12/16/24/36/48/64)
SETUP ── km range
(0.25/0.5/0.75/1/1.5/2/3/4/6/8/12/16/24/36/48/64)

── ARP SETUP ───── ARP TARGET INFO (INTERNAL ARPA, *EXTERNAL ARP,* OFF)
(Requires ARP ── CANCEL ALL TARGETS (YES, *NO*)   * = MODEL1722C
circuit board in ── ARP VECTOR MODE (RELATIVE, *TRUE*)   series only.
network radar ── ARP VECTOR TIME (30seconds, 1, 3, 6, 15, *30minutes*)
1833/1833C ── HISTORY INTERVAL (*OFF*, 30sec; 1, 3, 6 minutes)
series.) ── CPA (*OFF*, 0.5, 1, 2, 3, 5, 6nm)
── TCPA (*30seconds,* 1, 2, 3, 4, 5, 6, 12minutes)
── AUTO ACQUISITION AREA (ON, *OFF*)
── TARGET ID NUMBER (ON, *OFF*)

── FUNCTION ───── SOFTKEY 1 - SOFTKEY 5
KEY SETUP* (OFF, HDG LINE OFF, MODE, GAIN, A/C SEA, A/C RAIN, FTC,
ECHO STRETCH, PULSE LENGTH, ZOOM, OFFCENTER, ECHO
TRAIL, RINGS ON/OFF, TLL OUTPUT, GUARD ALARM, EBL, VRM,
TTM ON/OFF, WPT ON/OFF, WATCHMAN, ACQUISITION, STBY/TX,
RADAR SOURCE, DATA BOX ON/OFF, CHANGE CNTRL
Assigns function of each radar function key.)

── SYSTEM CONFIGURATION (See page AP-6.)

* Default settings for function keys:
SOFTKEY 1, HDG LINE OFF; SOFTKEY 2, RANGE; SOFTKEY 3, ECHO TRAIL;
SOFTKEY 4, OFFCENTER, SOFTKEY 5, RADAR SOURCE

Plotter

MENU Key —— CHART SETUP —— CHART OFFSET (offsets chart position.) * = Denotes MODEL1722C
series only.

TRACKS —— OWN SHIP TRACK DISP (**ON**, OFF)
& MARKS —— OWN SHIP TRACK COLOR (***RED***, YEL, GRN, L-BLU, PPL, BLU, WHT)*
CONTROL —— TARGET TRACK DISPLAY (**ON**, OFF)
—— TARGET TRACK COLOR (RED, YEL, GRN, L-BLU, PPL, BLU, ***WHT***)*
—— INTERVAL (***TIME***, DISTANCE)
—— TIME INTERVAL (0 - 99m59s, ***0m 10s***)
—— DISTANCE INTERVAL (0 - 99.99nm/km/sm, ***0.1nm***)
—— MEMORY (TRACK & MARK) (***2000/8000 pts***)

CHART —— LAT LON GRID (**ON**, OFF) (RED, YEL, ***GRN***, L-BLU, PPL, BLU, WHT)*
DETAILS —— TEXT INFORMATION (**ON**, OFF)
(FURUNO, —— WAYPOINTS (***LARGE***, SMALL, OFF)
NavCharts™) —— WAYPOINT NAMES (**ON**, OFF)
—— CHART BORDER LINES (**ON**, OFF)
—— LANDMASS (***BRIGHT***, DIM, OFF) (RED, ***YEL***, GRN, L-BLU, PPL, WHT)*
—— BACKGROUND (WHITE, ***BLACK***)*
—— NAVAIDS (**ON**, OFF)
—— LIGHT SECTOR INFO (**ON**, OFF)
—— OTHER SYMBOLS (**ON**, OFF) (RED, YEL, GRN, L-BLU, PPL, ***WHT***)*
—— MARKS SIZE (***LARGE***, SMALL)

—— CNTOUR LINE soft key
—— DEPTH < 10m (**ON**, OFF, ***Red****)
—— DEPTH = 10m (**ON**, OFF, ***Yellow****)
—— DEPTH > 10m (**ON**, OFF, ***Light blue****)
—— DEPTH INFORMATION (**ON**, OFF, ***Red****)
* Colors: Red, Yellow, Green, Light-blue, Purple,
Blue, White

(1)   (2)

AP-2

① ② (Continued from previous page)

CHART
DETAILS
(C-MAP
chart)

Page 1

WAYPOINTS (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
WAYPOINT NAME (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
LAT/LON GRID (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
CHART BORDER LINE (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
BACKGROUND (WHITE, **BLACK**)*
PORTS & SERVICE (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
ATTENTION AREA (**PLOTTER/OVERLAY**, PLOTTER, PLOTTER/CONTOUR, OFF)*
NAV LANE (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
LIGHT(**PLOTTER/OVERLAY**, PLOTTER, PLOT/NO SECTOR, OFF)*
BUOY & BEACON (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
SIGNAL (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
CARTOGRAPHIC OBJECT (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
PLACE NAME (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
COMPASS (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
TIDE AND CURRENT (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
NATURAL FEATURE (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
RIVER & LAKE (**PLOTTER/OVERLAY**, PLOTTER, OFF)*

Page 2

CULTURAL FEATURE (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
LANDMARK (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
CHART GENERATION (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
NEW OBJECT (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
COMPLEX OBJECT ICON (SINGLE, **MULTIPLE**)
INFORMATION LEVEL (**BASIC**, DETAILED

DEPTH INFO soft key

BATHYMETRIC LINE (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
SPOT SOUNDING (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
BOTTOM TYPE (**PLOTTER/OVERLAY**, PLOTTER, OFF)*
DEPTH AREA LIMIT (0-99999ft, **20, 164 ft**)
BATHYMETRIC RANGE (0-99999 ft, **33 ft**)

* = Denotes MODEL1722C
series only.
For MODEL 1722 series,
ON and OFF.

