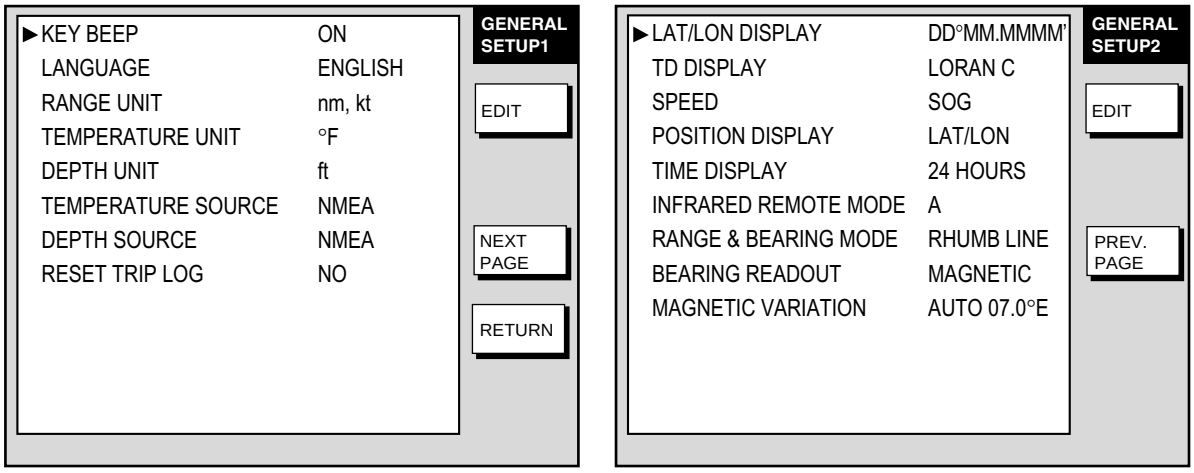
# 5. CUSTOMIZING YOUR UNIT

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.




Page 1 Page 2

*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.

*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) |

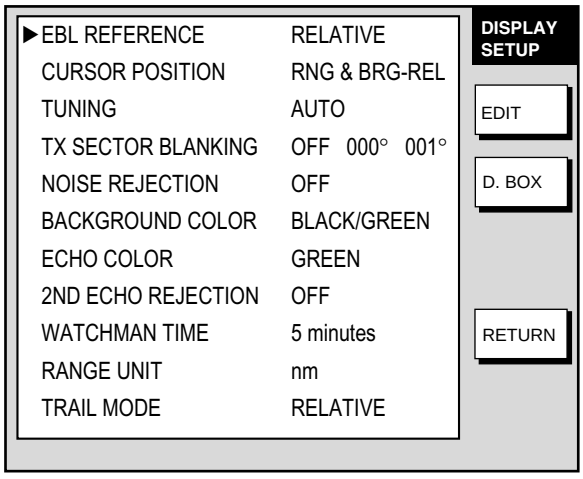
# 5.2 Radar Setup

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

## 5.2.1 Radar display setup

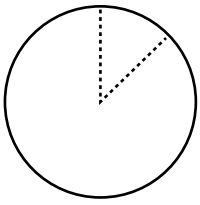
The radar display may be set up from the RADAR DISPLAY SETUP menu, which contains items such as EBL reference and cursor position format.

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




*Radar display setup menu*

*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.<br><br>**Note:** "RNG & BRG-TRUE" requires heading data, true bearing. Reverts to relative bearing when heading data is lost. | LAT/LON: Lat/Long position of cursor<br>TD: Loran C or Decca TDs<br>RNG & BRG-REL: Range and bearing in relative bearing.<br>RNG & BRG-TRUE: 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.<br>  <br>*Dead sector* | 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. | Black/Green<br>Background: Black<br>Rings: Green<br>Characters: Green<br>Black/Red<br>Background: Black<br>Rings: Green<br>Characters: Red<br>Blue/White<br>Background: Blue<br>Rings: White<br>Characters: White<br>DK Blue/White<br>Background: Dark Blue<br>Rings: Green<br>Characters: Red<br>White/Green<br>Background: White<br>Rings: Green<br>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.<br><br>**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.<br>**Relative:** Echo trails move relative to own ship. | Relative |

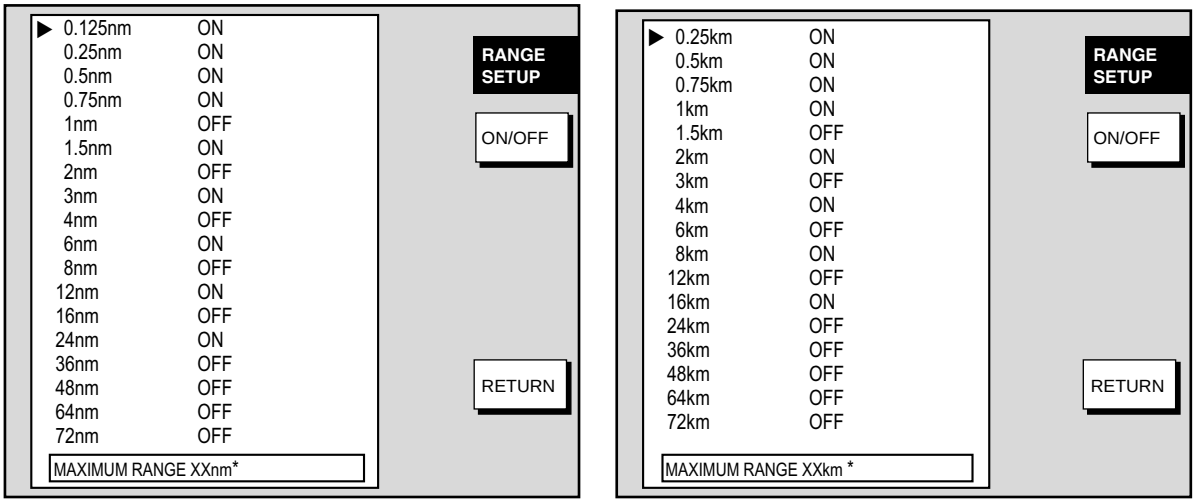
## 5.2.2 Radar range setup

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.




* = 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 |

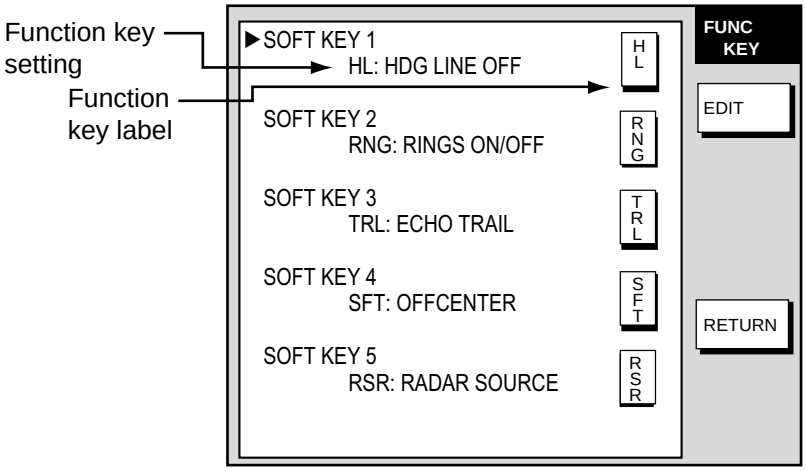
### 5.2.3 Function key setup

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 |

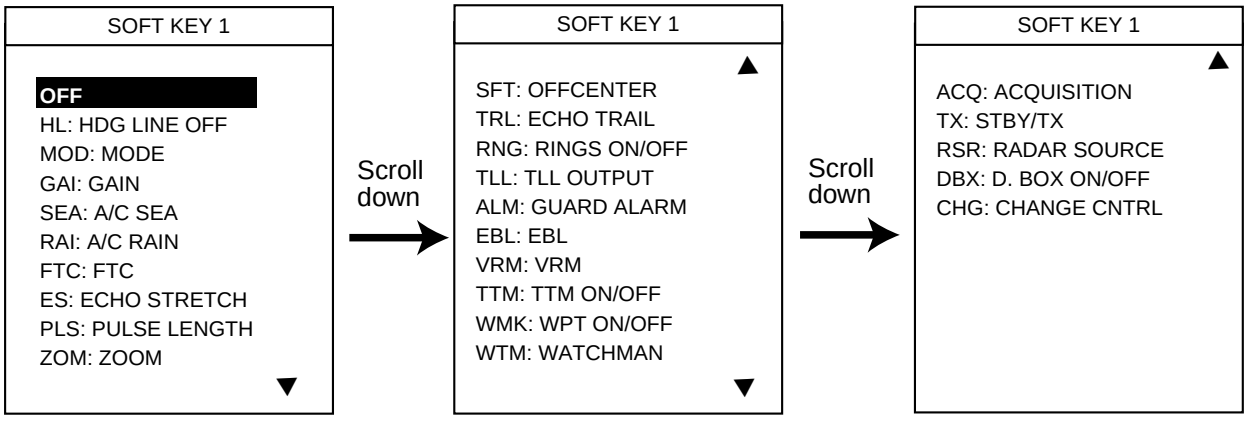
If the above settings are not to your liking you may change them as follows:

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*

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.

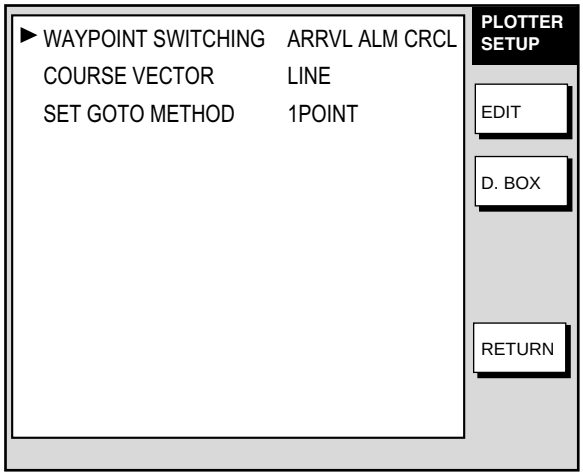
# 5.3 Plotter Setup

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. | | |

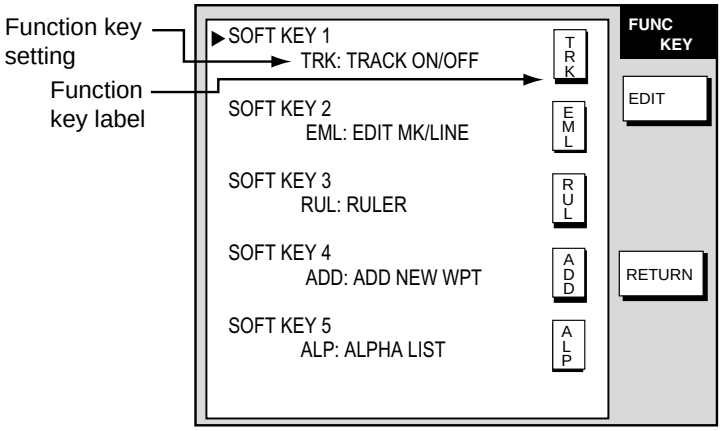
## 5.3.2 Function key setup

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 |

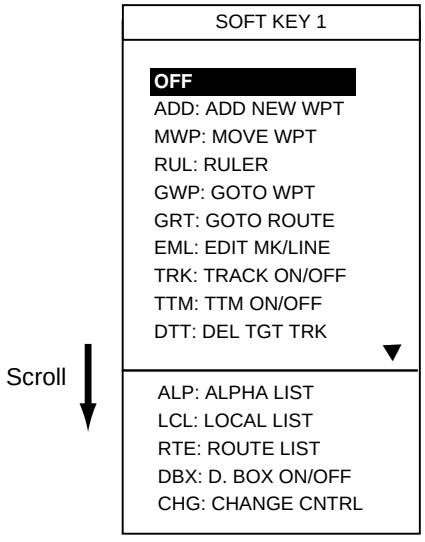
If the above settings are not to your liking you may change them as follows:

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.

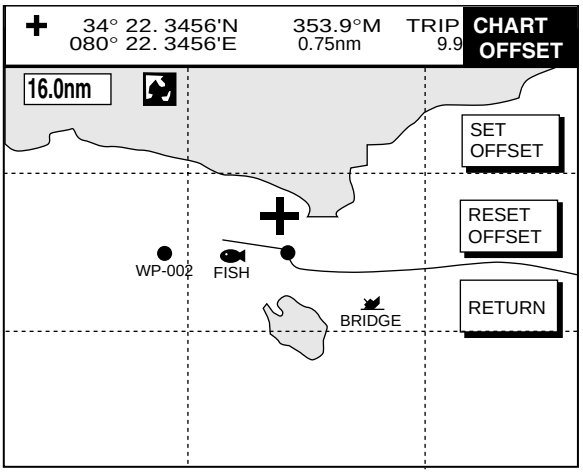
# 5.4 Chart Setup

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.

