

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 options.

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 language, key beep, units of measurement, data sources, etc.

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

GENERAL SETUP1	
► KEY BEEP	ON
LANGUAGE	ENGLISH
RANGE UNIT	nm, kt
TEMPERATURE UNIT	°F
DEPTH UNIT	ft
TEMPERATURE SOURCE	NMEA
DEPTH SOURCE	NMEA
RESET TRIP LOG	NO
EDIT	
NEXT PAGE	
RETURN	

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GENERAL SETUP2	
► LAT/LON DISPLAY	DD°MM.MMMM'
TD DISPLAY	LORAN C
SPEED	SOG
POSITION DISPLAY	LAT/LON
TIME DISPLAY	24 HOURS
INFRARED REMOTE MODE	A
RANGE & BEARING MODE	RHUMB LINE
BEARING READOUT	MAGNETIC
MAGNETIC VARIATION	AUTO 07.0°E
EDIT	
PREV. PAGE	

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General setup menu

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

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Contents of general setup menu

Item	Description	Settings	Default Setting
Key Beep	Turns key 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, P/B (Passi/Braza)	ft
Temperature Source	Chooses source of water temperature data.	ETR, NMEA. Select ETR to show water temperature data fed from the network sounder.	NMEA
Depth Source	Chooses source of depth data.	ETR, NMEA. Select ETR to show depth data fed from the network sounder.	NMEA
Reset Trip Log	Resets distance run to zero.	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

(Continued on next page)

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

Item	Description	Settings	Default Setting
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, then hit the ENTER soft key to set. "AUTO" requires position data.	Auto, Manual	Auto (07.0°W)

5.2 Radar Setup

This paragraph explains how to customize the radar display to suit your operational needs.

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.

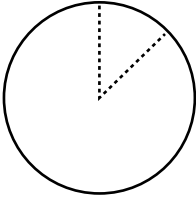
1. Press the [MENU] key to show the main menu.
2. Press the RADAR DISPLAY SETUP soft key.

► EBL REFERENCE	RELATIVE	DISPLAY SETUP EDIT D. BOX RETURN
CURSOR POSITION	RNG & BRG-REL	
TUNING	AUTO	
TX SECTOR BLANKING	OFF 000° 001°	
NOISE REJECTION	OFF	
BACKGROUND COLOR	BLACK/GREEN	
ECHO COLOR	GREEN	
2ND ECHO REJECTION	OFF	
WATCHMAN TIME	5 minutes	
RANGE UNIT	nm	
TRAIL MODE	RELATIVE	

Radar display setup menu

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Contents of radar display setup menu

Item	Description	Settings	Default Setting
EBL Reference	References EBL bearing, shown in the EBL data box, to North (True) or heading (Relative). Relative with no heading input. True only in course-up, north-up and true motion.	True, Relative	Relative
Cursor Position	Chooses how to display cursor position. Note: "RNG & BRG-TRUE" requires heading data, true bearing. Reverts to relative bearing when heading data is lost.	<u>LAT/LON:</u> Lat/Long position of cursor <u>TD:</u> Loran C or Decca TDs <u>RNG & BRG-REL:</u> Range and bearing in relative bearing. <u>RNG & BRG-TRUE:</u> Range and bearing in true bearing.	RNG & BRG-REL
Tuning	Selects receiver tuning method. For further details see the paragraph "2.6 Tuning."	Auto, Manual	Auto
TX Sector Blanking	Turns on/off dead sector graphic, which shows area where no echoes are transmitted. To set sector, select ON, then enter range. Max. sector is 135°. Dashed lines mark the dead sector. Note that noise may occasionally appear in the TX sector when the echo trail feature is turned on.  <i>Dead sector</i>	On, Off	Off (0°)
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

(Con't on next page)

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

Item	Description	Settings	Default Setting
Background Color	Chooses colors of background, range rings and characters. Effective when HUE soft key is set for MANUAL.	<u>Black/Green</u> Background: Black Rings: Green Characters: Green <u>Black/Red</u> Background: Black Rings: Green Characters: Red <u>Blue/White</u> Background: Blue Rings: White Characters: White <u>DK Blue/White</u> Background: Dark Blue Rings: Green Characters: Red <u>White/Green</u> Background: White Rings: Green Characters: Green	Black/Green
Echo Color	Chooses echo color.	Yellow, Green, Multi-color. (Multi-color shows echoes in red, yellow or green in order of descending strength.)	Green
2ND Echo Rejection	Reduces second-trace echoes. See the paragraph "2.24 Suppressing Second-trace Echoes."	On, Off	Off
Watchman Time	Sets watchman stand-by period. For further details see the paragraph "2.23 Watchman."	5, 10, 20 minutes	5 minutes
Range Unit	Select unit of range measurement.	nm, km, sm	nm
Trail Mode	Sets echo trail reference. Note: Relative trail is available in all presentation modes except true motion. True trail is available in all modes.	True: Echo trails plotted in actual courses and speeds. Requires compass signal and speed input. Relative: Echo trails move relative to own ship.	Relative

5.2.2 Radar range setup

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

At least two ranges (excluding maximum range) must be turned on. When less than two ranges are turned on you cannot escape from the RADAR RANGE SETUP menu.

Note that this function is not available with the GD-1900C.

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

0.25nm ON

0.5nm ON

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 OFF

48nm OFF

64nm OFF

72nm OFF

MAXIMUM RANGE XXnm*

RANGE SETUP

ON/OFF

RETURN

► 0.25km ON

0.5km ON

0.75km ON

1km ON

1.5km OFF

2km ON

3km OFF

4km ON

6km OFF

8km ON

12km OFF

16km ON

24km OFF

36km OFF

48km OFF

64km OFF

72km OFF

MAXIMUM RANGE XXkm*

RANGE SETUP

ON/OFF

RETURN

* = 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 trackball to select the range which you want to turn on or off.
4. Press the ON/OFF soft key to turn a range on or off as appropriate.
5. Press the RETURN soft key to register settings.
6. Press the [MENU] key to close the menu.

Model	Maximum Range
1833C	36 nm, km, sm
1933C	48 nm, km, sm
1943C	64 nm, km, sm
1953C	72 nm, km, sm

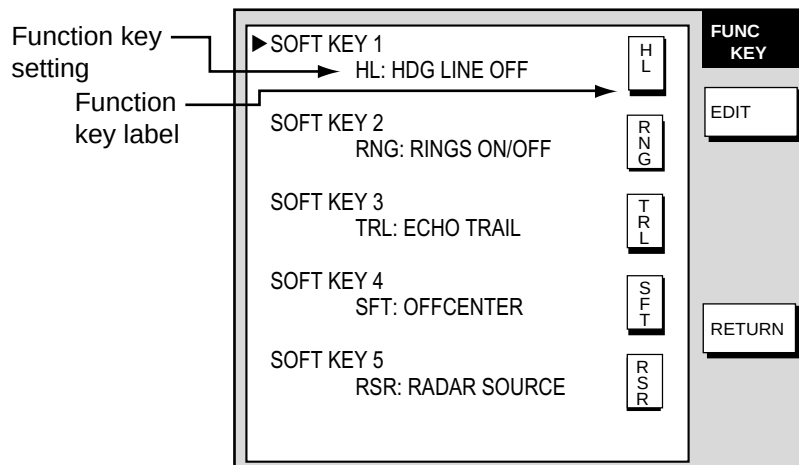
5.2.3 Function key setup

The function keys provide one-touch execution 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	Radar source	RSR

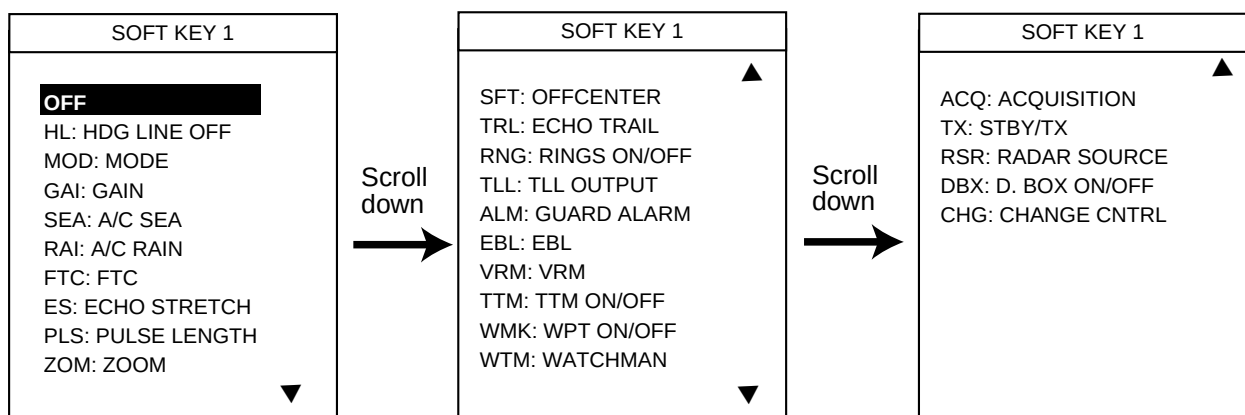
If the above settings are not to your liking you may change them as follows:

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, then press the EDIT soft key.



Radar function key options

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4. Select function desired with the trackball, then 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 A/C SEA adjustment window.	SEA
RAI: A/C RAIN	Shows A/C RAIN adjustment window.	RAI
FTC: FTC	Displays FTC window. Available with Model 1700 series radar. Inoperative otherwise.	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 VRM1 and VRM2 with each press.	VRM
TTM: TTM ON/OFF	Turns TTM (Tracked Target Message) display 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 1800/1900 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

Note: To use CHANGE CNTRL set it on all displays, with the same soft key number.

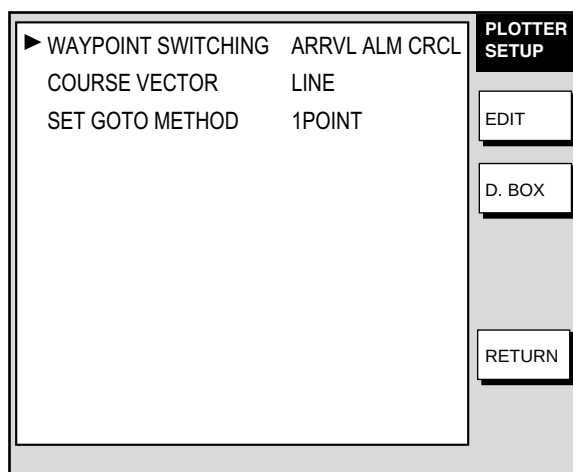
5.3 Plotter Setup

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, then press the [MENU] key open the main menu.
2. Press the PLOTTER SETUP soft key.



Plotter setup menu

Contents of plotter setup menu

Item	Description	Settings	Default Setting
Waypoint Switching	Chooses waypoint switching method. See "switching waypoints" on page 3-50.	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 "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.		

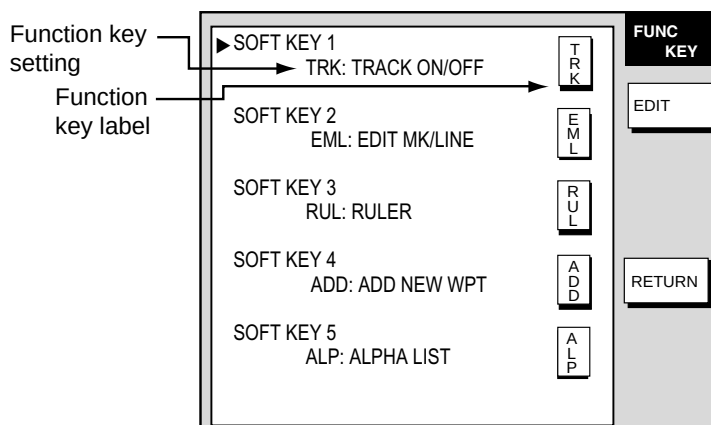
5.3.2 Function key setup

The function keys provide one-touch execution 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.	APL

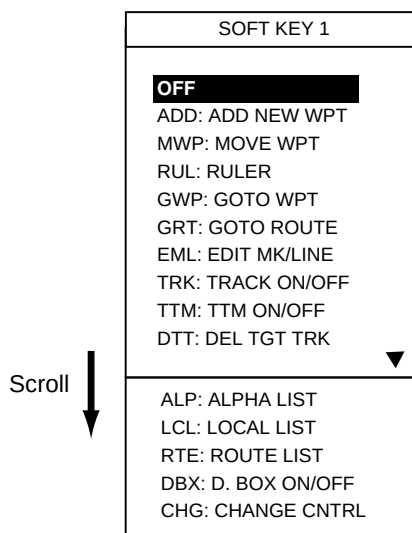
If the above settings are not to your liking you may change them as follows:

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, then 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 trackball, then press the ENTER soft key or [ENTER] knob to register your selection.
5. 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, press function key, select new position, then press the [ENTER] knob.	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 waypoint name in window, then press the ENTER soft key.	GWP
GRT: GOTO ROUTE	Specify route to follow. Enter route name in window, then 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 press starts or stops recording/plotting own ship's 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

Note: To use CHANGE CNTRL set it on all displays, with the same soft key number.

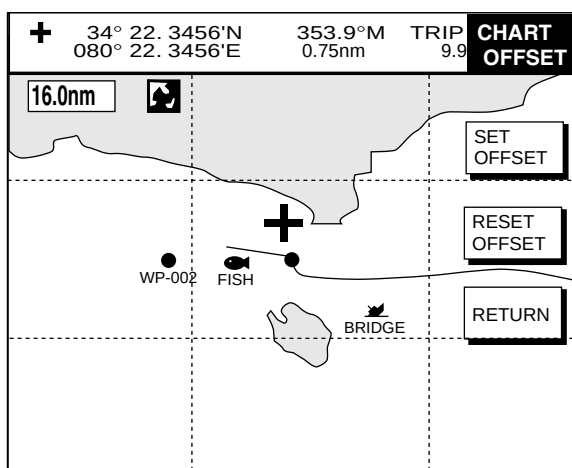
5.4 Chart Setup

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.

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



Plotter display, chart offset selected

2. Use the trackball to place the cursor at the correct latitude and longitude position of own ship.
3. Press the SET OFFSET soft key.
4. Press the [MENU] key to close the menu. The “chart offset icon” (📏) appears at the top of the display.

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

5.4.2 FURUNO, NavCharts™ chart attributes

FURUNO, NavCharts™ chart 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.