PLOTTER
SETUP

WAYPOINTS SWITCHING (PERPENDICULAR, **ARRVL ALM CRCL**, MANUAL)
COURSE VECTOR (VECTOR, **LINE**, OFF)
SET GOTO METHOD (**1POINT**, 35POINTS, 35PTS/PORT SVC)

①

AP-3

① 1

```
┌─── WAYPOINTS/ ───┬── WAYPOINTS ──┬── LOCAL LIST
│    ROUTES        │               ├── ALPHANUMERIC LIST
│                  │               ├── WAYPOINT BY CURSOR
│                  │               └── WAYPOINT BY RNG & BRG
│                  │
│                  ├── ROUTES ─────┬── GO TO soft key
│                  │               ├── NEW ROUTE soft key
│                  │               ├── EDIT ROUTE soft key
│                  │               └── ERASE ROUTE soft key
│                  │
│                  ├── LOG ────────┬── RESTART soft key
│                  │               ├── RVRSE soft key
│                  │               ├── SPEED soft key
│                  │               └── COORD TYPE soft key
│                  │
│                  └── CREATE ─────┬── NEW soft key
│                     VOYAGE-      └── SELECT ROUTE soft key
│                     BASED           (BCKTRK TIME, BCKTRK DIST, MANUAL)
│                     ROUTE
│
├─── FUNCTION ─────── SOFTKEY 1 - SOFTKEY 5
│    KEY SETUP*       (OFF, ADD NEW WPT, MOVE WPT, RULER, GO TO WPT, GO TO
│                     ROUTE, EDIT MK/LINE, TRACK ON/OFF, TTM ON/OFF, DEL TGT
│                     TRACK, ALPHA LIST, LOCAL LIST, ROUTE LIST,
│                     DATA BOX ON/OFF, CHANGE CNTRL)
│                     (Assigns function of each plotter function key.)
│
│                     * Defaut settings for function keys:
│                     SOFTKEY 1, TRACK ON/OFF; SOFTKEY 2, EDIT MARK/LINE:
│                     SOFTKEY 3, RULER; SOFTKEY 4, ADD NEW WPT;
│                     SOFTKEY 5, ALPHA LIST
│
└─── SYSTEM CONFIGURATION (See page AP-6.)
```

Sounder

MENU Key — SOUNDER SETUP
- NOISE LIMITER (*OFF*, LOW, MEDIUM, HIGH)　　　* = MODEL1722C series only
- CLUTTER (0 - 16(*9*), *AUTO*)
- WHITE MARKER (*OFF*, 1-8 (8-color), 1-16 (16 color))*
- ZOOM MARKER (*ON*, OFF)
- HUE (1-9, *1*)*
- SIGNAL LEVEL (*OFF*, SL1, SL2, SL3, SL4, SL5, SL6)
- PICTURE ADVANCE (2/1, *1/1*, 1/2, 1/4, 1/8, 1/16, STOP)
- TEMPERATURE GRAPH (ON, *OFF*)
- SPD SENSING PIC ADV (ON, *OFF*)
- D. BOX soft key (Same items as on plotter menu.)

SL1-SL2: Monochrome
SL1-SL3: 8 color
SL1-SL6: 16 color

SOUNDER SYSTEM SETUP
- FISH ALARM LEVEL (HIGH, *MEDIUM*, LOW)
- TRANSMISSION (*ON*, OFF)
- TVG 200kHz (0 - 9, *3*)
- TVG 50kHz (0 - 9, *3*)
- ECHO OFFSET 200kHz (-50 - +50, *0*)
- ECHO OFFSET 50kHz (-50 - +50, *0*)
- BOTTOM LEVEL 200kHz (-100 - +100, *0*)
- BOTTOM LEVEL 50kHz (-100 - +100, *0*)
- KP PULSE (*INTERNAL*, EXTERNAL)
- SMOOTHING (OFF, SM1-SM4, *SM3*)
- TLL OUTPUT (*ON*, OFF)

　　SENSOR SETUP soft key
- SPEED CALIBRATION (-50 - +50%, *0%*)
- TEMP. CALIBRATION (20 - +20 C/-40 - +40 F, *0* F)
- DEPTH CALIBRATION (-15 - +60m/-15 - +90ft/-15 - +30fa/-15 - +30PB, *0*)
- ACSTC SPD CALIBRATION (-500 - +500m/s, *+0m/s*)

SOUNDER RANGE SETUP
- RANGE 1 - RANGE 8*
- ZOOM RANGE (2-120 m, *10 m*; 7-400 ft, *30 ft*; 1-60 fa, *10 fa*; 1-70 PB, *10 PB*)
- BOTTOM LOCK RANGE (3 m/*6 m*; 10 ft/*20 ft*; 2 fa/*3 fa*; 2 PB/*3 PB*)

FUNCTION KEY SETUP#
- SOFTKEY 1- SOFTKEY 5
(MODE, GAIN 200KHz, GAIN 50KHz, SHIFT, NOISE LIMITER, CLUTTER, WHITE MARKER, HUE, SIGNAL LEVEL, PICTURE ADV, TEMP. GRAPH, TVG 200KHz, TVG 50KHz, OFFSET 200KHz, OFFSET 50KHz, SMOOTHING, ZOOM RANGE, B/L RANGE, TLL OUTPUT, SNDR SOURCE, D. BOX ON/OFF, CHANGE CNTRL)
(Assign function of echo sounder function key.)

SYSTEM CONFIGURATION (See page AP-6.)