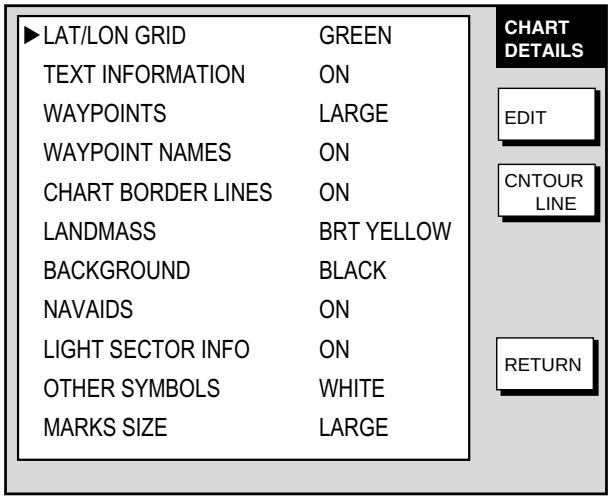


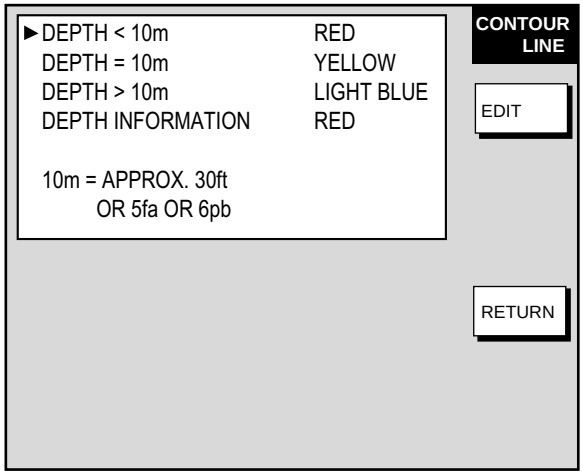

*Chart details menu (FURUNO, NavCharts™)*

*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.<br>Off | Brt, Yellow |
| Background | Chart background color | White, Black | Black |
| Navaids | Navaids 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.




*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.

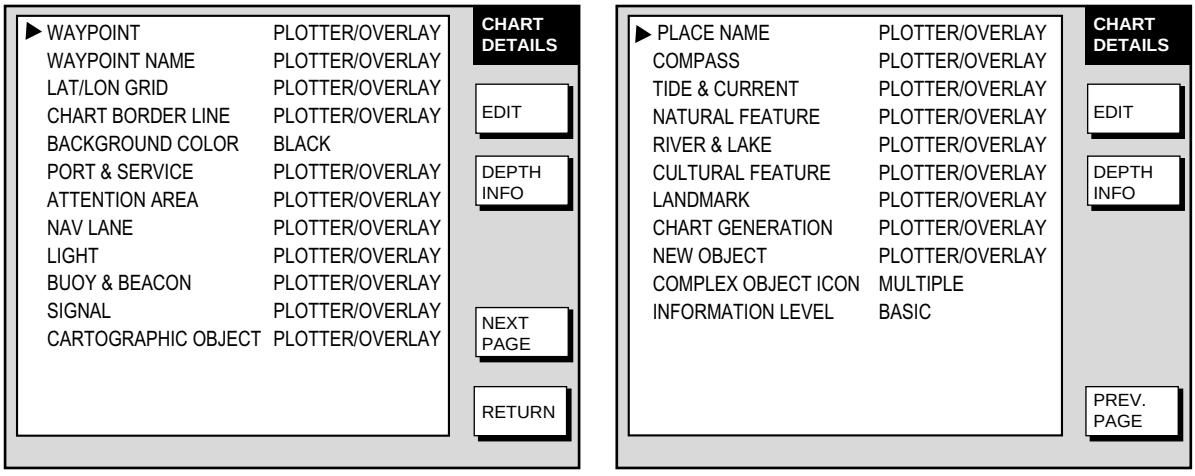



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*Chart details menu (C-MAP)*

*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)*

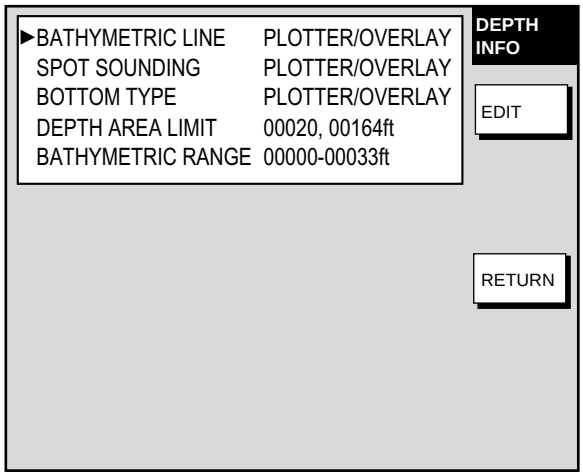
| Item | Description | Settings | Default Setting |
|---|---|---|---|
| DEPTH INFO soft key (See below.) | Bathymetric Line | Plotter/Overlay, Plotter, Off | Plotter/Overlay |
| | Spot Sounding | Plotter/Overlay, Plotter, Off | Plotter/Overlay |
| | Bottom Type | Plotter/Overlay, Plotter, Off | Plotter/Overlay |
| | 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

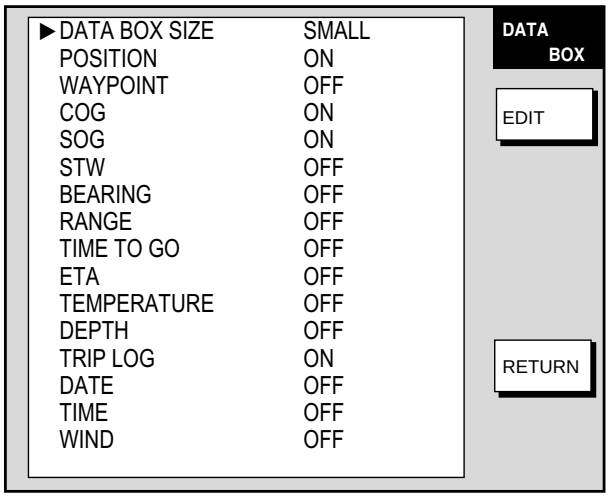
You may select the data to show in the data boxes for the plotter, radar and sounder displays. Six boxes may be displayed in case of small size data box and two for large size data box.

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



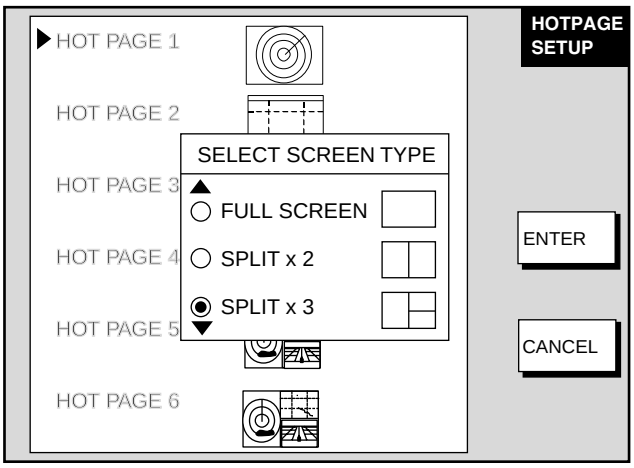

*Data box menu*

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.

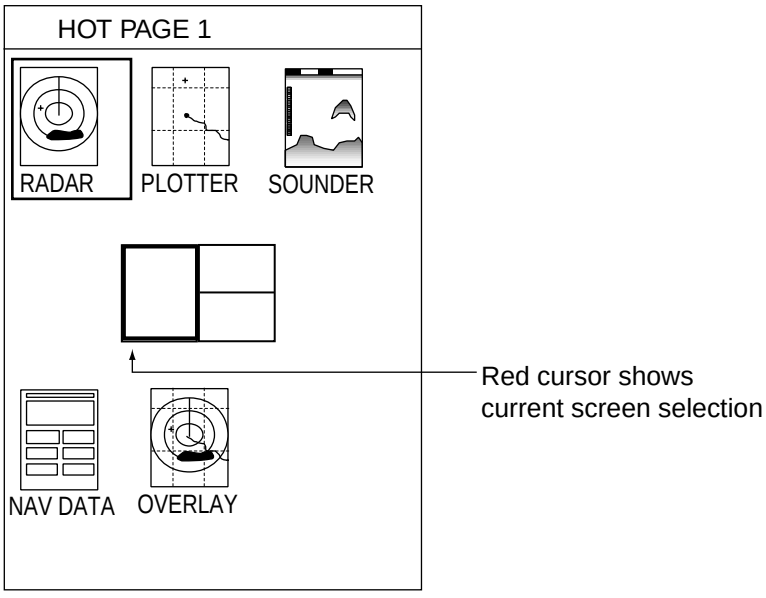
1. Press the [MENU] key followed by pressing the SYSTEM CONFIGURATION, SYSTEM SETUP, HOT PAGE & NAV DISP SETUP and HOT PAGE SETUP soft keys in that order.
2. Use the trackball to select the hot page number to set, then press the EDIT soft key. The “SELECT SCREEN TYPE” window appears.




*Hot page setup menu*

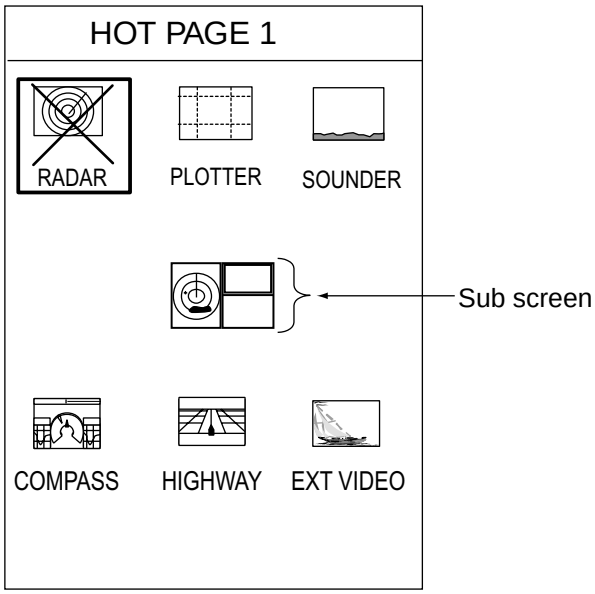
3. Use the trackball to select screen type desired among FULL SCREEN, SPLIT X 2 and SPLIT X 3 and push the [ENTER] knob.

   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.




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

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 is 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.

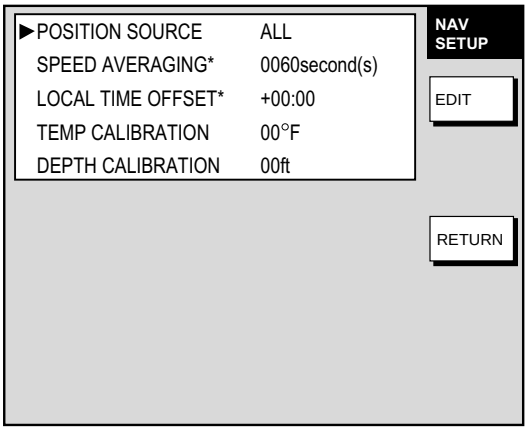
7. Press the [MENU] key to close the menu.

# 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.




* For GPS receiver othe than GP-310B.

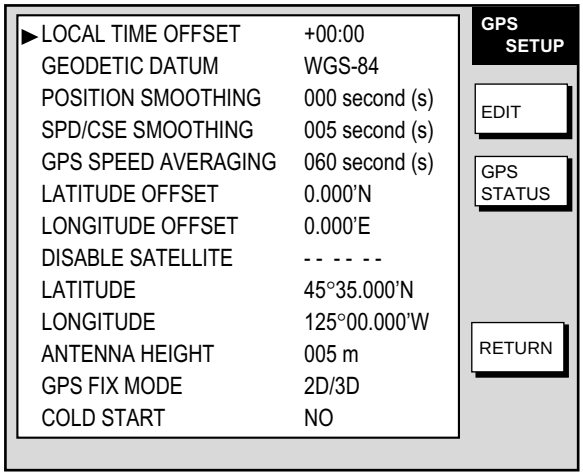
*Nav setup menu*

*Contents of nav setup menu*

| Item | Description | Settings | Default Setting |
|---|---|---|---|
| Position Source | Chooses source of position data. | **FURUNO BB GPS:** GPS Receiver GP-310B<br>**GP:** GPS navigator (via NETWORK or NMEA port)<br>**LC:** Loran C navigator (via NETWORK or NMEA port)<br>**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.




*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<br>0.001'E – 9.999'W | 0.0' (no offset) |

*(Con't on next page)*

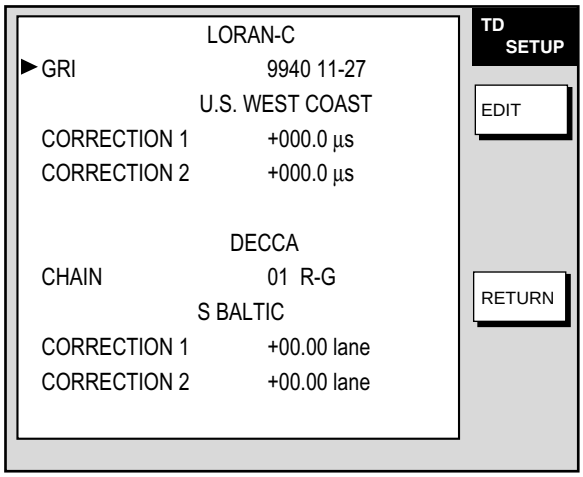
*Contents of GPS setup menu (con't from previous page)*

| 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.)

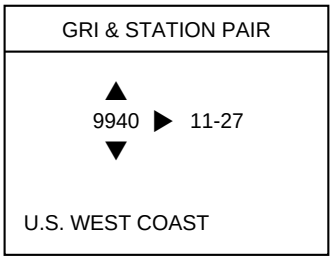
1. Press the [MENU] key.
2. Press the SYSTEM CONFIGURATION, NAV OPTION and TD SETUP soft keys to display the TD SETUP menu.




*TD setup menu*

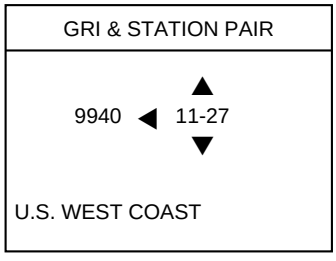
**Displaying Loran C TDs**

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




*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.



