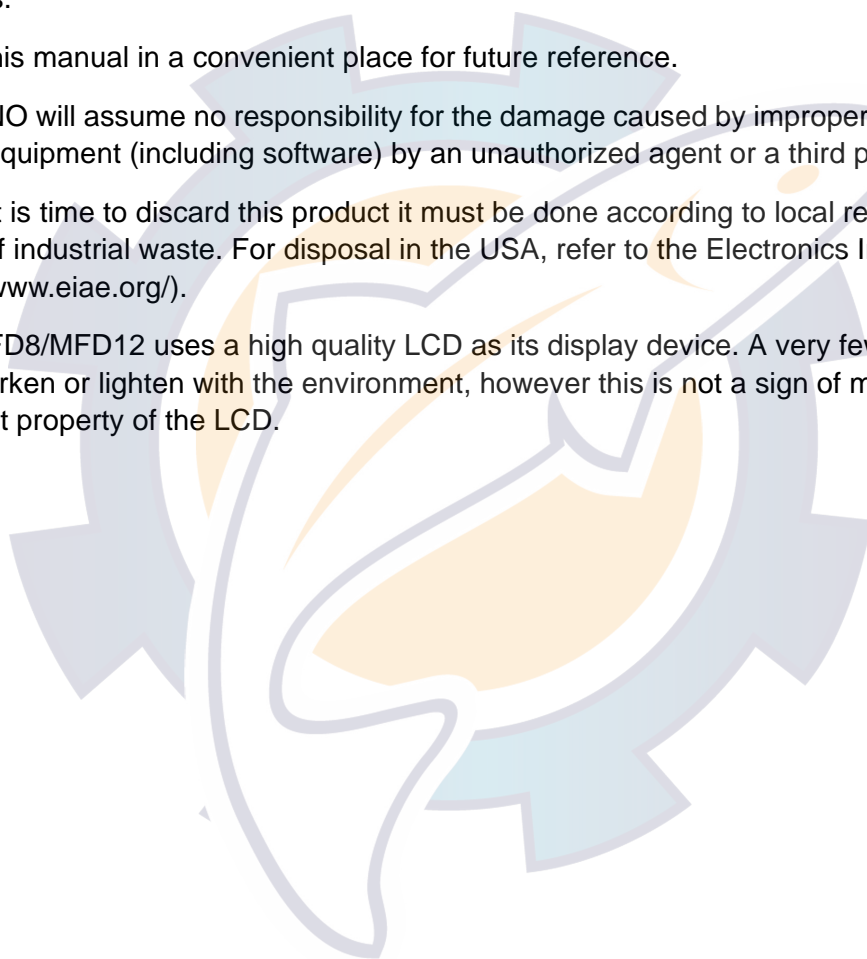


# Important Notices

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- The descriptions in this manual are intended for readers with a solid knowledge of English.
- No part of this manual may be copied or reproduced without written permission.
- If this manual is lost or worn, contact your dealer about replacement.
- The contents of this manual and equipment specifications are subject to change without notice.
- The example screens (or illustrations) shown in this manual may not match the screens you see on your display. The screen you see depends on your system configuration and equipment settings.
- Store this manual in a convenient place for future reference.
- FURUNO will assume no responsibility for the damage caused by improper use or modification of the equipment (including software) by an unauthorized agent or a third party.
- When it is time to discard this product it must be done according to local regulations for disposal of industrial waste. For disposal in the USA, refer to the Electronics Industries Alliance (<http://www.eiae.org/>).
- The MFD8/MFD12 uses a high quality LCD as its display device. A very few picture elements may darken or lighten with the environment, however this is not a sign of malfunction; it is an inherent property of the LCD.





# SAFETY INSTRUCTIONS

The operator of this equipment must read these safety instructions before attempting to operate the equipment.

**WARNING**

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION**

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Warning, Caution

Prohibitive Action

Mandatory Action

**WARNING**

The radar antenna emits electromagnetic radio frequency (RF) energy which can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance.

Distances at which RF radiation levels of 100 W/m<sup>2</sup> and 10 W/m<sup>2</sup> exist are given in the table below.

Antenna Model	Distance to 100 W/m <sup>2</sup> point	Distance to 10 W/m <sup>2</sup> point
DRS2D	-	0.4
DRS4D	0.1	1.4
DRS4A	-	1.2
DRS6A	-	1.2
DRS12A w/XN12A	0.2	2.4
DRS12A w/XN13A	0.2	1.9
DRS25A w/XN12A	0.5	5.3
DRS25A w/XN13A	0.4	4.4

**WARNING**

**Make sure no one is near the antenna unit before turning on the radar.**


Serious injury or death can result if someone is struck by a rotating radar antenna.

**Turn off the power immediately at the switchboard if water leaks into the equipment or the equipment is emitting smoke or fire.**


Continued use of the equipment can cause fire or electrical shock.

**Do not open the equipment.**

Only qualified personnel should work inside the equipment.




**WARNING**




**Do not subject the units other than the antenna unit to rain or water splash.**

Fire or electrical shock can result if water gets inside the equipment.



**Do not disassemble or modify the equipment.**

Fire or electrical shock can result if the equipment is modified.




**Do not operate the equipment with wet hands.**

Electrical shock can result.

Warning Labels

Warning labels are attached to the equipment. Do not remove any label. If a label is missing or damaged, contact a FURUNO agent or dealer about replacement.




**WARNING**









Name: Warning Label 1  
Type: 86-003-1011-1  
Code No.: 100-236-231






**WARNING**


Radiation hazard. Only qualified personnel should work inside scanner. Confirm that TX has stopped before opening scanner.



Name: Warning Sticker  
Type: 3-142-3201-0  
Code No.: 100-266-890




**WARNING**




**No one navigation device should ever be solely relied upon for the navigation of the vessel.**

Always confirm position against all available aids to navigation, for safety of vessel and crew.




**A radar is useful as an anti-collision aid. However, it does not remove the requirement for maintaining a vigilant watch.**

Always maintain a vigilant watch while underway.




**Do not leave ropes or other objects in the vicinity of the antenna unit.**

Fire, electrical shock or injury can result if an object becomes entangled in the antenna unit.



**Use the correct fuse.**

Use of an incorrect fuse can cause fire or serious damage to the equipment.



**Do not maneuver the vessel based on depth indication alone.**

Grounding may result.

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# Foreword

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## A Word to the Owner of the MFD8, MFD12

Congratulations on your choice of the FURUNO MFD8, MFD12 Multi-Function Display, an integral part of our new NavNet®3D series of multi-function displays. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

For 60 years FURUNO Electric Company has enjoyed an enviable reputation for quality marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

This equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless operated and maintained properly. Please carefully read and follow the recommended procedures for operation and maintenance.

Thank you for considering and purchasing FURUNO equipment.

## Features

The all new NavNet®3D series of multi-function displays combine radar, chart plotter, fish finder, AIS receiver, etc. into an easy to use networked navigation system. Chart plotter, radar, fish finder, navigation data, etc. are instantly transferred between NavNet®3D units with our lightning fast NavNet® network. Expandability is virtually limitless with USB connection, and up to 10 NavNet® devices may be connected.

The RotoKey™, a rotary knob that controls an on-screen, revolving menu of soft controls, gives you instant access to full control of NavNet®3D.

### **Chart plotter**

- TimeZero™ technology provides instant, seamless chart handling with no lag or loading time.
- Preloaded with full scale, complete Mapmedia-produced NOAA raster and vector chart libraries for the entire US coastline, including Alaska and Hawaii.
- 3D display with controls for adjustment of pitch and orientation.
- Waypoint, route and track data commonly shared via Ethernet.
- Large memory stores 12,000 track points, 2,000 waypoints, and 200 routes.
- Wide variety of overlays: depth shading, tide, tidal current, satellite photo (North America).

### **Radar sensor (option)**

- Antenna configuration available in radome or open array.
- Radar echoes presented in color or monochrome.
- Automatic control of sea clutter, tuning and gain, for ease of operation.
- Guard zone watches for targets within a specific area.
- ARPA provided standard.
- Dual-range display for watch on short and long ranges simultaneously.

### ***Fish finder (option)***

- Measures the depth to the bottom and displays underwater conditions in multi-colors\* according to echo strength. Monochrome presentation is also available.  
(\*Number of colors depends on network sounder.)
- Zoom mode magnifies targets of interest.
- Automatic and manual operation with automatic adjustment of range, gain and clutter according to objective, fishing or cruising.
- ACCU-FISH estimates length and depth of individual fish.  
(Requires DFF series network sounder. Transducer 50/200-1T required in case of DFF3.)

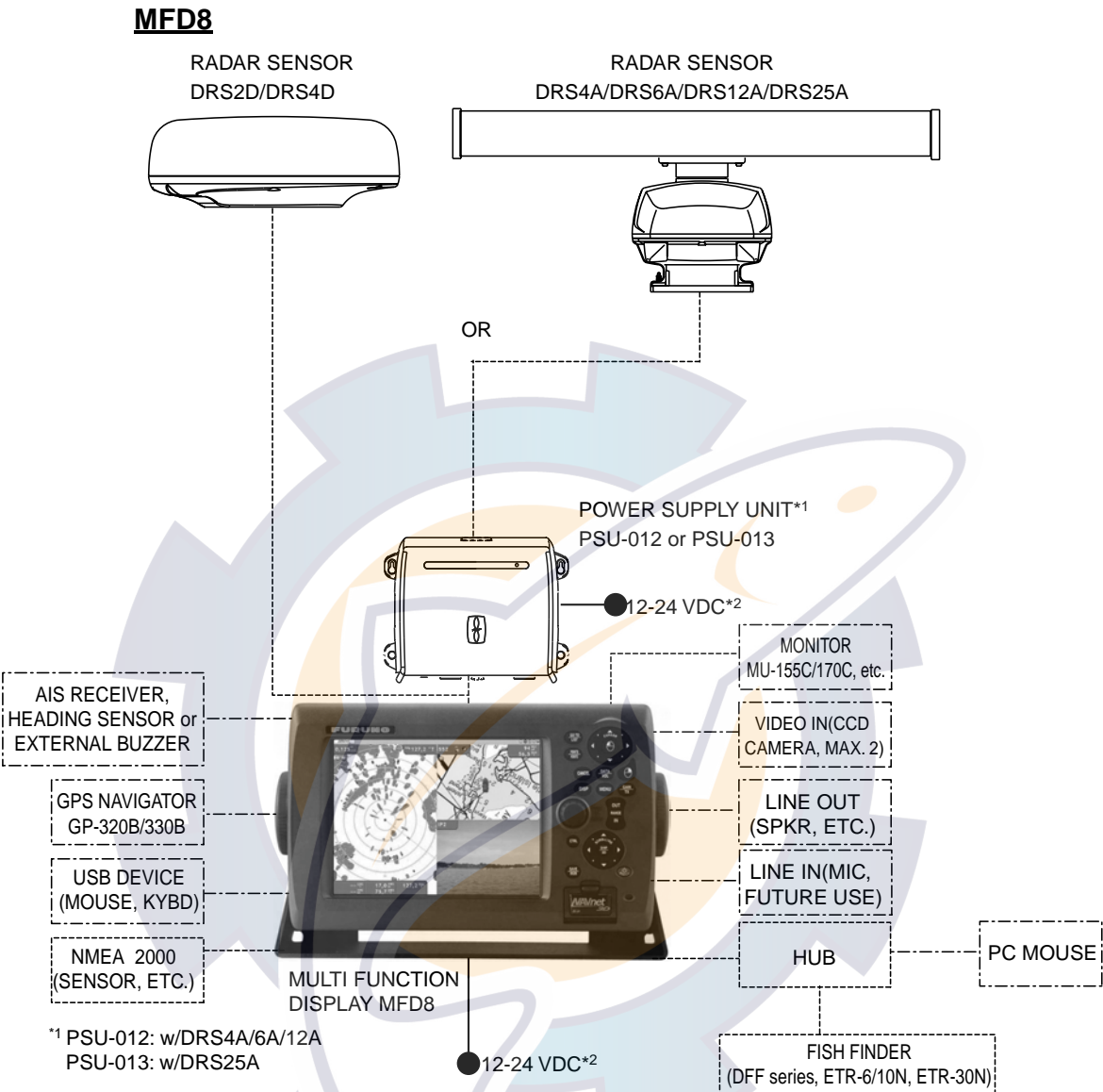
### ***Other***

- Dual head function allows use of primary and secondary displays, side by side on the bridge.
- AIS function receives AIS data from other vessels and shore stations and navigational aids and displays this data.
- USB port connects USB devices (mouse, etc.), for virtually limitless expandability and plug and play simplicity.
- Various instrument displays with connection of applicable sensors: Steering, Engine, Weather, and Wind.
- Weather information display available with connection of Sirius weather receiver.
- Sensor data commonly shared with all units connected via Ethernet.
- IP camera connectable to monitor onboard activity.
- NMEA 2000 interface for connection of GPS receiver, Weather Station, FI-50 (instrument series), Satellite Compass, etc.
- 100 Megabit per second transfer rate.

### ***NavNet®3D registration***

To take full advantage of all the features your NavNet®3D has to offer, we recommend that you register it at the NavNet® web site ([www.navnet.com](http://www.navnet.com)). This site is chock-full of information and news about the NavNet®3D system and even has a tutorial to help you get acquainted with your system. Registration is simple and best of all it's free. When you register, you will get a personalized page where you can gain access to various premium benefits. These include online software and chart updates and personalized news services. So go to [www.navnet.com](http://www.navnet.com) and sign up to get the most from your NavNet®3D system.

# System Configuration



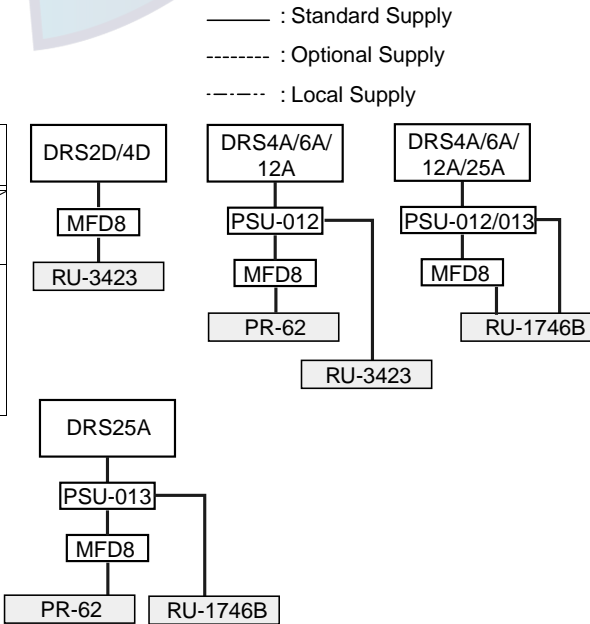
\*1 PSU-012: w/DRS4A/6A/12A  
PSU-013: w/DRS25A

\*2 See the table and figure below for  
configurations for the PSU and rectifiers.

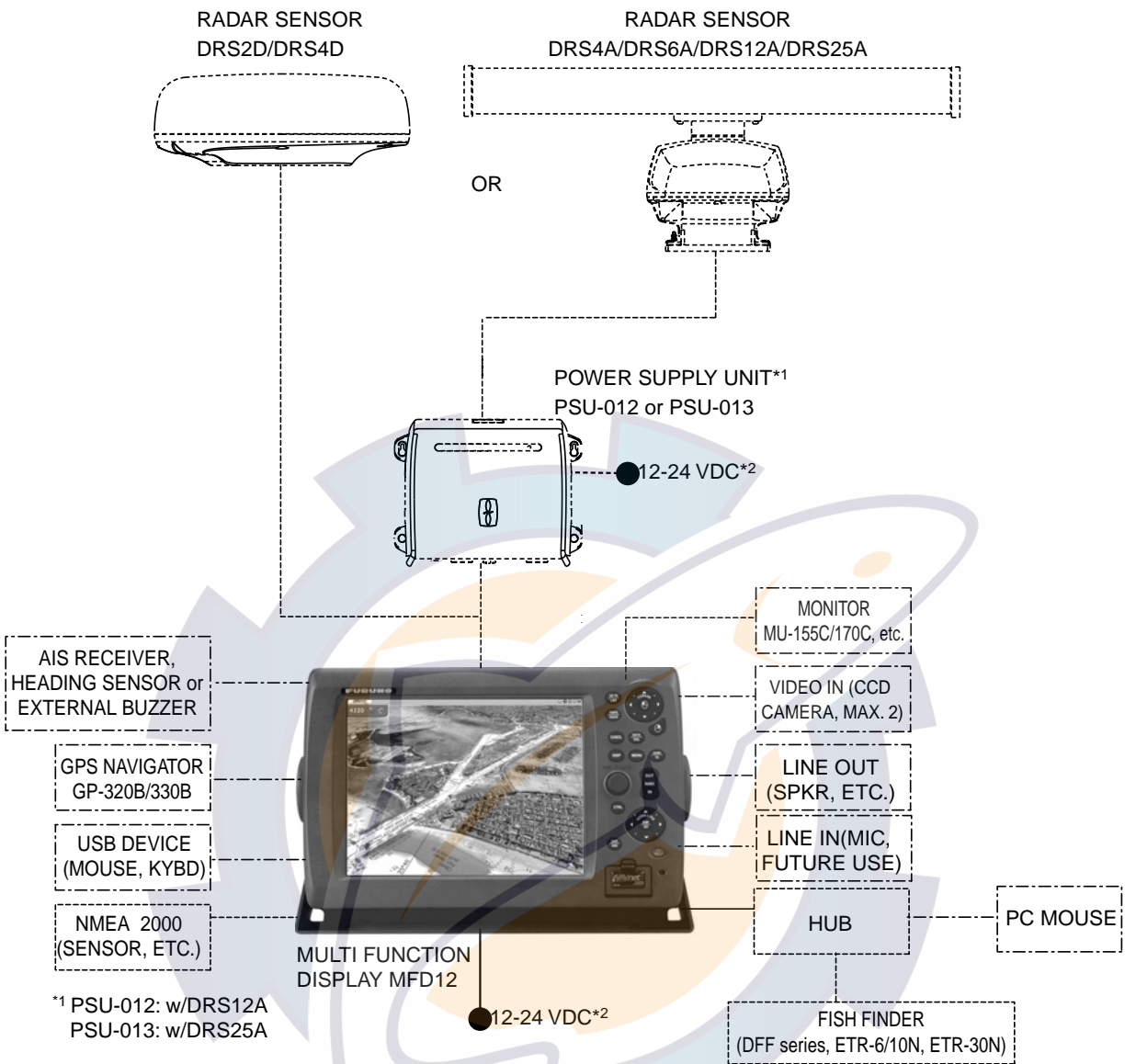
Matrix for radar model, PSU and rectifiers

Radar Model	PSU	Rectifier for MFD8	Rectifier for PSU	Rectifier for MFD8+PSU
DRS2D	Not required	RU-3423		
DRS4D				
DRS4A	PSU-012	PR-62	RU-3423	RU-1746B-2
DRS6A				
DRS12A				
DRS25A	PSU-013*		RU-1746B-2	

\* Standard supply with DRS25A.