* = Default sounder ranges

Range 1	Range 2	Range 3	*Range 4*	Range 5	Range 6	Range 7	Range 8
5 m	10 m	20 m	40 m	80 m	150 m	300 m	1200 m
15 ft	30 ft	60 ft	120 ft	200 ft	400 ft	1000 ft	4000 ft
3 fa	5 fa	10 fa	20 fa	40 fa	80 fa	150 fa	650 fa
3 PB	5 PB	10 PB	30 PB	50 PB	100 PB	200 PB	700 PB

Default settings for function keys:
SOFTKEY 1, TLL OUTPUT; SOFTKEY 2, CLUTTER; SOFTKEY 3, SIGNAL LEVEL:
SOFTKEY 4, NOISE LIMITER, SOFTKEY 5, PICTURE ADV

System configuration

MENU key ── SYSTEM ── GENERAL ── KEY BEEP (**ON**, OFF)
　　　　　　　CONFIGURATION　SETUP　├─ LANGUAGE (***ENGLISH***, others)
　　　　　　　　　　　　　　　　　├─ RANGE UNIT
　　　　　　　　　　　　Page 1　　　(***nm, kt;*** km, km/h; sm, mph; nm&yd, kt; nm&m, kt; km&m, km/h; sm&yd, mph)
　　　　　　　　　　　　　　　├─ TEMPERATURE UNIT (°C, °***F***)
　　　　　　　　　　　　　　　├─ DEPTH UNIT (m, ft, fa, PB)
　　　　　　　　　　　　　　　├─ TEMPERATURE SOURCE (ETR, ***NMEA***)
　　　　　　　　　　　　　　　├─ DEPTH SOURCE (ETR, ***NMEA***)
　　　　　　　　　　　　　　　├─ RESET TRIP LOG (Yes, ***NO***)
　　　　　　　　　　　　　　　├─ LAT/LON DISPLAY
　　　　　　　　　　　　　　　　(DD° MM. MM ,
　　　　　　　　　　　　　　　　 DD° MM. MMM
　　　　　　　　　　　　　　　　 DD° MM. MMMM
　　　　　　　　　　　　　　　　 DD° MM SS.S)
　　　　　　　　　　　　Page 2　├─ TD DISPLAY (***LORAN C***, DECCA)
　　　　　　　　　　　　　　　├─ SPEED (***SOG***, STW)
　　　　　　　　　　　　　　　├─ POSITION DISPLAY (***LAT/LON***, TD)
　　　　　　　　　　　　　　　├─ TIME DISPLAY (12 HOURS, ***24 HOURS***)
　　　　　　　　　　　　　　　├─ INFRARED REMOTE MODE (A, ***B***, C, D)
　　　　　　　　　　　　　　　├─ RANGE & BEARING MODE
　　　　　　　　　　　　　　　　(GREAT CIRCLE, ***RHUMB LINE***)
　　　　　　　　　　　　　　　├─ BEARING READOUT (TRUE, ***MAGNETIC***)
　　　　　　　　　　　　　　　├─ MAGNETIC VARIATION (***AUTO,*** MANUAL 07.0°W)
　　　　　　　　　　　　　　　└─ DISPLAY MODE (***DAY***, NIGHT)*　　* = MODEL1722 series only.

　　　　　　　├─ NAV ── NAV ── POSITION SOURCE
　　　　　　　　OPTION　SOURCE　(FURUNO BB GPS, GP, LC, ***ALL***)
　　　　　　　　　　　SETTING
　　　　　　　　　　　　　├─ SPEED AVERAGING (0-9999 sec,
　　　　　　　　　　　　　　0060 sec)
　　　　　　　　　　　　　├─ LOCAL TIME OFFSET (-13-+13:30 hr, ***+0:00***)
　　　　　　　　　　　　　├─ TEMP CALIBRATION (-40°F - +40°F, ***0°F***)
　　　　　　　　　　　　　└─ DEPTH CALIBRATION (-15 - +90 ft, ***0 ft***)

　　　　　　(3)　　　(4)

③　　④

GPS ——— LOCAL TIME OFFSET (-13:00-+13:30, *+0:00*)
SENSOR ├ GEODETIC DATUM (**WGS-84**, WGS-72, OTHER)
SETTINGS ├ POSITION SMOOTHING (0 - 999 sec, *0 sec*)
├ SPD/CSE SMOOTHING (0 - 999 sec *5 sec*)
├ GPS SPEED AVERAGING (0 - 9999 sec, *60 sec*)
├ LATITUDE OFFSET (0 - 9.9999 , *0 N*)
├ LONGITUDE OFFSET (0 - 9.9999, *0 E)*
├ DISABLE SATELLITE (Max. 3)
├ LATITUDE (45˚ 35.000' N)
├ LONGITUDE (125˚ 00.000'' W)
├ ANTENNA HEIGHT (0 - 999m, *5 m*)
├ GPS FIX MODE (2D, *2D/3D*,)
├ COLD START (YES, *NO*)

└ GPS STATUS soft key
(Displays status of GPS satellites.)

TD SETUP ┬ GRI (*9940: 11-27* (US west coast))
├ CORRECTION 1 (-999.9-+9999.9 μs, *0* μ*s*)
├ CORRECTION 2 (-999.9-+9999.9 μs, *0* μ*s*)
├ CHAIN (01: R-G (South Baltic))
├ CORRECTION 1 (-999.9-+9999.9 lane, *0 lane*)
└ CORRECTION 2 (-999.9-+9999.9 lane, *0 lane*)

③

③

SYSTEM — PORT —┬— GPS/NMEA —┬— FURUNO GPS
SETUP   SETUP   │   PORT   │   SENSOR (YES, **NO**)
                   │   (DATA 1) ├— OUTPUT FORMAT
                   │   │   (NMEA0183 Ver.1.5, **2.0**)
                   │   ├— LAT/LON FORMAT
                   │   │   (DD MM. MM
                   │   │   **DD MM. MMM**
                   │   │   DD MM. MMMM)
                   │   ├— OUTPUT DESTINATION
                   │   ┊   (YES, **NO**)
                   │   └— SELECT SNTNC
                   │   (soft key)[*1]
                   │
                   └— PC/NMEA —┬— NMEA OUTPUT FORMAT
                        EXT. BUZZ │   (NMEA Ver.1.5, **2.0**)
                        PORT   ├— BAUD RATE
                        (DATA 3) │   (**4800**, 9600, 19200 (bps))
                                  │
                                  ├— BIT LENGTH (7bits, **8bits**)
                                  ├— STOP BIT (**1 bit**, 2 bits)
                                  ├— PARITY
                                  ┊   (EVEN, ODD, **NONE**)
                                  └— SELECT SNTNC
                                       (soft key) [*2]

*1 = AAM, **APB**, BOD, **BWR/BWC**[#1], **DPT/DBT**[#2],
      GGA, **GLL**, GTD, MTW, RMA, **RMB**, **RMC**,
      VHW, **VTG**, WPL, XTE, **ZDA**, HDT, HDG, MWV

   #1 = BWR with rhumb line; BWC with great circle
   #2 = DPT with NMEA 0183 Ver 2.0;
           DBT with NMEA 0183 Ver 1.5.