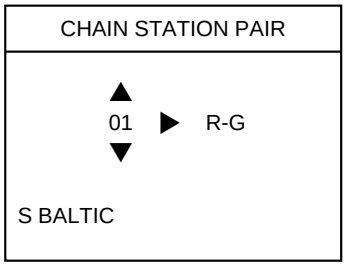

*Loran C GRI & station pair window*

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

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.

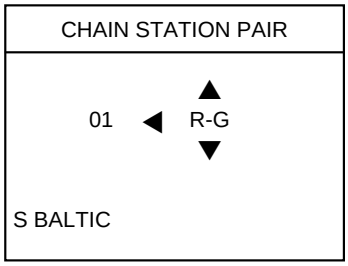
**Displaying DECCA TDs**

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.



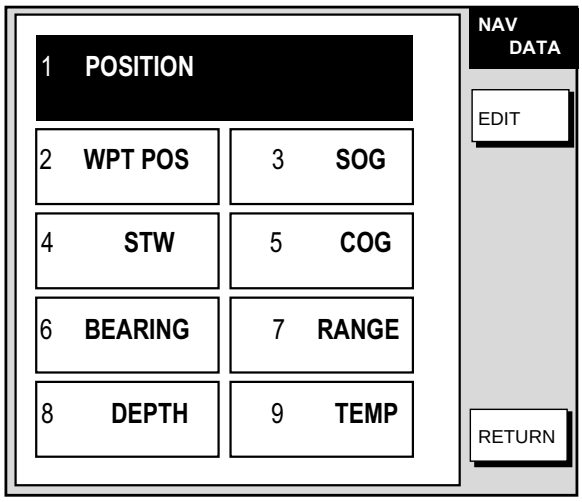

*Decca chain and station pair window*

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

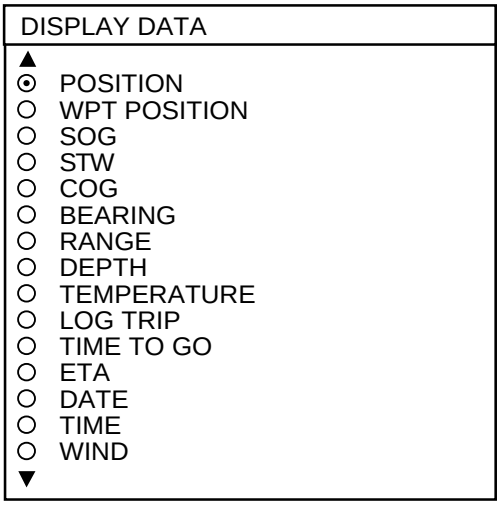
The nav data display shows various navigation data, fed from a navigator, network equipment, etc. You may select the data to display and where to display it as follows:

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*

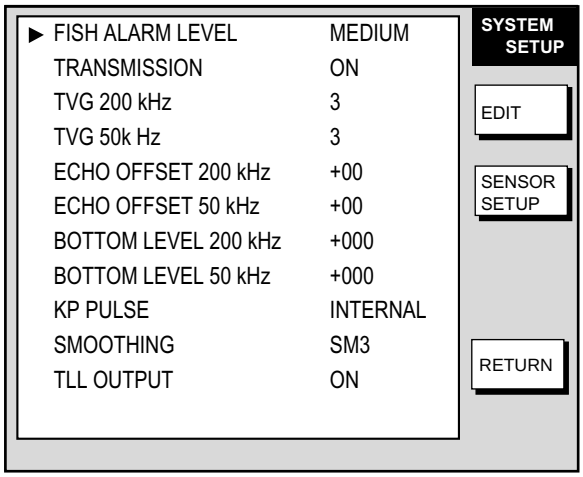
5. Select the data to display, then press the ENTER soft key or [ENTER] knob to register your selection.
6. Press the RETURN soft key followed by the [MENU] key to close the menu.

# 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.




*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.*<br>**Medium:** Yellow and stronger echoes trigger the alarm.*<br>**Low:** Green and stronger echoes trigger the alarm.*<br><br>* = 8-color display | Medium |
| Transmission | Turns TX power on/off. | On, Off | On |

*(Continued on next page)*

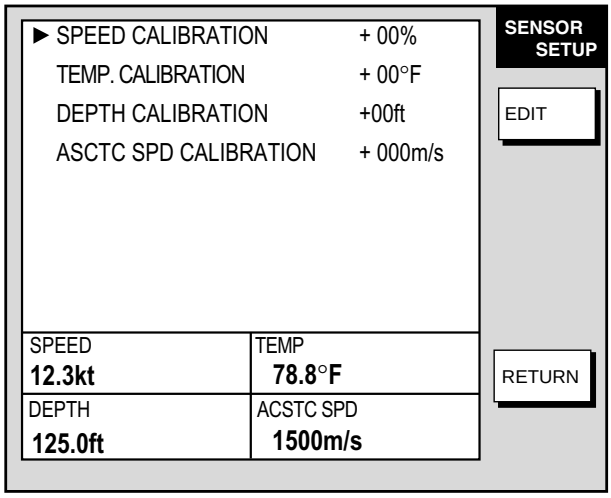
*Sounder system setup menu description (con't from previous page)*

| 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 | Smoothes 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 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*

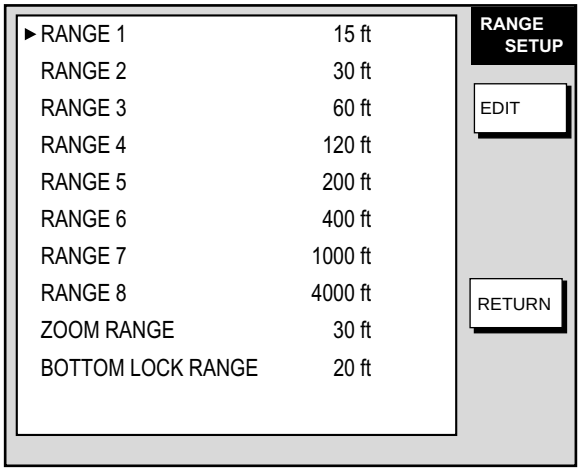
| Item | Settings | Default Setting |
|---|---|---|
| Speed Calibration | -50 -+50% | 0 (no offset) |
| Temperature Calibration | -40°F – +40°F | 0 (no offset) |
| Depth Calibration | -15 - +90 ft | 0 (no offset) |
| Acoustic Speed Calibration | -500 - +500 m/s | 0 (no offset) |

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 |

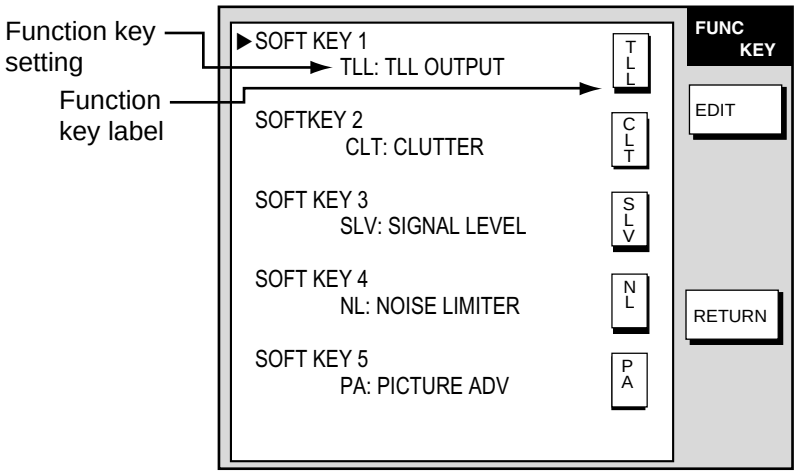
## 5.9.4 Function key setup

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 |

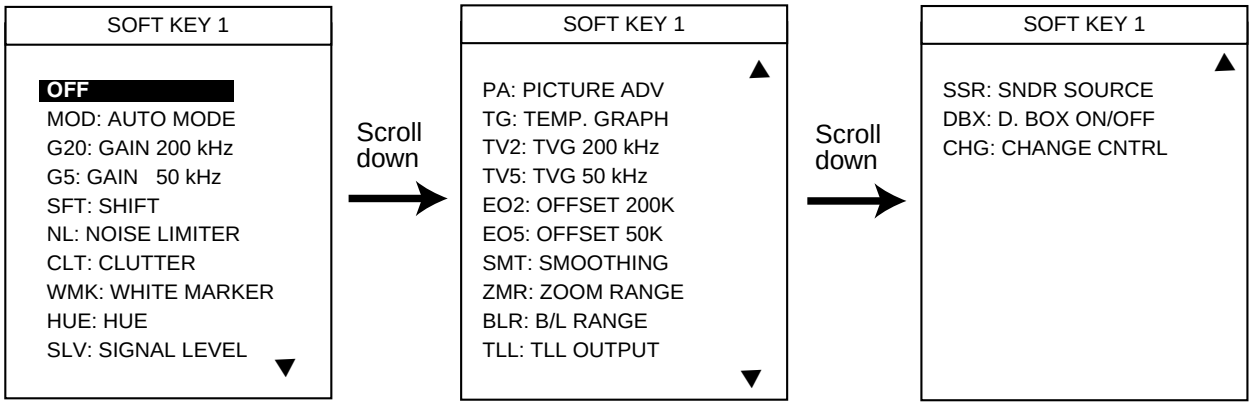
If the above settings are not to your liking you may change them as follows:

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.

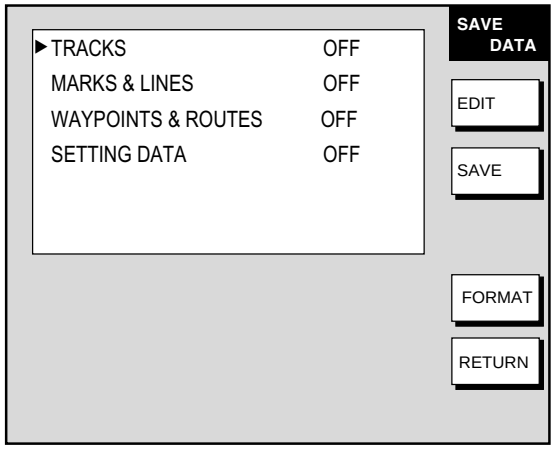
## 6.1 Memory Card Operations

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.



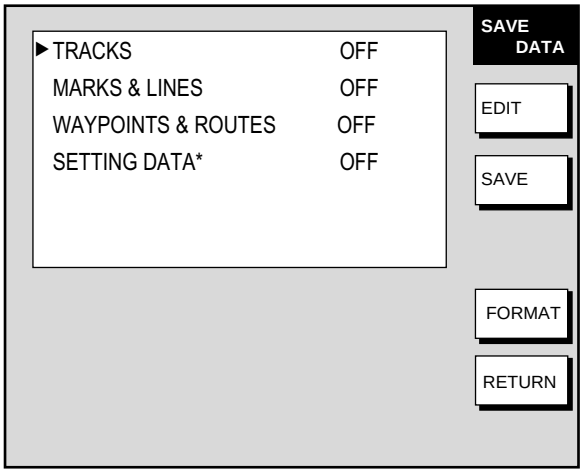

*Save data menu*

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.

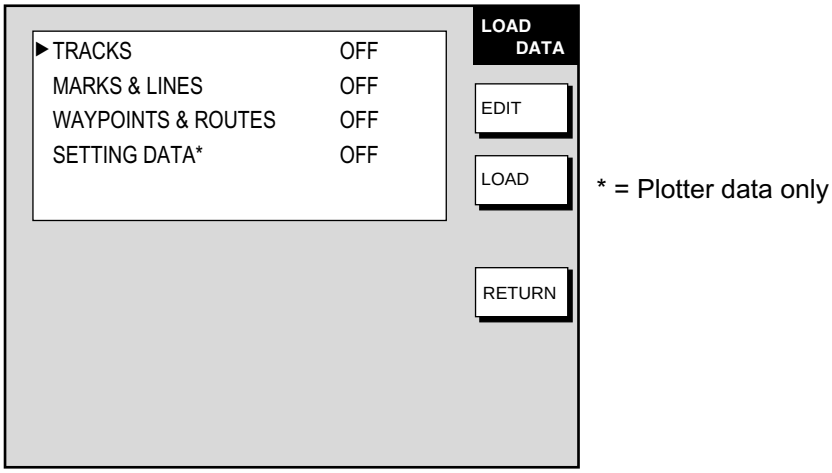
*Memory card messages*

| 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?<br>(Track)<br>(Mark)<br>(WPT)<br>(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) |

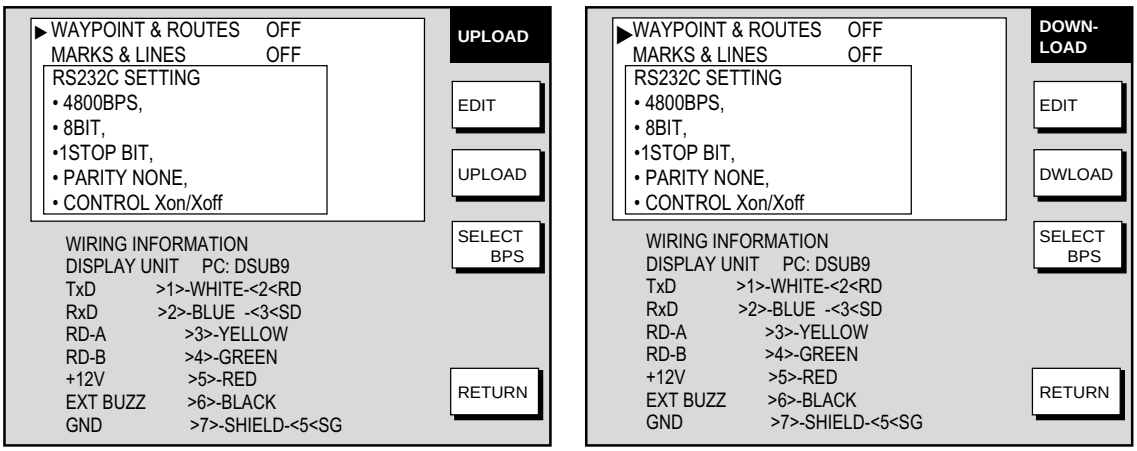
The following data can be downloaded/uploaded between a PC and this equipment:

- 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.