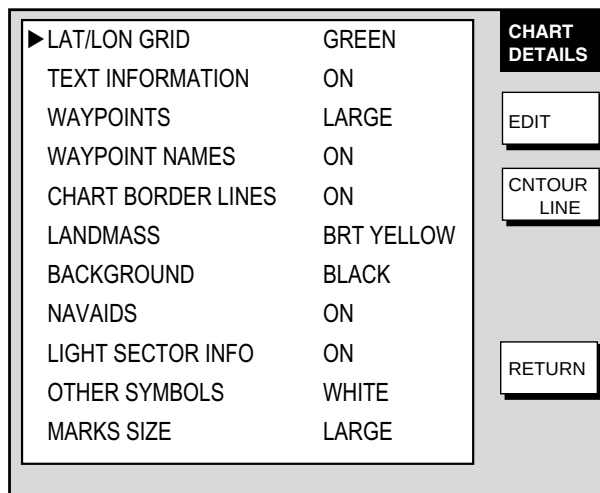


Chart details menu (FURUNO, NavCharts™)

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Contents of chart details menu (FURUNO, NavCharts™)

Item	Description	Settings	Default Setting
Lat/Lon Grid	Latitude and longitude grids	Red, yellow, green, light-blue, purple, blue, white, Off	Green
Text Information	Geographic place, name	On, Off	On
Waypoints	Waypoint size	Large, Small, Off	Large
Waypoint Names	Waypoint name	On, Off	On
Chart Border Lines	Border lines (indices)	On, Off	On
Landmass	Landmass color, brightness	Bright, Dim: Red, yellow, green, light-blue, purple, blue, white. Off	Brt, Yellow
Background	Chart background color	White, Black	Black
Nav aids	Nav aids data on NavCharts™; lighthouse data on FURUNO charts	On, Off	On
Light Sector Info	Lighthouse viewing sector	On, Off	On
Other Symbols	Other map symbols	Red, yellow, green, light-blue, purple, blue, white, Off	White
Marks Size	Marks size	Large, Small	Large
CNTOUR LINE soft key (See next page.)	Depth < 10 m	On, off, red, yellow, green, light-blue, purple, blue, white	On, Red
	Depth = 10 m	On, off, red, yellow, green, light-blue, purple, blue, white	On, Yellow
	Depth > 10 m	On, off, red, yellow, green, light-blue, purple, blue, white	On, Light-blue
	Depth Info	On, off, red, yellow, green, light-blue, purple, blue, white	On, Red

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.

CNTOUR LINE	
▶ DEPTH < 10m	RED
DEPTH = 10m	YELLOW
DEPTH > 10m	LIGHT BLUE
DEPTH INFORMATION	RED
10m = APPROX. 30ft OR 5fa OR 6pb	
EDIT	
RETURN	

*Contour line menu (FURUNO, NavCharts™)***5.4.3 C-MAP chart attributes**

C-MAP chart attributes may be turned on or off from the CHART DETAILS menu as follows:

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

CHART DETAILS	
▶ WAYPOINT	PLOTTER/OVERLAY
WAYPOINT NAME	PLOTTER/OVERLAY
LAT/LON GRID	PLOTTER/OVERLAY
CHART BORDER LINE	PLOTTER/OVERLAY
BACKGROUND COLOR	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
EDIT	
DEPTH INFO	
NEXT PAGE	
RETURN	

Page 1

CHART DETAILS	
▶ 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
EDIT	
DEPTH INFO	
PREV. PAGE	

Page 2*Chart details menu (C-MAP)*

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Contents of chart details menu (C-MAP)

Item	Description	Settings	Default Setting
Waypoint	Waypoint display	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Waypoint Name	Waypoint name	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Lat/Lon Grid	Latitude and longitude grids	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Chart Border Line	Border lines (indices)	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Background Color	Chart background color	White, Black	Black
Port & Service	Port services icon display	Plotter/Overlay, Plotter, Off	Plotter
Attention Area	Attention area icon display	Plotter/Overlay, Plotter Plotter/Contour, Off	Plotter/Contour
Nav Lane	Navigation lanes	Plotter/Overlay, Plotter, Off	Plotter
Light	Lighthouse icon, sector	Plotter/Overlay, Plot/No Sector, Off	Plotter/Overlay
Buoy & Beacon	Buoys, beacons display	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Signal	Signals category icon	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Cartographic Object	Cartographic objects category icon	Plotter/Overlay, Plotter, Off	Plotter
Place Name	Geographic names	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Compass	Compass category icons	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Tide & Current	Tide display	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Natural Feature	Land outline	Plotter/Overlay, Plotter, Off	Plotter/Overlay
River & Lake	Rivers and lakes	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Cultural Feature	Cultural features icons	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Landmark	Landmarks category icons	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Chart Generation	Chart generation category icons	Plotter/Overlay, Plotter, Off	Plotter/Overlay
New Object	New object category icons	Plotter/Overlay, Plotter, Off	Plotter/Overlay
Complex Object Icon	Single or multiple icon for object composed of several icons	Multiple, Single	Multiple
Information Level	Basic or detailed data for objects	Basic, Detailed	Basic

(Con't on next page)

Contents of chart details menu for C-MAP (con't from previous page)

Item	Description	Settings	Default Setting
DEPTH INFO soft key (See below.)	Bathymetric Line	Plotter/Overlay, Plotter, Off	Plotter/Overlay
	Spot Sounding	Plotter/Overlay, Plotter, Off	Plotter/Overlay
	Bottom Type	Plotter/Overlay, Plotter, Off	Plotter/Overlay
	Depth Area Limit	0-99999 ft (m, fa, P/B)	20,164 ft (6, 50 m, 3, 27 fa, 4, 30 P/B)
	Bathymetric Range	0-99999 ft (m, fa, P/B)	0-33 ft (0-10 m, 0-6 fa, 0-6 P/B)

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: Shows item on plotter display. Sector not shown.

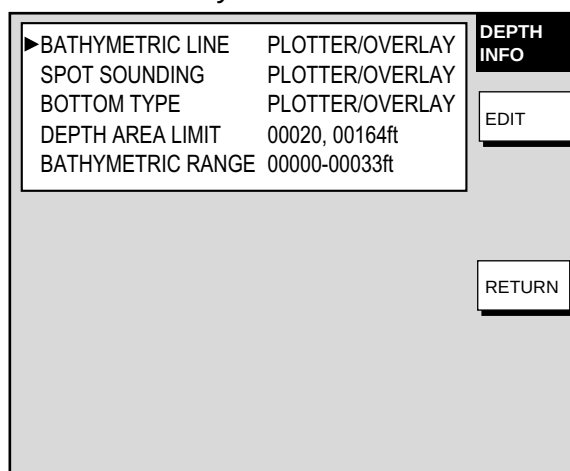
Plotter/Contour: Shows contour on plotter display.

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.



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 radar, plotter 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.

Plotter mode: PLOTTER SETUP, D. BOX

Radar mode: RADAR DISPLAY SETUP, D. BOX

Sounder mode: SOUNDER MENU, D. BOX

► DATA BOX SIZE	SMALL	DATA BOX
POSITION	ON	
WAYPOINT	OFF	EDIT
COG	ON	
SOG	ON	
STW	OFF	
BEARING	OFF	
RANGE	OFF	
TIME TO GO	OFF	
ETA	OFF	
TEMPERATURE	OFF	
DEPTH	OFF	
TRIP LOG	ON	RETURN
DATE	OFF	
TIME	OFF	
WIND	OFF	

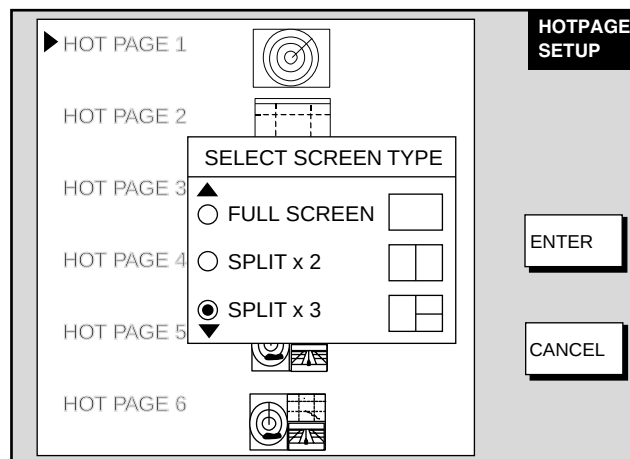
Data box menu

4. Use the trackball to select an item, 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

Six user-arrangeable hot pages are provided for quick selection of desired display. If the default hot pages are not to your liking you may change them as shown below.

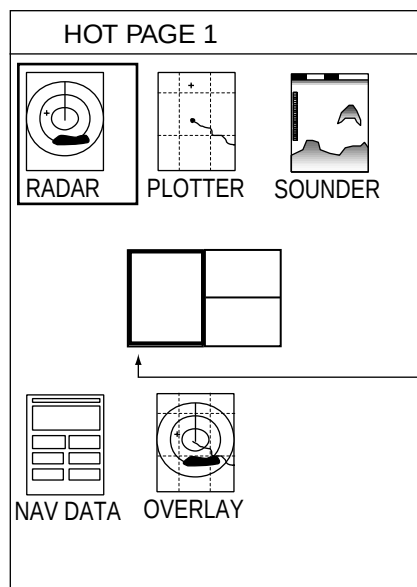
1. Press the [MENU] key followed by pressing the SYSTEM CONFIGURATION, SYSTEM SETUP, HOT PAGE & NAV DISP SETUP and HOT PAGE SETUP soft keys in that order.
2. Use the trackball to select the hot page number to set, then press the EDIT soft key. The "SELECT SCREEN TYPE" window appears.



Hot page setup menu

3. Use the trackball to select screen type desired among FULL SCREEN, SPLIT X 2 and SPLIT X 3 and push the [ENTER] knob.

For the full-screen display, rotate the [ENTER] knob to select screen desired, then press the [ENTER] knob. If you selected a split screen, for example, SPLIT X 3, the display now looks as in the figure below.

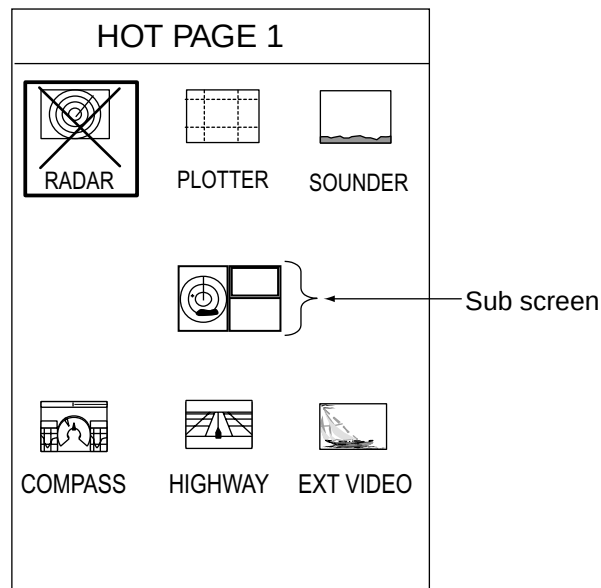


Red cursor shows
current screen selection

Hot page setup menu, SPLIT X 3 screen, main screen selection

5. CUSTOMIZING YOUR UNIT

4. Rotate the [ENTER] knob to select a main screen, then press the [ENTER] knob. For example, select the radar display. Your choice is then marked with an "X" to show that it has been selected.



Hot page setup menu, SPLIT X 3 screen, sub screen selection

5. Rotate the [ENTER] knob to select the screen to show at the top right 1/4 screen, then press the [ENTER] knob or the ENTER soft key.
6. Rotate the [ENTER] knob to select the screen to show at the bottom right 1/4 screen, then press [ENTER] knob or the ENTER soft key.

Note: The SELECT WINDOW soft key functions to select the window to process.

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

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.

NAV SETUP	
► POSITION SOURCE	ALL
SPEED AVERAGING*	0060second(s)
LOCAL TIME OFFSET*	+00:00
TEMP CALIBRATION	00°F
DEPTH CALIBRATION	00ft

EDIT

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 port) LC: Loran C navigator (via NETWORK or NMEA port) ALL: Multiple navaid connection (via NETWORK or NMEA port)	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 seconds	60 seconds
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 hours	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

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	+00:00	GPS SETUP EDIT GPS STATUS RETURN
GEODETIC DATUM	WGS-84	
POSITION SMOOTHING	000 second (s)	
SPD/CSE SMOOTHING	005 second (s)	
GPS SPEED AVERAGING	060 second (s)	
LATITUDE OFFSET	0.000°N	
LONGITUDE OFFSET	0.000°E	
DISABLE SATELLITE	-- -- --	
LATITUDE	45°35.000°N	
LONGITUDE	125°00.000°W	
ANTENNA HEIGHT	005 m	
GPS FIX MODE	2D/3D	
COLD START	NO	

GPS setup menu

Contents of GPS setup menu

Item	Description	Settings	Default Setting
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 hours	00:00
Geodetic Datum	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 latitude and longitude. 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

(Con't on next page)

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

Item	Description	Settings	Default Setting
Position Smoothing	When the DOP or receiving condition is unfavorable, the GPS fix may change greatly, even if the vessel is not moving. 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 latitude and longitude will be too long. This is especially noticeable if the vessel is moving fast. Increase the setting if the GPS fix changes randomly.	0-999 seconds	0 seconds (no position smoothing)
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 random variance by increasing the 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 zeroes.	0-999 seconds	5 seconds
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 seconds	60 seconds
Latitude, Longitude Offset	Offsets latitude position to further refine position accuracy.	0.001'S – 9.999'N 0.001'E – 9.999'W	0.0' (no offset)

(Con't on next page)

5. CUSTOMIZING YOUR UNIT

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

Item	Description	Settings	Default Setting
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), then press the ENTER soft key.	Max. 3 satellites	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 SETUP
► GRI	9940 11-27	
U.S. WEST COAST		
CORRECTION 1	+000.0 µs	
CORRECTION 2	+000.0 µs	EDIT
DECCA		RETURN
CHAIN	01 R-G	
S BALTIC		
CORRECTION 1	+00.00 lane	
CORRECTION 2	+00.00 lane	

TD setup menu

Displaying Loran C TDs

1. Select GRI, then 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. Adjust the trackball upward or downward to select GRI code.
3. Roll the trackball rightward to show the display below, to enable selection of station pair.

GRI & STATION PAIR	
9940 ◀	▲ 11-27 ▼
U.S. WEST COAST	

Loran C GRI & station pair window

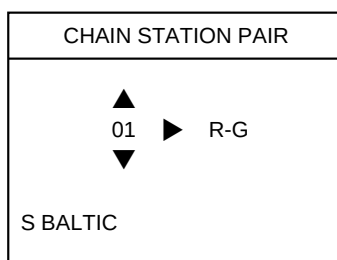
4. Adjust the trackball vertically to select station pair.
5. Press the ENTER soft key to register your selection.

5. CUSTOMIZING YOUR UNIT

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

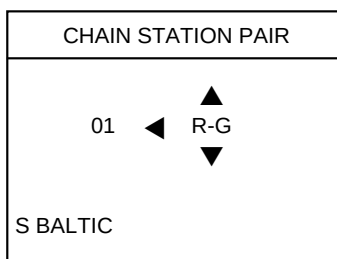
Displaying DECCA TDs

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



Decca chain and station pair window

2. Adjust the trackball upward or downward to select Decca chain number.
3. Roll the trackball rightward to show the display below, to enable selection of station pair.