③   ⑤   ⑥

*2 = AAM, APB, BOD, BWR/BWC, DPT/DBT,
      GGA, GLL, GTD, MTW, RMA, RMB, RMC,
      VHW, VTG, WPL, XTE, ZDA, HDT, HDG, MWV

③ ⑤ ⑥

⑥ └─ OUTPUT ─── ┬ AAM, APB, BOD, BWR, DBT, DPT,
THROUGH │ GGA, GLL, GTD, MTW, RMA, RMB,
NETWORK │ RMC, VHW, VTG, WPL, XTE, ZDA,
│ HDT, HDG, MWV
└ Chooses data sentences to output to
NavNet equipment.

⑤ ─── TEST & ─── ┬ MEMORY ─── ┬ DISPLAY UNIT TEST
CLEAR │ I/O TEST ├ GPS SENSOR TEST* NETWORK
│ ├ NETWORK SOUNDER TEST**
│ └ ARP TEST***
│
├ KEY BOARD & REMOTE TEST
│ (Tests keyboard and remote controller.)
│
├ TEST PATTERN
│ (Displays test pattern.)
│
└ MEMORY ─── ┬ DISPLAY UNIT (Yes, *No*)
CLEAR ├ GPS SENSOR (Yes, *No*)
└ NETWORK SOUNDER (Yes, *No*)

─── HOT PAGE ─── ┬ HOT PAGE SETUP
& NAV │ (Sets up hot pages 1-5.)
DATA │
DISPLAY └ NAV DATA DISPLAY SETUP
SETUP (Configures nav data displays.)

└── SIMULATION ─── ┬ RADAR
SETUP │ (SIMULATION 1, SIMULATION 2, *LIVE*)
├ PLOTTER (SIMULATION, *LIVE*)
├ SOUNDER (SIMULATION 1, SIMULATION 2, *LIVE*)
├ SPEED (0.0-99 kt, *0 kt*)
├ COURSE (8 Figure, *Direction* 0.0-359.9°, *0.0°*)
├ LATITUDE (85°0.0'N-85°0.0' , *45°35.0'N*)
├ LONGITUDE (180°0.0'E-180°0.0'W, *125°00.000' W*)
├ START DATE & TIME (*00:00 01. APR. 00*)
└ RADAR SIMULATION DATA (YES, *NO*)

③

* = Requires GPS Receiver GP-310B
** = Requires Network Sounder ETR-6/10N
*** = Requires ARP-equipped MODEL1833/1833C
series network radar.)

(3)

DATA
TRANSFER

UPLOAD/
DOWNLOAD
DATA

DOWNLOAD WPT/ROUTE TO PC
(WAYPOINTS & ROUTES ON, *OFF*,
MARKS & LINES ON, *OFF*)
UPLOAD WPT/ROUTE FROM PC
(WAYPOINTS & ROUTES ON, *OFF*,
MARKS & LINES ON, *OFF*)
SAVE DATA TO MEMORY CARD
(TRACKS ON, *OFF* , MARKS & LINES ON, *OFF*,
WAYPOINTS & ROUTES ON, *OFF*,
SETTING DATA ON, *OFF*)
LOAD DATA IN MEMORY CARD
(TRACK ON, *OFF*, MARKS & LINES ON, *OFF*,
WAYPOINTS & ROUTES ON, *OFF*,
SETTING DATA ON, *OFF*)

RECEIVE YEOMAN DATA (Receives waypoint
data from Yeoman.)

RECEIVE DATA
VIA NETWORK

HOST NAME (*PLOT1*)
MARKS & LINES (ON, *OFF*)
WAYPOINTS & ROUTES
(ON, *OFF*)

ALARM key

ALARM key ─── Plotter Alarms

- AUDIO ALARM (INT & EXT BUZZ, *INTERNAL BUZZ*, OFF)
- ARRIVAL ALARM (ON, *OFF*, *default range: 0.010 nm(km/sm)*)
- ANCHOR WATCH ALARM (ON, *OFF*, *default range: 0.010 nm(km/sm)*)
- PROXIMITY ALARM (ON, *OFF*)
- XTE ALARM (ON, *OFF*, *default range: 0.050 nm(km/sm)*)
- SPEED ALARM (WITHIN, UNDER/OVER, *OFF*)
- TRIP ALARM (ON, *OFF*)
- BOTTOM ALARM (ON, *OFF*)
- TEMPERATURE ALARM (WITHIN RANGE, OUT OF RANGE, *OFF*)

- NEXT INFO (Shows which alarms have been violated.)
- CLEAR ALARM (Acknowledges violated alarm.)

ALARM key ─── Sounder Alarms

- AUDIO ALARM (INT & EXT BUZZ, *INTERNAL BUZZ*, OFF)
- BOTTOM ALARM (ON, *OFF*)
- TEMPERATURE ALARM (WITHIN, OUT OF RANGE, *OFF*)
- FISH ALARM (ON, *OFF*)
- FISH ALARM (B/L) (ON, *OFF*)

- NEXT INFO (Shows which alarms have been violated.)
- CLEAR ALARM (Acknowledges violated alarm.)