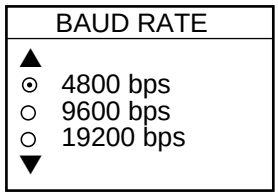
## 6.2.2 Uploading or downloading data

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*

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




*Baud rate window*

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

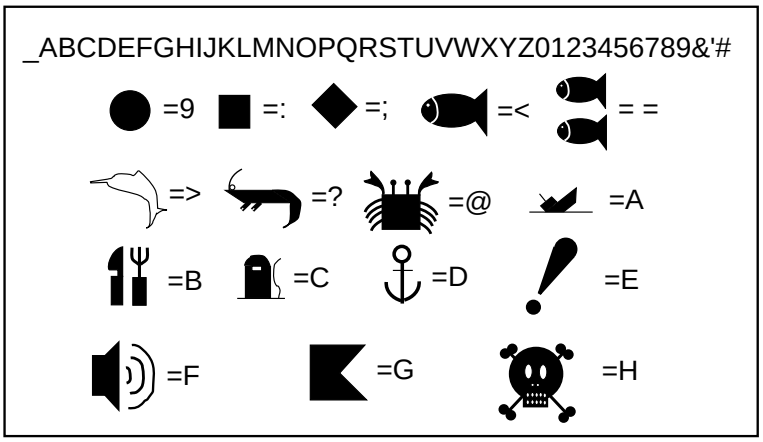
**Waypoint data format**

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

*Waypoint data format*

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

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




*Characters available for comment*

**Route data menu**

```
$GPRTE, x, x, a, ccc, c----c, c----c, ... , c----c <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,  xx, c----c <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.

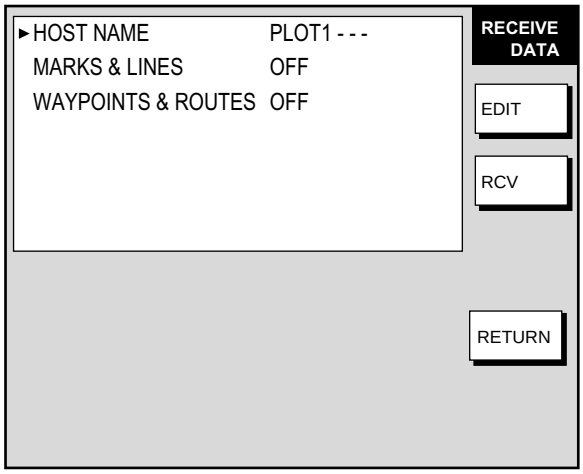
1. Press the [MENU] key.
2. Press the SYSTEM CONFIGURATION key.
3. Press the DATA TRANSFER soft key.
4. Press the RECEIVE YEOMAN DATA soft key.
5. You are asked if you are sure to receive waypoint data from Yeoman equipment. Push the [ENTER] knob to receive the data.

   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

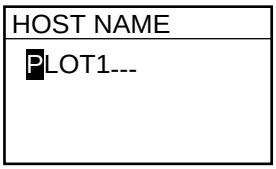
You can receive waypoints, routes, marks and lines from NavNet equipment.

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.



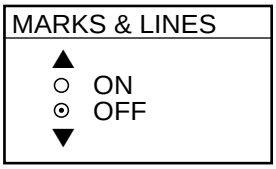

*Receive data menu*

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




*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 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.

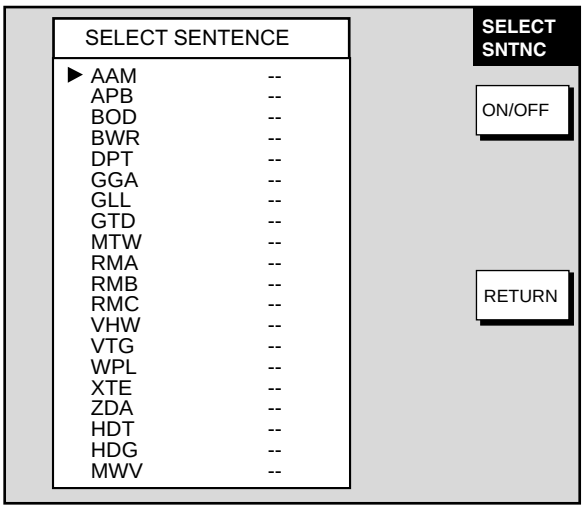
    The message “START RECEIVING DATA VIA NETWORK.” is displayed. If no data could be found, the message “(HOST NAME)’ IS NOT FOUND.” appears.

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.

**⚠ WARNING**

**Do not open the equipment.**

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

## 7.1 Preventive Maintenance

Regular maintenance is important for optimum performance. A maintenance 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**

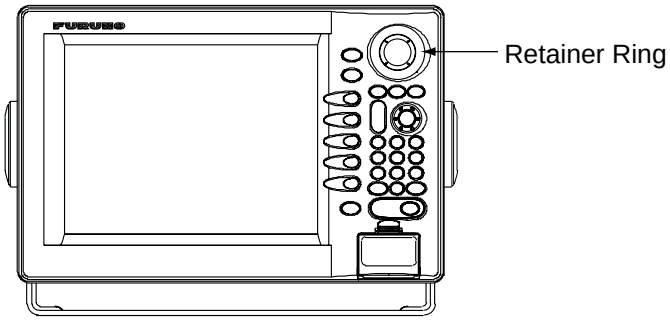
**Use the proper fuse.**

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.<br>• check that the power connector is firmly fastened.<br>• check for corrosion on the power cable connector.<br>• check for damaged power cable.<br>• 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.<br>• 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.<br>• 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.<br>• 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.<br>• 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.<br>• 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.<br>• 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.<br>• Check that sounder source is correct.<br>• 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.<br>• marine life or air bubbles may be clinging to transducer face.<br>• 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.<br>• check the ground.<br>• 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. |

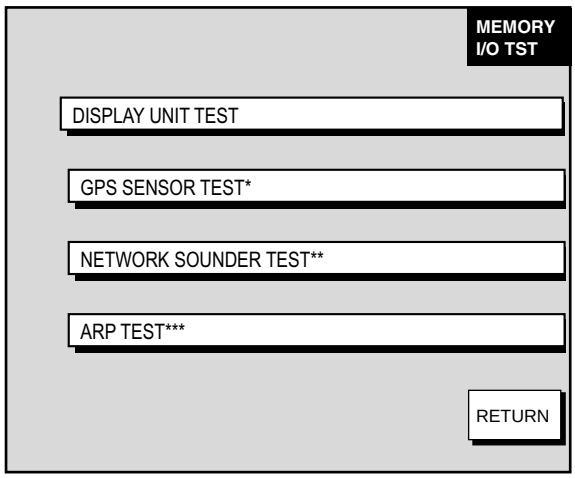
# 7.6 Diagnostics

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*

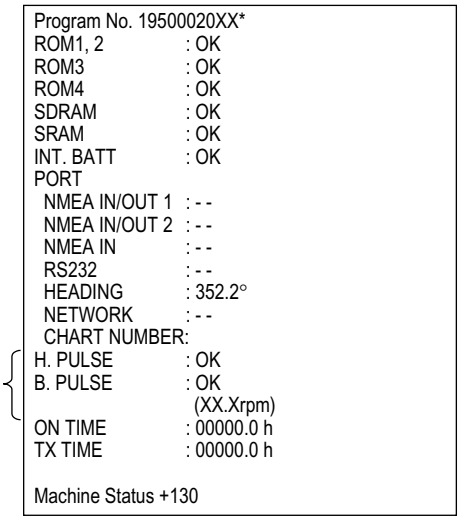
6. Then, press appropriate soft key to start a diagnostic test.

## 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.

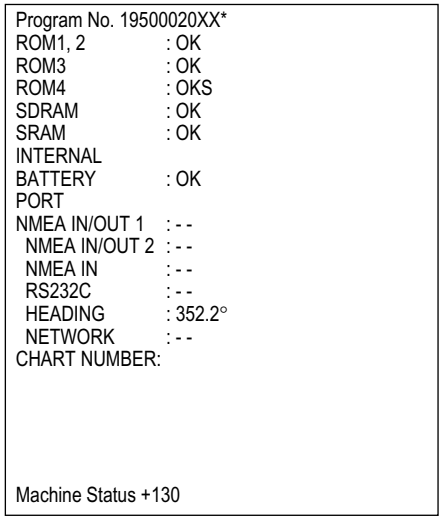
* = For FURUNO, NAVIONICS model. 19500010XX for C-MAP model.

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




XX = Program Version No.

Model 1800/1900 series



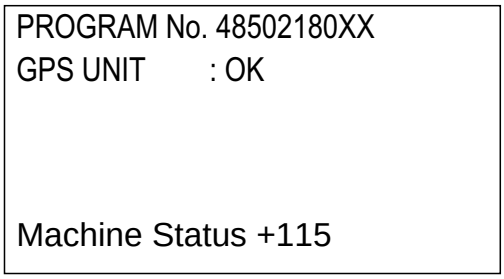

XX = Program Version No.

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.




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
```

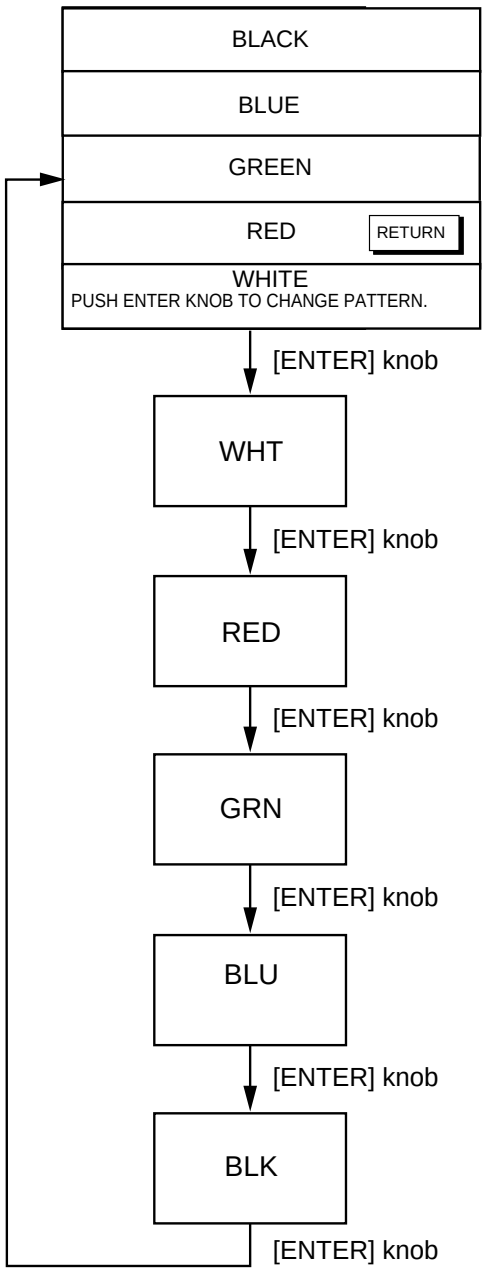
XX = Program Version No.

*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.