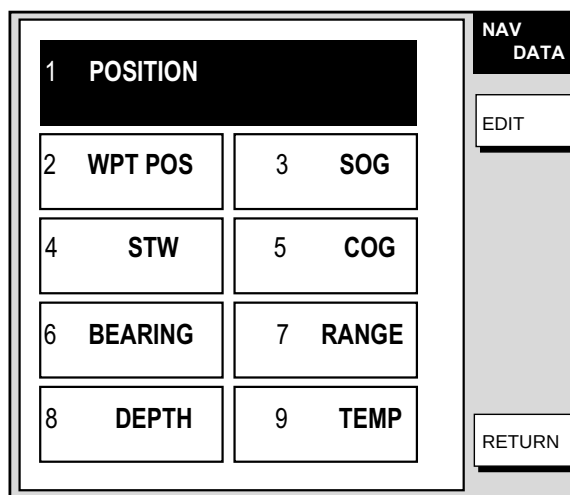
Decca chain and station pair window

4. Adjust the trackball upward or downward to select station 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, then press the EDIT soft key. Enter correction value with the trackball and alphanumeric keys. Use the + < - -> - soft key to switch from plus to minus and vice versa. Press the ENTER soft key or push the [ENTER] knob.
7. Press the RETURN soft key twice.
8. Press the GENERAL SETUP soft key followed by the NEXT PAGE soft key.
9. Select "DECCA" from "TD DISPLAY" and "TD" from "POSITION DISPLAY."
10. Press the [MENU] key twice to close the menu.

5.8 Nav Data Display Setup

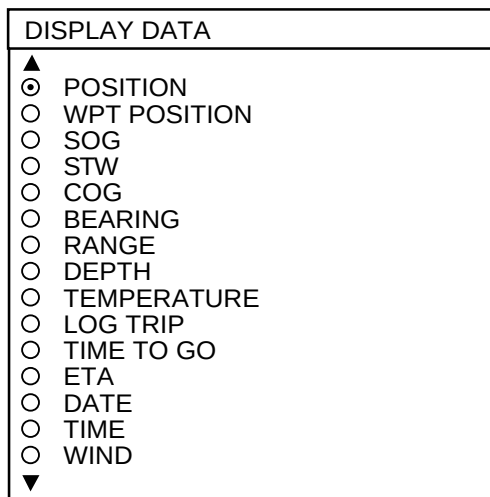
The nav data display shows various navigation data, fed from a navigator, network equipment, etc. You may select the data to display and where to display it as follows:

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 trackball to select a location.
4. Press the EDIT soft key. The following display appears.



Nav data setup window

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

5.9 Sounder Setup

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

5.9.1 System setup

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

► FISH ALARM LEVEL	MEDIUM	SYSTEM SETUP
TRANSMISSION	ON	
TVG 200 kHz	3	EDIT
TVG 50k Hz	3	SENSOR SETUP
ECHO OFFSET 200 kHz	+00	
ECHO OFFSET 50 kHz	+00	RETURN
BOTTOM LEVEL 200 kHz	+000	
BOTTOM LEVEL 50 kHz	+000	
KP PULSE	INTERNAL	
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 alarms.	High: Orange and stronger echoes trigger the alarm.* Medium: Yellow and stronger echoes trigger the alarm.* Low: Green and stronger echoes 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 from previous page)

Item	Description	Settings	Default Setting
TVG (50 kHz, 200 kHz)	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.	-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 current position to plotter where it is marked with TLL mark. Use soft key to output TLL.	ON, OFF	ON
SENSOR SETUP soft key (See next page.)	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, water temperature and depth data fed from the network sounder.

1. Show the sounder display, then 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.

SENSOR SETUP					
▶ SPEED CALIBRATION + 00% TEMP. CALIBRATION + 00°F DEPTH CALIBRATION +00ft ASCTC SPD CALIBRATION + 000m/s					
EDIT					
<table border="1"> <tbody> <tr> <td>SPEED 12.3kt</td> <td>TEMP 78.8°F</td> </tr> <tr> <td>DEPTH 125.0ft</td> <td>ACSTC SPD 1500m/s</td> </tr> </tbody> </table>		SPEED 12.3kt	TEMP 78.8°F	DEPTH 125.0ft	ACSTC SPD 1500m/s
SPEED 12.3kt	TEMP 78.8°F				
DEPTH 125.0ft	ACSTC SPD 1500m/s				
RETURN					

Sensor setup menu

3. Select item to adjust, then press the EDIT soft key.
4. Adjust the trackball upward or downward to set appropriate value.

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. Normally no adjustment is required, however if echoes are returning too slow or too fast adjust the value as appropriate. This is only used if water salinity is at an extreme level. Under normal circumstances, do not adjust.

Sensor setup menu settings

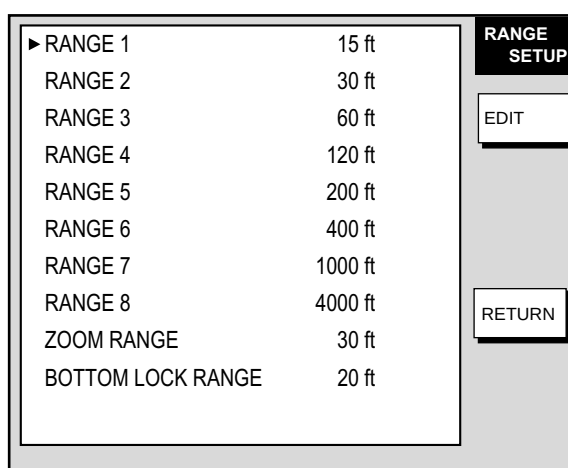
Item	Settings	Default Setting
Speed Calibration	-50 -+50%	0 (no offset)
Temperature Calibration	-40°F – +40°F	0 (no offset)
Depth Calibration	-15 - +90 ft	0 (no offset)
Acoustic Speed Calibration	-500 - +500 m/s	0 (no offset)

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

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, then press the [MENU] key to open the main menu.
2. Press the SOUNDER RANGE SETUP soft key to show the SOUNDER RANGE SETUP menu.



Sounder range setup menu

3. Select the range to change, then press the EDIT soft key.
4. Rotate the trackball or [ENTER] knob to set range desired, then press the RETURN soft key. For basic range, set depth from lowest to highest; a range cannot be higher than its succeeding neighbor.
5. Press the [MENU] key to finish.

Default basic 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 P/B	5 P/B	10 P/B	30 P/B	50 P/B	100 P/B	200 P/B	700 P/B

Setting range: 2 m –1200 m, 7 ft – 4000 ft, 2 fa – 650 fa, 1 P/B – 1000 P/B

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 P/B – 70 P/B	10 m, 30 ft, 10 fa, 10 P/B
Bottom-lock Range	3 or 6 m, 10 or 20 ft, 2 or 3 fa, 2 or 3 P/B	6 m, 20 ft, 3 fa, 3 P/B

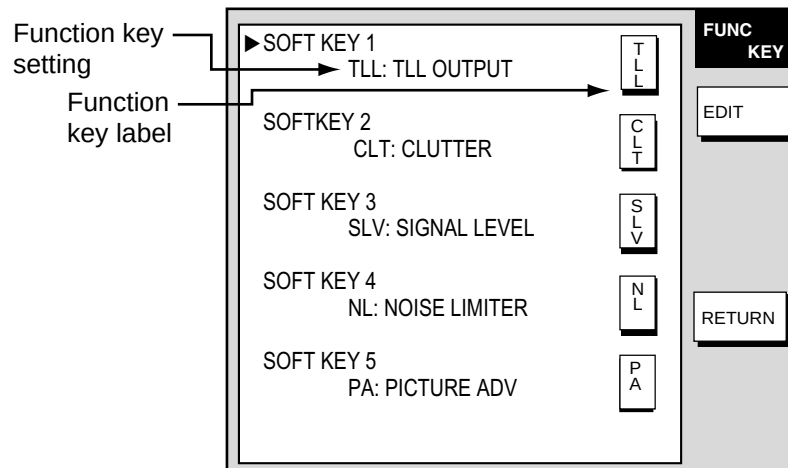
5.9.4 Function key setup

The function keys provide one-touch execution 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 current position.	TLL
2	Suppress clutter.	CLT
3	Erase weak signal.	SLV
4	Suppress noise.	NL
5	Set picture advancement speed.	PA

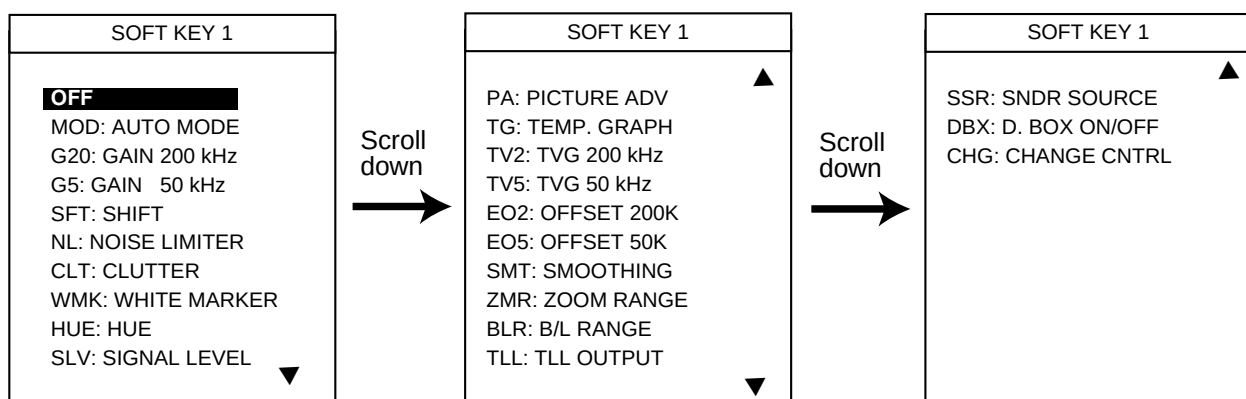
If the above settings are not to your liking you may change them as follows:

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, then press the EDIT soft key.



Sounder function key options

5. Select function desired with the trackball, then press the ENTER soft key or [ENTER] knob to register your selection.
6. 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.	G5
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.	WMK
HUE: HUE	Sets hue.	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
E02: 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.	SMZ
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 on plotter.	TLL
SSR: SNDR SOURCE	Selects source for sounder data.	SSR
DBX: D. BOX ON/OFF	Turns data boxes on/off.	DBX
CHG: CHANGE CNTRL	Switches control in combination display.	CHG

Note: To use CHANGE CNTRL set it on all displays, with the same soft key number.

6. DATA TRANSFER

This chapter provides information for saving and replaying data to and from memory cards, uploading and downloading data, loading waypoint data from Yeoman, and outputting data through the network.

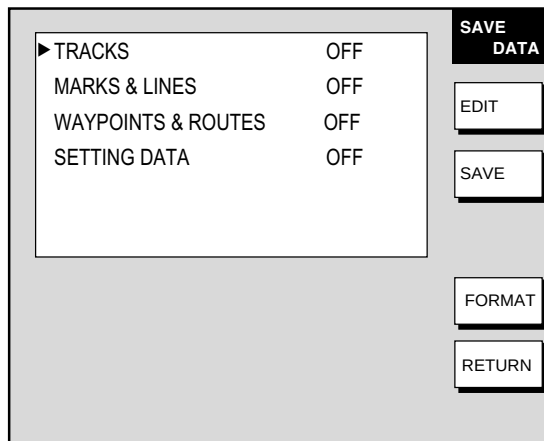
6.1 Memory Card Operations

The memory cards store these data: marks, lines, waypoints, routes, track, and setting data (plotter only).

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 data from the card.

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.



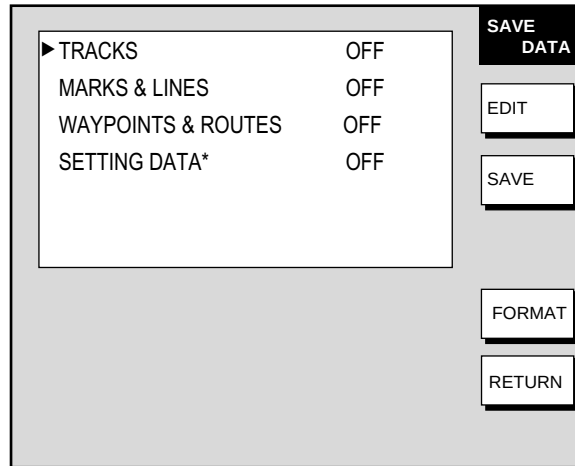
Save data menu

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 menu

3. Use the trackball to select item to save.
4. Press the EDIT soft key.
5. Use the trackball 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, then press the [ENTER] knob. The message "NOW SAVING DATA TO MEMORY CARD. DO NOT TURN OFF 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.

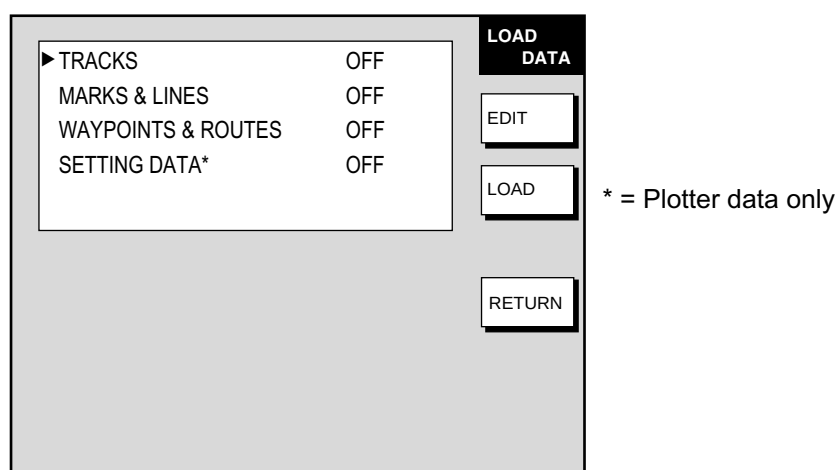
Memory card messages

Message	Reason	Remedy
Memory card is not inserted. Please insert memory 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 card, insert memory card, and then push the [ENTER] knob to continue.
Overwrite data? (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 “setting 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 IN MEMORY CARD soft key to show the LOAD DATA menu.



Load data menu

4. Use the trackball to select item to load.
5. Press the EDIT soft key. (The EDIT soft key is inoperative when no memory card is inserted or there is no data in the memory card.)
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 unit beeps and ON cannot be selected.
7. After selecting all items desired, press the LOAD soft key, then press the [ENTER] knob. The message “START LOADING 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 erased when the track memory capacity is exceeded.

Waypoints & routes: The loaded data replaces like stored data.

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 contents 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/download waypoints, routes, marks and lines from/to a PC, through the DATA 4 port at the rear of the display unit. Note that radar and sounder data cannot be uploaded or downloaded.

6.2.1 Setting communication software on the PC

The communication format (RS-232C) with the PC is as follows:

Baud Rate: 4800 bps
 Character Length: 8 bits
 Stop bit: 1 bit
 Parity: None
 X Control: XON/XOFF (fixed)

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

- Waypoint data (In alphanumeric order)
- Route data (In order of route number)
- End of sentence

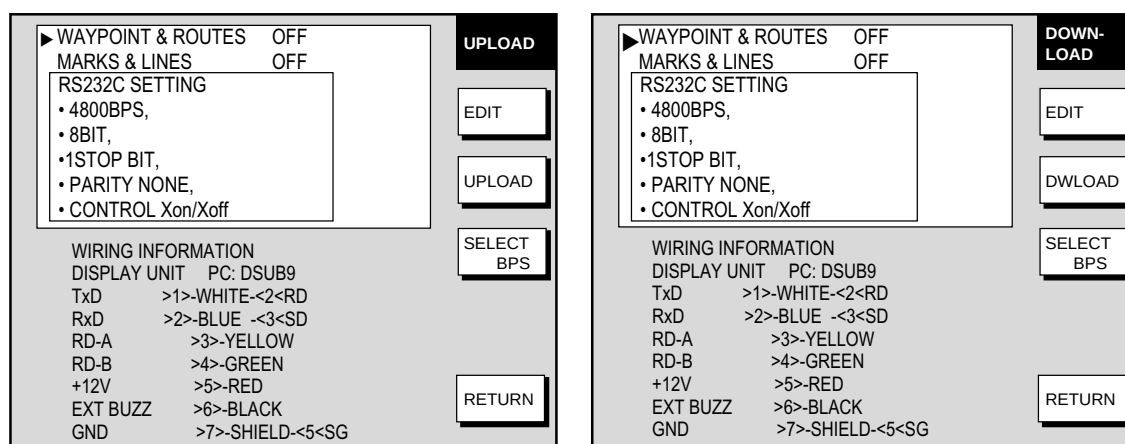
Note 1: There are two kinds of data for route data: route data and route comment data.