ALARM key ─── Radar Alarm

- SET GUARD 1 (ERASE GUARD 1)
- SET GUARD 2 (ERASE GUARD 2)

Geodetic Chart List

001: WGS84
002: WGS72
003: TOKYO : Mean Value (Japan, Korea, and Okinawa)
004: NORTH AMERICAN 1927 : Mean Value (CONUS)
005: EUROPEAN 1950 : Mean Value
006: AUSTRALIAN GEODETIC 1984 : Australia and Tasmania Island
007: ADINDAN : Mean Value (Ethiopia and Sudan)
008: : Ethiopia
009: : Mall
010: : Senegal
011: : Sudan
012: AFG : Somalia
013: AIN EL ABD 1970 : Bahrain Island
014: ANNA 1 ASTRO 1965 : Cocos Island
015: ARC 1950 : Mean Value
016: : Botswana
017: : Lesotho
018: : Malawi
019: : Swaziland
020: : Zaire
021: : Zambia
022: : Zimbabwe
023: ARC 1960 : Mean Value (Kenya, Tanzania)
024: : Kenya
025: : Tanzania
026: ASCENSION ISLAND 1958 : Ascension Island
027: ASTRO BEACON "E" : Iwo Jima Island
028: ASTRO B4 SOR. ATOLL : Tem Island
029: ASTRO POS 71/4 : St. Helena Island
030: ASTRONOMIC STATION 1952 : Marcus Island
031: AUSTRALIAN GEODETIC 1966 : Australia and Tasmania Island
032: BELLEVUE (IGN) : Efate and Erromango Islands
033: BERMUDA 1957 : Bermuda Islands
034: BOGOTA OBSERVATORY : Colombia
035: CAMPO INCHAUSPE : Argentina
036: CANTON ISLAND 1966 : Phoenix Islands
037: CAPE : South Africa
038: CAPE CANAVERAL : Mean Value (Florida and Bahama Islands)
039: CARTHAGE : Tunisia
040: CHATHAM 1971 : Chatham Island (New Zealand)
041: CHUA ASTRO : Paraguay
042: CORREGO ALEGRE : Brazil
043: DJAKARTA (BATAVIA) : Sumatra Island (Indonesia)
044: DOS 1968 : Gizo Island (New Georgia Island)
045: EASTER ISLAND 1967 : Easter Island
046: EUROPEAN 1950 (Cont'd) : Western Europe
047: : Cyprus
048: : Egypt
049: : England, Scotland, Channel, and Shetland Islands
050: : England,Ireland,   Scotland, and Shetland Islands
051: : Greece
052: : Iran
053: : Italy Sardinia
054: : Italy Sicily
055: : Norway and Finland
056: : Portugal and Spain
057: EUROPEAN 1979 : Mean Value
058: GANDAJIKA BASE : Republic of Maldives
059: GEODETIC DATUM 1949 : New Zealand
060: GUAM 1963 : Guam Island
061: GUX 1 ASTRO : Guadalcanal Island
062: HJORSEY 1955 : Iceland
063: HONG KONG 1963 : Hong Kong
064: INDIAN : Thailand and Vietnam
065: : Bangladesh, India, and Nepal
066: IRELAND 1956 : Ireland
067: ISTS 073 ASTRO 1969 : Diego Garcia
068: JHONSTON ISLAND 1961 : Johnston Island
069: KANDAWALA : Sri Lanka
070: KERGUELEN ISLAND : Kerguelen Island
071: KERTAU 1948 : West Malaysia and Singapore
072: LA REUNION : Mascarene Island
073: L.C. 5 ASTRO : Cayman Brac Island
074: LIBERIA   1964 : Liberia
075: LUZON : Philippines (Excluding Mindanao Island)
076: : Mindanao Island
077: MAHE 1971 : Mahe Island
078: MARCO ASTRO : Salvage Islands
079: MASSAWA : Eritrea (Ethiopia)
080: MERCHICH : Morocco
081: MIDWAY ASTRO 1961 : Midway Island
082: MINNA : Nigeria
083: NAHRWAN : Masirah Island(Oman)
084: : United Arab Emirates
085: : Saudi Arabia

086: NAMIBIA : Namibia
087: MAPARIMA, BWI : Trinidad and Tobago
088: NORTH AMERICAN 1927 : Western United States
089: : Eastern United States
090: : Alaska
091: : Bahamas (Excluding San Salvador Island)
092: : Bahamas San Salvador Island
093: : Canada (Including Newfoundland Island)
094: : Alberta and British Columbia
095: : East Canada
096: : Manitoba and Ontario
097: : Northwest Territories and Saskatchewan
098: : Yukon
099: : Canal Zone
100: : Caribbean
101: : Central America
102: : Cuba
103: : Greenland
104: : Mexico
105: NORTH AMERICAN 1983 : Alaska
106: : Canada
107: : CONUS
108: : Mexico, Central America
109: OBSERVATORIO 1966 : Corvo and Flores Islands (Azores)
110: OLD EGYPTIAN 1930 : Egypt
111: OLD HAWAIIAN : Mean Value
112: : Hawaii
113: : Kaual
114: : Maui
115: : Oahu
116: OMAN : Oman
117: ORDNANCE SURVEY OF GREAT BRITAIN 1936 : Mean Value
118: : England
119: : England, Isle of Man, and Wales
120: : Scotland and Shetland Islands
121: : Wales
122: PICO DE LAS NIVIES : Canary Islands
123: PITCAIRN ASTRO 1967 : Pitcairn Island
124: PROVISIONAL SOUTH CHILEAN 1963 : South Chile (near 53°s)
125: PROVISIONAL SOUTH AMERICAN 1956 : Mean Value
126: : Bolivia
127: : Chile Northern Chie (near 19° s)
128: : Chile Southern Chile (near 43° s)
129: : Colombia
130: : Ecuador
131: : Guyana
132: : Peru
133: : Venezuela
134: PUERTO RICO : Puerto Rico and Virgin Islands
135: QATAR NATIONAL : Qatar
136: QORNOQ : South Greenland
137: ROME 1940 : Sardinia Islands
138: SANTNA BRAZ : Sao Maguel, Santa Maria Islands (Azores)
139: SANTO (DOS) : Espirito Santo Island
140: SAPPER HILL 1943 : East Falkland Island
141: SOUTH AMERICAN 1969 : Mean Value
142: : Argentina
143: : Bolivia
144: : Brazil
145: : Chile
146: : Colombia
147: : Ecuador
148: : Guyana
149: : Paraguay
150: : Peru
151: : Trinidad and Tobago
152: : Venezuela
153: SOUTH ASIA : Singapore
154: SOUTHEAST BASE : Porto Santo and Medeira Islands
155: SOUTHWEST BASE : Faial, Graciosa, Pico, Sao Jorge, and Terceira Islands
156: TIMBALAI 1948 : Brunel and East Malaysia (Sarawak and Sadah)
157: TOKYO : Japan
158: : Korea
159: : Okinawa
160: TRISTAN ASTRO 1968 : Tristan da Cunha
161: VITI LEVU 1916 : Viti Levu Island (Fiji Islands)
162: WAKE-ENIWETOK 1960 : Marshall Islands
163: ZANDERIJ : Suriname
164: BUKIT RIMPAH : Bangka and Belitung Islands (Indonesia)
165: CAMP AREA ASTRO : Camp Mcmurdo Area, Antarctica
166: G. SEGARA : Kalimantan Islands(Indonesia)
167: HERAT NORTH : Afghanistan
168: HU-TZU-SHAN : Taiwan
169: TANANARIVE OBSERVATORY 1925 : Madagascar
170: YACARE : Uruguay
171: RT-90 : Sweden
172 : Pulkovo 1942 : Russia