MFD12



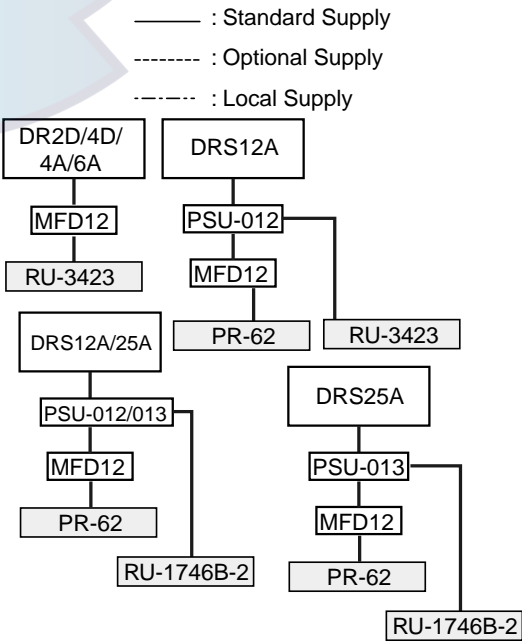
\*1 PSU-012: w/DRS12A  
PSU-013: w/DRS25A

\*2 See the table and figure below for configurations for the PSU and rectifier.

Matrix for radar model, PSU and rectifiers

Radar Model	PSU	Rectifier for MFD12	Rectifier for PSU	Rectifier for MFD12+PSU
DRS2D	Not required	RU-3423		
DRS4D				
DRS4A				
DRS6A				
DRS12A	PSU-012	PR-62	RU-3423	RU-1746B-2
DRS25A	PSU-013*	PR-62	RU-1746B-2	

\* Standard supply with DRS25A.





# Chapter 1: Operational Overview

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This chapter provides the information necessary to get you started using your system, from how to turn it on and off to how to read the main displays.

## Conventions used in this manual

- Dedicated keys are shown in bold face upper case letter; for example, **DISP**. All other labelled items, such as the soft controls affiliated with the RotoKey, are shown in normal typeface.
- The RotoKey mainly functions to access the "soft controls", a revolving menu of soft controls that gives you instant access to full control of NavNet®3D. You rotate the RotoKey to select a soft control and push it to do the function labelled on the soft control. For sake of brevity, we write "Use the RotoKey to select [menu item name or soft control name]..." in cases where you would rotate and then push the RotoKey to do a procedure.
- The menu system consists of up to 16 menus and accompanying sub menus. We write, for example, "Open the Routes-General menu" when it is necessary to open the Routes menu and General sub menu.
- Many operations can be done several ways: by key operation, by context-sensitive menu (pop-up menu) or RotoKey.

## 1.1 The NavNet® 3D System

The NavNet®3D network is a system where all components share information (navigation data, settings, points, routes, etc.). Each unit in the system displays information from other units as well as NMEA devices, such as GPS navigator. Information is shared between MFDs via a high speed Ethernet.

Each MFD has a special "sleep mode" that allows it to process data while consuming low power. The MFDs can be in three states:

- **ON:** Regular mode of operation. The screen is on and the user can interact with the MFD. The MFD can process and share information on the network.
- **Sleep Mode:** The screen is off and no user interaction is possible (except turning on the unit with the power switch). Even if the unit seems to be off, it can still process and share information with other units on the network. The unit consumes low current in this state.
- **OFF:** The unit is completely OFF and doesn't process information. The unit doesn't consume any current in this state.

When the first MFD is powered ON (using the power switch), all the other MFD(s) start in the sleep mode. Using the power switch on an MFD in sleep mode will turn it ON. Using the power switch on an MFD that is turned ON will put it in Sleep Mode. Using the power switch on the last MFD ON on the network (all the other are already in Sleep mode) will turn the system (all the MFDs) completely OFF.

The hub used to join equipment in the network is HUB-101 (optional supply).

## 1.2 Operating Controls

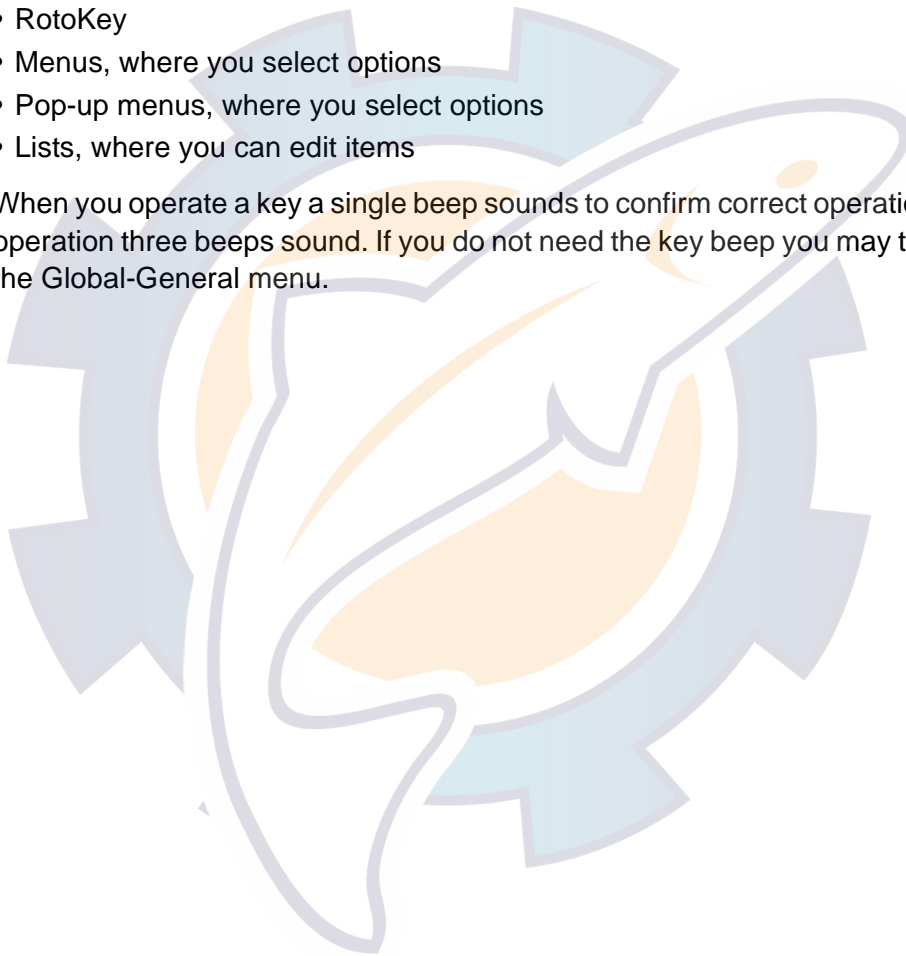
The controller for this system is either the MFD8 or MFD12.

Discrete keys whose key labels have two text labels separated by an underline carry two functions. The top label is the main function and the bottom label, the secondary function. You access those functions with a short push and long push (about three seconds), respectively.

You operate the chart plotter, radar, fish finder, etc. with a combination of

- Discrete keys
- Cursorpad
- Scrollingpad
- RotoKey
- Menus, where you select options
- Pop-up menus, where you select options
- Lists, where you can edit items

When you operate a key a single beep sounds to confirm correct operation. For invalid operation three beeps sound. If you do not need the key beep you may turn it off, from the Global-General menu.



1.2.1 Control Description

The controls of your system are shown in the figure below. Controls are backlit for easy viewing in nighttime use.




MFD8





MFD12

Control description


No.	Label	Function	Mouse operation
1	 BRILL	<b>Momentary push:</b> Turn on the power; adjust the panel dimmer when equipment is powered. <b>Long push:</b> Turn the power on/off.	—
2	Card drive	Card drive for memory cards.	—

Control description

No.	Label	Function	Mouse operation
3	SAVE/MOB	<b>SAVE:</b> Save current position as a point. <b>MOB:</b> Save current position as an MOB position.	—
4	CTRL	Switch active display in combination displays.	—
5	RotoKey	<ul style="list-style-type: none"> <li>• Rotate it to display soft controls, the quantity (basic, standard, full or custom) of which is specified on the menu, or select menu item.</li> <li>• Momentarily push it to display soft controls, the quantity (basic, standard, full or custom) of which is specified on the menu, or confirm a selection.</li> <li>• Long push it to display all available soft controls for the current mode.</li> </ul>	Scrollwheel. Spin to display soft controls or select item; push to confirm selection.
6	DISP	Select a display.	—
7	CANCEL	Undo or cancel last operation.	—
8	POINTS/ROUTE	<b>POINTS:</b> Save cursor position as a point. <b>ROUTE:</b> Enable route building tool.	—
9	GOTO/LIST	<b>GOTO:</b> Set cursor position as destination. <b>LIST:</b> Open the Points menu.	—
10	Cursorpad	<ul style="list-style-type: none"> <li>• <b>Pad:</b> Shift cursor.</li> <li>• : Like the "left-click" button on a PC mouse. Hereafter referred to as "<b>left-click</b> button".</li> </ul>	<ul style="list-style-type: none"> <li>• Drag mouse.</li> <li>• Left mouse button.</li> </ul>
11	 (right-click button)	Show context-sensitive (pop-up) menu. Hereafter referred to as " <b>right-click</b> button".	Right mouse button
12	DATA/VOL	<b>DATA:</b> Show/hide data boxes. <b>VOL:</b> Change audio level.	—
13	MENU	Open/close menu.	—
14	GAIN/TX	<b>GAIN:</b> Adjust gain for radar and fish finder. <b>TX:</b> Toggle between standby and transmit on the radar.	—
15	RANGE OUT, IN	<ul style="list-style-type: none"> <li>• Select range on chart, radar and fish finder.</li> <li>• Zoom in/zoom out Axis IP camera image.</li> </ul>	—
16	Scrollingpad	<ul style="list-style-type: none"> <li>• <b>Pad:</b> Scroll chart, radar picture and AXIS IP camera image.</li> <li>• <b>SHIP/3D button:</b> Short push to center vessel; long push to switch between the 3D and 2D displays alternately.</li> </ul>	—
17	Power lamp	Lights (in green) when power is on.	—



## 1.3 Turning the Power On/Off

Press  to turn the power on. To turn the power off, press and hold down the same key until the screen goes blank.

When you turn on the power, several beeps sound and the lamp near the power switch lights. Shortly thereafter the splash screen appears together with the progress bar (at the bottom of the screen), which moves rightward as the start-up progresses. About 90 seconds after applying the power, the Navigation Warning message appears. Read the message and push the RotoKey to begin operation.

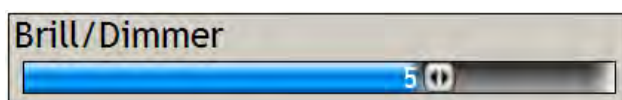


**Note:** Do not turn off the power while the application is starting up. Wait until the application is ready fully before turning off the power.

## 1.4 Adjusting Panel Dimmer, Display Brilliance

The backlighting for the panel dimmer display brilliance can be adjusted as shown below.

1. Push the  key to display the Brill/Dimmer adjustment window.

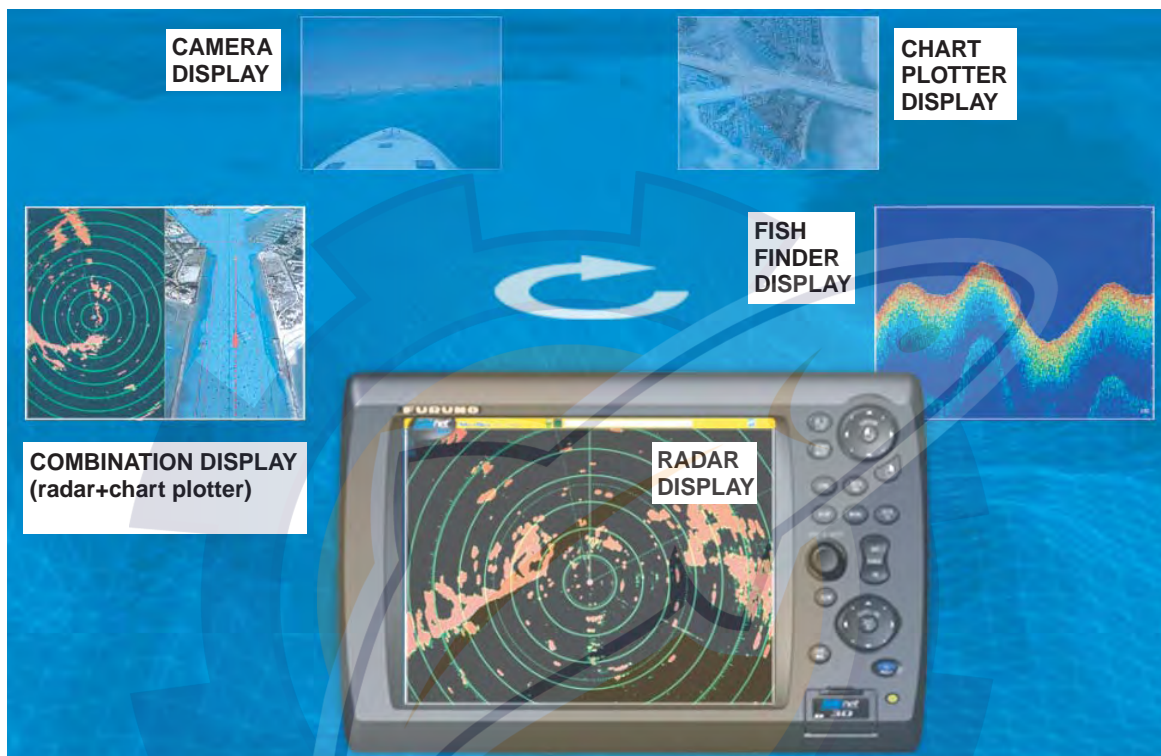


2. Rotate the RotoKey to adjust the panel dimmer and brilliance. Current level is shown on the bar.
3. Push the RotoKey to confirm setting and close the window.

## 1.5 Selecting a Display

Use the **DISP** key and the RotoKey to select a display, from the display selection window. The displays available depend on your system configuration and the HotPage settings on the My NavNet menu. In a later chapter you will learn how to customize the display selection window to your liking.

1. Press the **DISP** key to show the display selection window. (The labels in the illustration below do not appear on the actual display.)



*Display selection window (example)*

2. Rotate the RotoKey to place the display to use in the "monitor" at the bottom of the screen.
3. Push the RotoKey to confirm selection.

### Switching active display in combination displays

Use the **CTRL** key to switch the active display in combination displays. Each time the key is operated the active display is switched and it is circumscribed with a yellow square.





## 1.6 SD Cards

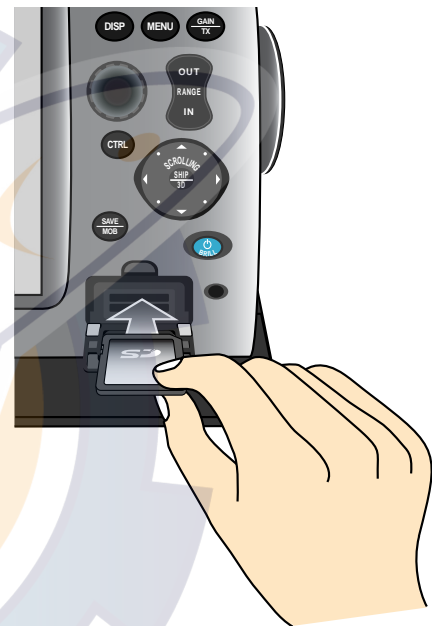
The SD card stores track, routes, points, settings, etc. Insert and remove SD cards as shown below. The recommended capacity for the cards is 128 MB to 2 GB. Secure Digital High Capacity (SDHC) SD cards cannot be used.

### Formatting an SD card

Before an SD card can be used with the system, it must be formatted. Format your cards in file system FAT16. It is recommended to use a formatting program that complies with the SD Memory Card specification. Generally, SD Memory Card file systems formatted with generic operating system formatting software do not comply with the SD Memory Card specification.

### To insert an SD card

1. Pull down on the tab on the card drive lid to open the card drive.
2. Insert the SD card in either card drive as shown at right, with the label side up. It should go in easily. If it doesn't, do not try to force it.
3. Push the card until it is in place and then close the lid.



### To remove an SD card

1. Pull down on the tab on the card drive lid to open the card drive
2. Push in the card until it pops out.
3. Remove the card with your fingers and then close the lid.