Note 2: DGPS position fix is not available when uploading or downloading data.

Note 3: 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/ROUTE TO PC or UPLOAD WPT/ROUTE FROM PC soft key.



Upload and download menus

6. DATA TRANSFER

- To change the baud rate, press the SELECT BPS soft key.

BAUD RATE	
▲	
⊙	4800 bps
○	9600 bps
○	19200 bps
▼	

Baud rate window

- Select baud rate, then press the ENTER soft key.
- Press the DWLOAD or UPLOAD soft key. You are asked if you are ready to download or upload waypoints and routes.
- Push the [ENTER] knob to download (upload).

Waypoint data format

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

Waypoint data format

- Waypoint latitude
- N/S
- Waypoint longitude
- E/W
- Waypoint name (Number of characters is fixed to 6 and space code is placed when the number of characters are less than 6.)
- Waypoint color
- 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.
- Information of marking waypoint. Always set to "A".
"A": Displayed
"V": Not displayed

Note 1: The following characters can be used for comments:

_ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789&#															
●	=9	■	=:	◆	=;	🐟	=<	🐟	=						
🐟	=>	🐟	=?	🦀	=@	🦀	=A								
🦀	=B	🦀	=C	🦀	=D	🦀	=E								
🦀	=F	🦀	=G	🦀	=H										

Characters available for comment

Route data menu

\$GPRTE,	<u>x</u> ,	<u>x</u> ,	<u>a</u> ,	<u>ccc</u> ,	<u>c----c</u> ,	<u>c----c</u> ,	... ,	<u>c----c</u>	<CR><LF>
	1	2	3	4	5	6		12	

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

\$PFEC, GPrtc,	<u>xx</u> ,	<u>c----c</u>	<CR><LF>
	1	2	

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 a 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 SOFT KEY '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.

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.

RECEIVE DATA	
►HOST NAME	PLOT1 ---
MARKS & LINES	OFF
WAYPOINTS & ROUTES	OFF
EDIT RCV RETURN	

Receive data menu

5. Select HOST NAME, then press the EDIT soft key.

HOST NAME
PLOT1---

Host name window

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

MARKS & LINES
▲ ☐ ON ☒ OFF ▼

Marks & lines window

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

10. Press the RCV soft key followed by the [ENTER] knob.

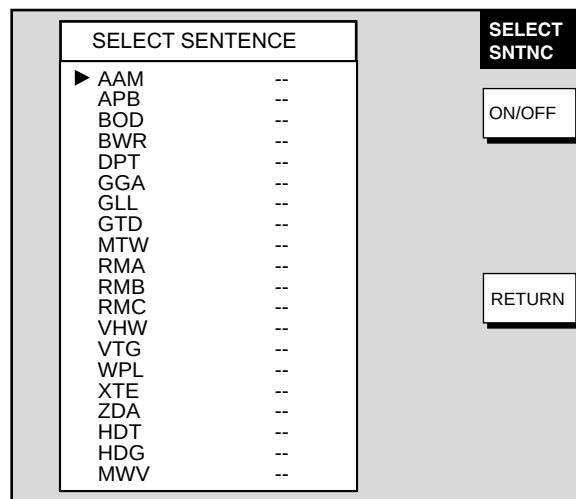
The message "START RECEIVING DATA VIA NETWORK." is displayed. If no data could be found, the message "(HOST NAME)' IS NOT FOUND." appears.

11. When the transfer is completed, the message "DATA TRANSFER COMPLETED. PUSH ENTER KNOB TO CONTINUE." appears. Push the [ENTER] knob to finish.
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 the SYSTEM CONFIGURATION, SYSTEM SETUP, PORT SETUP and OUTPUT THROUGH NETWORK soft keys.

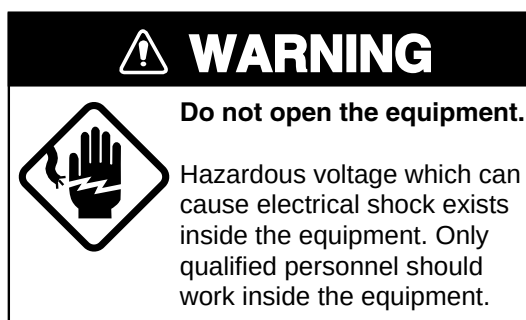


Select sentence menu

3. Select sentence with the trackball.
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.



7.1 Preventive Maintenance

Regular maintenance is important for optimum performance. A maintenance program should be established and should at least include the items shown in the table 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 Battery

A lithium battery (Type CR2450-F2 ST2, Code No. 000-133-495) 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.

7.3 Replacement of Fuse

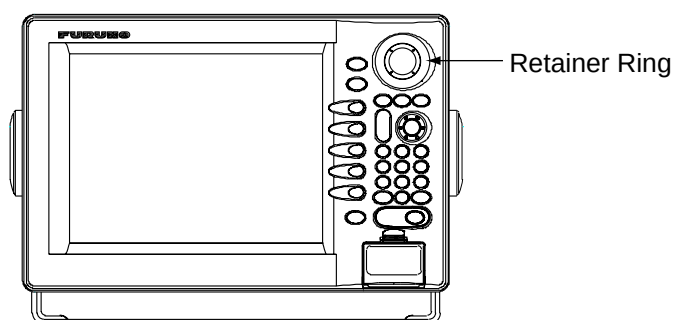
The fuse on the power cable protects the equipment from reverse polarity of the ship's mains and equipment fault. If the fuse blows, find out the cause before replacing it. Use the correct fuse (15A for 12 V device, 7A for 24 V device). Using the wrong fuse will damage the equipment and void the warranty.

 CAUTION
Use the proper fuse. Use of a wrong fuse can cause fire or damage the equipment.

7.4 Trackball Maintenance

If the cursor skips or moves abnormally, you may need to clean the trackball.

1. Turn the retainer ring counterclockwise 45° to unlock it.



Display unit

2. Remove the retainer ring and ball.
3. Clean the ball with a soft lint-free cloth, and then blow carefully into the ball-cage to dislodge dust and lint.
4. Look for a build-up of dirt on the metal rollers. If dirty, clean the rollers using a cotton swab moistened lightly with isopropyl-rubbing alcohol.
5. Make sure that fluff from the swab is not left on the rollers.
6. Replace the ball and retainer ring. Be sure the retainer ring is not inserted reversely.

Note: Trackball maintenance parts are available as below.

Part	Type	Code No.
Retainer ring and ball	MU3721	000-144-645

7.5 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.

7.5.1 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.

7.5.2 Radar

GD-1900C 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 antenna cable is firmly fastened. • check if radar source is correct.
marks, legends appear	no echo appears	• check Tx fuse in power cable. If it is blown, replace it.
the picture is not updated or it freezes	—	• check antenna cable. • for freeze up, turn the display unit on and off again.
tuning is adjusted	sensitivity is poor	• magnetron may need to be replaced. Contact your dealer.
the range is changed	radar picture does not change	• try to hit the [+] and [-] keys again. • turn the display unit off and on again.
there is poor discrimination in range	—	• adjust A/C SEA.
the true motion presentation is not working properly	—	• reselect true motion mode. • check if heading and speed are input.
the range rings are not displayed	—	• hit the RADAR DISPLY and RINGS soft keys to display them.

7.5.3 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 number of satellites received, on the GPS status display. (See page 7-11.) There should be three or more.
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.
the track is not plotted	• track is not being plotted. ("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.
the 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 (or Decca) TDs are wrong	• enter TD offset, on the TD SETUP menu.
the ship's speed indication is not zero after the ship is stopped	• try to decrease speed/course smoothing, on the GPS SENSOR SETTINGS menu.

7.5.4 Sounder

Requires Network Sounder ETR-6/10N.

Sounder troubleshooting

If...	But...	Then...
you selected a sounder display with the DISP key	picture does not appear	• check that the network sounder's signal cable is firmly fastened. • Check that sounder source is correct. • check that the network sounder is plugged in. The LED on the network sounder should flash every second.
marks and characters appear	picture does not appear	• check for loosened transducer connector.
the picture appears	zero line does not appear	• the picture is shifted. Confirm 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.
the depth indication is not displayed	—	• adjust gain and range to display the bottom echo (in reddish brown), if you are using the 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.
the water temperature graph appears	data is wrong	• check that sensor cable is tightly fastened.

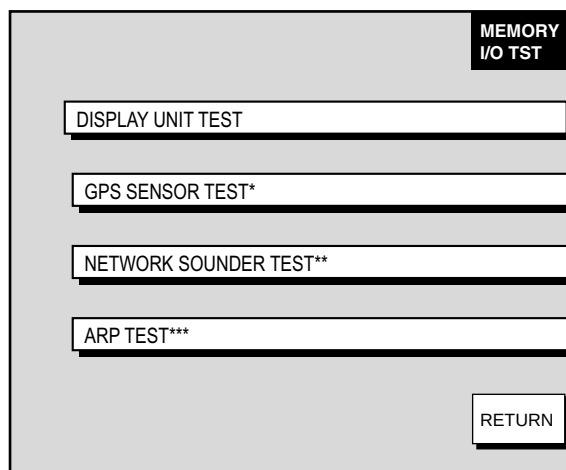
7.6 Diagnostics

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.

7.6.1 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.



* = Requires GPS Receiver GP-310B.

** = Requires Network Sounder ETR-6/10N.

*** = Requires ARP-equipped Model
1800/1900 series network radar.

MEMORY I/O TEST 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 and checks devices. Results for device checks are shown as OK or NG (No Good). For any NG, request service. A test connector is required to check ports. " - - " shown when no test connector is connected. Chart number shown when chart is inserted. Press the RETURN soft key to return the MEMORY I/O TEST menu.

* = For FURUNO, NAVIONICS model. 19500010XX for C-MAP model.

No results appear when "sub" radar selected as radar source.

```

Program No. 19500020XX*
ROM1, 2      : OK
ROM3         : OK
ROM4         : OK
SDRAM        : OK
SRAM         : OK
INT. BATT    : OK
PORT
NMEA IN/OUT 1 : --
NMEA IN/OUT 2 : --
NMEA IN       : --
RS232        : --
HEADING       : 352.2°
NETWORK       : --
CHART NUMBER:
H. PULSE      : OK
B. PULSE      : OK
              (XX.Xrpm)
ON TIME       : 00000.0 h
TX TIME       : 00000.0 h

Machine Status +130

```

XX = Program Version No.

Model 1800/1900 series

```

Program No. 19500020XX*
ROM1, 2      : OK
ROM3         : OK
ROM4         : OKS
SDRAM        : OK
SRAM         : OK
INTERNAL
BATTERY      : OK
PORT
NMEA IN/OUT 1 : --
NMEA IN/OUT 2 : --
NMEA IN       : --
RS232C       : --
HEADING       : 352.2°
NETWORK       : --
CHART NUMBER:

Machine Status +130

```

XX = Program Version No.

GD-1900C

Display unit test results

GPS sensor test (Requires GPS Receiver GP-310B)

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 unit for proper operation, displaying OK or NG (No Good) as the result. For NG, request service. Press the RETURN soft key to return the MEMORY I/O TEST menu.

```

PROGRAM No. 48502180XX
GPS UNIT    : OK

Machine Status +115

```

XX = Program Version No.

GPS receiver test results

Network sounder test (Requires Network Sounder ETR-6/10N)

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 any 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 pcb in Model 1800/1900 series network radar)

The ARP 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 any NG, request service. Press the RETURN soft key to return 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

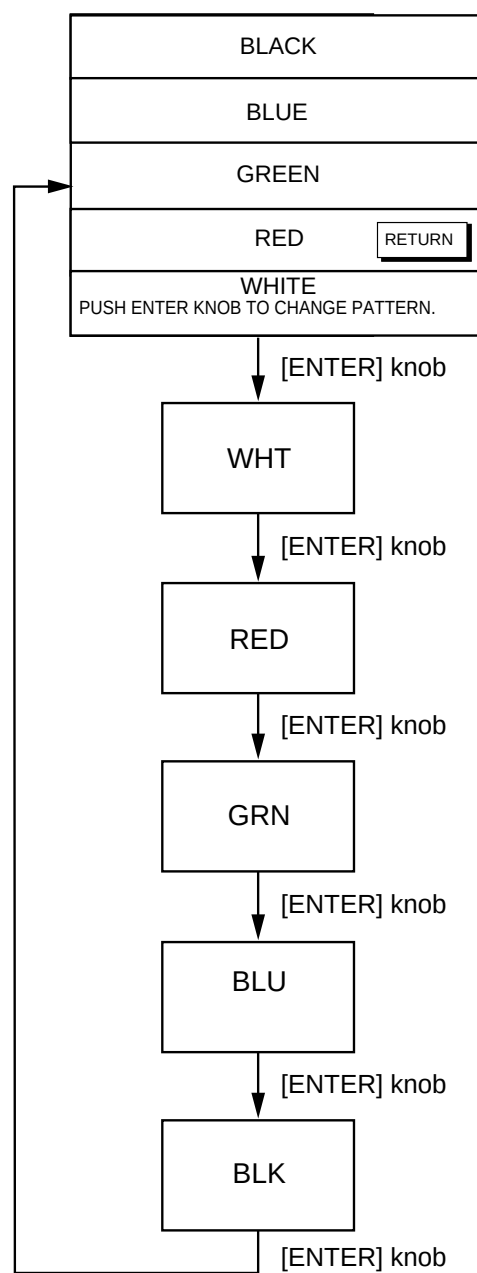
XX = Program Version No.

ARP test results

7.6.2 Test pattern

The test pattern test checks the display for proper display of colors.

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 the test pattern.
6. Push the [ENTER] knob consecutively to show white, red, green, blue and black colors individually.
7. Press the RETURN soft key.
8. Press the [MENU] key to close the menu.