World Time Chart
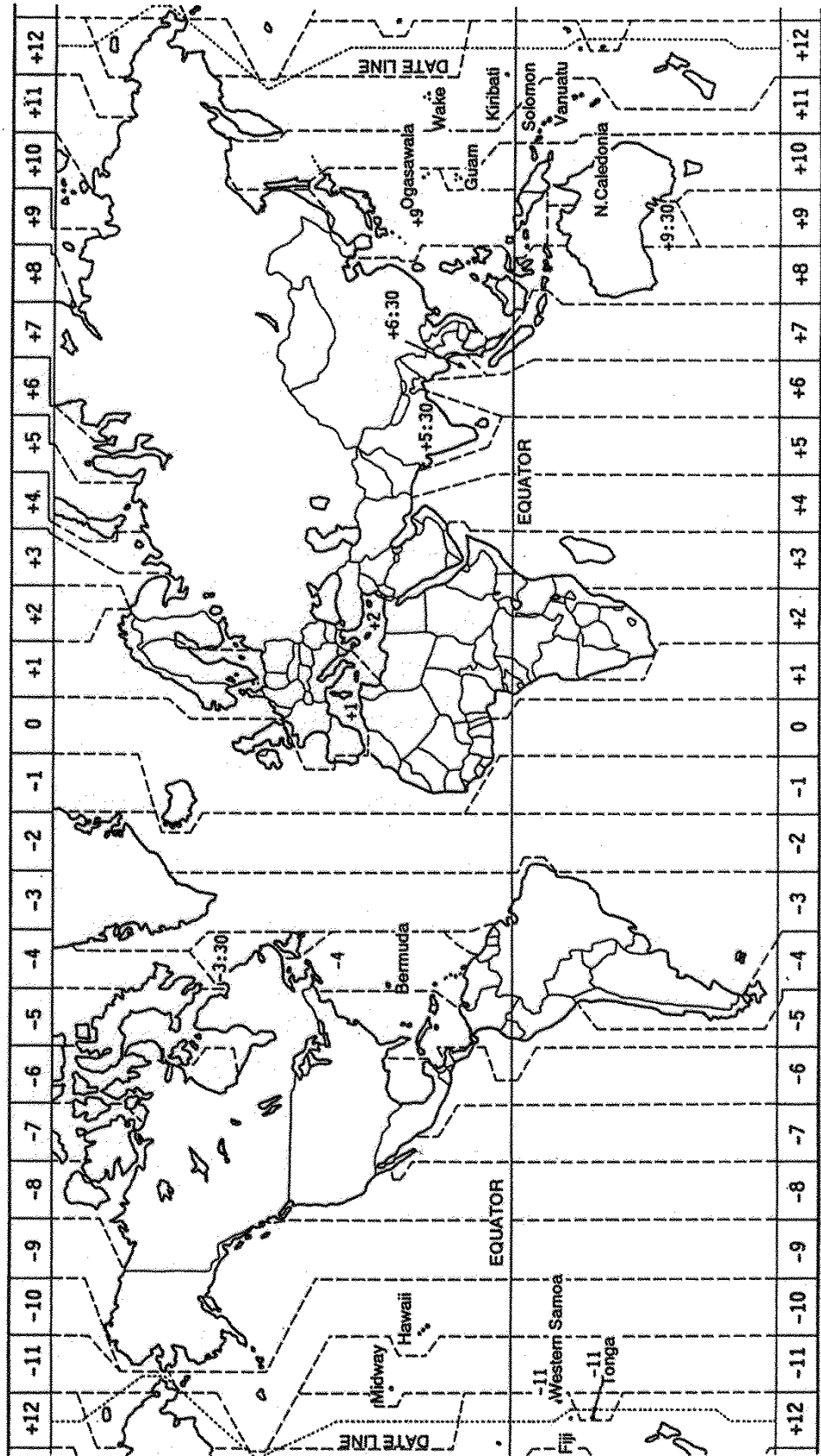
Icons

Icon	Meaning
	North marker. Points to North.
	Correct chart and suitable scale - full chart reliability.
	Chart overenlarged.
	Chart card not inserted. Wrong chart card inserted. Chart scale too small.
	Plotter, sounder alarm setting violated.
H	Track is not being recorded or plotted.
	Chart offset applied.
S A V E	Voyage-based route being created.
L/L	Latitude and longitude position offset applied.
S I M	Simulation mode
	Voltage of battery on circuit board in display unit is low. Contact your dealer about replacement.