### Care and handling of SD cards

- Handle SD cards carefully. Careless handling can damage the card and destroy its contents.
- **Ensure the lid is closed at all times, to keep water out.**
- Remove the card with only your fingers. Do not use metallic instruments (such as tweezers, etc.) to remove a card.
- Do not remove a card during either reading or writing to the card.
- **If there is water at the bottom of the card lid, DO NOT open the lid. Wipe the water with a dry cloth completely and then open the lid.**

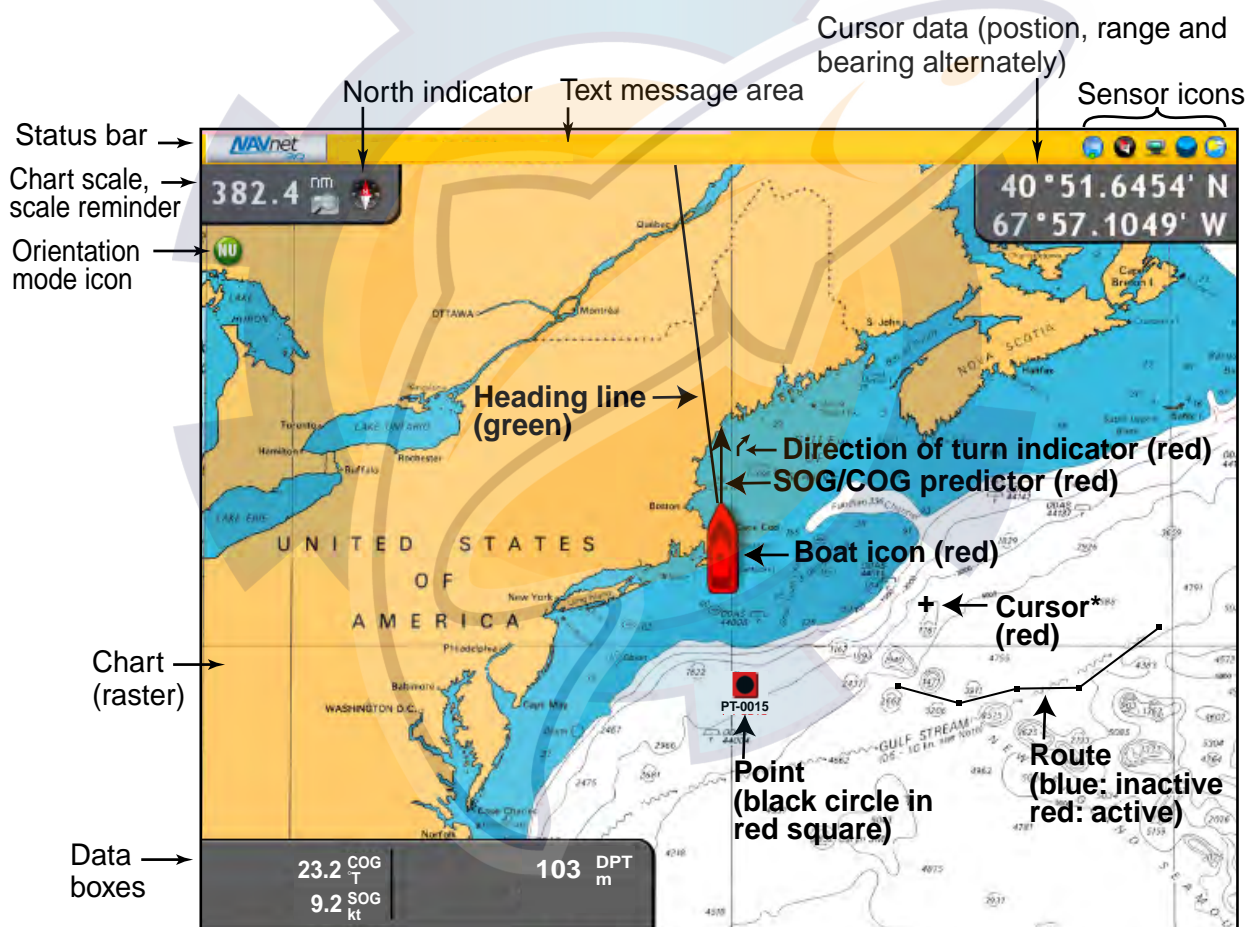
## 1.7 Chart Plotter Overview


The chart plotter display provides a miniature world map in raster format, shown in the figure below. A vector chart for the US coastline including Alaska and Hawaii is also provided standard. Detailed chart information for your area is also available. The plotter section has facilities for waypoint entry and route construction and planning.

The chart plotter uses position information fed from position-fixing equipment such as GPS or DGPS. With position data available, your boat's position is marked on screen with a boat icon, the configuration of which can be selected from the menu.

Waypoints and routes you have entered are shown on the display, and they can easily be moved, deleted and edited from a pop-up menu.

In addition to waypoint and route processing, the chart plotter displays your boat's track, measures distances and bearings, marks man overboard (MOB) position, processes various alarms, follows simple and complex routes, etc.



\* Inactive cursor. Active cursor looks like this .

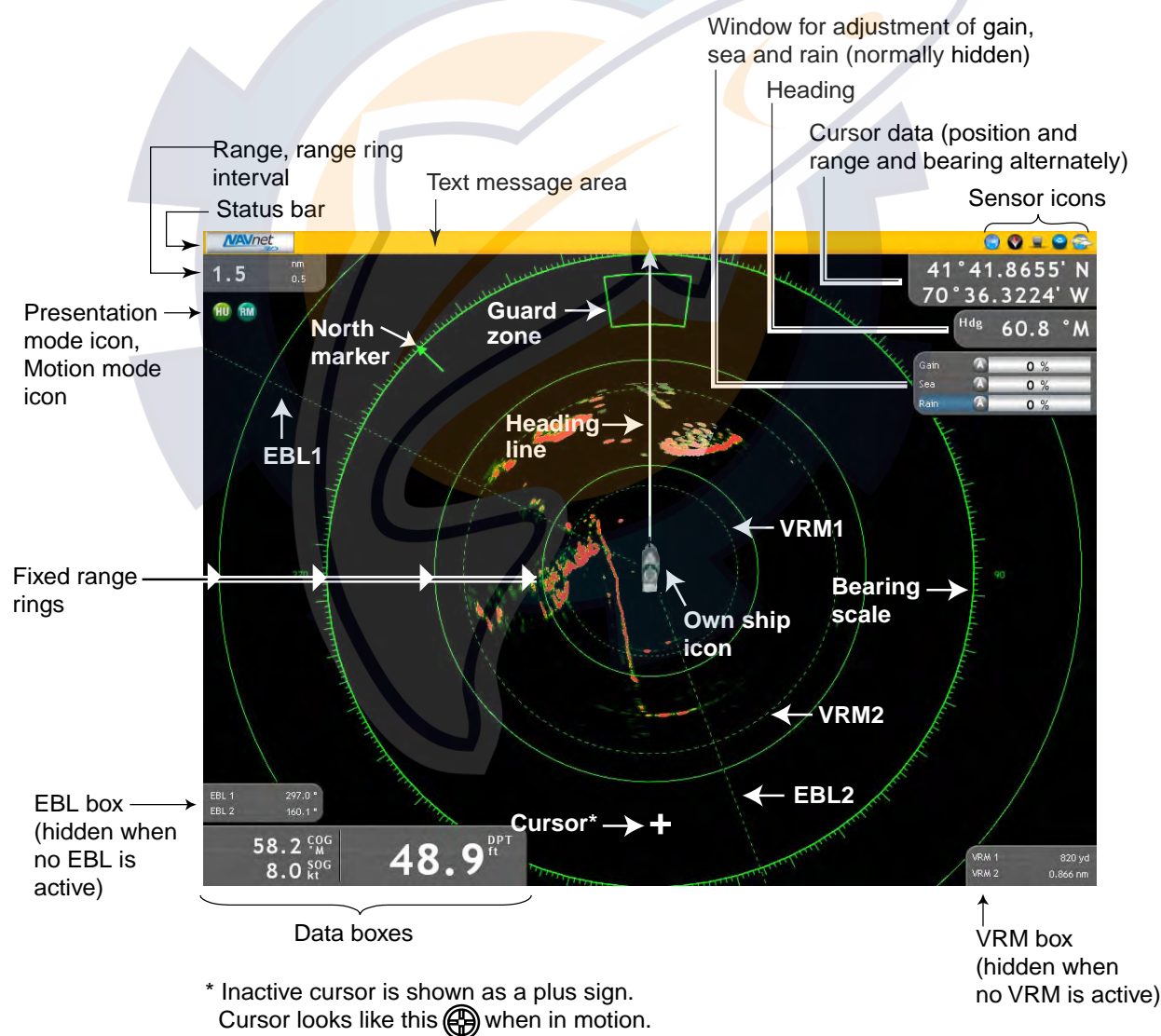
## 1.8 Radar Overview

A radar system operates in the microwave part of the radio-frequency (RF) spectrum, and is used to detect the position and movement of objects. Objects are shown on the radar display at their measured distances and bearings, in intensities according to echo strength.

The radar display is available in head-up, course-up and north-up modes and orientation in true and relative motion. Relative motion shows other ships movement relative to own ship. True motion shows own ship and other moving objects moving in accordance with their true courses and speed.

Dual VRMs are provided to measure the range to objects, and dual EBLs to measure the bearing to targets. A guard zone can be created to be alerted to targets in a specific area. The trail of targets can be shown in afterglow to monitor their movement.

The dual-range display scans and displays two different radar ranges simultaneously, for watch on both short and long ranges.



## 1.9 Fish Finder Overview

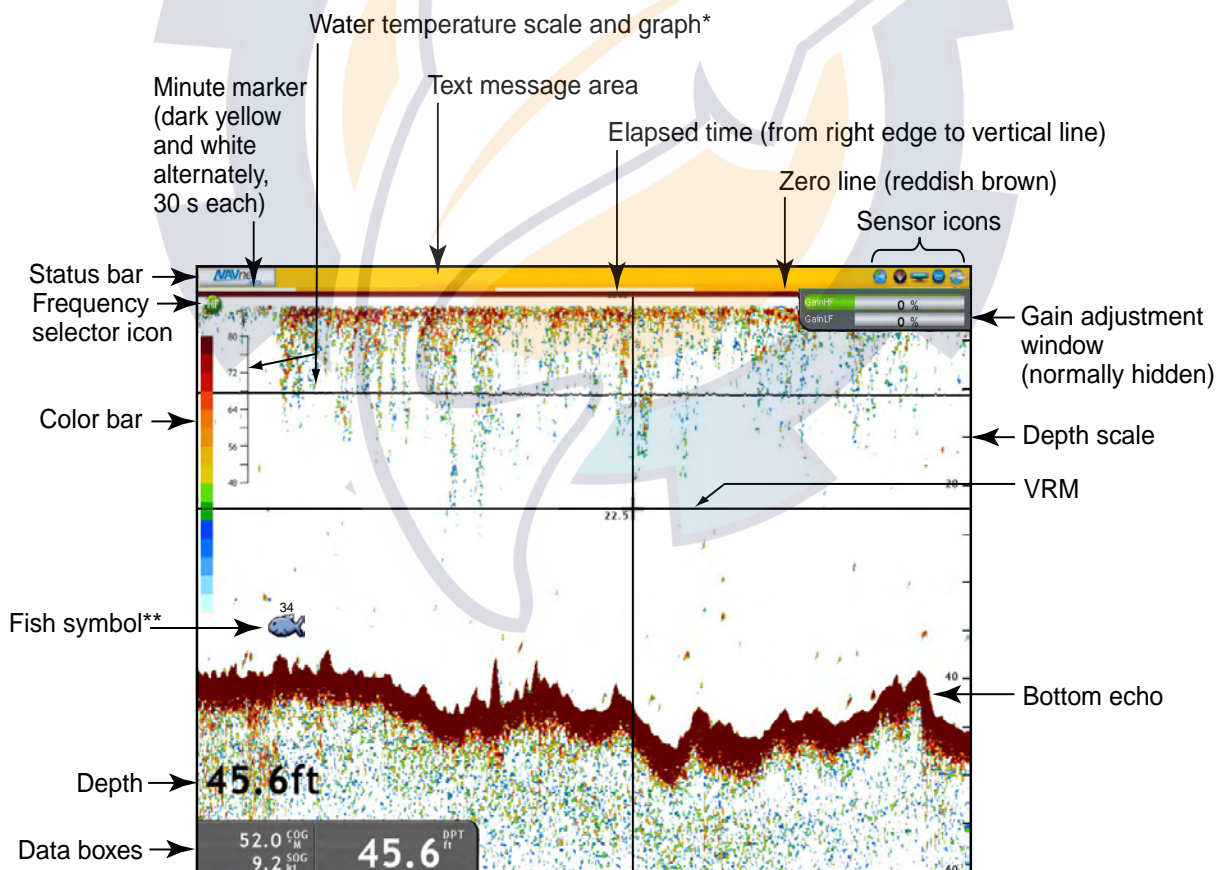
The fish finder display provides a graphical presentation of the echoes found by the fish finder. Echoes are scrolled across the screen from right to left over time, providing a "history" of what has occurred beneath the transducer. The amount of time an echo is displayed on the screen is controllable with the picture advance speed.

The echoes at the right hand side are the most recent ones. These echoes can be from individual fish, a fish school, the bottom, shipwreck, etc. Depth to the bottom is indicated always, provided the gain is correctly set.

Both low and high frequency transmitting frequencies are provided. (Frequencies depend on the transducer connected.) The low frequency, because of its wide detection area, is well-suited to general detection and judging bottom condition. The high frequency is ideal for detailed observation of fish schools because of its narrow beam.

Your fish finder's range, gain and clutter can be automatically adjusted according to your objective, cruising or fishing, freeing you to do other tasks. Auto range is also available in the manual mode.

The color bar at the left side of the display shows the range of colors used to display different echo strengths. Weaker echoes are displayed with colors near the bottom of the scale, and stronger echoes are displayed with colors near the top of the scale.



\* Requires water temperature sensor.

\*\*ACCU-FISH feature estimates length of individual fish.

(Requires DFF series network sounder. Transducer 50/200-1T required in case of DFF3.)

*Fish finder display*



## 1.10 The Cursor

The cursor is always displayed on the radar, chart plotter and fish finder displays and functions to

- Find the position, range and bearing to an object on the chart plotter and radar displays
- Find the depth to an object on the fish finder display.
- Select position for waypoint on the chart plotter display.
- Select an item; for example, waypoint on the chart plotter display.

The appearance of the cursor depends on its state, as illustrated below.

✚ : Inactive

⊕ : In motion

To move the cursor, press on any of the four arrows on the Cursorpad to move it in the direction indicated on the arrow pressed. You may also move the cursor diagonally by pressing and holding down on any two locations together on the pad. The current cursor position and range and bearing from own vessel are alternately shown in the cursor data box at the upper right corner of the screen on the chart plotter and radar displays.



*Cursor position and range and bearing to cursor*

On the radar and chart plotter displays the cursor also provides a context-sensitive control, or pop-up menu. On the radar and chart plotter displays the cursor also provides a context-sensitive control, or pop-up menu. For further details, see "1.13 Pop-up Menus."

## 1.11 Status Bar

The status bar is the horizontal bar at the top of any display. It provides operating information with messages, and sensor state with icons. The color of the bar changes according to message type. It is yellow for message of low priority or no message, red for alert or alarm messages and green for operation guidance messages.



The sensor icons at the far right hand side of the status bar show sensor state. An icon is animated if the corresponding sensor is active. An inactive or malfunctioning sensor is not animated and has a red "X" through it.

Icon	Sensor
	GPS
	Compass
	Radar
	Fish Finder
	Weather



## 1.12 RotoKey and Soft Controls

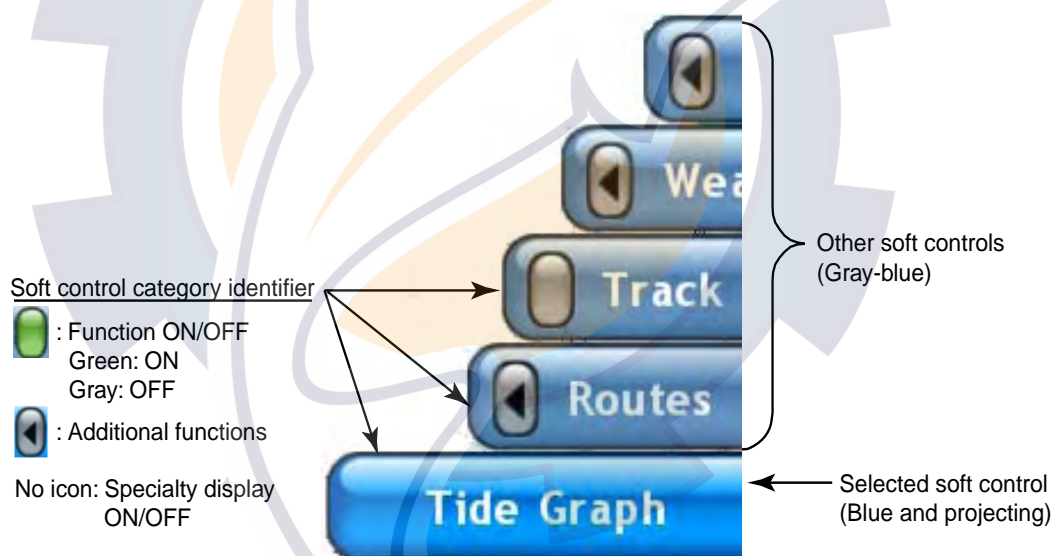
The RotoKey's main function is to display the soft controls, a revolving menu of soft controls which change with operating mode. A short push or rotation of the RotoKey gives you access to a user-selected set of the functions that you select at the My NavNet menu, among Basic, Standard, Full and Custom. A longer push displays all of the soft controls available for the current mode.

The soft controls are auto-hiding; they are erased from the screen if not operated within about six seconds. To erase them manually, press the **CANCEL** key.



The icon at the tip of a soft control indicates soft control category:

- A left arrow within an icon means a multi-function soft control. Affiliated functions are accessed by pushing the RotoKey.
- An icon without an arrow indicates the ON/OFF status of the item labeled on the soft control. The icon is colored green when the item is ON; gray when OFF.
- No icon indicates the soft control enables or disables a specialty display such as the tide graph.