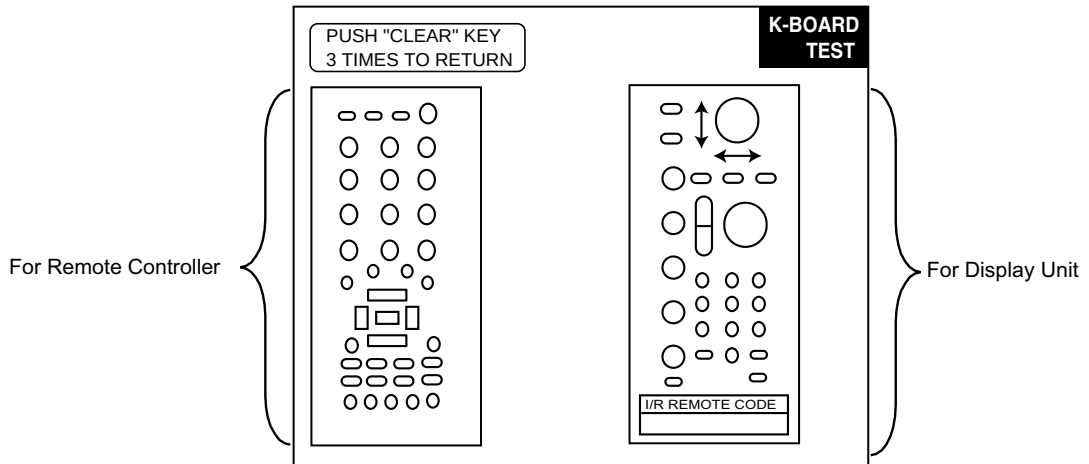


Test pattern sequence

7.6.3 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.



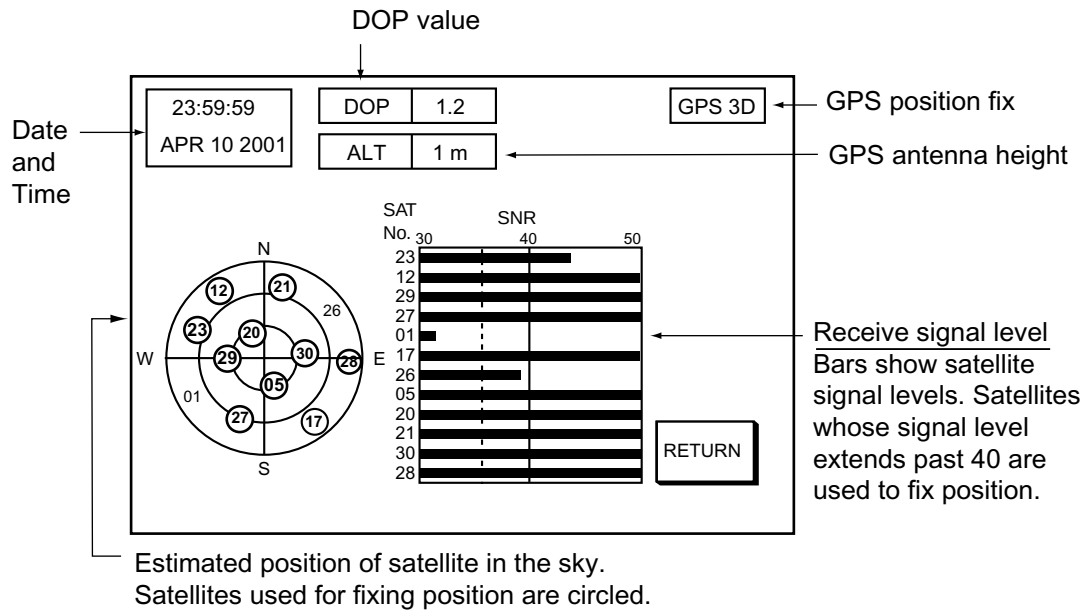
Screen for testing keyboard, remote controller

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 when the key is pressed. For the [ENTER] knob and trackball, rotate them to show their X-Y positions digitally, and push the [ENTER] knob to confirm its function.
7. Press the [CLEAR] key three times on the display unit or remote controller to escape from the test.
8. Press the [MENU] key to close the menu.

7.7 GPS Status Display

The GPS status display provides data about the GPS satellites. It 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 the 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

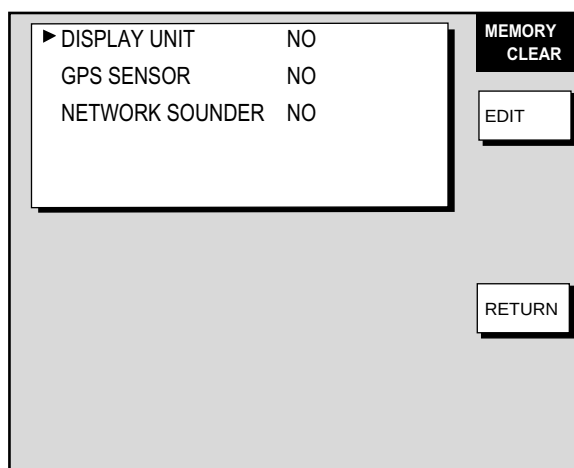
4. Press the RETURN soft key to quit the GPS status display.

7.8 Clearing Memories

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

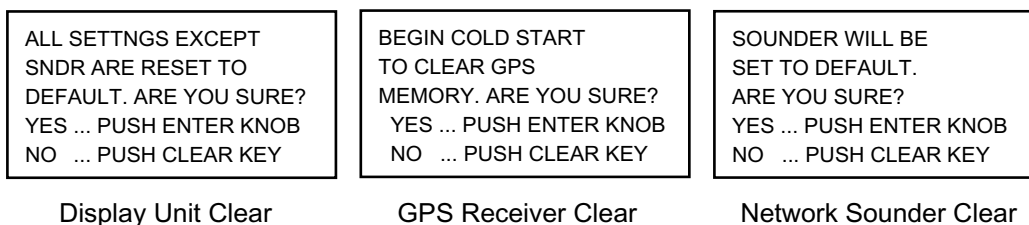
The following data are not cleared: **Radar**; Heading adjustment, timing adjustment, MBS level, tuning point, tuning indication (short, medium, long), video level, dead sector, antenna height, STC curve, antenna type, on time, tx time, **Sounder**; White marker, hue, signal level, TLL output, depth calibration, range.

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.



Memory clear menu

6. Use the trackball to choose the memory to clear.
7. Press the EDIT soft key.
8. Use the trackball to select YES, then press the ENTER soft key. One of the following displays appears depending on the selection made at step 6.



Windows for clearing memory

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

7.9 Error Messages

In addition to alarm messages your equipment also displays error messages.

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.
HEADING DATA MISSING!		Check heading cable.

APPENDIX

Menu Overview

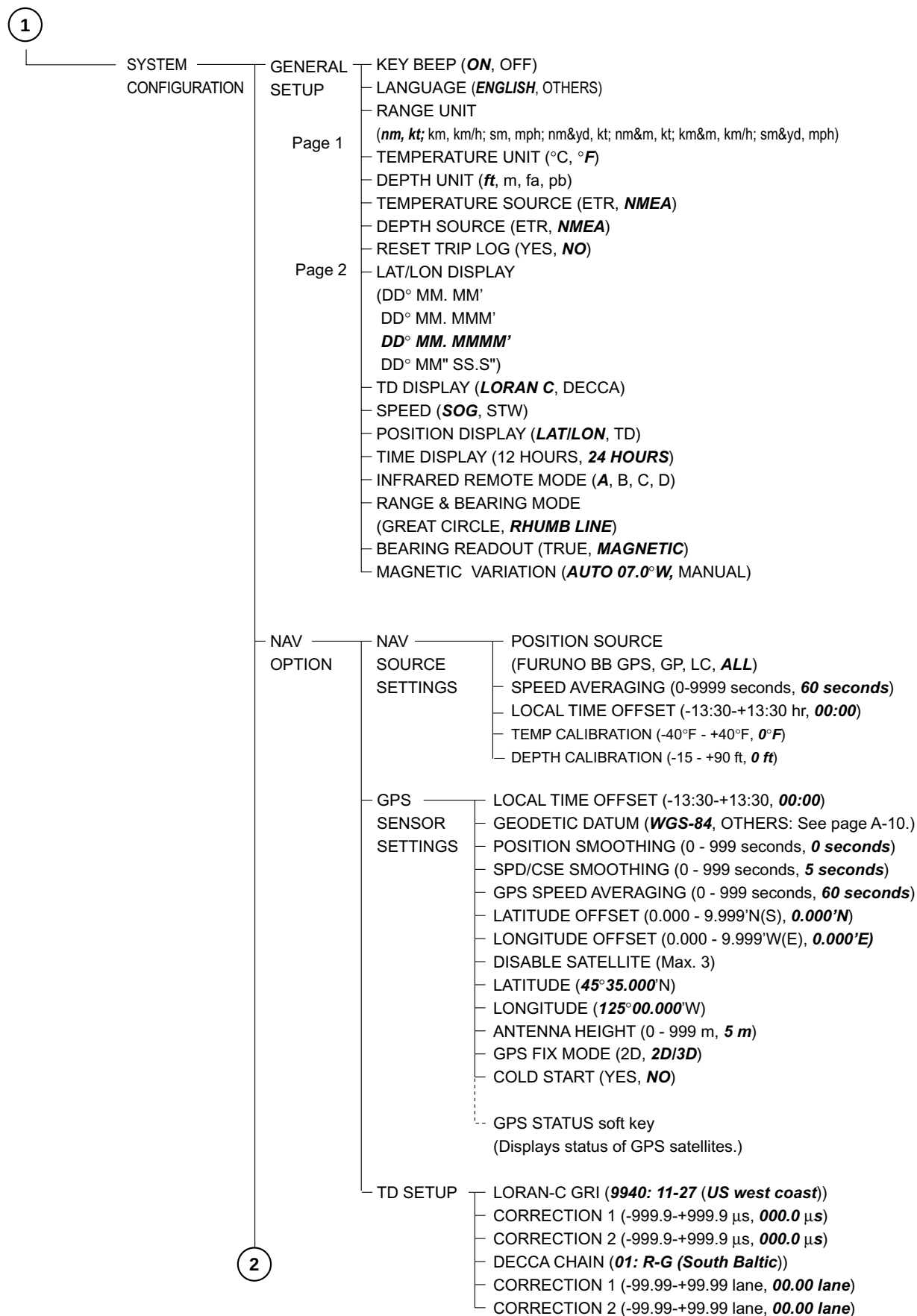
MENU key

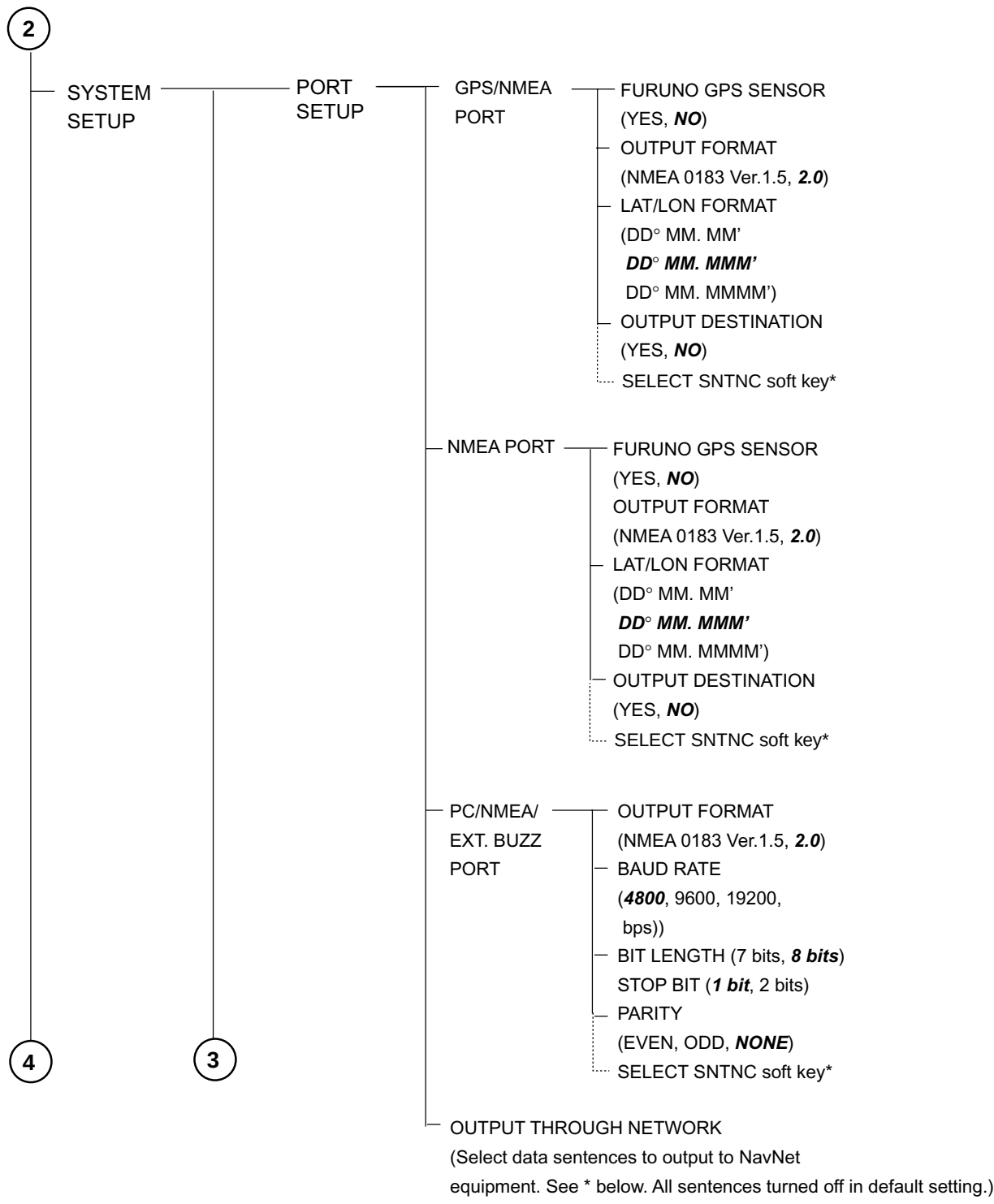
Radar

MENU Key	RADAR DISPLAY SETUP	EBL REFERENCE (TRUE, RELATIVE) CURSOR POSITION (LAT/LON, TD, RNG&BRG-REL , RNG&BRG-TRUE) TUNING (AUTO , MAN) TX SECTOR BLANKING (ON (FROM 000°, SECTOR 001°)), 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) 2ND ECHO REJECTION (ON, OFF) WATCHMAN TIME (5 , 10, 20 minutes) RANGE UNIT (nm , km, sm) TRAIL MODE (TRUE, RELATIVE) D. BOX soft key (DATABOX SIZE SMALL /LARGE, POSITION , WAYPOINT, COG , SOG , STW, BEARING, RANGE, TIME TO GO, ETA, TEMPERATURE, DEPTH, TRIP LOG , DATE, TIME, WIND)
	RADAR RANGE SETUP#	0.125/0.25/0.5/0.75/1/1.5/2/3/4/6/8/12/16/24/36/48/64 (nm & sm) Max. range 36 nm/sm, km = 1833C 0.25/0.5/0.75/1/1.5/2/3/4/6/8/12/16/24/36/48/64 (km) 48 nm/sm, km = 1933C 64 nm/sm, km = 1943C 72 nm/sm, km = 1953C # = Not used on GD-1900C.
	ARP SETUP (Requires ARP circuit board in network radar 1800/1900.)	ARP TARGET INFO (INTERNAL ARP, EXTERNAL ARP , OFF) CANCEL ALL TARGETS (YES, NO) APP VECTOR MODE (RELATIVE, TRUE) ARP VECTOR TIME (30 seconds; 1, 3, 6, 15, 30 minutes) HISTORY INTERVAL (OFF , 30 seconds; 1, 3, 6 minutes) CPA (OFF , 0.5, 1, 2, 3, 5, 6 nm) TCPA (30 seconds ; 1, 2, 3, 4, 5, 6, 12 minutes) AUTO ACQUISITION AREA (ON, OFF) TARGET ID NUMBER (ON, OFF)
	FUNCTION KEY SETUP*	SOFT KEY 1 - SOFT KEY 5 (OFF, HDG LINE OFF, MODE, GAIN, A/C SEA, A/C RAIN, FTC (Model 1700 series NavNet radar only), 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 (ARP-equipped Model 1800/1900 series NavNet radar only), STBY/TX, RADAR SOURCE, D. BOX ON/OFF, CHANGE CNTRL)