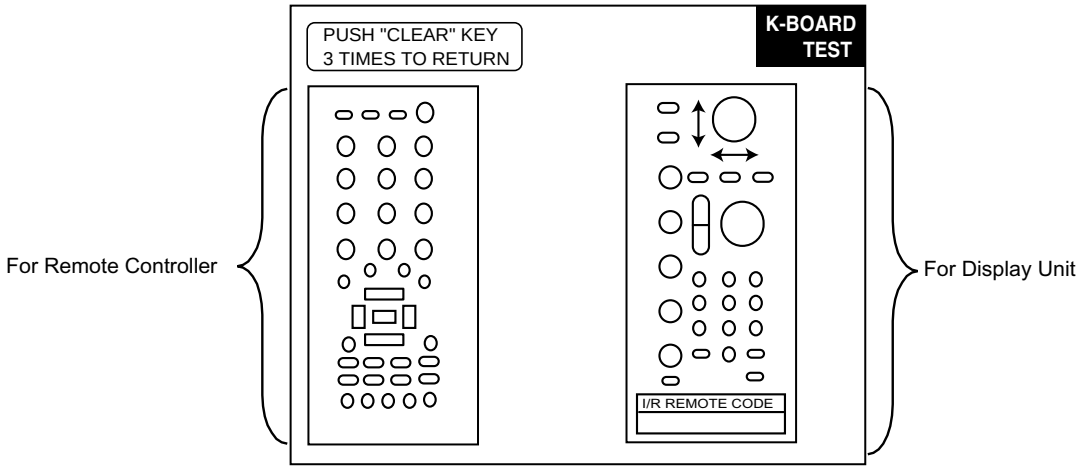



*Test pattern sequence*

## 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.



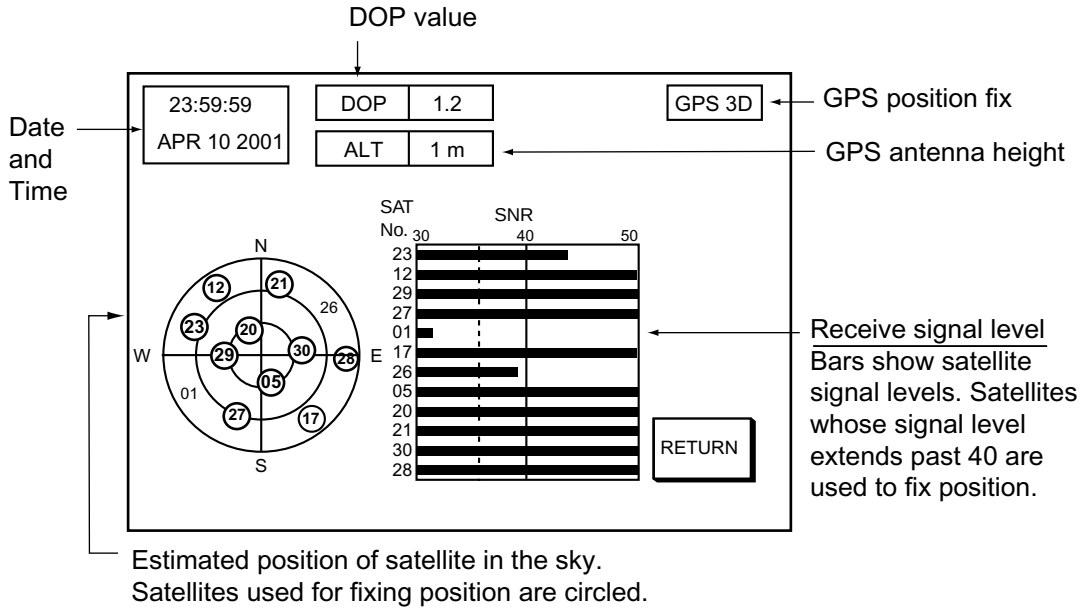

*Screen for testing keyboard, remote controller*

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*

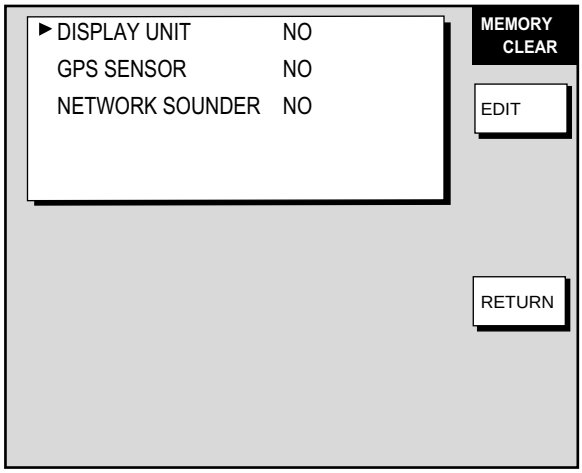
4. Press the RETURN soft key to quit the GPS status display.

# 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.

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

*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.<br>• 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.<br>• 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

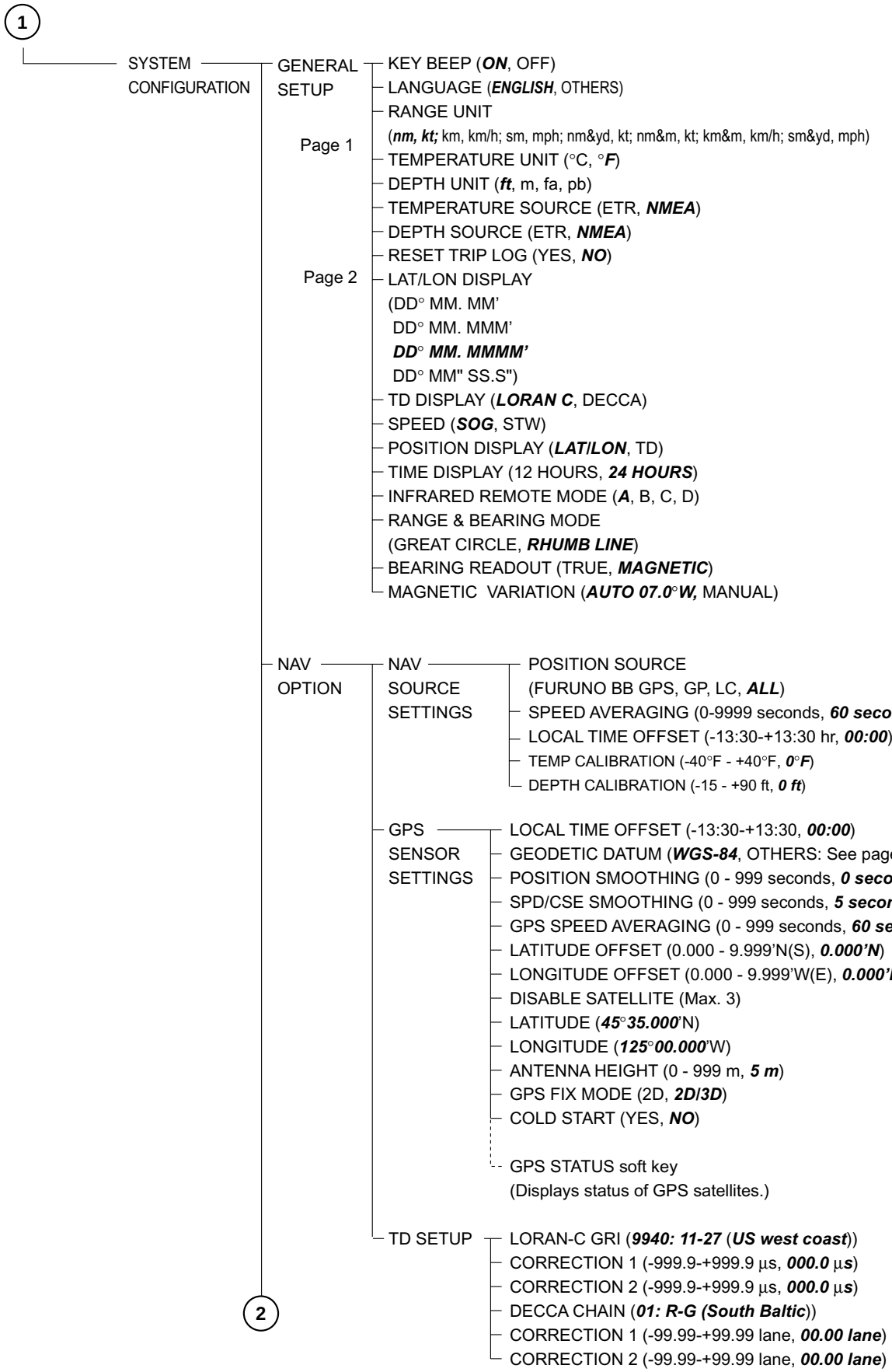
MENU Key
- RADAR DISPLAY SETUP
  - EBL REFERENCE (TRUE, ***RELATIVE***)
  - CURSOR POSITION (LAT/LON, TD, ***RNG&BRG-REL***, RNG&BRG-TRUE)
  - TUNING (***AUTO***, MAN)
  - TX SECTOR BLANKING (ON (FROM 000°, SECTOR 001°)), ***OFF***)
  - NOISE REJECTION (OFF, ***LOW,*** HIGH)
  - BACKGROUND COLOR (***BLACK/GREEN***, 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)
  - ***0.25***/***0.5***/***0.75***/***1***/1.5/***2***/3/***4***/6/***8***/12/***16***/24/***36***/***48***/64 (km)

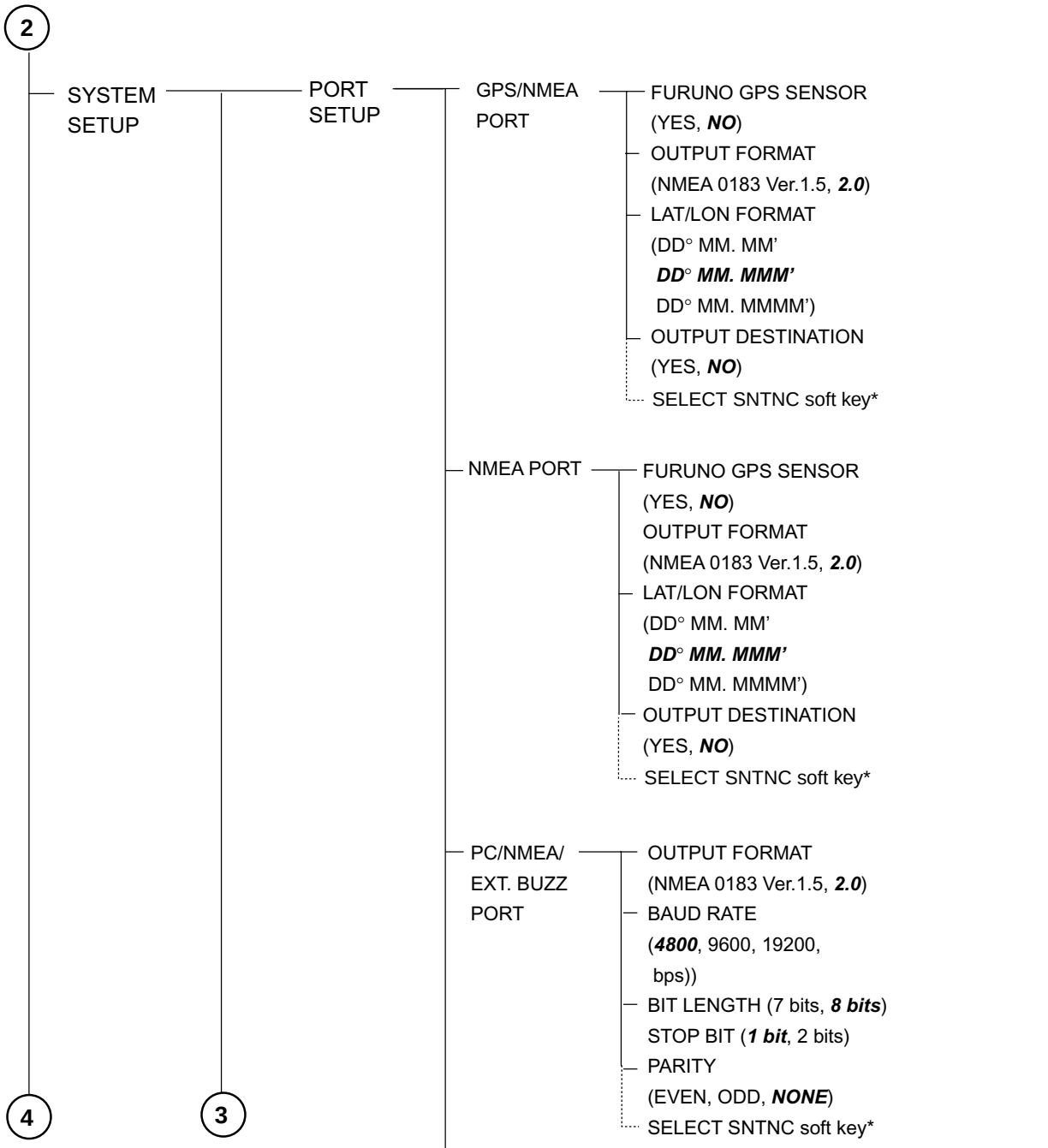
  Max. range
  36 nm/sm, km = 1833C
  48 nm/sm, km = 1933C
  64 nm/sm, km = 1943C
  72 nm/sm, km = 1953C

  # = 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)

(1)

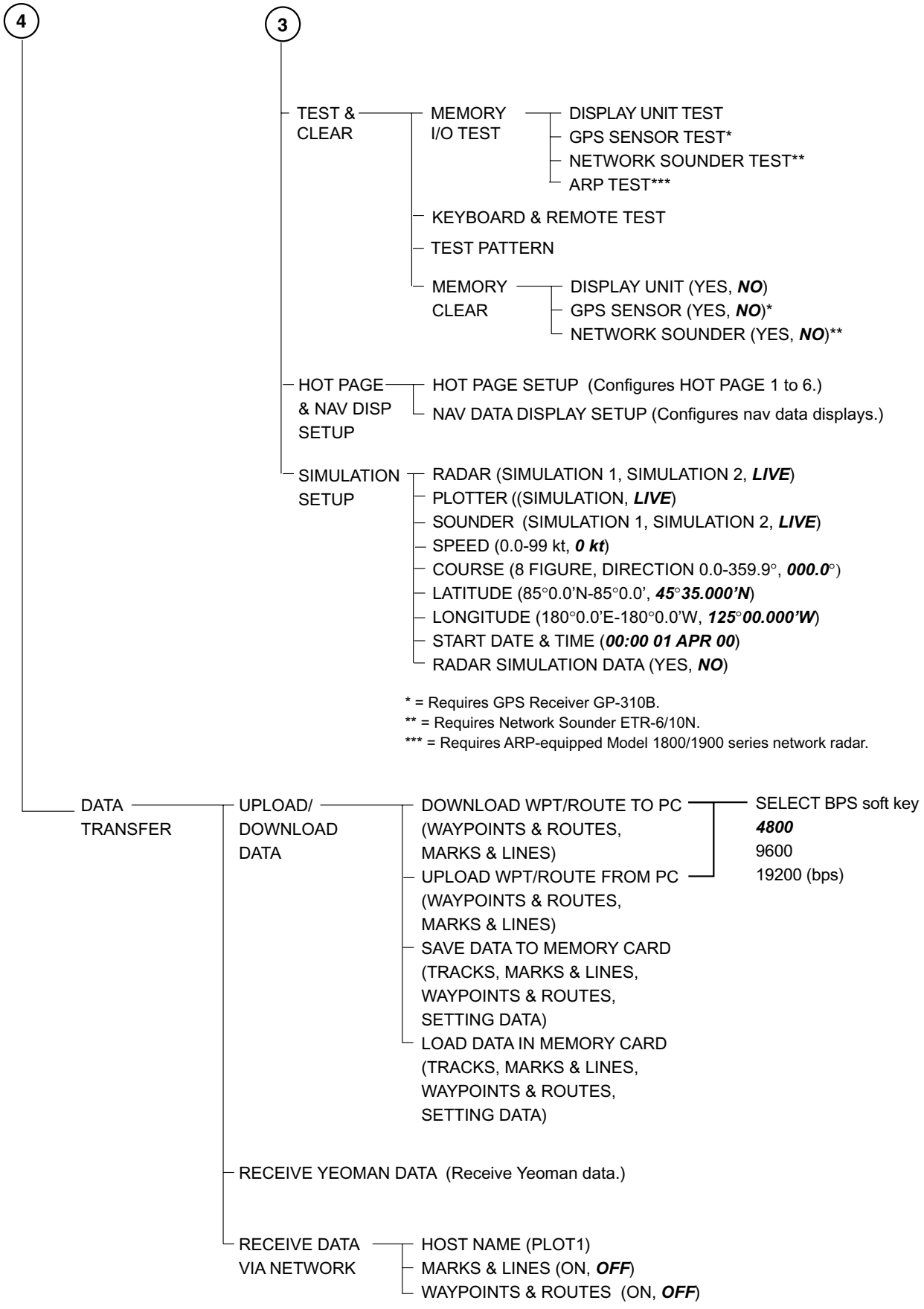
* Default settings for function keys:
SOFT KEY 1, HDG LINE OFF; SOFT KEY 2, RINGS ON/OFF; SOFT KEY 3, ECHO TRAIL; SOFT KEY 4, OFFCENTER, SOFT KEY 5, RADAR SOURCE