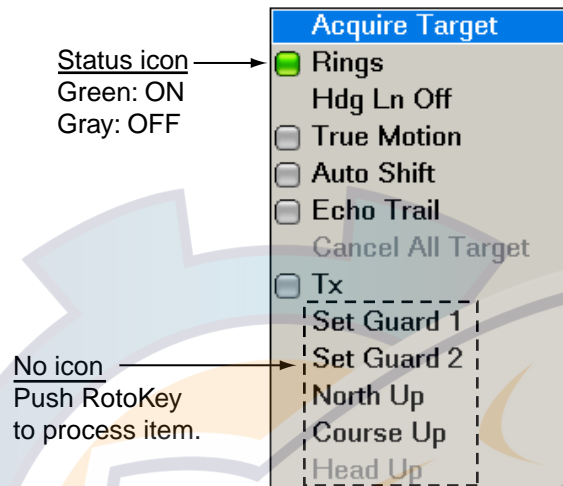
*A few soft controls for the chart plotter*

### To operate the soft controls:

Push or rotate the RotoKey to show the soft controls. Rotate the RotoKey to select a soft control. As you step through the soft control "menu", the currently selected soft control is blue and projecting and all others are gray-blue. Push the RotoKey to do the function labeled on the soft control.

## 1.13 Pop-up Menus

In addition to the menus, context-sensitive pop-up menus display commands relevant to the selected object or active display. Context menus let you quickly access useful commands according to the selected object or active display. To display a context-sensitive menu, hit the **right-click** button while an object is selected, or hit the same button anywhere on the active display. The illustration below shows the Radar pop-up menu.



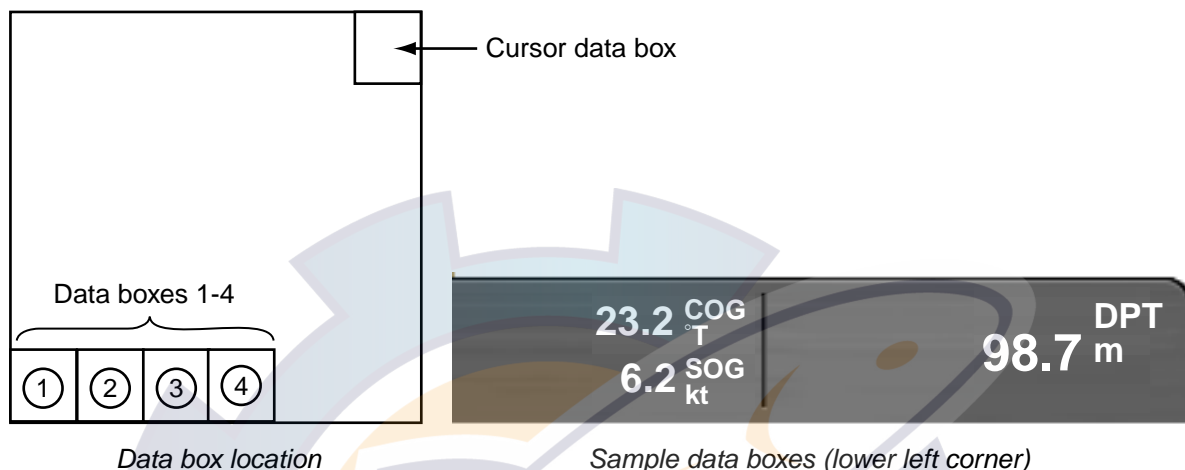
*Radar pop-up menu*

### To process items on a pop-up menu:

Rotate the RotoKey to select an item. In case of status icon, push the RotoKey to color the item's status icon in green to turn it on, or color it gray to turn it off. For items which have no status icon, push the RotoKey to proceed to the next level.

## 1.14 Data Boxes

The data boxes show various navigation data. You can select what data to display in them and add or remove boxes freely. A box can show one single data or multiple data, in which case the data is scrolled according to the scrolling time set on the DataBox menu. The data that can be displayed depends on your system configuration. Up to five boxes may be shown, four at the bottom left corner and the cursor data box at the top right corner. The no. 4 data box only appears when a destination is set.

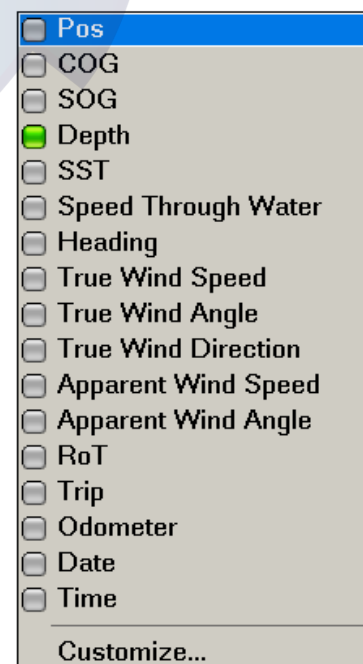


To alternately hide and show the boxes, use the **DATA/VOL** key.

You can configure the boxes directly on the screen, or from the Data Box menu. In the latter case more detailed configuration is available. For further details, see "13.2 Data Boxes" on page 13-6.

### To change the contents of a data box:

1. Put the cursor in the data box (the box is colored blue if correctly selected) to process and hit the **right-click** button to show the Data Box pop-up menu.
2. Rotate the RotoKey to select the data item you want to turn on or off.
3. Push the RotoKey to turn the item on or off and close the pop-up menu.



## 1.15 Menu Overview

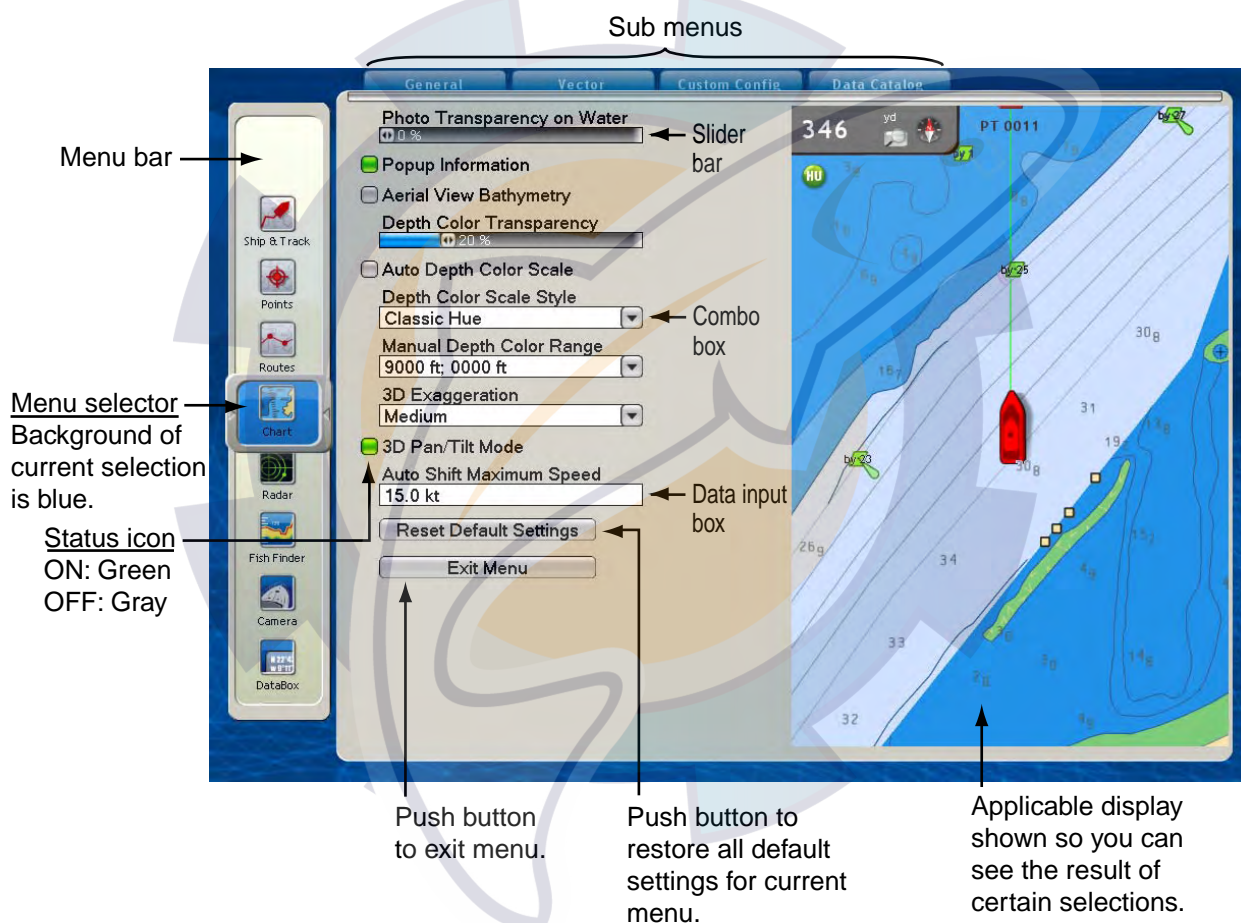
The menu system consists of up to 16 main menus and accompanying sub menus. The actual number of menus depends on equipment connected. To display the menu, press the **MENU** key.

### To operate the menu:












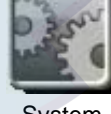



1. Press the **MENU** key to open the menu.

The last-used menu appears. If an alarm has been violated, the Alarm menu automatically appears, displaying the alarm log, which shows the name of violated alarm(s).

The icons at the left side of the screen represent the menus. An icon is not present when its corresponding function is not available.



### Menu description

Menu icon	Function	Menu icon	Function
 Ship & Track	Set up boat icon and own boat's track.	 Targets	Set up ARPA and AIS targets.
 Points	Manage points.	 Weather	Set up the weather display.
 Routes	Manage routes.	 Alarms	Enable and disable alarms.
 Chart	Set up the chart plotter display.	 Global	Set up items common to all operating modes, such as key beep on/off and font size.
 Radar	Set up the radar display.	 Files	File operations (import and export of track, route and points; software updating, etc.).
 Fish Finder	Set up the fish finder display.	 System	Manage system-wide settings such as menu language.
 Camera	Set up the camera display.	 My NavNet	Customize items such as RotoKey and boat icon.
 DataBox	Set up the data boxes.		

2. Rotate the RotoKey to select a menu with the menu selector at the left side of the screen. Clockwise rotation scrolls the menu bar downward while counterclockwise rotation scrolls it upward. The background color of the selector is blue at this time, which means you have not yet determined the menu to use.





3. Do one of the following depending on menu type:
- **For single sub menu**, push the RotoKey to enable menu operation.
  - **For multiple sub menus**, push the RotoKey. Rotate the RotoKey to select desired sub menu and then push it to confirm selection. Clockwise rotation selects tabs from left to right and counterclockwise rotation selects them from right to left. As you rotate the RotoKey, the tabs at the top of the screen become enlarged when selected.

When you push the RotoKey to confirm menu selection:

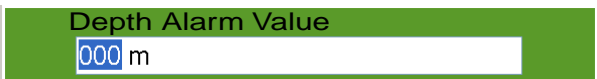
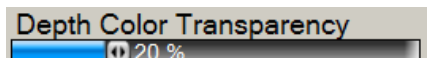
- The tab selected, the bar below the tabs and the background for the menu selector change from blue to green to indicate that the menu selected is available for operation.
- The topmost menu item is highlighted in blue.



4. Rotate the RotoKey to select menu item and then push it to confirm selection. Do one of the following depending on type of menu item selected.

Menu item type	Procedure
<p>Combo box</p> 	<p>Rotate the RotoKey to select an option and then push it to save the setting and close the box. Clockwise rotation sends the cursor downward.</p>
<p>Status icon</p> <p>Status icon →  My NavNet Reminder</p>	<p>Items which you turn on or off have a status icon before them. Push the RotoKey to color the icon green to turn the item on, or gray to turn it off.</p>



Menu item type	Procedure
Alphanumeric data input box 	Rotate the RotoKey to select alphanumeric (A-Z, 0-9) desired and push it to confirm selection. Rotate the RotoKey clockwise to go forward in alphanumeric order; counterclockwise to go in reverse order. When you need to position the cursor in a specific location, for example, when entering a point's name, use ◀ or ▶ on the Cursorpad.
Slider bar 	Rotate the RotoKey to set level and push it to confirm setting.

- **To select a different sub menu or a different menu**, rotate the RotoKey counterclockwise until control is returned to the menu selector. (You can also return control to the menu selector by pressing the **CANCEL** key consecutively.)
- **To close the menu**, press the **MENU** key, or use the RotoKey to click the Exit Menu button at the bottom of the menu.

## 1.16 Selecting Language

The default interface language is American English. Language is also available in British English, Spanish, German, French, Italian, Portuguese, Danish, Swedish, Norwegian, Finnish, and Dutch.

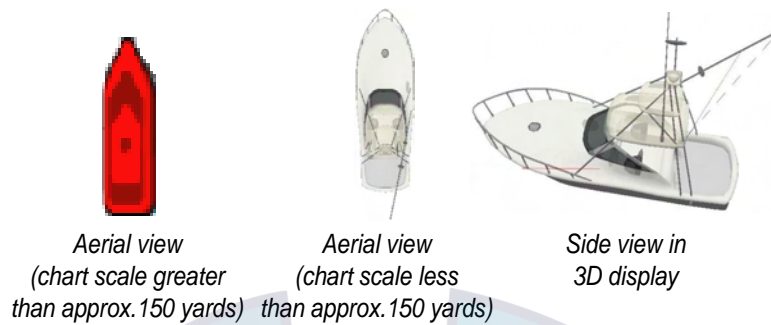
1. Press the **MENU** key to open the menu.
2. Select the System-General menu.
3. Use the RotoKey to select Language.



4. Use the RotoKey to select your language.
5. Push the RotoKey. You are asked if it is OK to reboot. Use the RotoKey to choose Yes.

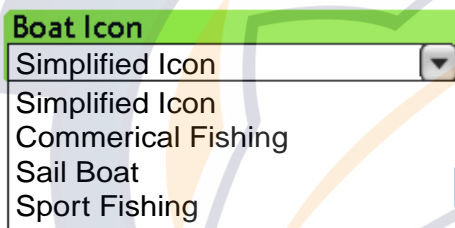
## 1.17 Boat Icon Configuration

The boat icon marks current position, and the default configuration is "sport fishing." If your boat is different, you can change the appearance of the boat icon to match your boat, from the menu.



*Appearance of default boat icon*

1. Press the **MENU** key to open the menu.
2. Open the My NavNet-General menu.
3. Use the RotoKey to select Boat Icon.



4. Use the RotoKey to select the boat icon which best matches your own boat.
5. Press the **MENU** key to close the menu.

## 1.18 Man Overboard (MOB)

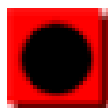
Use the MOB function if you lose a person or object overboard. You need either position data from a navigation device, or heading and speed data to calculate position by dead reckoning. Activation is done from the chart plotter display and MOB position is marked on both the chart plotter and radar displays.

To mark MOB position, long-push the **SAVE/MOB** key on the chart plotter display. Then, the following occurs:

- The MOB mark is placed on the chart plotter and radar, at the position the moment the **SAVE/MOB** key is pressed.



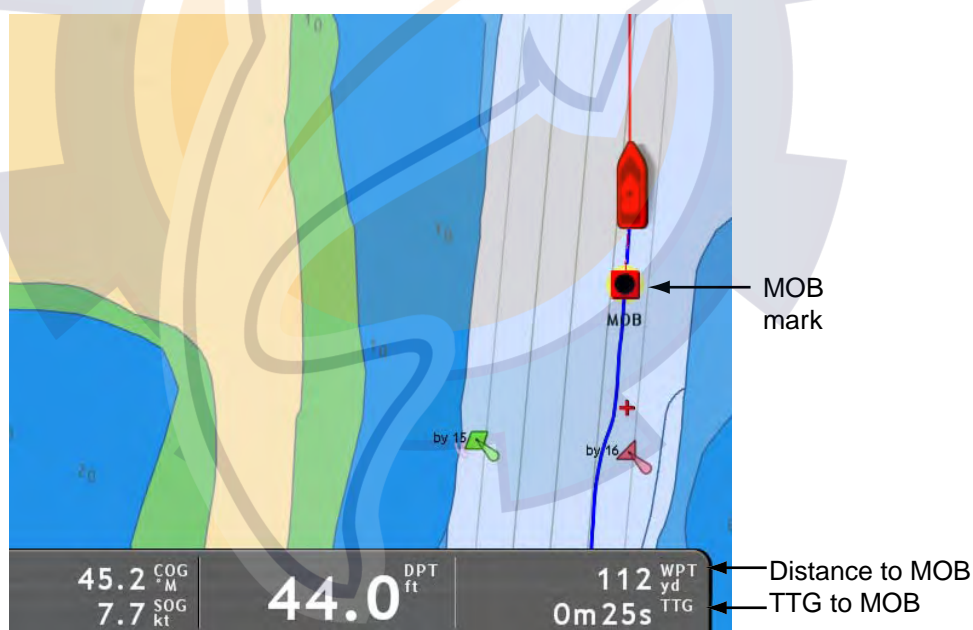
MOB mark on  
radar display



MOB

MOB mark on  
chart plotter display

- The chart scale is automatically set to 508 yards.
- The distance and the time to go to the MOB position appear in the far right hand side data box at the bottom of the chart plotter and radar displays.



- A red dashed line runs between MOB position and own vessel, on the chart plotter and radar displays. This is the course to take to go to the MOB position.