* Default settings for function keys:

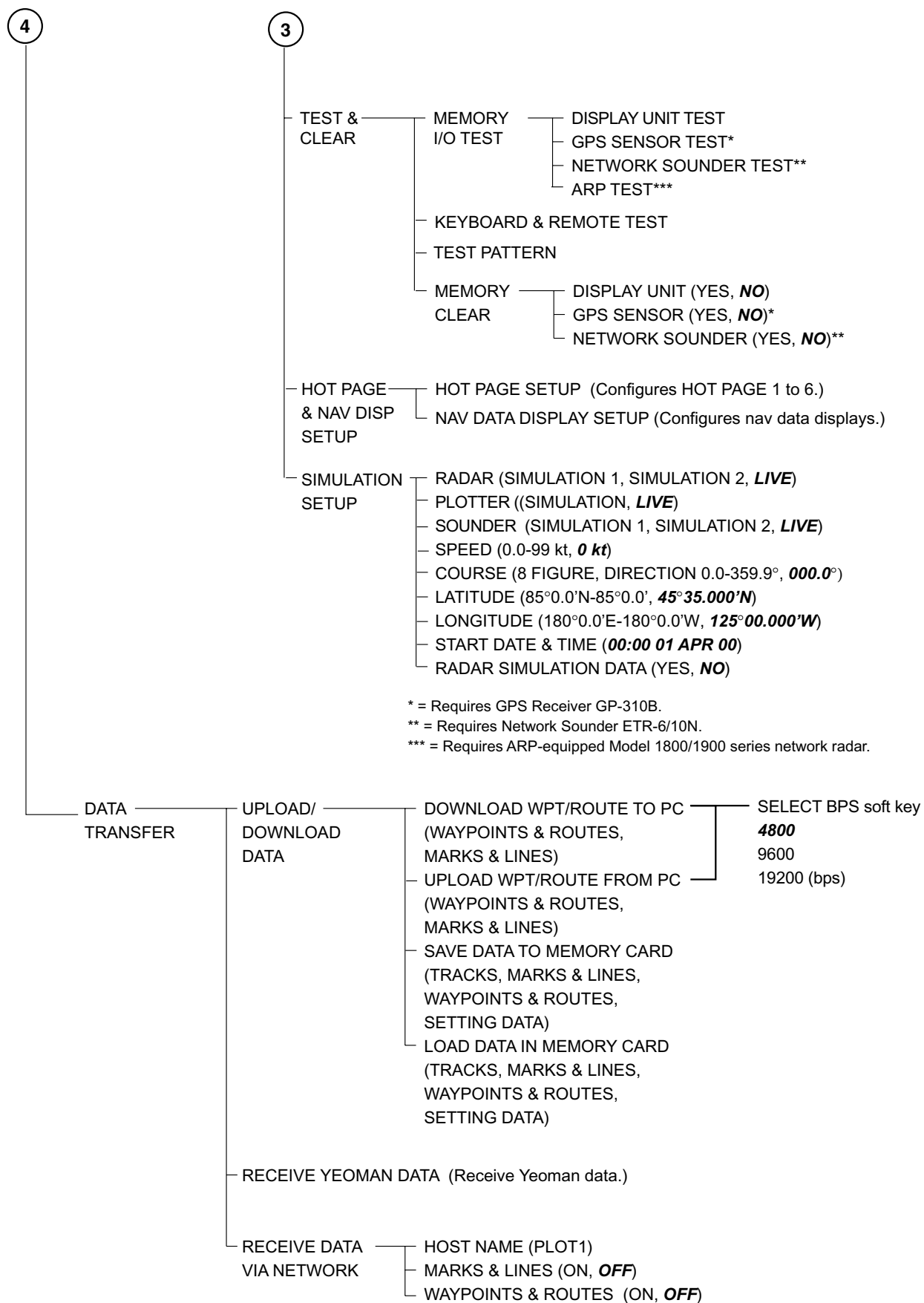
SOFT KEY 1, HDG LINE OFF; SOFT KEY 2, RINGS ON/OFF; SOFT KEY 3, ECHO TRAIL;
 SOFT KEY 4, OFFCENTER, SOFT KEY 5, RADAR SOURCE

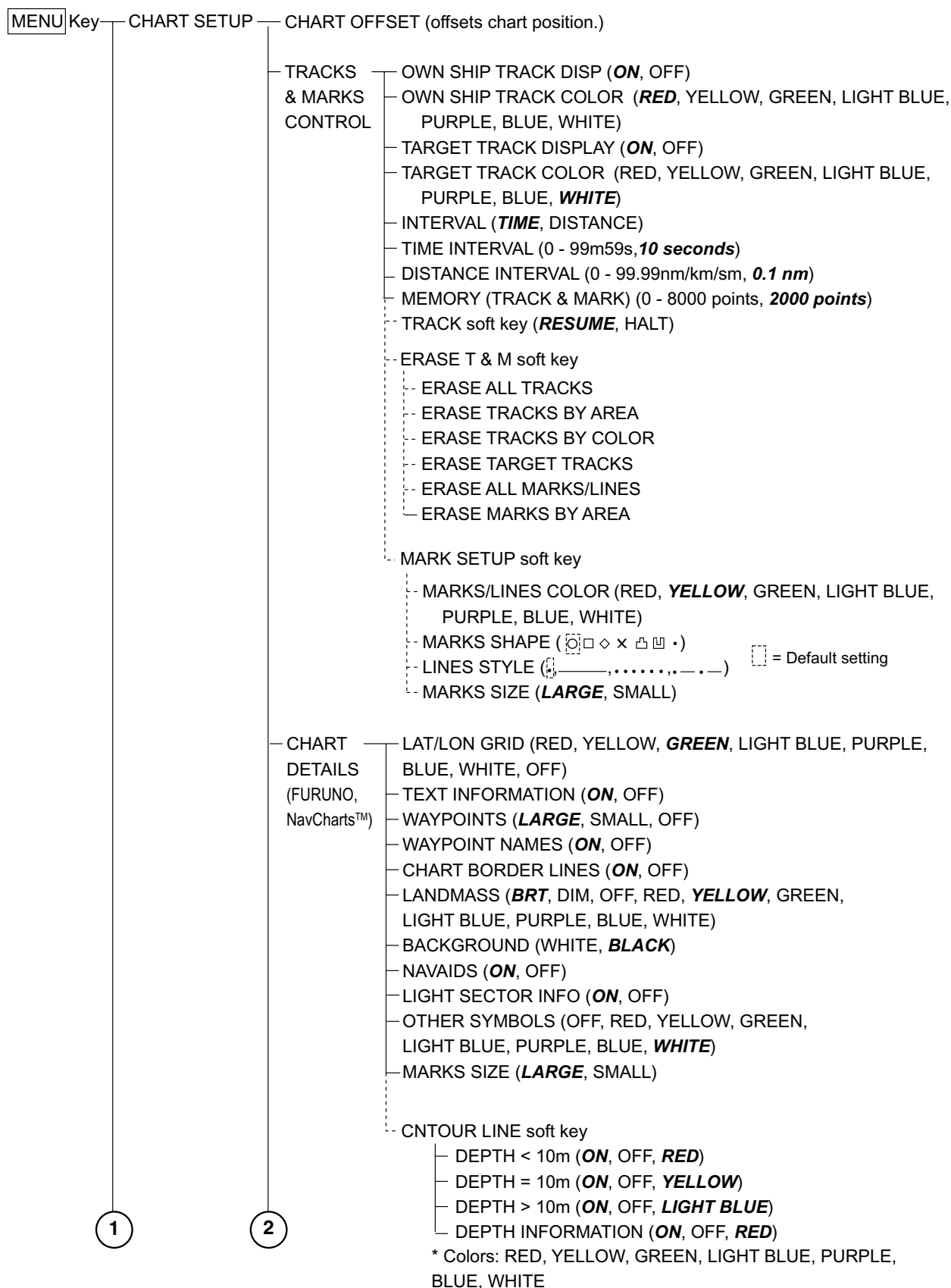


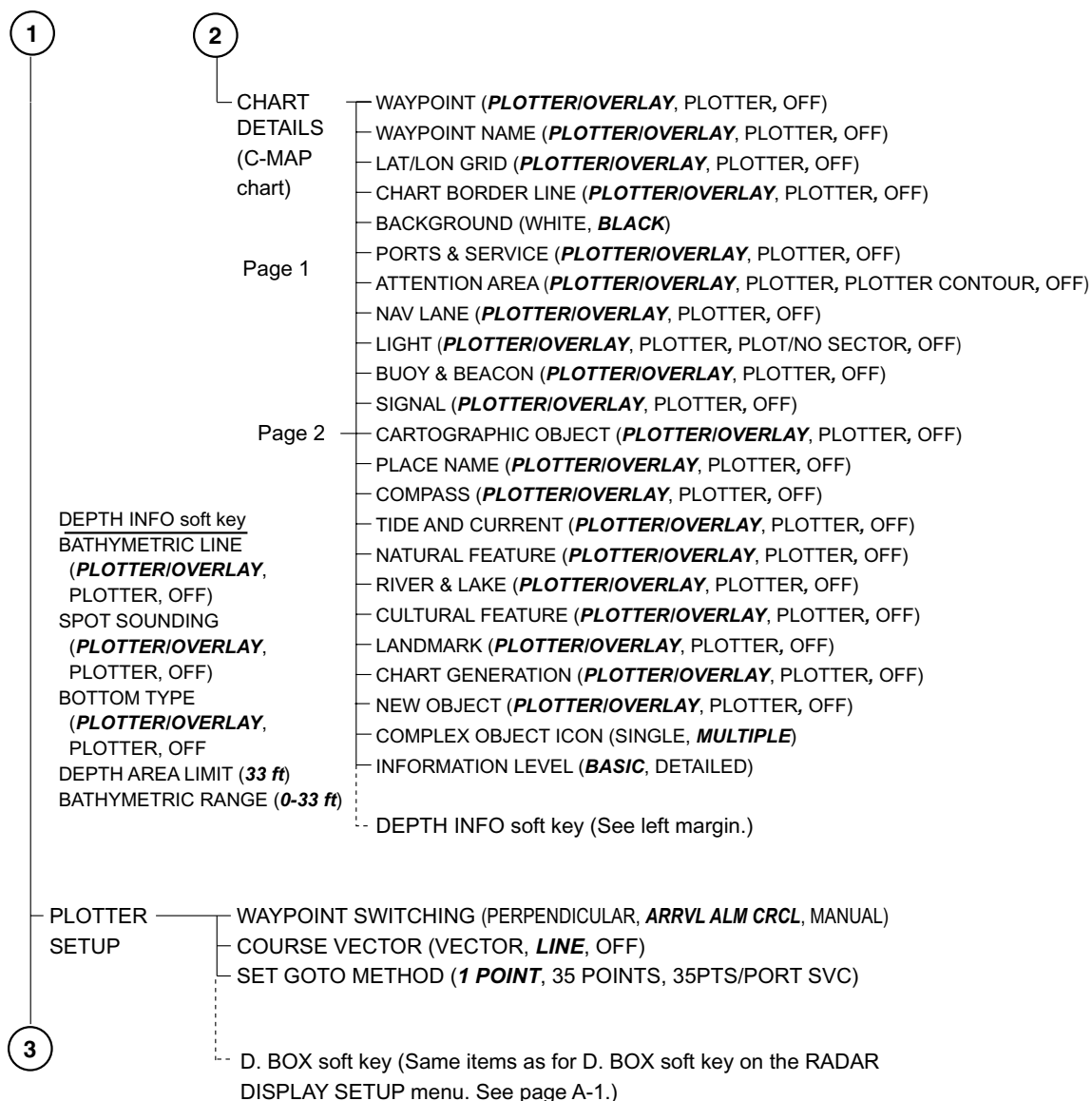


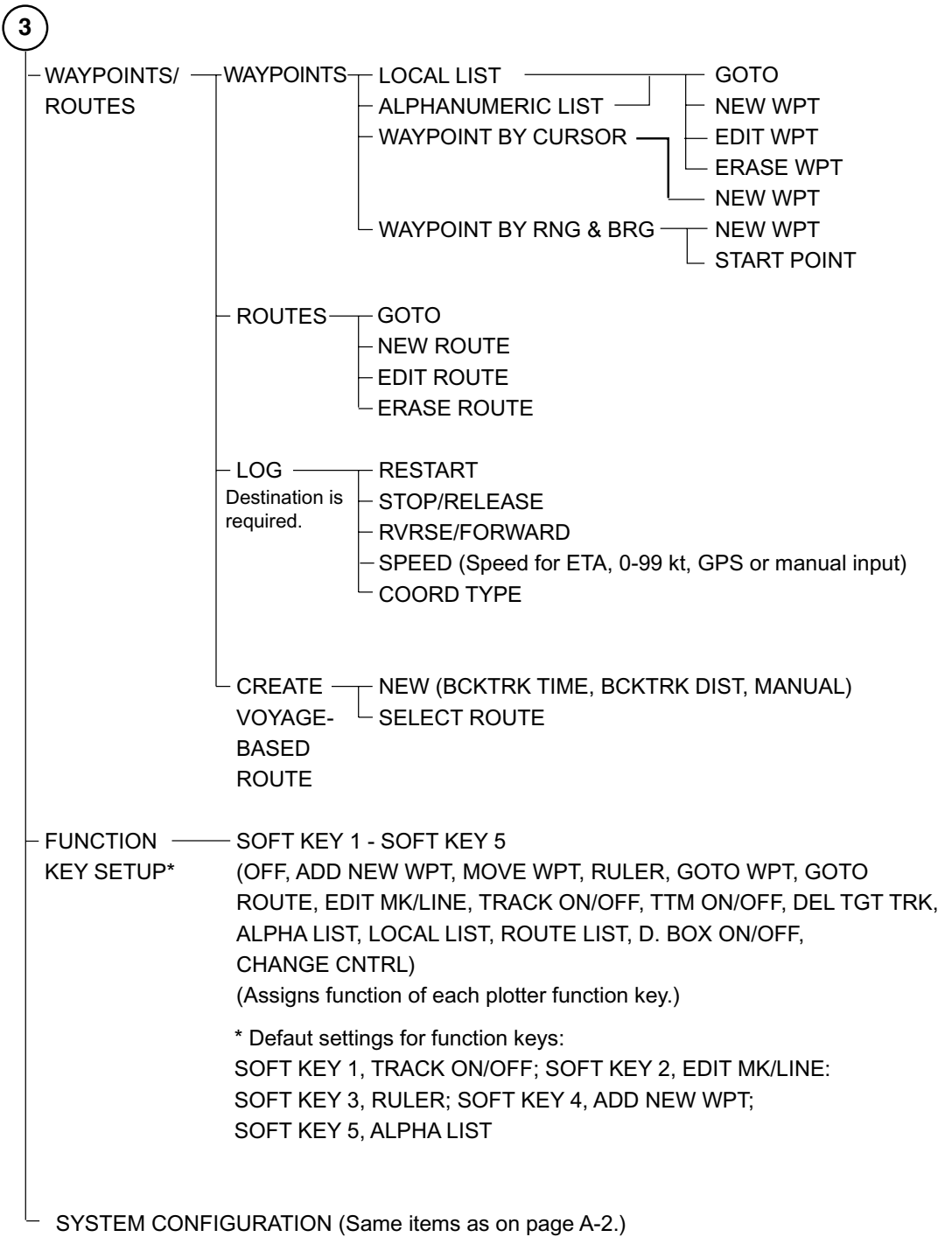
* = AAM, **APB**, BOD, BWR(BWC)#1, DPT(DBT)#2, GGA, **GLL**, GTD, MTW, RMA, **RMB**, **RMC**, VHW, **VTG**, WPL, XTE, **ZDA**, HDT, HDG, MWV