1
SYSTEM CONFIGURATION
GENERAL SETUP
Page 1
KEY BEEP (ON, OFF)
LANGUAGE (ENGLISH, OTHERS)
RANGE UNIT
(nm, kt; km, km/h; sm, mph; nm&yd, kt; nm&m, kt; km&m, km/h; sm&yd, mph)
TEMPERATURE UNIT (°C, °F)
DEPTH UNIT (ft, m, fa, pb)
TEMPERATURE SOURCE (ETR, NMEA)
DEPTH SOURCE (ETR, NMEA)
Page 2
RESET TRIP LOG (YES, NO)
LAT/LON DISPLAY
(DD° MM. MM'
DD° MM. MMM'
DD° MM. MMMM'
DD° MM" SS.S")
TD DISPLAY (LORAN C, DECCA)
SPEED (SOG, STW)
POSITION DISPLAY (LAT/LON, TD)
TIME DISPLAY (12 HOURS, 24 HOURS)
INFRARED REMOTE MODE (A, B, C, D)
RANGE & BEARING MODE
(GREAT CIRCLE, RHUMB LINE)
BEARING READOUT (TRUE, MAGNETIC)
MAGNETIC VARIATION (AUTO 07.0°W, MANUAL)
NAV OPTION
NAV SOURCE SETTINGS
POSITION SOURCE
(FURUNO BB GPS, GP, LC, ALL)
SPEED AVERAGING (0-9999 seconds, 60 seconds)
LOCAL TIME OFFSET (-13:30-+13:30 hr, 00:00)
TEMP CALIBRATION (-40°F - +40°F, 0°F)
DEPTH CALIBRATION (-15 - +90 ft, 0 ft)
GPS SENSOR SETTINGS
LOCAL TIME OFFSET (-13:30-+13:30, 00:00)
GEODETIC DATUM (WGS-84, OTHERS: See page A-10.)
POSITION SMOOTHING (0 - 999 seconds, 0 seconds)
SPD/CSE SMOOTHING (0 - 999 seconds, 5 seconds)
GPS SPEED AVERAGING (0 - 999 seconds, 60 seconds)
LATITUDE OFFSET (0.000 - 9.999'N(S), 0.000'N)
LONGITUDE OFFSET (0.000 - 9.999'W(E), 0.000'E)
DISABLE SATELLITE (Max. 3)
LATITUDE (45°35.000'N)
LONGITUDE (125°00.000'W)
ANTENNA HEIGHT (0 - 999 m, 5 m)
GPS FIX MODE (2D, 2D/3D)
COLD START (YES, NO)
GPS STATUS soft key
(Displays status of GPS satellites.)
TD SETUP
LORAN-C GRI (9940: 11-27 (US west coast))
CORRECTION 1 (-999.9-+999.9 µs, 000.0 µs)
CORRECTION 2 (-999.9-+999.9 µs, 000.0 µs)
DECCA CHAIN (01: R-G (South Baltic))
CORRECTION 1 (-99.99-+99.99 lane, 00.00 lane)
CORRECTION 2 (-99.99-+99.99 lane, 00.00 lane)
2

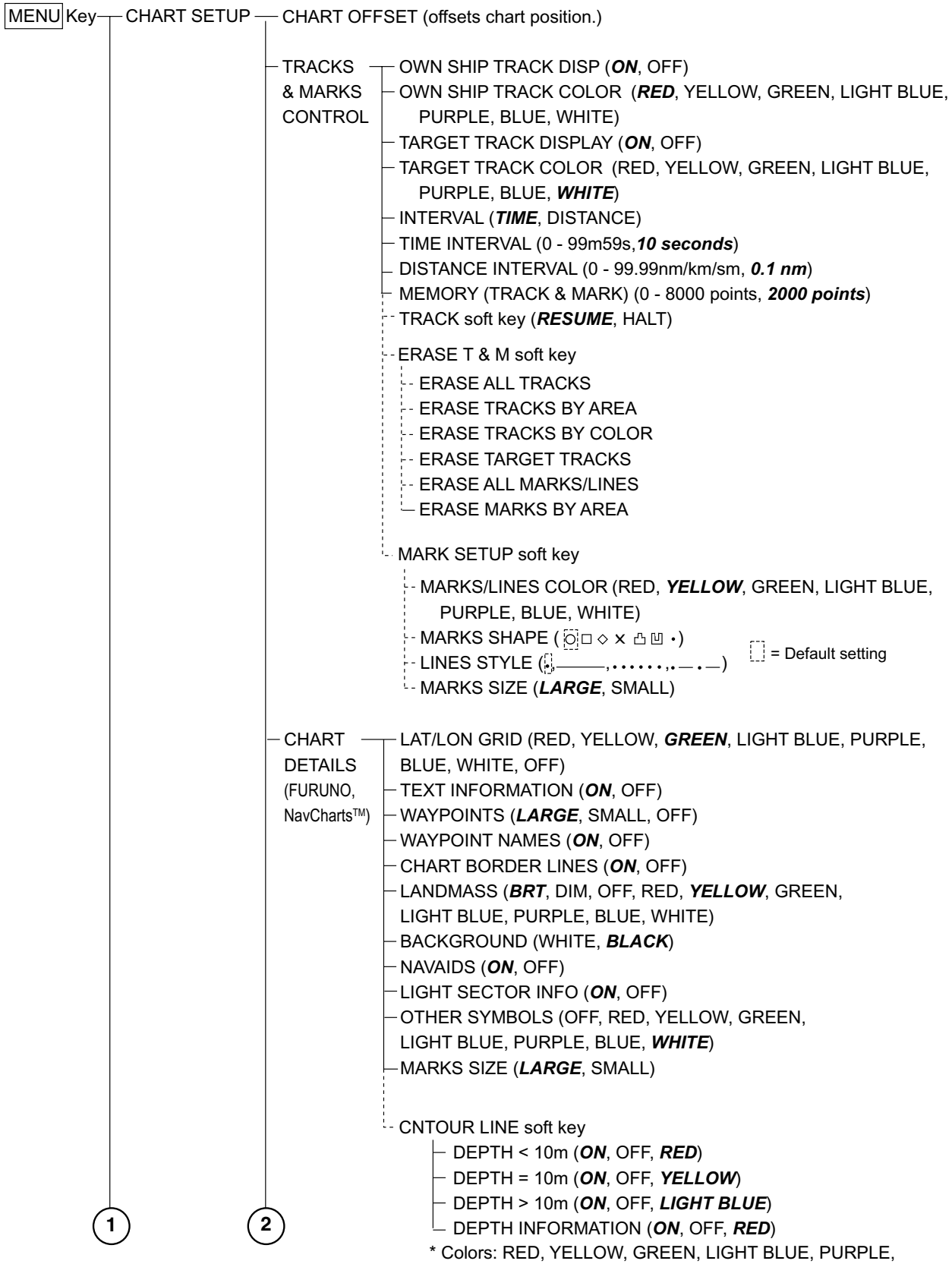


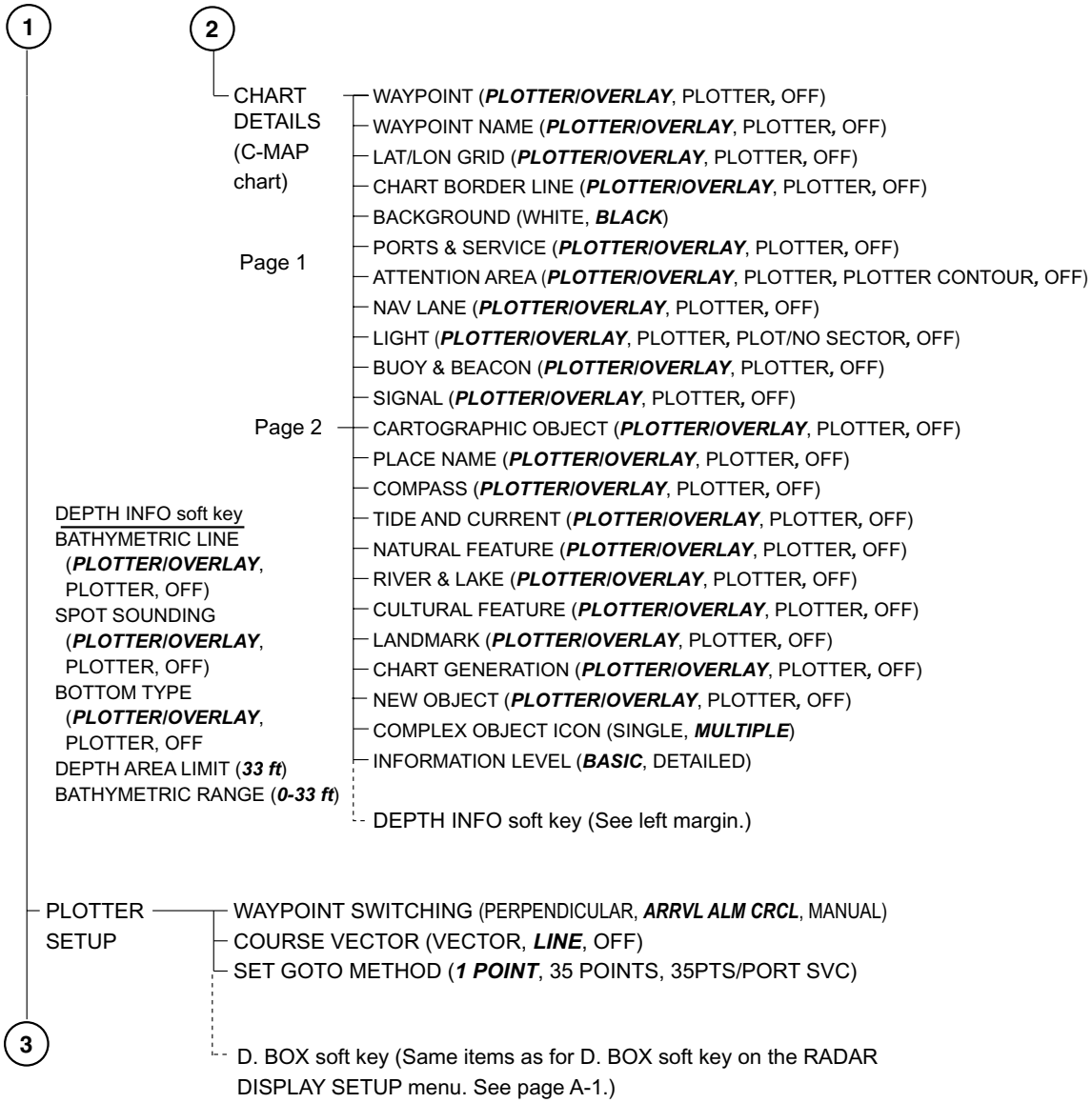

* = AAM, ***APB***, BOD, BWR(BWC)#1, DPT(DBT)#2, GGA, ***GLL***, GTD, MTW, RMA, ***RMB***, ***RMC***, VHW, ***VTG***, WPL, XTE, ***ZDA***, HDT, HDG, MWV