## MOB information

Simple MOB information, consisting of point name (MOB) and range and bearing to the MOB, can be obtained by placing the cursor on the MOB mark on the chart plotter display. For detailed information, put the cursor on the MOB mark and hit the **left-click** button. Detailed information includes the data shown with simple information plus

- Comment (default: time of MOB)
- Depth at MOB position (requires depth sensor)
- Water temperature at MOB position (requires temperature sensor)
- Group name (if any)
- Avoidance circle radius

Name	MOB
Range	244 yd
Bearing	229.1 °M

Simple MOB information

Name	MOB
Comment	Oct0307 015918 PM
Range	244 yd
Bearing	229.1°M
Depth	0.0 ft
Temp	32.00 °F
Group	
Avoidance Circle Area	0 yd

Detailed MOB information

## Erasing MOB marks

An MOB mark can be erased directly on the chart plotter display. It can also be erased from the Points list in the Points menu.

**Inactive MOB mark:** Place the cursor on the MOB mark and press the **right-click** button to show the Points popup menu. Use the RotoKey to select Delete.

**Active MOB mark:** If you are currently navigating to an MOB position, you must first cancel navigation. Place the cursor on the MOB mark and press the **right-click** button to show the Points popup menu. Rotate the RotoKey to select Cancel Route and push the RotoKey. Reselect the MOB mark, show the Points pop-up menu, and use the RotoKey to select Delete.

Move
Go To
Edit
Rename
Delete

Points popup menu  
(No route active)

Move
Cancel Route
Restart
Extend Route
Edit
Rename

Points popup menu  
(Route active)

## 1.19 Facsimile Receiver FAX-30

The FURUNO Facsimile Receiver FAX-30 can be installed in the NavNet network and operated from the NavNet display. The steps for enabling fax operation are

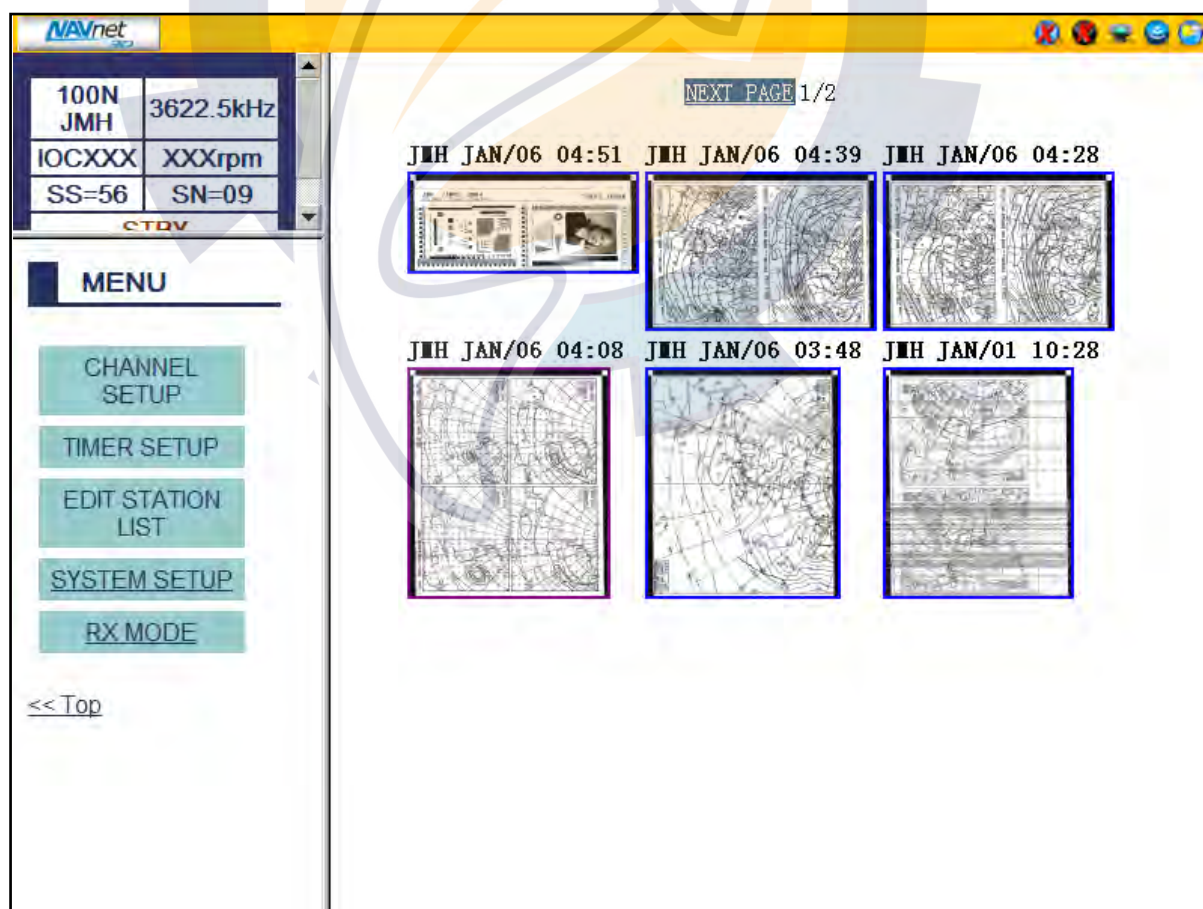
1. At installation of this equipment, connect the FAX-30 to the NavNet and confirm that the equipment recognizes the FAX-30, through the Installation Wizard.
2. Set up for a "full screen" FAX display by selecting the FAX icon (see the figure below) at the display selection window, referring to "13.3 Setting up the Display Selection Window" on page 13-8. The fax display is only available in the full-screen display.



3. To operate the FAX-30, use the **DISP** key to select the fax display icon to show the fax display, a sample of which is shown below. Operate it referring to its Operator's Manual.

For ease of use we recommend that you use the Cursorpad or a PC mouse to operate the fax screens.

The FAX-30 display can only be accessed by one NavNet display at a time. When another NavNet display accesses it, switching occurs after the fax display is completely stopped, which takes about one minute.





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# Chapter 2: Chart Plotter

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This chapter shows you how to

- Use and set up the chart plotter
- Set chart plotter related alarms
- Manage track

## 2.1 Charts

### 2.1.1 Chart Description

A world map in raster chart format is built into your unit. (A vector chart for the US coastline including Alaska and Hawaii is also provided standard.) To use this chart plotter as a navigation aid, you may need to have electronic charts (stored in the hard disk) for the area in which you wish to navigate. Contact your dealer about charts for your area. For how to manage charts stored in your system, see "13.7 Managing Charts".

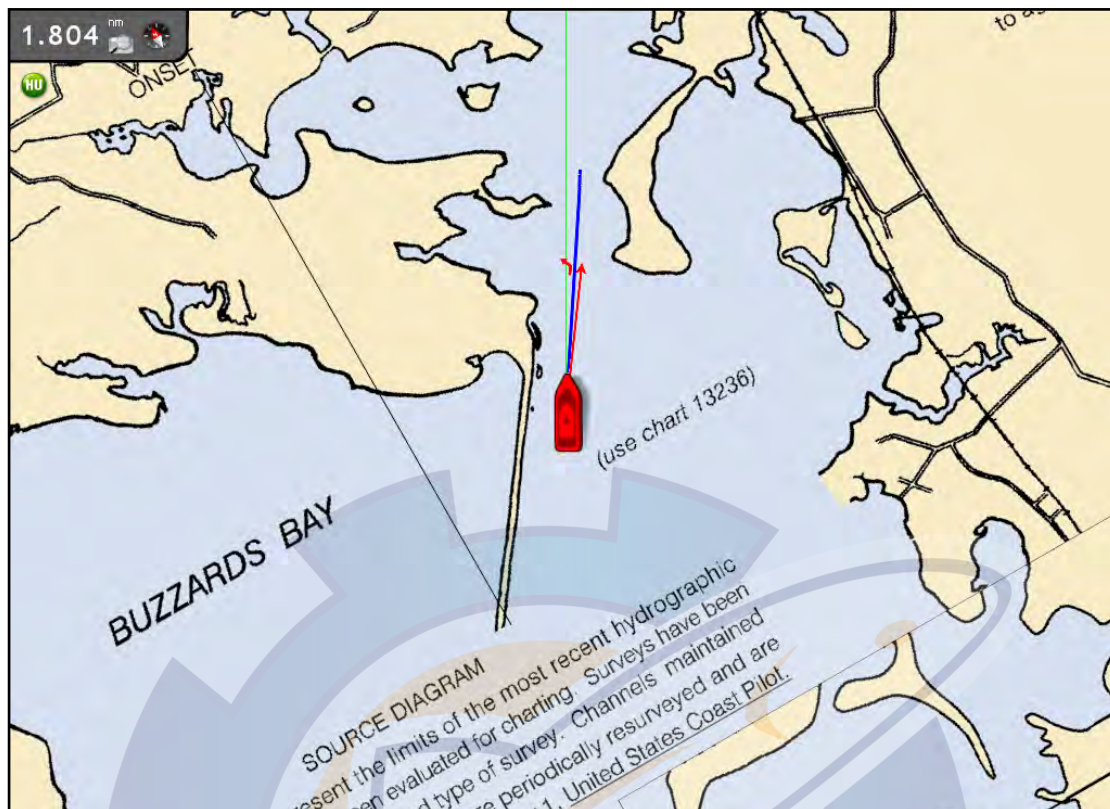
**Raster charts** are digitized scans of NOAA paper charts. Raster charts are often referred to as being "simple images". Far from being "simple", official raster charts incorporate considerable "meta data" which allows all chart information: notes, source diagrams, tidal diamonds, horizontal and vertical datums, etc., to be displayed clearly and quickly.

**Vector charts** are digital files which contain marine features and information specially designed for marine navigation and are produced according to the International Hydrographic Organization (IHO).

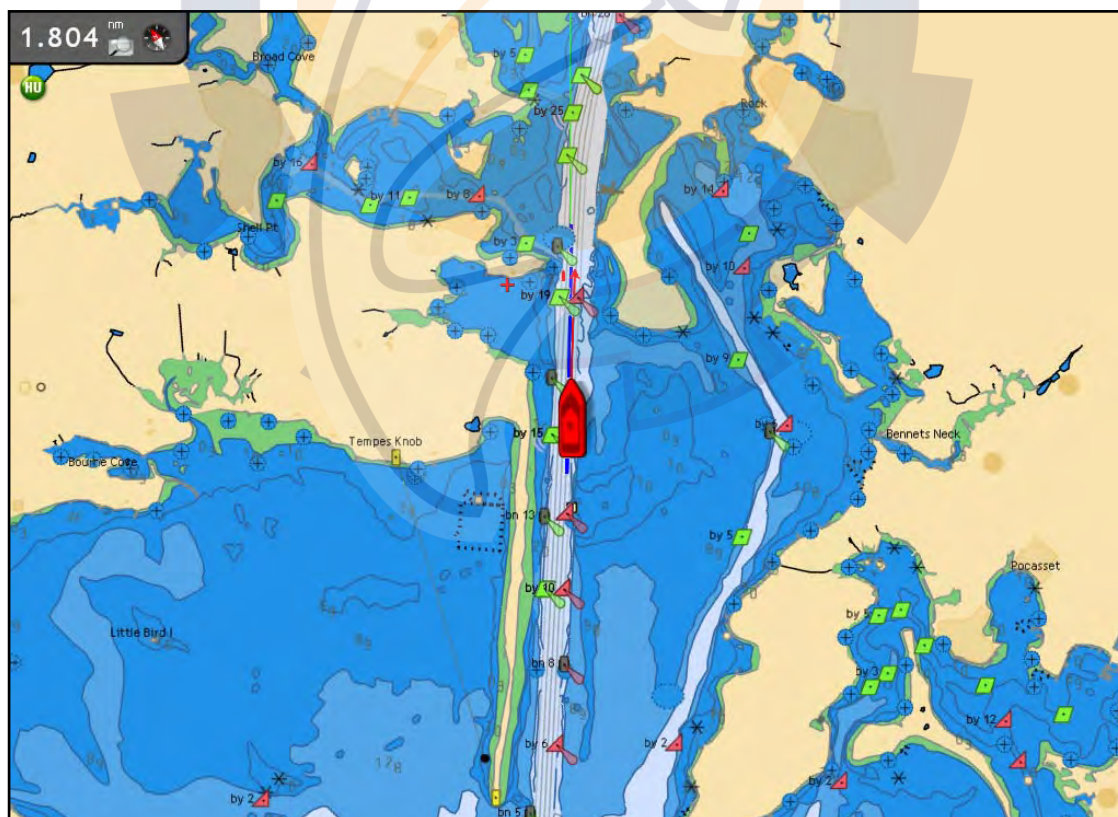
See the next page for a comparison of chart types.

### 2.1.2 Selecting Chart Type

Push the RotoKey, rotate the RotoKey to select Chart followed by Raster or Vector as applicable and then push the RotoKey.



*Raster chart*

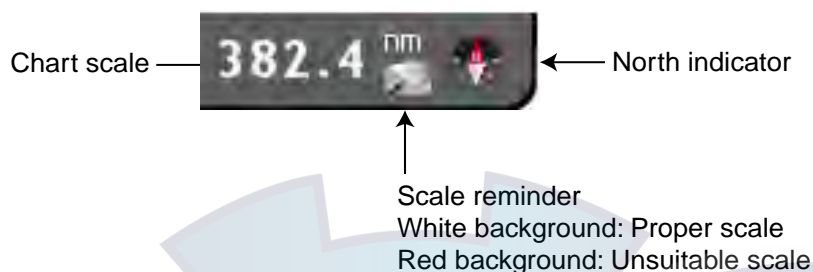


*Vector chart*

## 2.2 Selecting a Chart Scale

You can change the chart scale to see either more or less detail, or zoom in or out at specific location. The selected chart scale is indicated at the top left-hand corner on the screen. In the full screen display, the value shown is 1/2 the distance from the top of the screen to the bottom of the screen.

There are two ways to change the chart scale: with the **RANGE** key, and the cursor and RotoKey.

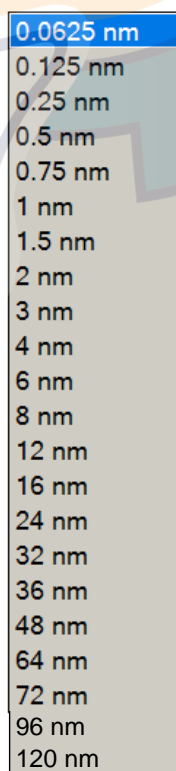


### Method 1: RANGE key

Use the **RANGE** key to select a chart scale. Each time you operate a **RANGE** key the chart scale changes to next available setting. Hit **RANGE IN** to decrease the chart distance, and hit **RANGE OUT** to increase the chart distance. The current chart scale is shown in the chart scale indication box at the top left corner. The scale advisor icon helps you select a suitable chart scale. The background of the icon is white if the scale is suitable, and red if not suitable.

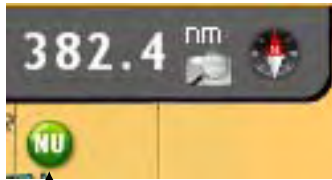
### Method 2: Cursorpad and RotoKey

This method provides quick selection of specific ranges between 0.0625 and 120 nm. Use the Cursorpad to place the cursor on the chart scale indication. Press the **right-click** button to show the Range pop-up menu, shown below. Rotate the RotoKey to select a range and push it to confirm selection



## 2.3 Selecting an Orientation Mode

The chart can be shown in head-up, course-up or north-up orientation. To select an orientation mode, use the RotoKey to select the Head Up, North Up or Course Up soft control as applicable. Alternatively, put the cursor on the orientation mode icon at the top left hand corner and push the **left-click** button to show HU (Head-up), NU (North-up) or CU (Course-up) as applicable.



Orientation mode icon

### Description of orientation modes

**Head-up:** Displays the chart with your boat's current compass heading upwards. Heading data from a compass is required. As the heading changes the boat symbol remains fixed and the chart picture rotates accordingly.

**North-up:** Chart orientation is fixed with true north upwards. As your heading changes the boat symbol moves accordingly. This mode is useful for long-range navigation.

**Course-up:** Chart picture is stabilized and shown with your current course over ground upwards. As your boat's course changes, the ship symbol moves accordingly. If you select a new course, the picture will reset to display the new course upwards.

## 2.4 Moving the Chart

You will need to move the chart if your vessel moves out of the area currently shown, you want to take a look at another area, or enter points at another location.

You can move the chart several ways:

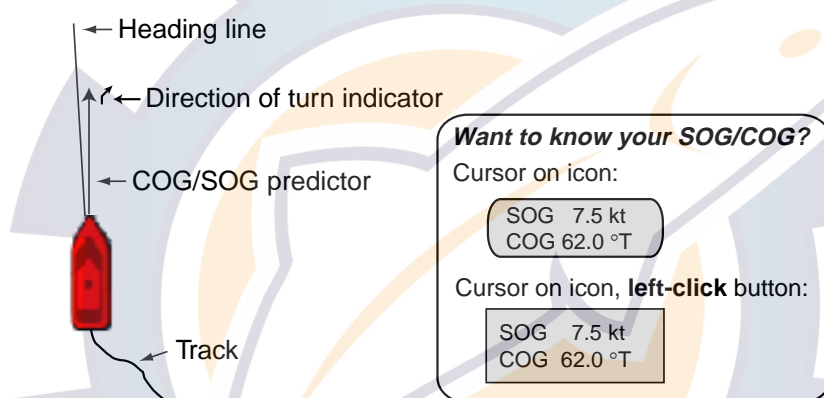
- Change the chart scale on zoom in or zoom out at cursor position.
- Use the Scrollingpad to pan the chart.
- Manual re-center your vessel with the **SHIP/3D** button or automatically re-center it with the Auto Shift soft control.
- Get a simple aerial view 3D display by long-pushing the **SHIP/3D** button, or get a simple or advanced aerial view or underwater view 3D display with the RotoKey.