SPECIFICATIONS OF THE MARINE RADAR
MODEL 1722/1732/1742/1752/1762
MODEL 1722C/1732C/1742C/1752C/1762C

1. GENERAL

1.1. Indication System

    M1722 series   PPI Daylight display, raster scan, 4 tones monochrome LCD

    M1722C series   PPI Daylight display, raster scan, color LCD

1.2. Range, Pulse length (PL) & Pulse Repetition Rate (PRR)

Range (nm)	Pulse length (µs)	PRR (Hz approx.)
0.125 to 1.5	0.08	2100
1.5 to 3	0.3	1200
3 to 48*	0.8	600

    *Maximum Range: M1722/C: 24nm, M1732/1742/1752 (C): 36nm, M1762/C: 48nm

1.3. Range Resolution   M1722/1732/1742/1762 (C): 29 m, M1752/C: 39 m

1.4. Bearing Resolution   M1722/C: 6.7°, M1732/C: 5.5°, M1742/C: 5.0°,

                                  M1752/C: 4.5°, M1762/C: 3.9°

1.5. Minimum Range   M1722/1732/1742/1762 (C): 41 m, M1752/C: 46 m

1.6. Bearing Accuracy   ±1°

1.7. Range Ring Accuracy   0.9 % of range or 8 m, whichever is the greater

2. SCANNER UNIT

2.1. MODEL1722/C:

2.1.1. Radiator   Micro-strip

2.1.2. Polarization   Horizontal

2.1.3. Antenna Rotation Speed   23 rpm nominal

2.1.4. Radiator Length   45 cm

2.1.5. Horizontal Beamwidth   less than 5.2°

2.1.6. Vertical Beamwidth   25°

2.1.7. Sidelobe Attenuation   less than -20 dB

2.2. MODEL1732/C:

2.2.1. Radiator   Printed waveguide array

2.2.2. Polarization   Horizontal

2.2.3. Antenna Rotation Speed   24 rpm nominal

2.2.4. Radiator Length   60 cm

2.2.5. Horizontal Beamwidth   less than 4°

2.2.6. Vertical Beamwidth   20°

2.2.7. Sidelobe Attenuation   less than -18 dB

2.3.   MODEL1742/C:

2.3.1. Radiator   Slotted waveguide array

2.3.2. Polarization   Horizontal

2.3.3. Antenna Rotation Speed   24 rpm nominal

2.3.4. Radiator Length   60 cm

2.3.5. Horizontal Beamwidth   less than 3.5°

2.3.6. Vertical Beamwidth   30°

2.3.7. Sidelobe Attenuation   less than -20 dB

2.4.   MODEL1752/C:

2.4.1. Radiator   Slotted waveguide array

2.4.2. Polarization   Horizontal

2.4.3. Antenna Rotation Speed   24 rpm nominal

2.4.4. Radiator Length   65 cm

2.4.5. Horizontal Beamwidth   less than 4.0°

2.4.6. Vertical Beamwidth   30°

2.4.7. Sidelobe Attenuation   less than -20 dB

2.5.   MODEL1762/C:

2.5.1. Radiator   Slotted waveguide array

2.5.2. Polarization   Horizontal

2.5.3. Antenna Rotation Speed   24 rpm nominal

2.5.4. Radiator Length   100 cm

2.5.5. Horizontal Beamwidth   less than 2.4°

2.5.6. Vertical Beamwidth   27°

2.5.7. Sidelobe Attenuation   less than -24 dB

3. TRANSCEIVER MODULE

3.1.   Frequency and Modulation   9410 MHz ±30MHz (X band), P0N

3.2.   Peak Output Power   M1722/1742/1722C/1742C: 2 kW nominal,

                                   M1732/1752/1762/1732C/1752C/1762C: 4 kW nominal

3.3.   Modulator   FET Switching Method

3.4.   Intermediate Frequency   60 MHz

3.5.   Tuning   Automatic

3.6.   Receiver Front End   MIC (Microwave IC)

3.7.   Bandwidth   M1722/1732/1742/1762 (C): 7 MHz,

                                   M1752/C: 3 MHz (L)/ 10MHz (S/M)

3.8.	Duplexer	Circulator with diode limiter
3.9.	Warming up	M1722/1722C: 60 sec. approx.
		M1732/1742/1752/1762(C): 90 sec. approx.

4. DISPLAY UNIT

4.1. Display

M1722 /1732/1742/1752/1762:

   7 inch rectangular monochrome LCD, 240(H) x 320(V) dots,

   Effective radar display area: 216 x 216 dots

M1722C/1732C/1742C/1752C/1762C:

   7 inch rectangular color LCD, 234(H) x 320(V) dots,

   Effective radar display area: 216 x 216 dots

4.2. Range, Range Ring Interval (RRI), Number of Rings

Range (NM)	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6	8	12	16	24	36	48
RRI (NM)	0.0625	0.125	0.125	0.25	0.25	0.5	0.5	1	1	2	2	3	4	6	12	12
Number of Rings	2	2	4	3	4	3	4	3	4	3	4	4	4	4	3	4

Maximum range: M1722/C: 24nm, M1732/1742/1752(C): 36nm, M1762/C: 48nm

4.3.	Markers	Heading Line, Bearing Scale, Range Rings,
		Variable Range Marker (VRM), Electronic Bearing Line (EBL),
		Alarm Zone, Waypoint Mark (navigation input required)
4.4.	Alphanumeric Indications	Range, Range Ring Interval, Interference Rejection (IR),
		Variable Range Marker (VRM), Electronic Bearing Line (EBL),
		Stand-by (ST-BY), Guard Alarm (G(IN), G(OUT)),
		Echo Stretch (ES), Echo Tailing (TRAIL), Trailing Time,
		Watchman (WATCHMAN),
4.5.	Input Data	IEC 61162-1
	Own ship's position:	GGA>RMC>RMA>GLL
	Ship's speed:	RMC>RMA>VTG>VHW
	Bearing (True):	HDT>HDG[*1]>HDM[*1]
	Course:	RMC>RMA>VTG
	Water depth:	DPT>DBT
	Wind:	MWV>VWT>VWR
	Water Temperature:	MTW
	Time:	ZDA
		[*1]: calculated by magnetic deviation
4.6.	Output Data	
	Alarm signal	12 VDC, 100 mA or less
	NMEA 0183 Ver1.5	GGA, GLL, RMA, RMC, GTD, VTG, ZDA (GPS data required)
		RMB, WPL, BWC or BWR, APB, AAM, BOD, XTE, VHW, MTW,