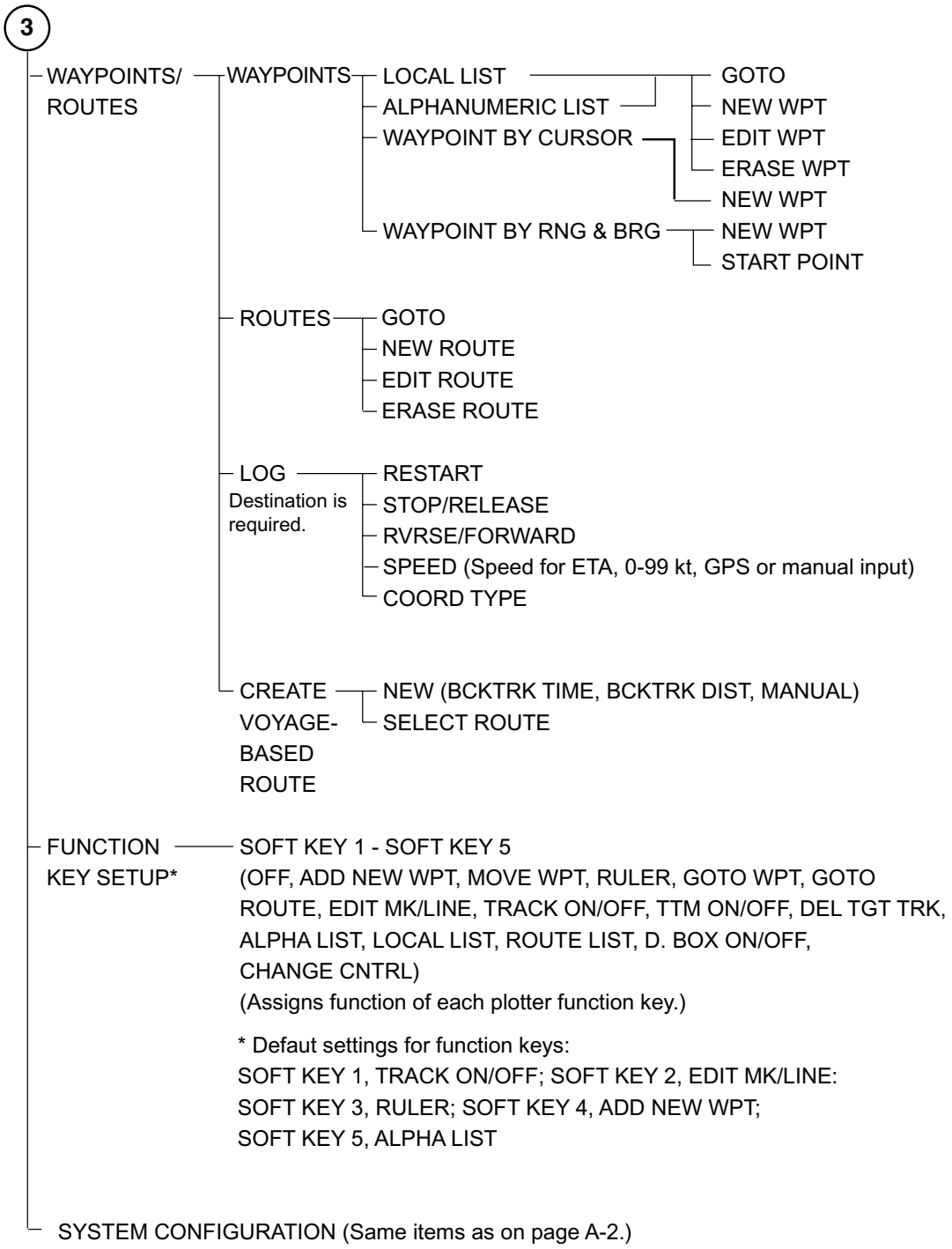
#1= BWR for rhumb line, BWC for great circle
#2 = DBT for NMEA Ver. 1.5; DPT for NMEA Ver. 2.0


4
3
TEST & CLEAR
MEMORY I/O TEST
DISPLAY UNIT TEST
GPS SENSOR TEST*
NETWORK SOUNDER TEST**
ARP TEST***
KEYBOARD & REMOTE TEST
TEST PATTERN
MEMORY CLEAR
DISPLAY UNIT (YES, NO)
GPS SENSOR (YES, NO)*
NETWORK SOUNDER (YES, NO)**
HOT PAGE & NAV DISP SETUP
HOT PAGE SETUP (Configures HOT PAGE 1 to 6.)
NAV DATA DISPLAY SETUP (Configures nav data displays.)
SIMULATION SETUP
RADAR (SIMULATION 1, SIMULATION 2, LIVE)
PLOTTER ((SIMULATION, LIVE)
SOUNDER (SIMULATION 1, SIMULATION 2, LIVE)
SPEED (0.0-99 kt, 0 kt)
COURSE (8 FIGURE, DIRECTION 0.0-359.9°, 000.0°)
LATITUDE (85°0.0'N-85°0.0', 45°35.000'N)
LONGITUDE (180°0.0'E-180°0.0'W, 125°00.000'W)
START DATE & TIME (00:00 01 APR 00)
RADAR SIMULATION DATA (YES, NO)
* = Requires GPS Receiver GP-310B.
** = Requires Network Sounder ETR-6/10N.
*** = Requires ARP-equipped Model 1800/1900 series network radar.
DATA TRANSFER
UPLOAD/ DOWNLOAD DATA
DOWNLOAD WPT/ROUTE TO PC (WAYPOINTS & ROUTES, MARKS & LINES)
SELECT BPS soft key
4800
9600
19200 (bps)
UPLOAD WPT/ROUTE FROM PC (WAYPOINTS & ROUTES, MARKS & LINES)
SAVE DATA TO MEMORY CARD (TRACKS, MARKS & LINES, WAYPOINTS & ROUTES, SETTING DATA)
LOAD DATA IN MEMORY CARD (TRACKS, MARKS & LINES, WAYPOINTS & ROUTES, SETTING DATA)
RECEIVE YEOMAN DATA (Receive Yeoman data.)
RECEIVE DATA VIA NETWORK
HOST NAME (PLOT1)
MARKS & LINES (ON, OFF)
WAYPOINTS & ROUTES (ON, OFF)

## Plotter


MENU Key
CHART SETUP
CHART OFFSET (offsets chart position.)
TRACKS & MARKS CONTROL
OWN SHIP TRACK DISP (ON, OFF)
OWN SHIP TRACK COLOR (RED, YELLOW, GREEN, LIGHT BLUE, PURPLE, BLUE, WHITE)
TARGET TRACK DISPLAY (ON, OFF)
TARGET TRACK COLOR (RED, YELLOW, GREEN, LIGHT BLUE, PURPLE, BLUE, WHITE)
INTERVAL (TIME, DISTANCE)
TIME INTERVAL (0 - 99m59s,10 seconds)
DISTANCE INTERVAL (0 - 99.99nm/km/sm, 0.1 nm)
MEMORY (TRACK & MARK) (0 - 8000 points, 2000 points)
TRACK soft key (RESUME, HALT)
ERASE T & M soft key
ERASE ALL TRACKS
ERASE TRACKS BY AREA
ERASE TRACKS BY COLOR
ERASE TARGET TRACKS
ERASE ALL MARKS/LINES
ERASE MARKS BY AREA
MARK SETUP soft key
MARKS/LINES COLOR (RED, YELLOW, GREEN, LIGHT BLUE, PURPLE, BLUE, WHITE)
MARKS SHAPE
LINES STYLE
MARKS SIZE (LARGE, SMALL)
= Default setting
CHART DETAILS (FURUNO, NavCharts™)
LAT/LON GRID (RED, YELLOW, GREEN, LIGHT BLUE, PURPLE, BLUE, WHITE, OFF)
TEXT INFORMATION (ON, OFF)
WAYPOINTS (LARGE, SMALL, OFF)
WAYPOINT NAMES (ON, OFF)
CHART BORDER LINES (ON, OFF)
LANDMASS (BRT, DIM, OFF, RED, YELLOW, GREEN, LIGHT BLUE, PURPLE, BLUE, WHITE)
BACKGROUND (WHITE, BLACK)
NAVAIDS (ON, OFF)
LIGHT SECTOR INFO (ON, OFF)
OTHER SYMBOLS (OFF, RED, YELLOW, GREEN, LIGHT BLUE, PURPLE, BLUE, WHITE)
MARKS SIZE (LARGE, SMALL)
CNTOUR LINE soft key
DEPTH < 10m (ON, OFF, RED)
DEPTH = 10m (ON, OFF, YELLOW)
DEPTH > 10m (ON, OFF, LIGHT BLUE)
DEPTH INFORMATION (ON, OFF, RED)
* Colors: RED, YELLOW, GREEN, LIGHT BLUE, PURPLE, BLUE, WHITE
1
2


1
2
CHART DETAILS (C-MAP chart)
Page 1
Page 2
WAYPOINT (PLOTTER/OVERLAY, PLOTTER, OFF)
WAYPOINT NAME (PLOTTER/OVERLAY, PLOTTER, OFF)
LAT/LON GRID (PLOTTER/OVERLAY, PLOTTER, OFF)
CHART BORDER LINE (PLOTTER/OVERLAY, PLOTTER, OFF)
BACKGROUND (WHITE, BLACK)
PORTS & SERVICE (PLOTTER/OVERLAY, PLOTTER, OFF)
ATTENTION AREA (PLOTTER/OVERLAY, PLOTTER, PLOTTER CONTOUR, OFF)
NAV LANE (PLOTTER/OVERLAY, PLOTTER, OFF)
LIGHT (PLOTTER/OVERLAY, PLOTTER, PLOT/NO SECTOR, OFF)
BUOY & BEACON (PLOTTER/OVERLAY, PLOTTER, OFF)
SIGNAL (PLOTTER/OVERLAY, PLOTTER, OFF)
CARTOGRAPHIC OBJECT (PLOTTER/OVERLAY, PLOTTER, OFF)
PLACE NAME (PLOTTER/OVERLAY, PLOTTER, OFF)
COMPASS (PLOTTER/OVERLAY, PLOTTER, OFF)
TIDE AND CURRENT (PLOTTER/OVERLAY, PLOTTER, OFF)
NATURAL FEATURE (PLOTTER/OVERLAY, PLOTTER, OFF)
RIVER & LAKE (PLOTTER/OVERLAY, PLOTTER, OFF)
CULTURAL FEATURE (PLOTTER/OVERLAY, PLOTTER, OFF)
LANDMARK (PLOTTER/OVERLAY, PLOTTER, OFF)
CHART GENERATION (PLOTTER/OVERLAY, PLOTTER, OFF)
NEW OBJECT (PLOTTER/OVERLAY, PLOTTER, OFF)
COMPLEX OBJECT ICON (SINGLE, MULTIPLE)
INFORMATION LEVEL (BASIC, DETAILED)
DEPTH INFO soft key (See left margin.)
DEPTH INFO soft key
BATHYMETRIC LINE (PLOTTER/OVERLAY, PLOTTER, OFF)
SPOT SOUNDING (PLOTTER/OVERLAY, PLOTTER, OFF)
BOTTOM TYPE (PLOTTER/OVERLAY, PLOTTER, OFF
DEPTH AREA LIMIT (33 ft)
BATHYMETRIC RANGE (0-33 ft)
PLOTTER SETUP
WAYPOINT SWITCHING (PERPENDICULAR, ARRVL ALM CRCL, MANUAL)
COURSE VECTOR (VECTOR, LINE, OFF)
SET GOTO METHOD (1 POINT, 35 POINTS, 35PTS/PORT SVC)
3
D. BOX soft key (Same items as for D. BOX soft key on the RADAR DISPLAY SETUP menu. See page A-1.)


3
WAYPOINTS/ ROUTES
WAYPOINTS
LOCAL LIST
ALPHANUMERIC LIST
WAYPOINT BY CURSOR
WAYPOINT BY RNG & BRG
GOTO
NEW WPT
EDIT WPT
ERASE WPT
NEW WPT
NEW WPT
START POINT
ROUTES
GOTO
NEW ROUTE
EDIT ROUTE
ERASE ROUTE
LOG
Destination is required.
RESTART
STOP/RELEASE
RVRSE/FORWARD
SPEED (Speed for ETA, 0-99 kt, GPS or manual input)
COORD TYPE
CREATE VOYAGE-BASED ROUTE
NEW (BCKTRK TIME, BCKTRK DIST, MANUAL)
SELECT ROUTE
FUNCTION KEY SETUP*
SOFT KEY 1 - SOFT KEY 5
(OFF, ADD NEW WPT, MOVE WPT, RULER, GOTO WPT, GOTO ROUTE, EDIT MK/LINE, TRACK ON/OFF, TTM ON/OFF, DEL TGT TRK, ALPHA LIST, LOCAL LIST, ROUTE LIST, D. BOX ON/OFF, CHANGE CNTRL)
(Assigns function of each plotter function key.)
* Defaut settings for function keys:
SOFT KEY 1, TRACK ON/OFF; SOFT KEY 2, EDIT MK/LINE:
SOFT KEY 3, RULER; SOFT KEY 4, ADD NEW WPT;
SOFT KEY 5, ALPHA LIST
SYSTEM CONFIGURATION (Same items as on page A-2.)

## 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

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

## Plotter Alarms

ALARM key
- AUDIO ALARM (INT & EXT BUZZ, ***INTERNAL BUZZ***, OFF)
- ARRIVAL ALARM (ON, ***OFF***, ***default range: 0.010 nm(km/sm)***)
- ANCHOR WATCH ALARM (ON, ***OFF***, ***default range: 0.010 nm(km/sm)***)
- PROXIMITY ALARM (ON, ***OFF***)
- XTE ALARM (ON, ***OFF***, ***default range: 0.050 nm(km/sm)***)
- SPEED ALARM (WITHIN, UNDER/OVER, ***OFF***)
- TRIP ALARM (ON, ***OFF***)
- BOTTOM ALARM (ON, ***OFF***)
- TEMPERATURE ALARM (WITHIN RANGE, OUT OF RANGE, ***OFF***)
- NEXT INFO soft key (Shows which alarms have been violated.)
- CLEAR ALARM soft key (Acknowledges violated alarm.)