## 2.5 The Boat Icon

The boat icon is placed at current position. Its default configuration is "sport fisher", however several other configurations, such as yacht and sailboat, also are available, from the menu. In addition to marking current position, it has the following functions:

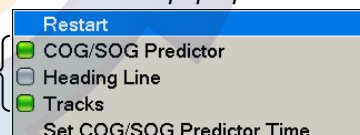
- The **Heading line** is a straight line extending from your position and it shows current heading.
- The **COG/SOG predictor** is a vector extending from the boat icon that shows estimated course and speed of your boat. The tip of the predictor shows estimated position of your boat after the selected predictor time (settable from the menu) elapses. It can be useful to extend the predictor to predict your boat's location in the future, on the current course and speed.
- The **Direction of turn indicator** points in the direction in which your boat is turning.
- The **Track** traces your boat's path, using GPS position data fed from a GPS navigator.



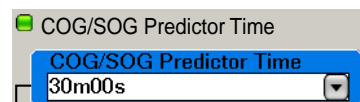
The Boat Icon pop-up menu provides for control of the COG/SOG predictor, heading line and track. To display this pop-up, put the cursor on the boat icon and push the **right-click** button.

Turn on or off as appropriate.

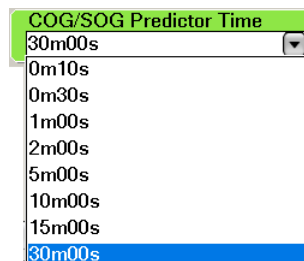
Boat icon pop-up menu



To set COG/SOG predictor time, select Set COG/SOG Predictor Time and hit **right-click** button to show the Ship & Track menu.



Select COG/SOG Predictor Time and push RotoKey.

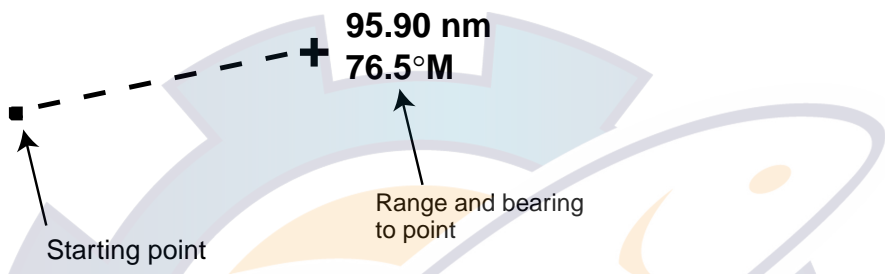


Rotate RotoKey to select a time. Push RotoKey to confirm setting. The greater the time the longer the COG/SOG predictor.

## 2.6 Finding Range and Bearing to a Location

The "ruler" feature measures the range and bearing between any two points on your chart. Range and bearing between the two points are digitally indicated on the screen.

1. Use the Cursorpad to put the cursor on the starting point.
2. Long-push the RotoKey.
3. Use the RotoKey to select Ruler.
4. Use the Cursorpad to drag the cursor to the 2nd point. As you drag the cursor, a dashed line extends from the starting point to the cursor location and the range and bearing to cursor position as shown next to the cursor.
5. Push the RotoKey to erase the ruler and the indication.



## 2.7 Chart Object Information

Vector charts carry a large number of objects, such as buoys and lighthouses, for which you can find information. Port, tide and current information are also available if the chart contains such information.

Place the cursor on any chart object to find object type. For more detailed information, push the **left-click** button.

Buoy, lateral Phinneys Harbor Buoy 6

*Simple chart object information*

Buoy, lateral	
Buoy shape	conical (nun, ogival)
Category of	starboard-hand lateral mark
Colour	red
Object name	Phinneys Harbor Buoy 14
Scale minimum	1:150000
Source date	Mar/07/98
Source indic	US,US,graph,chart 13236
Status	permanent

*Detailed chart object information*

## 2.8 Multiple Chart Plotter Displays

It is possible to show up to four chart plotter displays on one screen. This lets you view the situation around your vessel on both short and long ranges and your progress toward your destination from several angles. Each display can be adjusted independently. For example, you could show one display in 2D and another in 3D.

The following items can be adjusted or set independently:

- AIS
- ARPA
- Chart scale
- Chart orientation
- Chart type
- Countdown timer
- Route creation
- Overlays (sat photo, depth shading, tide icon, tidal current, weather)
- Scrolling
- 2D and 3D (3D is mutually adjusted, in case of multiple displays in 3D, but different orientations are possible)

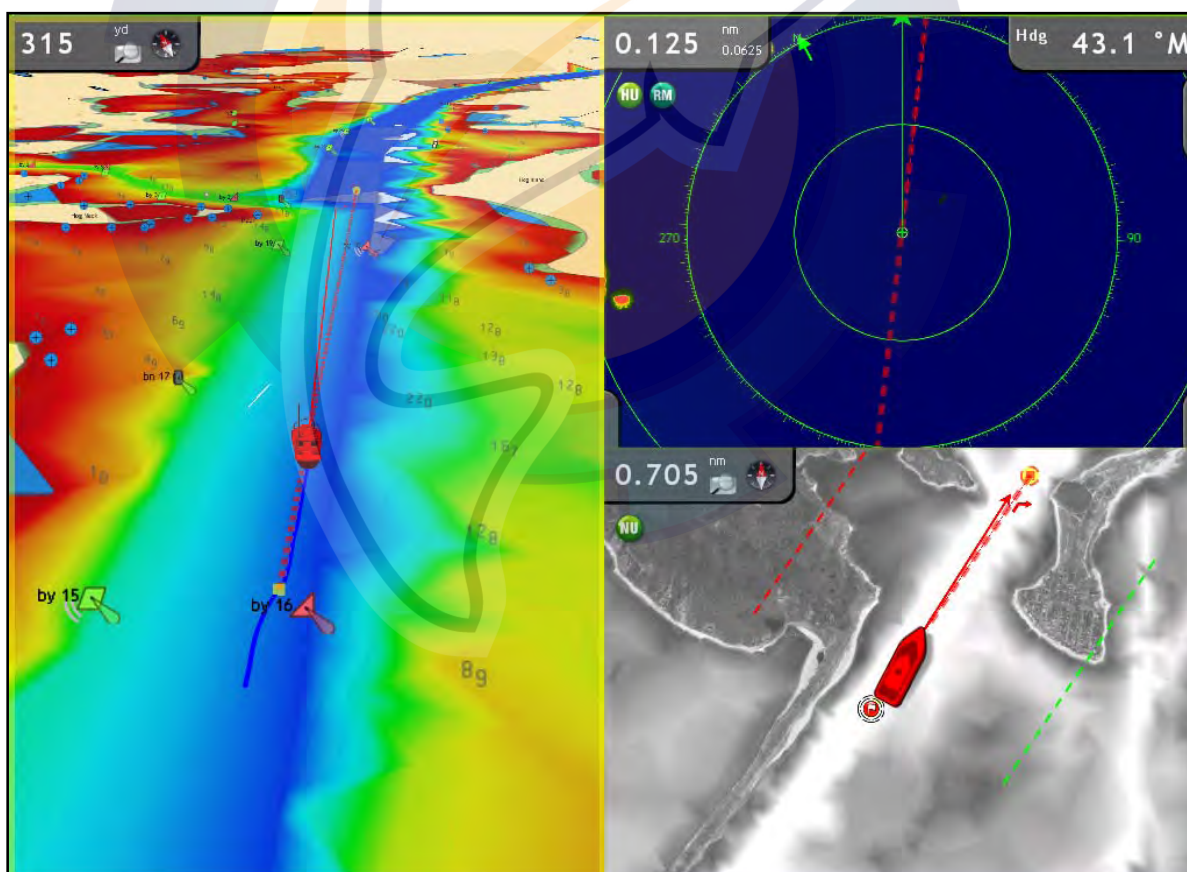


Chart plotter display 1

Chart type: Vector  
Chart scale: 315 yd  
Orientation: Head-up  
Perspective: 3D  
Overlay: Depth shading

Chart plotter display 2

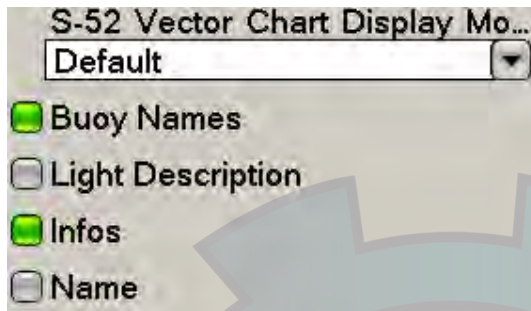
Chart type: Raster  
Chart scale: 0.705 nm  
Orientation: North-up  
Perspective: 2D  
Overlay: Satellite photo

## 2.9 Cartographic Text, Objects Setup

This section shows you how to show or hide the various cartographic objects and text information which appears on vector charts.

### 2.9.1 Visibility of Text Information

The Chart-Vector menu controls visibility of text information such as buoy names and light description.



#### Chart-vector menu description

**S-52 Vector Chart Display Mode:** Set the level of detail to show on the chart. The choices are Basic, Standard, Other, Fishing, Custom, and Default. Chart features are turned on or off according to setting.

**Buoy Names:** Show or hide buoy names.

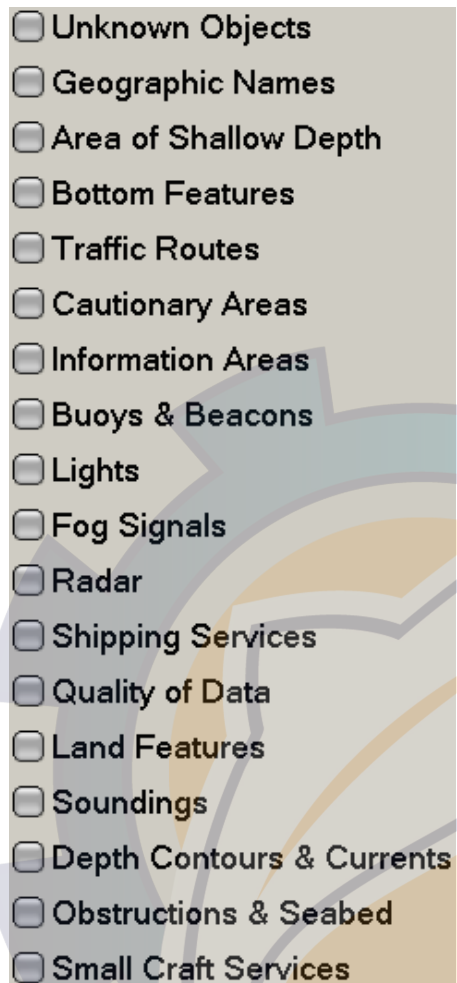
**Light Description:** Show or hide the sector of light shown by a fixed beacon.

**Infos:** Show or hide text information.

**Name:** Show or hide geographic names.

## 2.9.2 Visibility of Cartographic Objects

The Chart-Custom Config menu controls visibility of cartographic objects such as lights, fog signals, etc.



### Chart-config menu description

**Unknown Objects:** Unknown objects appearing on the chart.

**Geographic Names:** Geographic names appearing on the chart.

**Area of Shallow Depth:** Shallow depths on the chart.

**Bottom Features:** Enhanced seabed presentation.

**Traffic Routes:** Marine traffic routes.

**Cautionary Areas:** Cautionary areas appearing on the chart.

**Information Areas:** Information areas appearing on the chart.

**Buoys & Beacons:** Buoys and beacons.

**Lights:** The sector of light shone by a fixed beacon.

**Fog Signals:** Fog signal generating structure.

**Radar:** Radar buoy

**Shipping Services:** Shipping services



**Quality of Data:** Quality of data indicator.

**Land Features:** Cartographic features that are shown on land.

**Soundings:** Number on the chart showing depth.

**Depth Contours and Currents:** Lines indicating depth contours and currents.

**Obstructions and Seabed:** Obstructions such as wrecks, and seabed.

**Small Craft Services:** Services available for small craft.



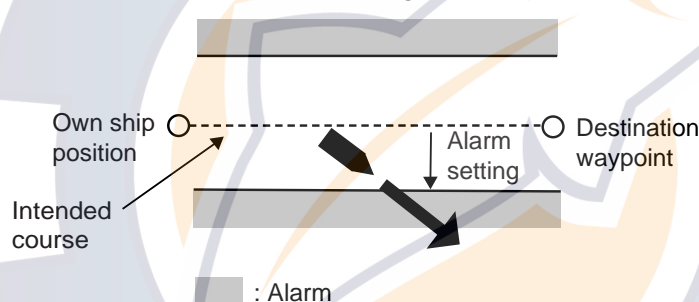
## 2.10 Alarms

This section covers the alarms available with the chart plotter:

- XTE alarm
- Anchor watch alarm
- Proximity alarm
- Depth alarm
- Sea surface temperature alarm
- Sea surface temperature shear
- Speed alarm
- Trip log alarm
- Countdown timer
- Alarm clock

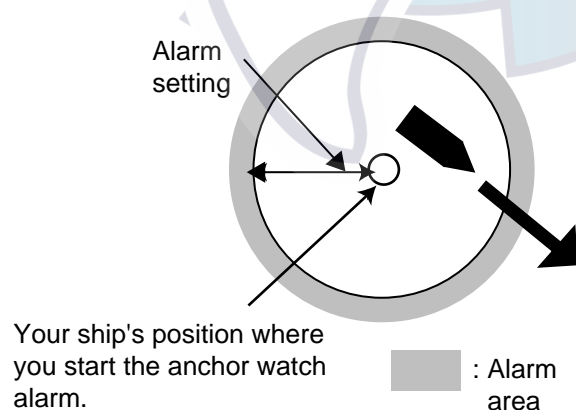
### 2.10.1 XTE Alarm

The XTE alarm warns you when your boat is off its intended course by more than the threshold value. When the XTE alarm is active, two dashed lines mark the XTE alarm boundaries, red for starboard, green for port.



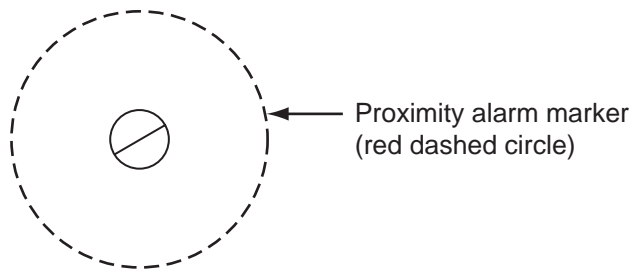
### 2.10.2 Anchor Watch Alarm

The anchor watch alarm informs you that your boat has travelled a distance greater than the threshold value, when it should be at rest. When the anchor watch is active, a red dashed circle with an "X" at its center marks the anchor watch area.



### 2.10.3 Proximity Alarm

The proximity alarm alerts you when own ship is nearing a point for which an avoidance circle, set on the Points list, is active. A red dashed circle, the radius of which is set on the Points list, circumscribes relevant points. When own ship is within the threshold value, audio and visual alarms are released.



### 2.10.4 Depth Alarm

The depth alarm informs you when the depth to the bottom is over or under the value specified. Requires depth measuring device.

### 2.10.5 SST Alarm

The SST (Sea Surface Temperature) alarm informs you when the sea surface temperature is over, under, within range, out of range. Shear also is available and it lets you know when temperature goes higher or lower than the preset value within one minute.

Set Over and Under alarm value with "SST Alarm Value", and Shear with "Shear". For Within Range and Out of Range, set alarm value with SST Alarm Range.

Requires temperature sensor.

### 2.10.6 Speed

The speed alarm lets you know when your ship's speed is within range, out of range, over or under the specified value. Set value at Speed Alarm Value. Requires GPS navigator or speed sensor.

### 2.10.7 Trip Log Alarm

The trip log alarm informs when you have travelled a certain distance. Requires speed log or GPS navigator sensor.

### 2.10.8 Countdown Timer

The countdown timer lets you keep track of how much of a pre-set period of time remains. It is only available on the chart plotter display. You set the alarm time on the Alarm menu and start and disable it from the chart plotter display. Long-push the RotoKey to select Countdown, and push the RotoKey to turn the timer on or off. The timer appears at the center of the plotter chart display when active. When terminal count is reached, several beeps sound and the countdown indication is erased from the screen.

4m51s

### 2.10.9 Alarm Clock

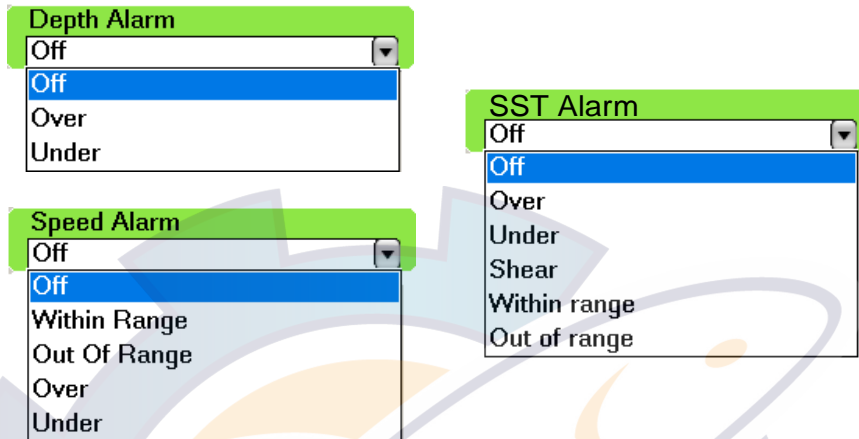
The alarm clock works like an ordinary household alarm clock, releasing audio and visual alarms when the preset time comes.