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



Plotter





Sounder

MENU Key	SOUNDER MENU	NOISE LIMITER (OFF , LOW, MEDIUM, HIGH) CLUTTER (0-16, AUTO) WHITE MARKER (1-8 (8-color), 1-16 (16 color), OFF) ZOOM MARKER (ON , OFF) HUE (1-9, 1) SIGNAL LEVEL (OFF , SL1-SL3, 8 color, monochrome, SL1-SL6, 16 color) 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. See page A-2.)
	SOUNDER SYSTEM SETUP	FISH ALARM LEVEL (HIGH, MEDIUM , LOW) TRANSMISSION (OFF, ON) TVG 200 kHz (0 - 9, 3) TVG 50 kHz (0 - 9, 3) ECHO OFFSET 200 kHz (-50 - +50, 0) ECHO OFFSET 50 kHz (-50 - +50, 0) BOTTOM LEVEL 200 kHz (-100 - +100, 0) BOTTOM LEVEL 50 kHz (-100 - +100, 0) KP PULSE (INTERNAL , EXTERNAL) SMOOTHING (OFF, SM1, SM2, SM3 , SM4) TLL OUTPUT (ON , OFF) SENSOR SETUP soft key SPEED CALIBRATION (-50 - +50%, 0%) TEMP. CALIBRATION (-40°F - +40°F, 0°F) DEPTH CALIBRATION (-15 - +90 ft, 0 ft) ACSTC SPD CALIBRATION (-500 - +500m/s, 0 m/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 P/B, 10 P/B) BOTTOM LOCK RANGE (3 m, 6 m ; 10 ft, 20 ft ; 2 fa, 3 fa: 3 fa ; 2 P/B, 3 P/B: 3 P/B)
	FUNCTION KEY SETUP#	SOFT KEY 1- SOFT KEY 5 (OFF, AUTO MODE, GAIN 200 kHz, GAIN 50 kHz, SHIFT, NOISE LIMITER, CLUTTER, WHITE MARKER, HUE, SIGNAL LEVEL, PICTURE ADV, TEMP. GRAPH, TVG 200 kHz, TVG 50 kHz, OFFSET 200K, OFFSET 50K, 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 (Same items as on page A-2.)	

* = 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 P/B	5 P/B	10 P/B	30 P/B	50 P/B	100 P/B	200 P/B	700 P/B

Default settings for function keys:

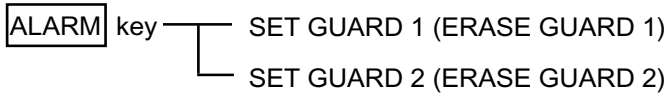
SOFT KEY 1, TLL OUTPUT; SOFT KEY 2, CLUTTER; SOFT KEY 3, SIGNAL LEVEL;
 SOFT KEY 4, NOISE LIMITER, SOFT KEY 5, PICTURE ADV

EXT VIDEO

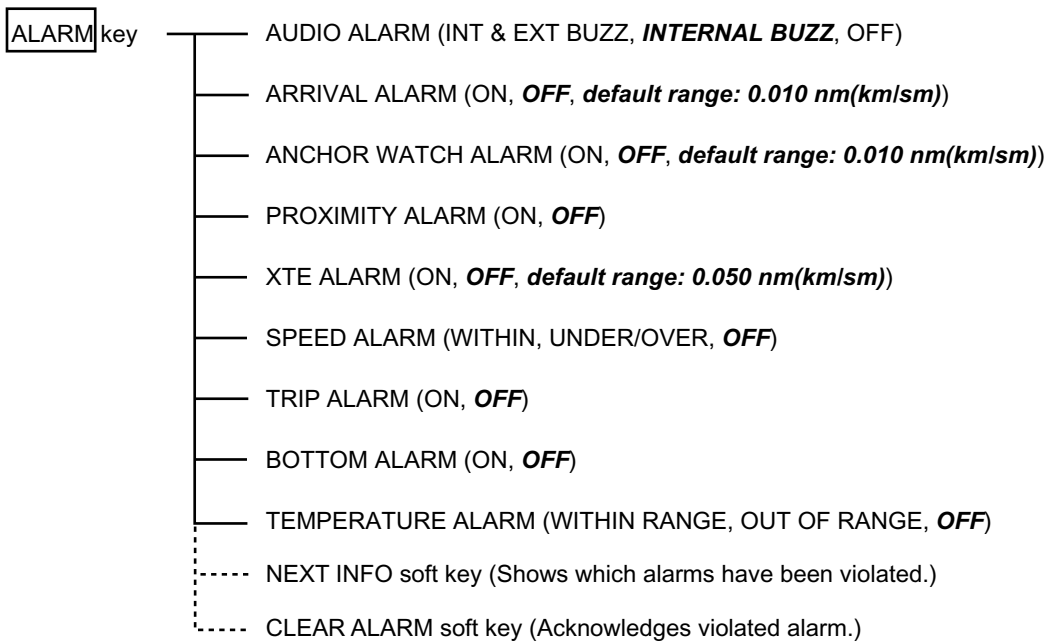
MENU Key — CONFIGURATION — (Same items as on page A-2.)

ALARM key

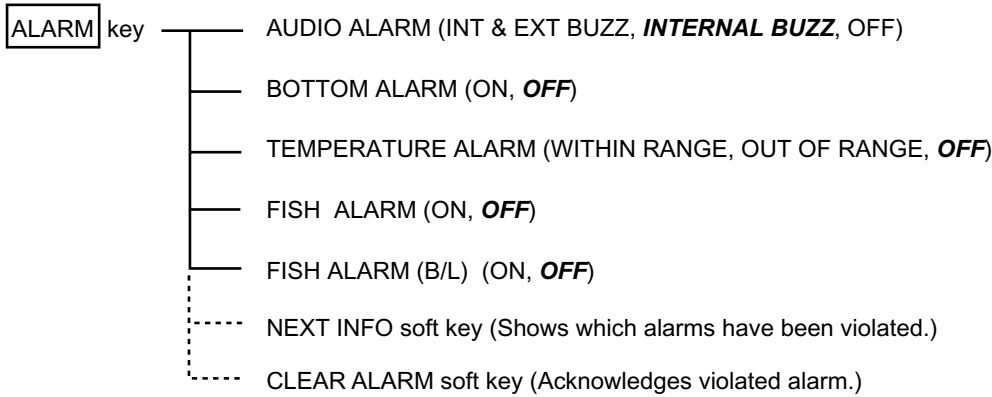
Radar Alarms



Plotter Alarms



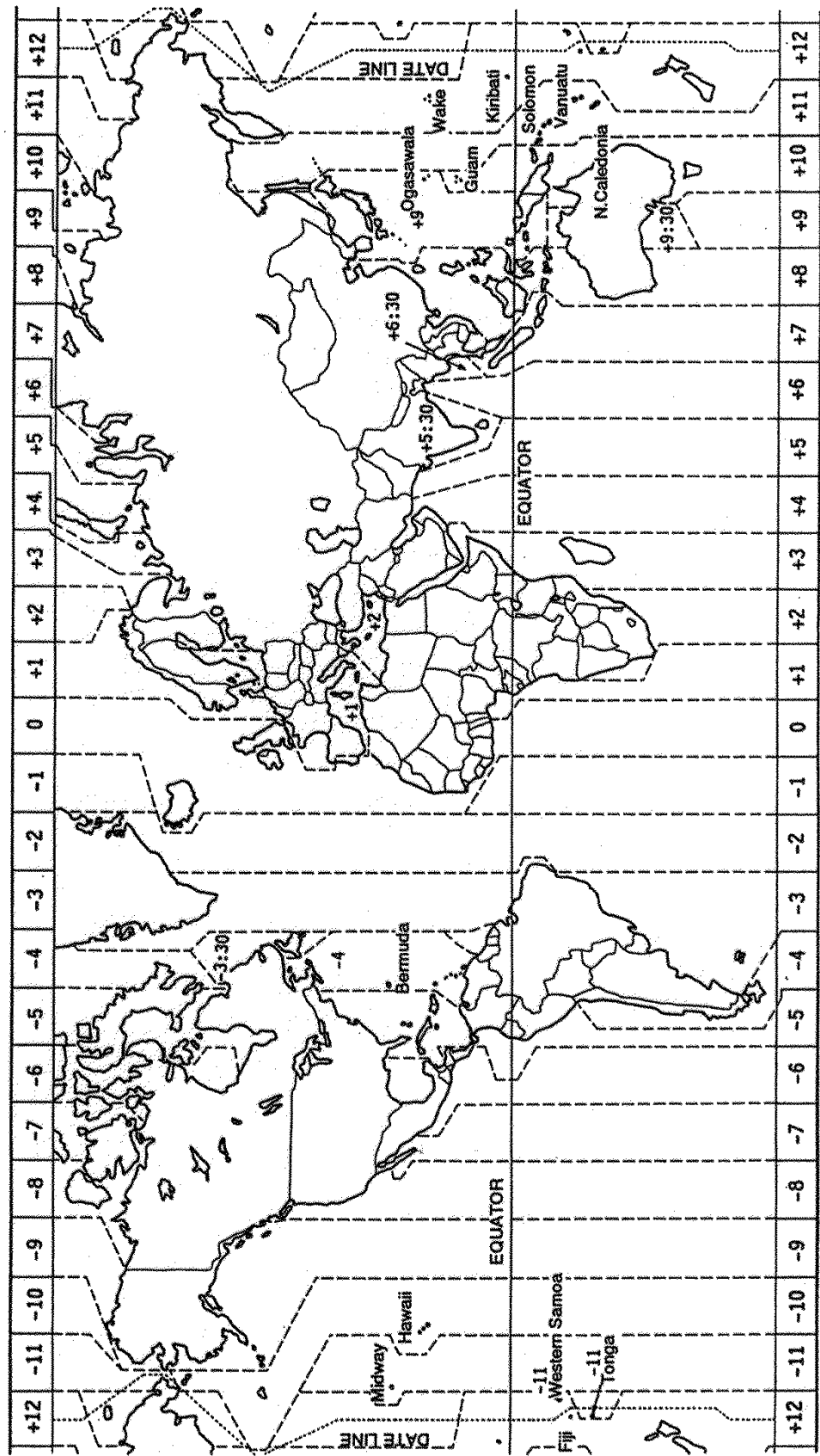
Sounder Alarms



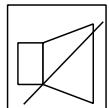
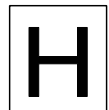
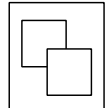
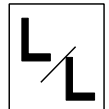
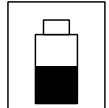
Geodetic Chart List