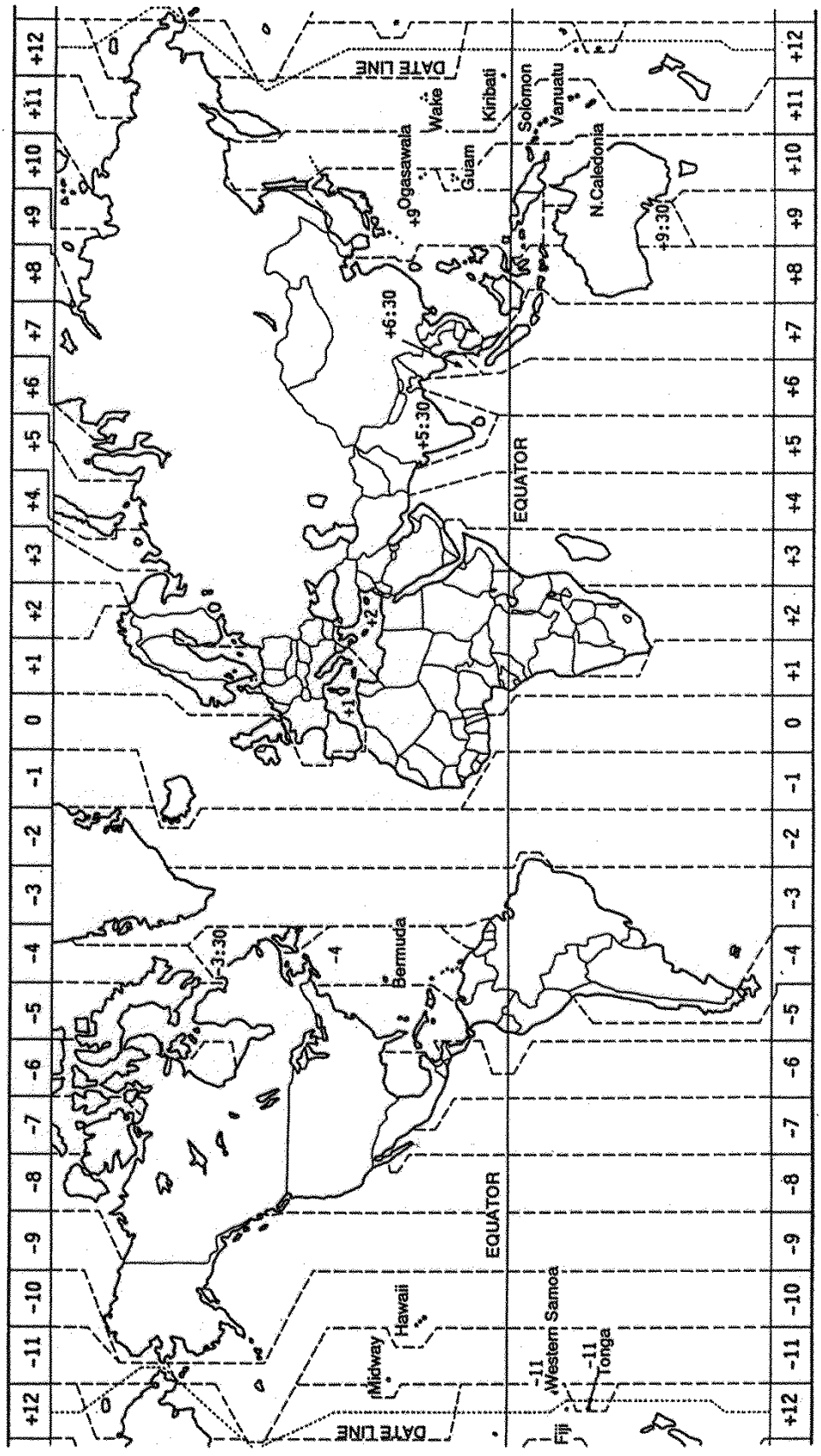
## Sounder Alarms

ALARM key
- AUDIO ALARM (INT & EXT BUZZ, ***INTERNAL BUZZ***, OFF)
- BOTTOM ALARM (ON, ***OFF***)
- TEMPERATURE ALARM (WITHIN RANGE, OUT OF RANGE, ***OFF***)
- FISH ALARM (ON, ***OFF***)
- FISH ALARM (B/L) (ON, ***OFF***)
- NEXT INFO soft key (Shows which alarms have been violated.)
- CLEAR ALARM soft key (Acknowledges violated alarm.)

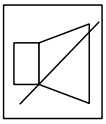
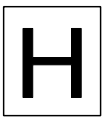
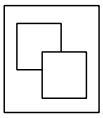
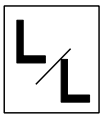
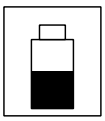
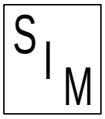
# Geodetic Chart List

001: WGS84
002: WGS72
003: TOKYO : Mean Value (Japan, Korea, and Okinawa)
004: NORTH AMERICAN 1927 : Mean Value (CONUS)
005: EUROPEAN 1950 : Mean Value
006: AUSTRALIAN GEODETIC 1984 : Australia and Tasmania Island
007: ADINDAN : Mean Value (Ethiopia and Sudan)
008: : Ethiopia
009: : Mall
010: : Senegal
011: : Sudan
012: AFG : Somalia
013: AIN EL ABD 1970 : Bahrain Island
014: ANNA 1 ASTRO 1965 : Cocos Island
015: ARC 1950 : Mean Value
016: : Botswana
017: : Lesotho
018: : Malawi
019: : Swaziland
020: : Zaire
021: : Zambia
022: : Zimbabwe
023: ARC 1960 : Mean Value (Kenya, Tanzania)
024: : Kenya
025: : Tanzania
026: ASCENSION ISLAND 1958 : Ascension Island
027: ASTRO BEACON "E" : Iwo Jima Island
028: ASTRO B4 SOR. ATOLL : Tern Island
029: ASTRO POS 71/4 : St. Helena Island
030: ASTRONOMIC STATION 1952 : Marcus Island
031: AUSTRALIAN GEODETIC 1966 : Australia and Tasmania Island
032: BELLEVUE (IGN) : Efate and Erromango Islands
033: BERMUDA 1957 : Bermuda Islands
034: BOGOTA OBSERVATORY : Colombia
035: CAMPO INCHAUSPE : Argentina
036: CANTON ISLAND 1966 : Phoenix Islands
037: CAPE : South Africa
038: CAPE CANAVERAL : Mean Value (Florida and Bahama Islands)
039: CARTHAGE : Tunisia
040: CHATHAM 1971 : Chatham Island (New Zealand)
041: CHUA ASTRO : Paraguay
042: CORREGO ALEGRE : Brazil
043: DJAKARTA (BATAVIA) : Sumatra Island (Indonesia)
044: DOS 1968 : Gizo Island (New Georgia Island)
045: EASTER ISLAND 1967 : Easter Island
046: EUROPEAN 1950 (Cont'd) : Western Europe
047: : Cyprus
048: : Egypt
049: : England, Scotland, Channel, and Shetland Islands
050: : England,Ireland, Scotland, and Shetland Islands
051: : Greece
052: : Iran
053: : Italy Sardinia
054: : Italy Sicily
055: : Norway and Finland
056: : Portugal and Spain
057: EUROPEAN 1979 : Mean Value
058: GANDAJIKA BASE : Republic of Maldives
059: GEODETIC DATUM 1949 : New Zealand
060: GUAM 1963 : Guam Island
061: GUX 1 ASTRO : Guadalcanal Island
062: HJORSEY 1955 : Iceland
063: HONG KONG 1963 : Hong Kong
064: INDIAN : Thailand and Vietnam
065: : Bangladesh, India, and Nepal
066: IRELAND 1956 : Ireland
067: ISTS 073 ASTRO 1969 : Diego Garcia
068: JHONSTON ISLAND 1961 : Johnston Island
069: KANDAWALA : Sri Lanka
070: KERGUELEN ISLAND : Kerguelen Island
071: KERTAU 1948 : West Malaysia and Singapore
072: LA REUNION : Mascarene Island
073: L.C. 5 ASTRO : Cayman Brac Island
074: LIBERIA 1964 : Liberia
075: LUZON : Philippines (Excluding Mindanao Island)
076: : Mindanao Island
077: MAHE 1971 : Mahe Island
078: MARCO ASTRO : Salvage Islands
079: MASSAWA : Eritrea (Ethiopia)
080: MERCHICH : Morocco
081: MIDWAY ASTRO 1961 : Midway Island
082: MINNA : Nigeria
083: NAHRWAN : Masirah Island(Oman)
084: : United Arab Emirates
085: : Saudi Arabia
086: NAMIBIA : Namibia
087: MAPARIMA, BWI : Trinidad and Tobago
088: NORTH AMERICAN 1927 : Western United States
089: : Eastern United States
090: : Alaska
091: : Bahamas (Excluding San Salvador Island)
092: : Bahamas San Salvador Island
093: : Canada (Including Newfoundland Island)
094: : Alberta and British Columbia
095: : East Canada
096: : Manitoba and Ontario
097: : Northwest Territories and Saskatchewan
098: : Yukon
099: : Canal Zone
100: : Caribbean
101: : Central America
102: : Cuba
103: : Greenland
104: : Mexico
105: NORTH AMERICAN 1983 : Alaska
106: : Canada
107: : CONUS
108: : Mexico, Central America
109: OBSERVATORIO 1966 : Corvo and Flores Islands (Azores)
110: OLD EGYPTIAN 1930 : Egypt
111: OLD HAWAIIAN : Mean Value
112: : Hawaii
113: : Kaual
114: : Maui
115: : Oahu
116: OMAN : Oman
117: ORDNANCE SURVEY OF GREAT BRITAIN 1936 : Mean Value
118: : England
119: : England, Isle of Man, and Wales
120: : Scotland and Shetland Islands
121: : Wales
122: PICO DE LAS NIVIES : Canary Islands
123: PITCAIRN ASTRO 1967 : Pitcairn Island
124: PROVISIONAL SOUTH CHILEAN 1963 : South Chile (near 53° s)
125: PROVISIONAL SOUTH AMERICAN 1956 : Mean Value
126: : Bolivia
127: : Chile Northern Chie (near 19° s)
128: : Chile Southern Chile (near 43° s)
129: : Colombia
130: : Ecuador
131: : Guyana
132: : Peru
133: : Venezuela
134: PUERTO RICO : Puerto Rico and Virgin Islands
135: QATAR NATIONAL : Qatar
136: QORNOQ : South Greenland
137: ROME 1940 : Sardinia Islands
138: SANTNA BRAZ : Sao Maguel, Santa Maria Islands (Azores)
139: SANTO (DOS) : Espirito Santo Island
140: SAPPER HILL 1943 : East Falkland Island
141: SOUTH AMERICAN 1969 : Mean Value
142: : Argentina
143: : Bolivia
144: : Brazil
145: : Chile
146: : Colombia
147: : Ecuador
148: : Guyana
149: : Paraguay
150: : Peru
151: : Trinidad and Tobago
152: : Venezuela
153: SOUTH ASIA : Singapore
154: SOUTHEAST BASE : Porto Santo and Medeira Islands
155: SOUTHWEST BASE : Faial, Graciosa, Pico, Sao Jorge, and Terceira Islands
156: TIMBALAI 1948 : Brunel and East Malaysia (Sarawak and Sadah)
157: TOKYO : Japan
158: : Korea
159: : Okinawa
160: TRISTAN ASTRO 1968 : Tristan da Cunha
161: VITI LEVU 1916 : Viti Levu Island (Fiji Islands)
162: WAKE-ENIWETOK 1960 : Marshall Islands
163: ZANDERIJ : Suriname
164: BUKIT RIMPAH : Bangka and Belitung Islands (Indonesia)
165: CAMP AREA ASTRO : Camp Mcmurdo Area, Antarctica
166: G. SEGARA : Kalimantan Islands(Indonesia)
167: HERAT NORTH : Afghanistan
168: HU-TZU-SHAN : Taiwan
169: TANANARIVE OBSERVATORY 1925 : Madagascar
170: YACARE : Uruguay
171: RT-90 : Sweden
172 : Pulkovo 1942 : Russia

# World Time Chart



# Icons

| Icon | Meaning |
|---|---|
|  | North marker. Points to North. |
|  | Correct chart and suitable scale - full chart reliability. |
|  | Chart overenlarged. |
|  | Chart card not inserted.<br>Wrong chart card inserted.<br>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 ±20° of main-lobe) |
| | | -30 dB or less (±20° 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 ±20° of main-lobe) |
| | | -30 dB or less (±20° of main-lobe or more) |
| | XN13: | -24 dB or less (within ±10° of main-lobe) |
| | | -30 dB or less (±10° of main-lobe or more) |

3. TRANSCEIVER MODULE

| | | |
|---|---|---|
| 3.1. | Frequency and Modulation | 9410 MHz ±30MHz (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 μs and 0.3 μs: 25 MHz |
| | | Tx pulselength 0.8 μs: 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<br>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<br>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<br>Display Unit: -15°C to +55°C<br>Remote Controller: +5°C to +45°C<br>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)<br>RMB, WPL, BWC or BWR, APB, AAM, BOD, XTE, VHW, MTW,<br>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<br>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 |

| | | |
|---|---|---|
| | | C-MAP chart card also available for C-MAP NT Model |
| 2.14. | 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) |

3. POWER SUPPLY

| | | |
|---|---|---|
| 3.1. | Rated Voltage/Current | 12-24 VDC: 2.1-1.1 A (3.1-1.6 A)<br>( ): 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 |

# INDEX

FURUNO ELECTRIC CO., LTD.
9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan
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Pub NO. DOC-389

# Declaration of Conformity CE 0560

We FURUNO ELECTRIC CO., LTD.

(Manufacturer)

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

(Address)

declare under our sole responsibility that the product

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/m$^2$ or 700 cd/m$^2$

(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 report s 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)