### 2.10.10 Setting an Alarm

1. Press the **MENU** key to open the menu.
2. Open the Alarms-General menu.

Alarm Off	SST Alarm Range +059.00 °F; +068.00 °F
<input checked="" type="checkbox"/> Speaker Alarm Output	Speed Alarm Off
<input type="checkbox"/> Speed-Based Output	Speed Alarm Value 010.0 kt; 015.0 kt
Speed-Based Output Value 10.0 kt	<input type="checkbox"/> Trip Log Alarm
External Alarm Input MOB	Trip Log Alarm Value 005 nm
<input type="checkbox"/> XTE Alarm	Countdown Timer Value 05m
XTE Alarm Value 104 yd	<input type="checkbox"/> Alarm Clock
<input type="checkbox"/> Anchor Watch Alarm	Alarm Clock Time 07:13 AM
Anchor Watch Alarm Value 100 yd	Alarm Clock Date Nov/25/07
<input type="checkbox"/> Proximity Alarm	<input type="checkbox"/> Sirius Marine WatchBox
Depth Alarm Off	Reset Default Settings
Depth Alarm Value 030 ft	Exit Menu
SST Alarm Off	
SST Alarm Value or Shear +009.00 °F	

3. Use the RotoKey to select an alarm item and then do one of the following:
  - a) **For the alarms which have a status icon**, push the RotoKey to disable or enable the alarm; color the icon green to enable the alarm, or gray to disable it.
  - b) **For the depth, speed and SST alarms**, select item's combo box and push the RotoKey to show alarm types available. Use the RotoKey to select desired alarm.



4. Use the RotoKey to select the alarm's Alarm Value box.
5. Use the RotoKey to set value. Rotate it to select value and push it to confirm.
6. Press the **MENU** key to close the menu.

### 2.10.11 Internal/External Alarm

In the default setting the audio alarm is output only internally, however it can be output both internally and externally or externally alone.

1. Press the **MENU** key to open the menu.
2. Open the Alarms-General menu.
3. Use the RotoKey to select and set "Alarm" to set up how to output alarms.
  - Internal:** Alarms are output internally only.
  - External:** Alarms are output externally only.
  - Internal/External:** Alarms are output both internally and externally.
4. Use the RotoKey to select and set External Alarm Input to set what alarm to output.
  - OFF:** No output
  - Save\*:** The point saved with the **SAVE/MOB** key is output.
  - MOB\*:** The MOB point saved with the **SAVE/MOB** key is output.
  - \* Do not select when "Alarm" is set to External or Internal/External.
5. Press the **MENU** key to close the menu.



## 2.10.12 Alarm Audio Options

In the default setting, audio and visual alarms are released when an alarm is violated. You can enable or disable the audio buzzer as desired. Further, you can enable or disable audible alarm output according to ship's speed.

1. Press the **MENU** key to open the menu.
2. Open the Alarms-General menu.
3. Use the RotoKey to turn the items below on or off as appropriate.

**Speaker Alarm Output:** Enable or disable alarm output.

**Speed-Based Output:** Enable or disable alarm output according to ship's speed.

**Speed-Based Output Value:** Set ship's speed at which alarms are output.

4. Press the **MENU** key to close the menu.

## 2.10.13 Alarm Log

The Alarm-Log menu lists the names of active and past alarms and the date and time they were violated. Refer to it to know what alarms have been violated.

Active alarms	
Date	Description
Oct/17/02 01:25:56 ...	Speed Alarm
<div>↑</div> <div>Active alarm (displayed in red)</div>	
Alarms Log	
Date	Description
Oct/17/02 01:25:56 ...	Speed Alarm
Oct/17/02 01:20:42 ...	Speed Alarm
Oct/17/02 01:12:18 ...	Speed Alarm
<div>}</div> <div>Past alarms</div>	

## 2.11 Track

Your ship's track is plotted on the screen using position data fed from a navigator, giving you a graphic presentation of where your boat has been.

The track, if turned on, is temporarily saved to the hard disk. A line runs between each track point. Up to 12,000 points can be saved. When the capacity for track points is reached the oldest track points are deleted to make room for the latest.

Your track remains on screen even if the power is removed. When you no longer require track you can erase it.

Track can be saved to the memory and one past track displayed at a time. This can be useful for making a route from past track.

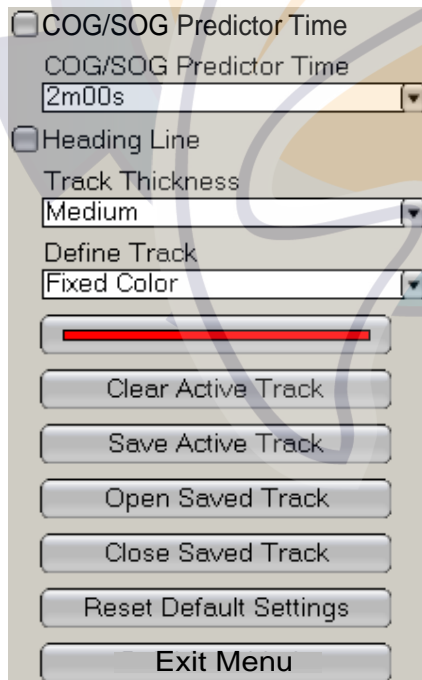
### 2.11.1 Turning the Track Display On/Off

1. Push the RotoKey to show the soft controls.
2. Use the RotoKey to select Track and then push the RotoKey to alternately turn track on and off.

### 2.11.2 Track Thickness

Track thickness can be specified, and the choices are thin, medium and thick. It can be useful to show your track in the thinnest width if you retrace it many times.

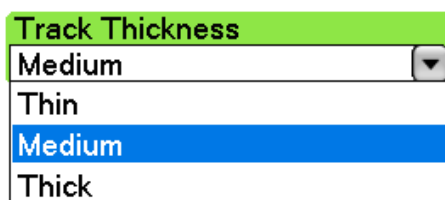
1. Press the **MENU** key to open the menu.
2. Open the Ship & Track menu.



The screenshot shows a menu interface with the following elements:

- ☐ COG/SOG Predictor Time
- COG/SOG Predictor Time: 2m00s (dropdown menu)
- ☐ Heading Line
- Track Thickness: Medium (dropdown menu)
- Define Track: Fixed Color (dropdown menu)
- A red horizontal bar indicator.
- Clear Active Track (button)
- Save Active Track (button)
- Open Saved Track (button)
- Close Saved Track (button)
- Reset Default Settings (button)
- Exit Menu (button)

3. Use the RotoKey to select Track Thickness.



4. Use the RotoKey to select thickness desired.
5. Press the **MENU** key to close the menu.

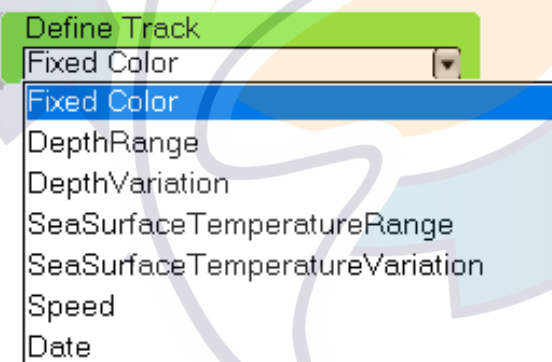
### 2.11.3 Track Color

Track can be displayed in a single color or multiple colors according to a parameter listed below.

- Depth range
- Depth variation
- Sea surface temperature range
- Sea surface temperature variation
- Speed
- Date

**To select track color:**

1. Press the **MENU** key to open the menu.
2. Open the Ship & Track menu.
3. Use the RotoKey both to select Define Track and open its options menu.



4. Use the RotoKey to select option desired.
5. To change parameters, use the RotoKey to select the "color" box below Define Track. One of the menus shown on the next page appears.
6. Use the RotoKey to set values, referring to the description at the bottom of the next page.

☐ White

Value  
033 ft

☐ Blue

Value  
164 ft

☐ Purple

Value  
328 ft

☐ Cyan

Value  
656 ft

☐ Green

Value  
984 ft

☐ Yellow

Value  
1312 ft

☐ Red

OK

Depth range

☐ White

Value  
41.00 °F

☐ Blue

Value  
50.00 °F

☐ Purple

Value  
54.50 °F

☐ Cyan

Value  
59.00 °F

☐ Green

Value  
63.50 °F

☐ Yellow

Value  
68.00 °F

☐ Red

OK

Sea surface temperature range

☐ White

Value  
005.00 kt

☐ Blue

Value  
010.00 kt

☐ Purple

Value  
015.00 kt

☐ Cyan

Value  
020.00 kt

☐ Green

Value  
025.00 kt

☐ Yellow

Value  
030.00 kt

☐ Red

OK

Speed

☒ White

☐ Blue

☐ Purple

☐ Cyan

☐ Green

☐ Yellow

☐ Red

Fixed color

☐ Sunday

☐ Monday

☐ Tuesday

☐ Wednesday

☐ Thursday

☐ Friday

☐ Saturday

Date

Step  
002 ft

OK

Depth variation

Step  
+00.20 °F

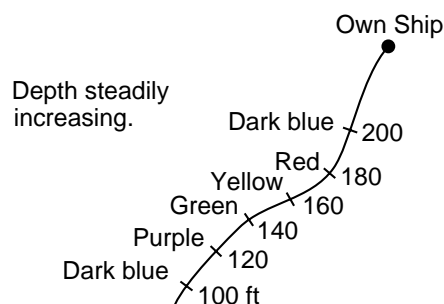
OK

Sea surface temperature variation

**Fixed color:** The track is painted in one color among white, blue, purple, cyan, green, yellow and red.

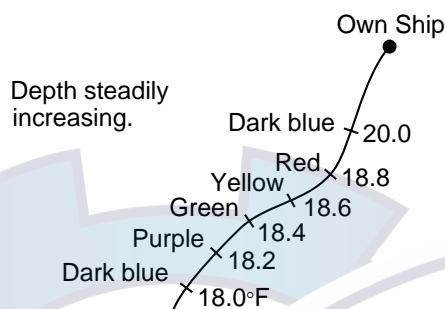
**Depth range:** Change the color of the track with change in depth. Set the threshold value for each color. For example, the default setting for white is 33 ft. This means that the track is painted in white for depths up to 33 ft.

**Depth variation:** Paint the track in a different color whenever the depth changes by the figure set here. For example, the setting of 20 ft would change the color of the track each time the depth changes by 20 ft, in colors of dark blue, purple, green, yellow and red as below.



**Sea surface temperature range:** Change the color of the track with change in sea surface temperature. Set the threshold value for each color. For example, the default setting for white is 41.0°F. This means that the track is painted in white for temperatures up to 41.0°F.

**Sea surface temperature variation:** Paint the track in a different color whenever the sea surface temperature changes by the figure set here. For example, the setting of +00.20°F would change the color of the track each time the sea surface changes by +00.20°F, in colors of dark blue, purple, green, yellow and red as below.



**Date:** The track color changes at the turn of a new day.

7. Press the **MENU** key to close the menu.

## 2.11.4 Clearing Active Track

Active track can be cleared from the display. This is useful when the screen becomes cluttered with track.

1. Press the **MENU** key to open the menu.
2. Open the Ship & Track menu.
3. Use the RotoKey to select Clear Active Track and then push it. You are asked if you are sure to reset the track.
4. Rotate the RotoKey to select Yes and then push it to erase track.
5. Press the **MENU** key to close the menu.

## 2.11.5 Saving Active Track

Your equipment stores up to 12,000 points of track. When that amount is reached, the oldest track is erased to make room for the latest. For that reason you may wish to save your track. You can save up to 20 sets of track, to the Track list. A saved track can be replayed at a later date, which can be useful for creating a route with past track.

1. Press the **MENU** key to open the menu.
2. Open the Ship & Track menu.
3. Use the RotoKey to select Save Active Track. You are asked to enter track name. If desired, you can select a name you have already used, in which case the previous data is written over.

Rename

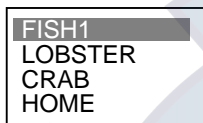


4. Use the RotoKey to enter name. Rotate it to select character; push it to confirm selection. Up to eight characters may be used. (To save the track under the name shown in the Rename, push the RotoKey consecutively until the box closes. Use the RotoKey to push the OK button.)
5. Press the **MENU** key to close the menu.

### 2.11.6 Replaying Saved Track

One saved track can be replayed on the display. This is useful for making a route with a past track. Note that saved track appear together with current track.

1. Press the **MENU** key to open the menu.
2. Open the Ship & Track menu.
3. Use the RotoKey to select Open Saved Track. The saved track list appears, an example of which is shown below.



4. Use the RotoKey to select the track to replay.
5. Press the **MENU** key to close the menu and replay the track.

### 2.11.7 Removing Saved Track

After you have viewed a replayed track, you can remove it from the screen as follows:

1. Press the **MENU** key to open the menu.
2. Open the Ship & Track menu.
3. Use the RotoKey to select Close Saved Track.
4. Press the **MENU** key to close the menu.

### 2.11.8 Finding Track Information

Simple track information provides the depth and temperature at the location selected on the track. (Applicable sensors are required.) Place the cursor anywhere on the track to get this information.

Detailed track information shows the information listed below, in addition to the depth and temperature at track point selected. Hit the **left-click** button to show detailed track information.

- Name of the track
- Time the track was started
- Time the selected point on the track was made
- Position at the selected location



Simple track information

Name	ACTIVETRACK
Start Time	Oct/03/07 02:25:23 PM
Point Date	Oct/03/07 02:34:05 PM
Position	41° 42.8378' N; 70° 38.9505' W
Depth	47.6 ft
Temp	66.72 °F

Detailed track information

## 2.11.9 Track Pop-up Menu

The Track pop-up menu offers a convenient way to clear track, save track, set track parameters, and go to the most recently plotted track point. To show the Track pop-up menu, place the cursor anywhere on your track and press the **right-click** button.

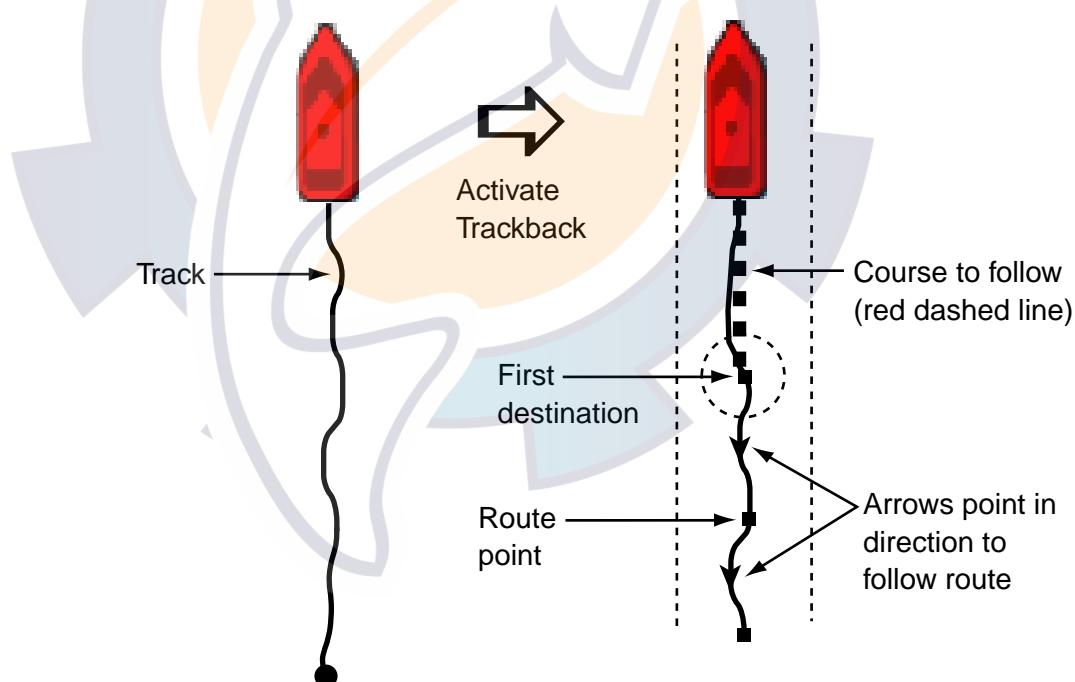
Go to most recent track point. →	Trackback
Save track. →	Save Track
Clear track. →	Clear Track
Open Ship & Track menu. →	Parameters

### Trackback

The trackback feature creates a route with your current track, and saves it to the Routes list under the youngest empty route number. This is useful when, for example, you need to return along previous track to retrieve traps or pots, etc.

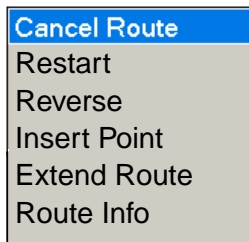
To use the trackback feature, put the cursor on the track and press the **right-click** button to open the Track pop-up menu. Trackback is selected; push the RotoKey. Then,

- a red dashed line runs between own ship and the destination,
- a blue solid line connects between route points (automatically created) and own ship and,
- arrows on the track mark the direction to follow.



### Route following options

Once you have started following the route you can cancel the route, restart following the route, reverse the following direction, insert a point, extend the final point on the route, and find route info. Push the right-click button to show the Route pop-up menu, shown below. For details, see section 5.6 Route Following Options.