001: WGS84	087: MAPARIMA, BWI : Trinidad and Tobago
002: WGS72	088: NORTH AMERICAN 1927 : Western United States
003: TOKYO : Mean Value (Japan, Korea, and Okinawa)	089: : Eastern United States
004: NORTH AMERICAN 1927 : Mean Value (CONUS)	090: : Alaska
005: EUROPEAN 1950 : Mean Value	091: : Bahamas (Excluding San Salvador Island)
006: AUSTRALIAN GEODETIC 1984 : Australia and Tasmania Island	092: : Bahamas San Salvador Island
007: ADINDAN : Mean Value (Ethiopia and Sudan)	093: : Canada (Including Newfoundland Island)
008: : Ethiopia	094: : Alberta and British Columbia
009: : Mali	095: : East Canada
010: : Senegal	096: : Manitoba and Ontario
011: : Sudan	097: : Northwest Territories and Saskatchewan
012: AFG : Somalia	098: : Yukon
013: AIN EL ABD 1970 : Bahrain Island	099: : Canal Zone
014: ANNA 1 ASTRO 1965 : Cocos Island	100: : Caribbean
015: ARC 1950 : Mean Value	101: : Central America
016: : Botswana	102: : Cuba
017: : Lesotho	103: : Greenland
018: : Malawi	104: : Mexico
019: : Swaziland	105: NORTH AMERICAN 1983 : Alaska
020: : Zaire	106: : Canada
021: : Zambia	107: : CONUS
022: : Zimbabwe	108: : Mexico, Central America
023: ARC 1960 : Mean Value (Kenya, Tanzania)	109: OBSERVATORIO 1966 : Corvo and Flores Islands (Azores)
024: : Kenya	110: OLD EGYPTIAN 1930 : Egypt
025: : Tanzania	111: OLD HAWAIIAN : Mean Value
026: ASCENSION ISLAND 1958 : Ascension Island	112: : Hawaii
027: ASTRO BEACON "E" : Iwo Jima Island	113: : Kaul
028: ASTRO B4 SOR. ATOLL : Tem Island	114: : Maui
029: ASTRO POS 71/4 : St. Helena Island	115: : Oahu
030: ASTRONOMIC STATION 1952 : Marcus Island	116: OMAN : Oman
031: AUSTRALIAN GEODETIC 1966 : Australia and Tasmania Island	117: ORDNANCE SURVEY OF GREAT BRITAIN 1936 : Mean Value
032: BELLEVUE (IGN) : Elate and Erromango Islands	118: : England
033: BERMUDA 1957 : Bermuda Islands	119: : England, Isle of Man, and Wales
034: BOGOTA OBSERVATORY : Colombia	120: : Scotland and Shetland Islands
035: CAMPO INCHAUSPE : Argentina	121: : Wales
036: CANTON ISLAND 1966 : Phoenix Islands	122: PICO DE LAS NIVIES : Canary Islands
037: CAPE : South Africa	123: PITCAIRN ASTRO 1967 : Pitcairn Island
038: CAPE CANAVERAL : Mean Value (Florida and Bahama Islands)	124: PROVISIONAL SOUTH CHILEAN 1963 : South Chile (near 53° s)
039: CARTHAGE : Tunisia	125: PROVISIONAL SOUTH AMERICAN 1956 : Mean Value
040: CHATHAM 1971 : Chatham Island (New Zealand)	126: : Bolivia
041: CHUA ASTRO : Paraguay	127: : Chile Northern Chile (near 19° s)
042: CORREGO ALEGRE : Brazil	128: : Chile Southern Chile (near 43° s)
043: DJAKARTA (BATAVIA) : Sumatra Island (Indonesia)	129: : Colombia
044: DOS 1968 : Gizo Island (New Georgia Island)	130: : Ecuador
045: EASTER ISLAND 1967 : Easter Island	131: : Guyana
046: EUROPEAN 1950 (Cont'd) : Western Europe	132: : Peru
047: : Cyprus	133: : Venezuela
048: : Egypt	134: PUERTO RICO : Puerto Rico and Virgin Islands
049: : England, Scotland, Channel, and Shetland Islands	135: QATAR NATIONAL : Qatar
050: : England, Ireland, Scotland, and Shetland Islands	136: QORNOQ : South Greenland
051: : Greece	137: ROME 1940 : Sardinia Islands
052: : Iran	138: SANTNA BRAZ : Sao Maguel, Santa Maria Islands (Azores)
053: : Italy Sardinia	139: SANTO (DOS) : Espirito Santo Island
054: : Italy Sicily	140: SAPPER HILL 1943 : East Falkland Island
055: : Norway and Finland	141: SOUTH AMERICAN 1969 : Mean Value
056: : Portugal and Spain	142: : Argentina
057: EUROPEAN 1979 : Mean Value	143: : Bolivia
058: GANDAJIKA BASE : Republic of Maldives	144: : Brazil
059: GEODETIC DATUM 1949 : New Zealand	145: : Chile
060: GUAM 1963 : Guam Island	146: : Colombia
061: GUX 1 ASTRO : Guadalcanal Island	147: : Ecuador
062: HJORSEY 1955 : Iceland	148: : Guyana
063: HONG KONG 1963 : Hong Kong	149: : Paraguay
064: INDIAN : Thailand and Vietnam	150: : Peru
065: : Bangladesh, India, and Nepal	151: : Trinidad and Tobago
066: IRELAND 1956 : Ireland	152: : Venezuela
067: ISTS 073 ASTRO 1969 : Diego Garcia	153: SOUTH ASIA : Singapore
068: JHONSTON ISLAND 1961 : Johnston Island	154: SOUTHEAST BASE : Porto Santo and Madeira Islands
069: KANDAWALA : Sri Lanka	155: SOUTHWEST BASE : Faial, Graciosa, Pico, Sao Jorge, and Terceira Islands
070: KERGUELEN ISLAND : Kerguelen Island	156: TIMBALAI 1948 : Brunel and East Malaysia (Sarawak and Sadah)
071: KERTAU 1948 : West Malaysia and Singapore	157: TOKYO : Japan
072: LA REUNION : Mascarene Island	158: : Korea
073: L.C. 5 ASTRO : Cayman Brac Island	159: : Okinawa
074: LIBERIA 1964 : Liberia	160: TRISTAN ASTRO 1968 : Tristan da Cunha
075: LUZON : Philippines (Excluding Mindanao Island)	161: VITI LEVU 1916 : Viti Levu Island (Fiji Islands)
076: : Mindanao Island	162: WAKE-ENIWETOK 1960 : Marshall Islands
077: MAHE 1971 : Mahe Island	163: ZANDERIJ : Suriname
078: MARCO ASTRO : Salvage Islands	164: BUKIT RIMPAH : Bangka and Belitung Islands (Indonesia)
079: MASSAWA : Eritrea (Ethiopia)	165: CAMP AREA ASTRO : Camp Mcmurdo Area, Antarctica
080: MERCHICH : Morocco	166: G. SEGARA : Kalimantan Islands (Indonesia)
081: MIDWAY ASTRO 1961 : Midway Island	167: HERAT NORTH : Afghanistan
082: MINNA : Nigeria	168: HU-TZU-SHAN : Taiwan
083: NAHRWAN : Masirah Island (Oman)	169: TANANARIVE OBSERVATORY 1925 : Madagascar
084: : United Arab Emirates	170: YACARE : Uruguay
085: : Saudi Arabia	171: RT-90 : Sweden
086: NAMIBIA : Namibia	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, radar, sounder alarm setting violated.
	Track is not being recorded or plotted.
	Chart offset applied.
	Voyage-based route currently being created.
	Latitude and longitude position offset applied.
	Voltage of battery on circuit board in display unit is low. Contact your dealer about replacement.
	Simulation mode.

SPECIFICATIONS OF MARINE RADAR

MODEL 1833C/1933C/1943C/1953C

1. GENERAL

1.1 Indication System 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 72*	0.8	600

*Maximum Range: M1833C: 36nm, M1933C: 48nm, M1943C: 64nm, M1953C: 72nm

1.3 Range Resolution 20 m

1.4 Bearing Resolution M1833C: 4.0°, M1933C: 2.4°, M1943C: 1.9°,
M1953C: 1.9° (XN12A), 1.2° (XN13A)

1.5 Minimum Range 27 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 MODEL1833C:

2.1.1 Radiator Printed waveguide array

2.1.2 Polarization Horizontal

2.1.3 Antenna Rotation 24 rpm nominal

2.1.4 Radiator Length 60 cm

2.1.5 Horizontal Beamwidth 3.9°

2.1.6 Vertical Beamwidth 20°

2.1.7 Sidelobe Attenuation -18 dB or less (within ±20° of main-lobe)
-23 dB or less (±20° of main-lobe or more)

2.2 MODEL1933C:

2.2.1 Radiator Slotted waveguide array

2.2.2 Polarization Horizontal

2.2.3 Antenna Rotation 24 or 48 rpm nominal
High brilliance monitor: 24 rpm nominal only

2.2.4 Radiator Length 100 cm (XN10)

2.2.5 Horizontal Beamwidth 2.4°

2.2.6 Vertical Beamwidth 27°

2.2.7 Sidelobe Attenuation -20 dB or less (within ±20° of main-lobe)
-28 dB or less (±20° of main-lobe or more)

2.3 MODEL1943C:

2.3.1	Radiator	Slotted waveguide array
2.3.2	Polarization	Horizontal
2.3.3	Antenna Rotation	24 or 48 rpm nominal High brilliance monitor: 24 rpm nominal only
2.3.4	Radiator Length	120 cm (XN12)
2.3.5	Horizontal Beamwidth	1.9°
2.3.6	Vertical Beamwidth	22°
2.3.7	Sidelobe Attenuation	-24 dB or less (within $\pm 20^\circ$ of main-lobe) -30 dB or less ($\pm 20^\circ$ of main-lobe or more)

2.4 MODEL1953C:

2.4.1	Radiator	Slotted waveguide array
2.4.2	Polarization	Horizontal
2.4.3	Antenna Rotation	24 or 48 rpm nominal
2.4.4	Radiator Length	120 cm (XN12), 180 cm (XN13, 24rpm only)
2.4.5	Horizontal Beamwidth	1.9° (XN12), 1.2° (XN13)
2.4.6	Vertical Beamwidth	22°
2.4.7	Sidelobe Attenuation	
	XN12:	-24 dB or less (within $\pm 20^\circ$ of main-lobe) -30 dB or less ($\pm 20^\circ$ of main-lobe or more)
	XN13:	-24 dB or less (within $\pm 10^\circ$ of main-lobe) -30 dB or less ($\pm 10^\circ$ of main-lobe or more)

3. TRANSCEIVER MODULE

3.1.	Frequency and Modulation	9410 MHz ± 30 MHz (X band), P0N
3.2.	Peak Output Power	M1833C/1933C: 4 kW nominal, M1943C: 6 kW nominal, M1953C: 12 kW nominal
3.3.	Modulator	FET Switching Method
3.4.	Intermediate Frequency	60 MHz
3.5.	Tuning	Automatic or manual
3.6.	Receiver Front End	MIC (Microwave IC)
3.7.	Bandwidth	Tx pulselength 0.08 μ s and 0.3 μ s: 25 MHz Tx pulselength 0.8 μ s: 3 MHz
3.8.	Duplexer	Circulator with diode limiter
3.9.	Warming up	90 s approx.

4. DISPLAY UNIT

- 4.1. Display 10.4-inch rectangular TFT color LCD
640(H) x 480(V) dots, Effective radar display dia.: 152 mm

4.2. Range, Range Ring Interval (RI), 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	64	72
RI (nm)	0.0625	0.125	0.125	0.25	0.25	0.5	0.5	1	1	2	2	3	4	6	12	12	16	18
Rings	2	2	4	3	4	3	4	3	4	3	4	4	4	4	3	4	4	4

Maximum range: M1833C: 36nm, M1933C: 48nm, M1943C: 64nm, M1953C: 72nm

- 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), Echo Averaging (EAV), TX Pulse width
Guard Alarm (G(IN), G(OUT)), Echo Stretch (ES),
Range and Bearing to Cursor or Cursor Position,
Echo Trailing (TRAIL), Trailing Time,
Data Box (Position, COG, SOG, STW etc. selectable on menu)

4.5. Input Data IEC 61162-1 (NMEA 0183 Ver1.5/2.0)

- Own ship's position: GGA>RMC>RMA>GLL
Ship's speed: RMC>RMA>VTG>VHW
Bearing (True): HDT>HDG^{*1}>HDM^{*1}>VHW
Bearing (Magnetic): HDM>HDG^{*1}>HDT^{*1}>VHW
Course: RMC>RMA>VTG
Waypoint (Range, bearing): RMB>WPL>BWR>BWC
Water depth: DPT>DBT>DBS>DBK
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),
TLL (L/L, Heading data required), TTM (ARPA required)

5. PLOTTER FUNCTION

5.1. Projection	Mercator
5.2. Usable Area	85 latitude or below
5.3. Effective Area	211.2 x 158.4 mm
5.4. Display pixels	640 x 480 dots
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 sec. to 99 min. 59 sec.) 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, Fish alarm, Bottom alarm (ETR required)

6. POWER SUPPLY

6.1. Rated Voltage/Current	
M1833C	12-24 VDC: 5.3-2.6 A (6.4-3.1 A)
M1933C (24rpm)	12-24 VDC: 5.6-2.7 A (6.7-3.2 A)
M1933C (48rpm)	12-24 VDC: 7.5-3.6 A
M1943C (24rpm)	12-24 VDC: 6.3-3.1 A (7.4-3.5 A)
M1943C (48rpm)	12-24 VDC: 8.1-3.8 A
M1953C (24rpm)	12-24 VDC: 8.6-4.3 A
M1953C (48rpm)	12-24 VDC: 10.3-5.1 A
	(): for high brilliance monitor
6.2. Rectifier (option)	RU-3423: 100-115/220-230 VAC, 1 phase, 50/60 Hz

7. ENVIRONMENTAL CONDITION

7.1. Ambient Temperature	Scanner Unit: -25°C to +70°C Display Unit: -15°C to +55°C Remote Controller: +5°C to +45°C Power Supply Unit: -15°C to +55°C
7.2. Relative Humidity	93 % or less at +40°C

- | | |
|------------------------|---|
| 7.3. Waterproofing | Scanner Unit: IPX6
Display Unit: IPX5 (External monitor connected: IPX0)
Remote Controller, Power Supply Unit: IPX0 |
| 7.4. Bearing Vibration | IEC 60945-3rd |

8. COATING COLOR

- | | |
|--------------------|-----------------------------------|
| 8.1. Display Unit | N3.0 |
| 8.2. Scanner Unit | |
| M1833C | N9.5 (upper), 2.5PB3.5/10 (lower) |
| M1933C/1943C/1953C | N9.5 |

9. COMPASS SAFE DISTANCE

- | | | |
|---------------------|------------------|------------------|
| 9.1. Display Unit | Standard: 0.60 m | Steering: 0.40 m |
| 9.2. Scanner Unit | | |
| M1833C: | Standard: 0.90 m | Steering: 0.70 m |
| M1933C/1943C/1953C: | Standard: 1.00 m | Steering: 0.75 m |

SPECIFICATIONS OF VIDEO PLOTTER GD-1900C

1. DISPLAY UNIT

1.1. Indication System	PPI Daylight display, raster scan, color LCD
1.2. Display	10.4-inch rectangular TFT color LCD, 640(H) x 480(V) dots
1.3. Input Data	IEC 61162-1 (NMEA 0183 Ver1.5/2.0)
Own ship's position:	GGA>RMC>RMA>GLL
Ship's speed:	RMC>RMA>VTG>VHW
Bearing (True):	HDT>HDG ^{*1} >HDM ^{*1} >VHW
Bearing (Magnetic):	HDM>HDG ^{*1} >HDT ^{*1} >VHW
Course:	RMC>RMA>VTG
Waypoint (Range, bearing):	RMB>WPL>BWR>BWC
Water depth:	DPT>DBT>DBS>DBK
Wind:	MWV>VWT>VWR
Water Temperature:	MTW
Time:	ZDA
	^{*1} : calculated by magnetic deviation
1.4. 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)

2. PLOTTER FUNCTION

2.1. Projection	Mercator
2.2. Usable Area	85 latitude or below
2.3. Effective Area	211.2 x 158.4 mm
2.4. Display pixels	640 x 480 dots
2.5. Position Indication	Latitude/longitude, Loran C LOP or DECCA LOP
2.6. Effective Projection Area	0.125 nm to 1,024 nm (at equatorial area)
2.7. Track Display	Plot interval: by time (1 sec. to 99 min. 59 sec.) or by distance (0 to 99.9 nm)
2.8. Colors	Red, yellow, green purple, light-blue, blue, white
2.9. Memory Capacity	Track/mark: 8000 points, Waypoint: 999 points
2.10. Storage Capacity	Simple route: 200 routes with 35 waypoints each
2.11. MOB	1 point
2.12. Quick Routes	1 course with 35 waypoints max.
2.13. Electronic Chart	FURUNO chart card or NAVIONICS chart card available

2.14. Alarms C-MAP chart card also available for C-MAP NT Model
Arrival and Anchor watch, Cross track error and proximity alarms, Ship's speed in and out alarms, Water temperature, Trip alarm, Fish alarm, Bottom alarm (ETR required)

3. POWER SUPPLY

3.1. Rated Voltage/Current 12-24 VDC: 2.1-1.1 A (3.1-1.6 A)
(): for high brilliance monitor
3.2. Rectifier (option) PR-62: 100/110/220/230 VAC, 1 phase, 50/60 Hz

4. ENVIRONMENTAL CONDITION

4.1. Ambient Temperature -15°C to +55°C
4.2. Relative Humidity 93 % or less at +40°C
4.3. Waterproofing IPX5
4.4. Bearing Vibration IEC 60945-3rd

5. COATING COLOR

5.1. Display Unit N3.0

6. COMPASS SAFE DISTANCE

6.1. Display Unit Standard: 1.00 m Steering: 0.80 m

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Declaration of Conformity

We **FURUNO ELECTRIC CO., LTD.**

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declare under our sole responsibility that the product

10.4" colour LCD radar Models 1833C (ø602 mm radome, 4 kW, 24 rpm), 1933C (1035 mm open, 4 kW, 24/48 rpm) and 1943C (1255 mm open, 6 kW, 24/48 rpm) with optional GPS receiver GP-310B for recreational crafts; the LCD is available in two versions: brightness level 300 cd/m² or 700 cd/m²

(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° 01214052/AA/00 of 27 March 2001 issued by KTL Certification, The Netherlands
- Test reports FLI 12-00-017, FLI 12-01-018, FLI 12-01-019, FLI 12-01-004, FLI 12-01-005, FLI 12-01-006, FLI 12-01-015, FLI-12-01-028 prepared by Furuno Labotech International Co., Ltd., Japan

On behalf of Furuno Electric Co., Ltd.

Hiroaki Komatsu
Manager,
International Rules and Regulations

Nishinomiya City, Japan
May 25, 2001

(Place and date of issue)

(name and signature or equivalent marking of authorized person)