DPT or DBT, DBS (ETR required), TTM (ARPA required)

5. PLOTTER FUNCTION

5.1.	Projection	Mercator
5.2.	Usable Area	85 latitude or below
5.3.	Effective Area	133.4 x 97.3 mm
5.4.	Display pixels	240 x 320 dots (M1722 series), 234 x 320 dots (M1722C series)
5.5.	Position Indication	Latitude/longitude, Loran C LOP or DECCA LOP
5.6.	Effective Projection Area	0.125 nm to 1,024 nm (at equatorial area)
5.7.	Track Display	Plot interval: by time (1 s to 99 m 59 s) or
		by distance (0 to 99.9 nm)
5.8.	Colors	Red, yellow, green purple, light-blue, blue, white
5.9.	Memory Capacity	Track/mark: 8000 points, Waypoint: 999 points
5.10.	Storage Capacity	Simple route: 200 routes with 35 waypoints each
5.11.	MOB	1 point
5.12.	Quick Routes	1 course with 35 waypoints max.
5.13.	Electronic Chart	FURUNO chart card or NAVIONICS chart card available
		C-MAP chart card also available for C-MAP NT Model
5.14.	Alarms	Arrival and Anchor watch, Cross track error and proximity alarms,
		Ship's speed in and out alarms, Water temperature, Trip alarm,
		Bottom alarm, Fish alarm (ETR required)

6. POWER SUPPLY

6.1. Rated Voltage/Current

M1722	12-24 VDC: 3.8-1.9 A
M1732	12-24 VDC: 3.8-1.9 A
M1742/1752	12-24 VDC: 4.6-2.3 A
M1762/1752C	12-24 VDC: 5.4-2.7 A
M1722C	12-24 VDC: 4.0-2.0 A
M1732C	12-24 VDC: 4.0-2.0 A
M1742C	12-24 VDC: 5.0-2.5 A
M1762C	12-24 VDC: 6.0-3.0 A

6.2. Rectifier

PR-62 (option for M1722/1732 (C))

100/110/115/200/220/230 VAC, 1 phase, 50/60 Hz

RU-3423 (option for M1742/1752/1762 (C))

100/110/115/200/220/230 VAC, 1 phase, 50/60 Hz

7. ENVIRONMENTAL CONDITION

7.1.	Ambient Temperature	Scanner Unit: -25°C to +70°C
	(IEC 60945)	Display Unit: -15°C to +55°C
7.2.	Relative Humidity	93 % or less at +40°C
7.3.	Waterproofing	Scanner Unit: IPX6
	(IEC 60529)	Display Unit: IPX5
7.4.	Bearing Vibration	IEC 60945

8. COATING COLOR

8.1.	Display Unit	N3.0
8.2.	Scanner Unit	
	M1722/1732 (C)	N9.5 (upper), 2.5PB3.5/10 (lower)
	M1742/1752/1762 (C)	N9.5

9. COMPASS SAFE DISTANCE

9.1.	Display Unit	
	M1722 series	Standard: 0.70 m Steering: 0.50 m
	M1722C series	Standard: 0.65 m Steering: 0.45 m
9.2.	Scanner Unit	
	M1722/C	Standard: 1.25 m Steering: 0.85 m
	M1732/C	Standard: 1.40 m Steering: 1.10 m
	M1742/C	Standard: 2.10 m Steering: 1.60 m
	M1762/C	Standard: 1.00 m Steering: 0.75 m
	M1752/C	Standard: 1.50 m Steering: 1.00 m

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Declaration of Conformity $C \in 0560$

We   FURUNO ELECTRIC CO., LTD.

(Manufacturer)

9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan

(Address)

declare under our sole responsibility that the product

7" monochrome LCD radar Models 1722 (ø460 mm radome, 2.2 kW), 1732 (ø602 mm radome, 4 kW), 1742 (665 mm open, 2.2 kW) and 1762 (1035 mm open, 4 kW) with optional GPS receiver GP-310B for recreational crafts
(Serial No. 4305-0020 for Model 1722)

(Model name, type number(s))

are in conformity with the essential requirements as described in the Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment (R&TTE Directive) and satisfies all the technical regulations applicable to the product within this Directive

EN 60945: 1997-01 (IEC 60945 Third edition: 1996-11)
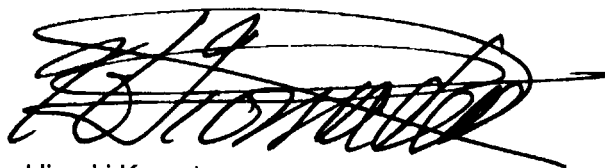KSR 142: October 1985, Annex 1
ITU-RR. App. S3: ed. 1998, Appendix S3, table 2

(title and/or number and date of issue of the standard(s) or other normative document(s))

For assessment, see

• Statement of Opinion N° 01214051/AA/00 of 15 May 2001 issued by KTL Certification, The Netherlands

• Test report s FLI 12-00-001, FLI 12-01-002, FLI 12-01-003, FLI 12-01-029, FLI 12-01-030, FLI 12-01-031, FLI 12-01-015 prepared by Furuno Labotech International Co., Ltd., Japan

• Test report 96303200 prepared by Telefication bv, the Netherlands

• Test report TI-1477 prepared by Furuno Electric Co., Ltd., Japan

On behalf of Furuno Electric Co., Ltd.

Hiroaki Komatsu
Manager,
International Rules and Regulations

Nishinomiya City, Japan
May 22, 2001

(Place and date of issue)   (name and signature or equivalent marking of authorized person)