## Chapter 3: 3D Display, Overlays

### 3.1 3D Display

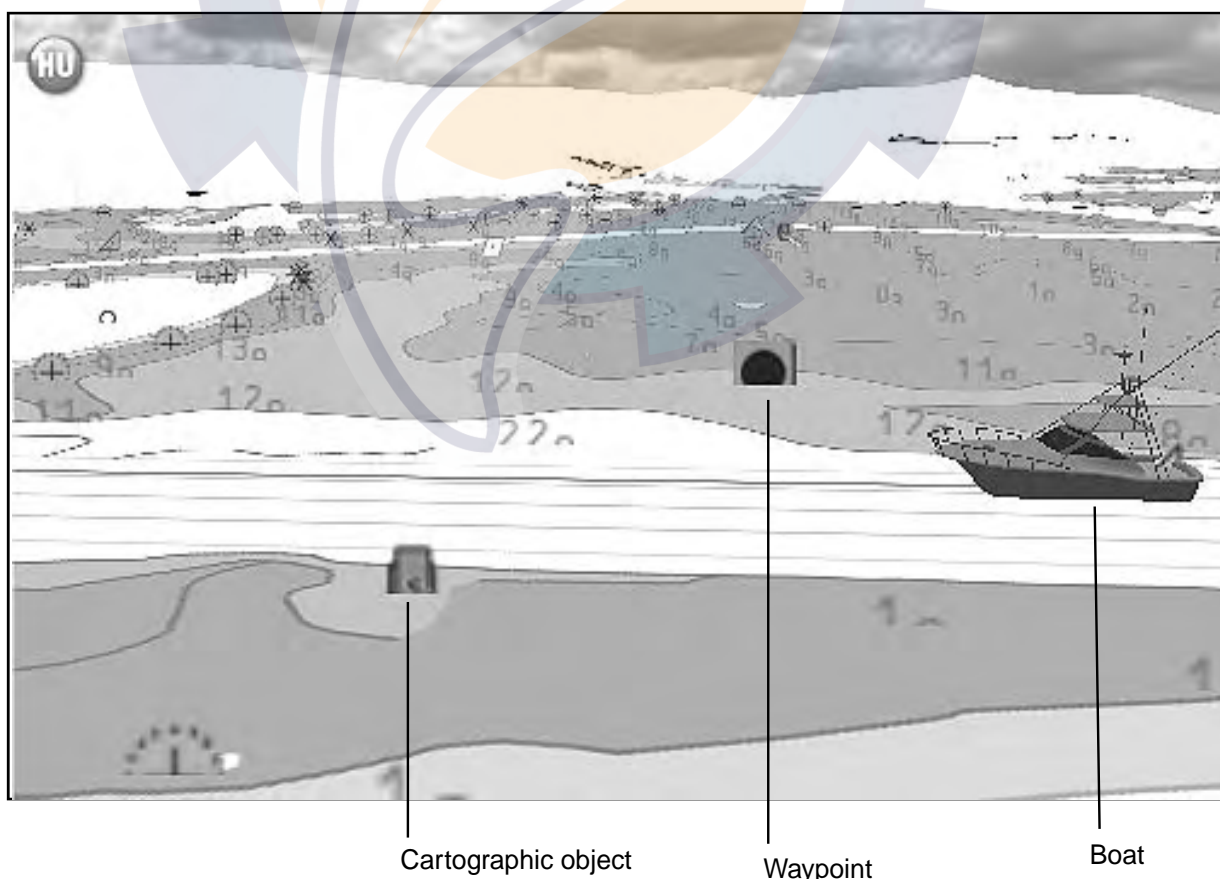
The 3D display incorporates native 3D chart architecture that allows full time three-dimensional presentation. With NavNet®3D's true 3D environment, you can see all of the information you want with no limitations on what information you wish to view. You can plan your routes, enter points, etc. the same as on the 2D chart.

The 3D display provides a three-dimensional view of land and sea around your boat. Land is shown in various shades of beige according to height above the sea level. Water is shown in various shades of blue according to depth. The 3D display shares much of the same information with the 2D display, so you can get a better idea of what's happening around your boat. This is especially useful when you are in unfamiliar waters. Also, most functions of the 2D display, for example, destination setting, are available in the 3D display.

For best results be sure you are receiving accurate position and heading data.

#### 3.1.1 Aerial View

The aerial view is the view you get anytime you enable the 3D display. This display shows an aerial view of the 3D chart, with you above and behind your boat looking in the forward direction. The illustration provides an example of how you can vary the orientation of the aerial view display, with a view from the port side of the boat.



*3D display, aerial view*

### Activating/deactivating the aerial view by SHIP/3D button

Before doing this procedure, open the Chart-General menu and activate 3D Pan/Tilt Mode. Otherwise you won't be able to adjust the pitch and orientation by this method.

1. Long push the **SHIP/3D** button to start the 3D display.
2. Rotate the RotoKey to adjust the pitch, i.e., the vertical angle of view. The range of adjustment is 1-90°.
3. Push the RotoKey to confirm setting.
4. Rotate the RotoKey to rotate the picture, from 0-360°.
5. Push the RotoKey to confirm setting.

Alternatively, you can use the Cursorpad to adjust the display. Use ▲ and ▼ to adjust the pitch and ◀ and ▶ to set orientation. After setting both of those parameters, press the **left-click** button or the RotoKey.

If you need to readjust the display, long push the RotoKey and select the 3D and 3D Pan/Tilt soft controls. Readjust the display as directed above.

To return to the 2D display, long push the **SHIP/3D** button.

### Activating/deactivating the aerial view with the soft controls

1. Long push the RotoKey.
2. Select the 3D and 3D Pan/Tilt soft controls. (You may also activate the display by selecting the Aerial View soft control. However it is then necessary to re-push the RotoKey to select the 3D Pan/Tilt soft control.)
3. Adjust the display with the RotoKey, following step 2-5 above.

If you need to readjust the display, long push the RotoKey and select the 3D and 3D Pan/Tilt soft controls.

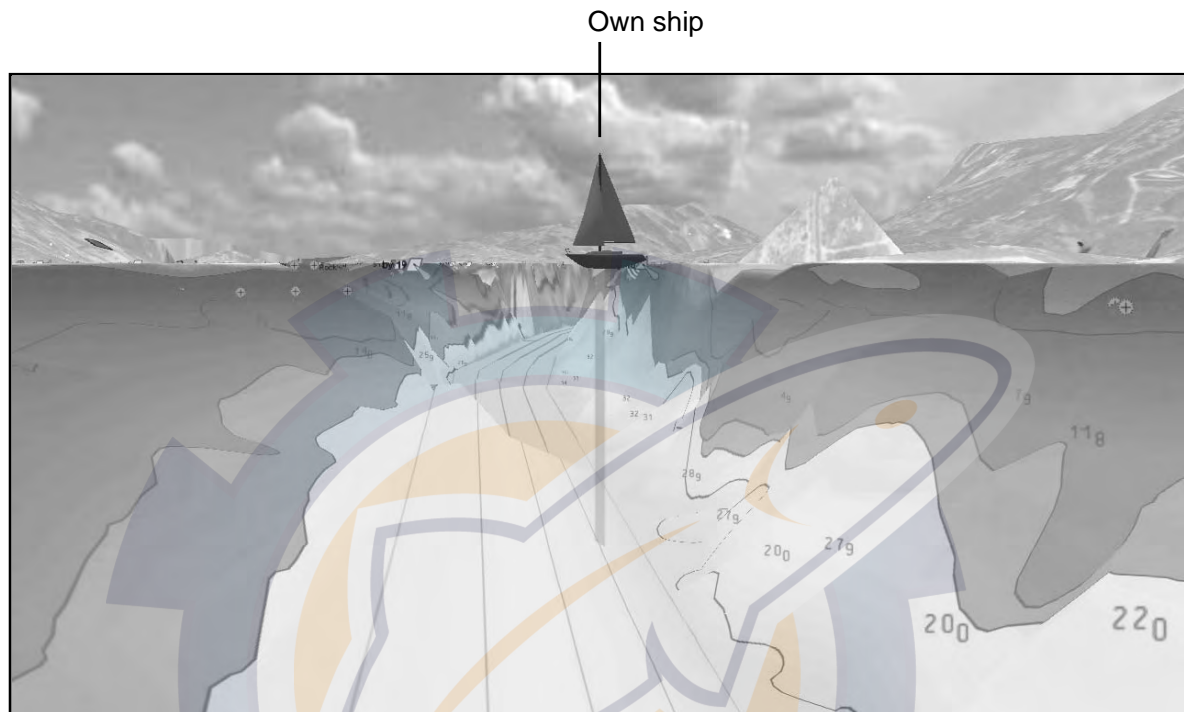
To restore the 2D display, push the RotoKey and select the 3D and 2D View soft controls.



### 3.1.2 Underwater Display

The underwater display provides a downward looking view into the water. It is available between 7 yards and 1.0003 nm.

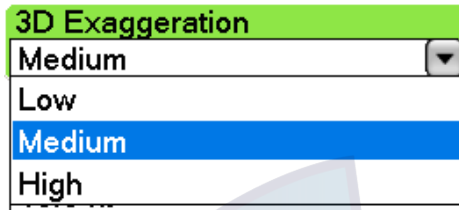
To activate the underwater display, use the RotoKey to select the 3D and Underwater soft controls. The picture can be rotated with ◀ and ▶ on the Scrollingpad.



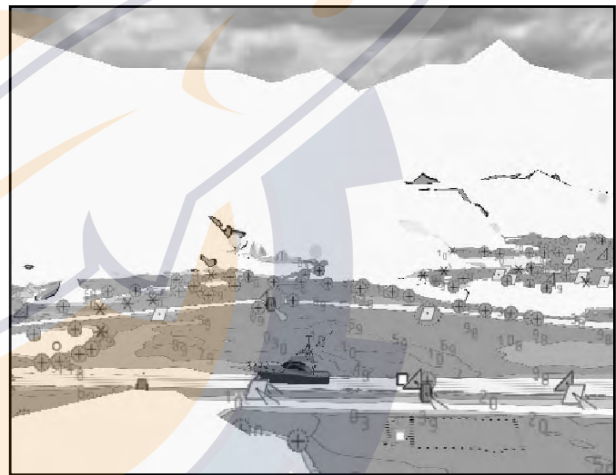
*Underwater display*

### 3.1.3 Making the 3D View Clearer

In the 3D display it is sometimes easier to view some topographical features by "exaggerating" them. The exaggeration feature stretches both objects on the chart and underwater vertically so that you can view their shape and position more easily. To adjust the exaggeration, open the Chart-General menu and set the level with "3D Exaggeration", the settings of which are shown below. High offers the highest level of exaggeration. In the example below, the height of the land in the background is greatly exaggerated in the "high" setting.



Exaggeration "low"



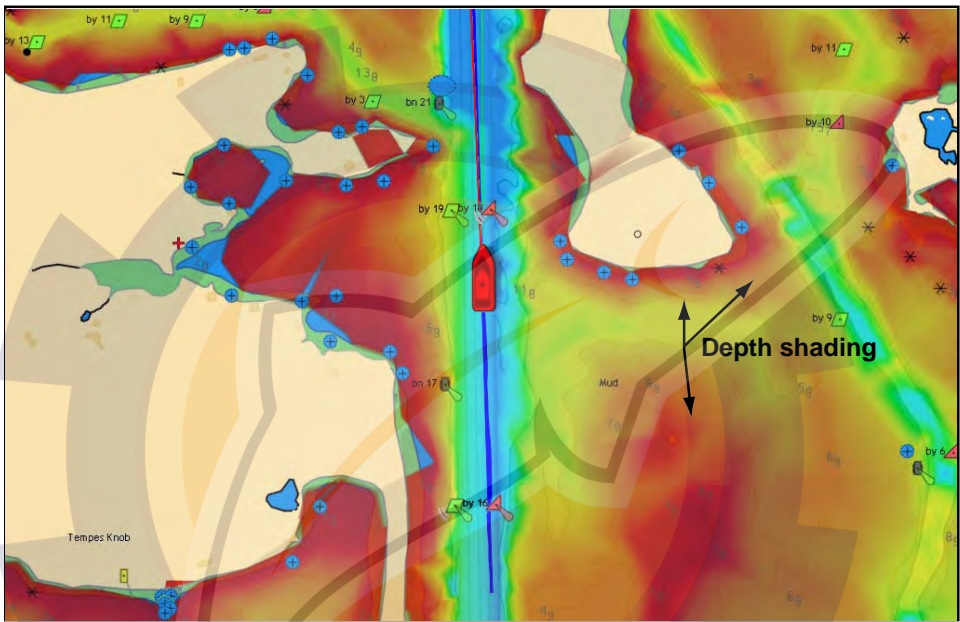
Exaggeration "high"

### 3.2 Overlays

Several chart overlays are available on the chart plotter display: depth shading, weather, satellite photo, and animation.

#### 3.2.1 Depth Shading Overlay

The depth shading overlay shows depths in red (shallow), yellow (medium) and green (deep), and is available in 2D and 3D presentations. It is useful for getting an at-a-glance appreciation of water depths. Transparency levels can be adjusted so that the chart data is visible beneath the color shading. To show the depth shading overlay, use the RotoKey to select Overlay and Dpth Shade and then push the RotoKey to show or hide the depth shading overlay as applicable.



#### Depth shading parameters

Depth shading appearance is controlled from the Chart-General menu.

<input type="checkbox"/> Aerial View Bathymetry	—	Show/hide below-the-surface depth shading in the aerial view.
Depth Color Transparency	—	Adjust the transparency of depth color. The higher the figure the greater the transparency
<input type="checkbox"/> Auto Depth Color Scale	—	Turn automatic depth color scale selection on/off.
Depth Color Scale Style	—	Select how to display the depth colors.
Classic Hue	—	Classic Hue: Colors of the rainbow
Manual Depth Color Range	—	Blue Hue: Shades of blue
0000 ft; 0049 ft	—	Set the depth range for which to show depth shading.

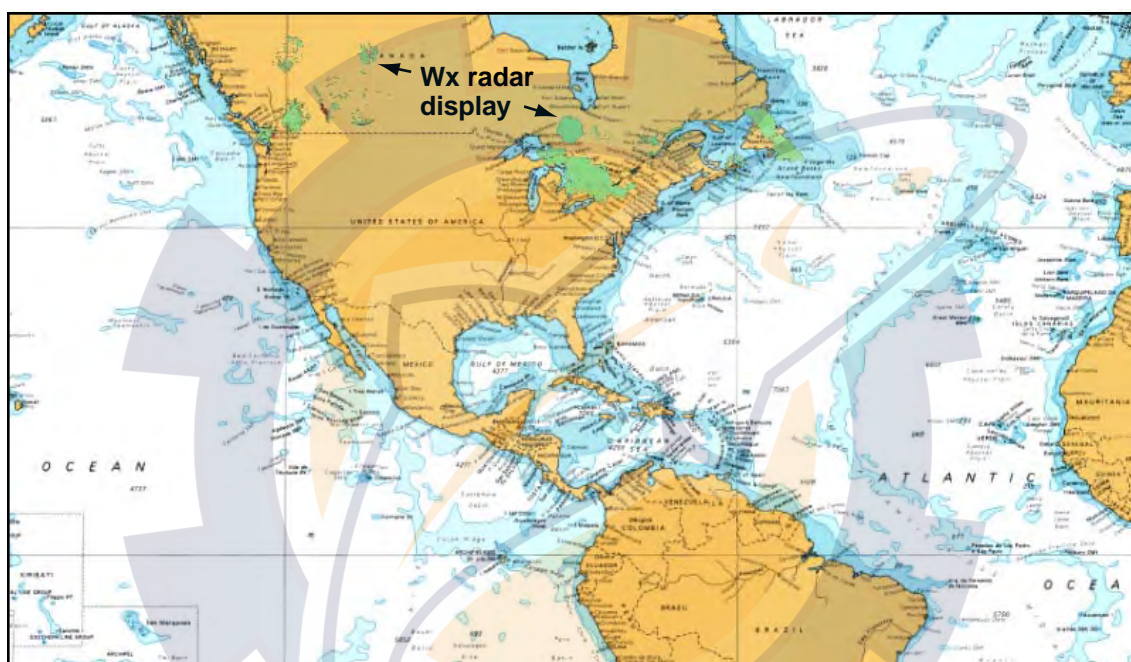
Chart menu, general sub menu  
depth shading related items

### 3.2.2 Weather Overlays

The weather overlays, available only in North America and with connection of a Sirius weather receiver, superimpose weather information on the 2D and 3D displays. Four types are available: Wx Radar, Wx Data, and Adv Wx Data, and Marine Zone. Use the RotoKey to select Weather and applicable "Wx" soft control and then push the RotoKey to hide or show selected weather display. For detailed information about weather overlays, see Chapter 11.

#### Weather radar overlay

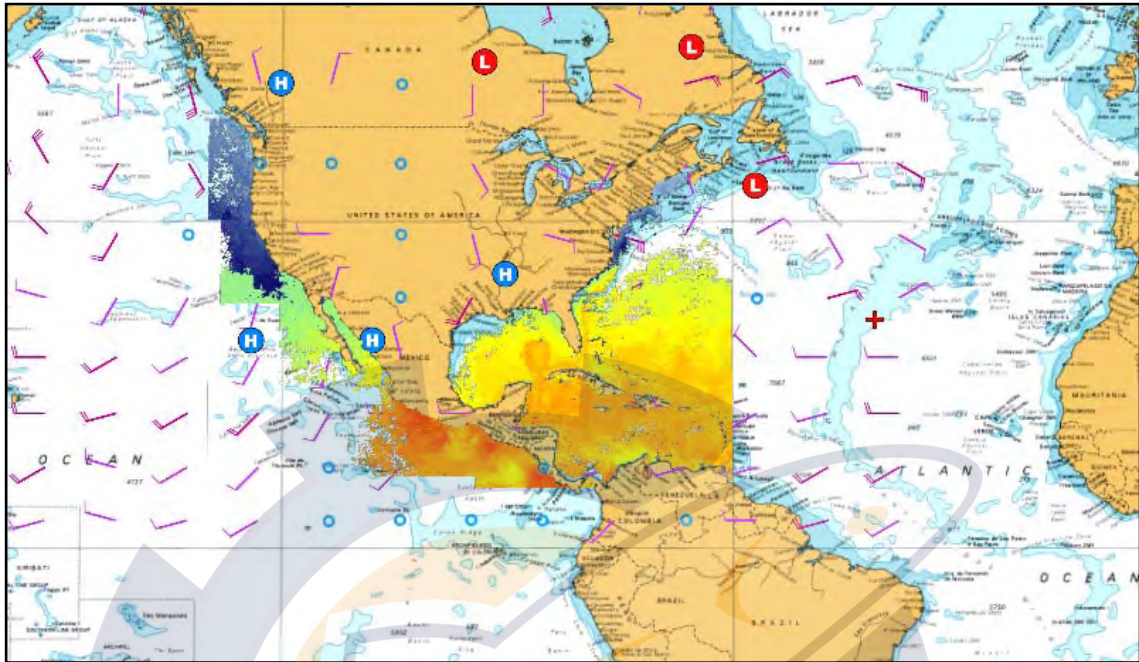
NOWRAD and Canadian weather radar information on your chart. Independent radar confirmation of possible storm fronts to help you sort the clouds from possible sea clutter.





### Weather data overlay

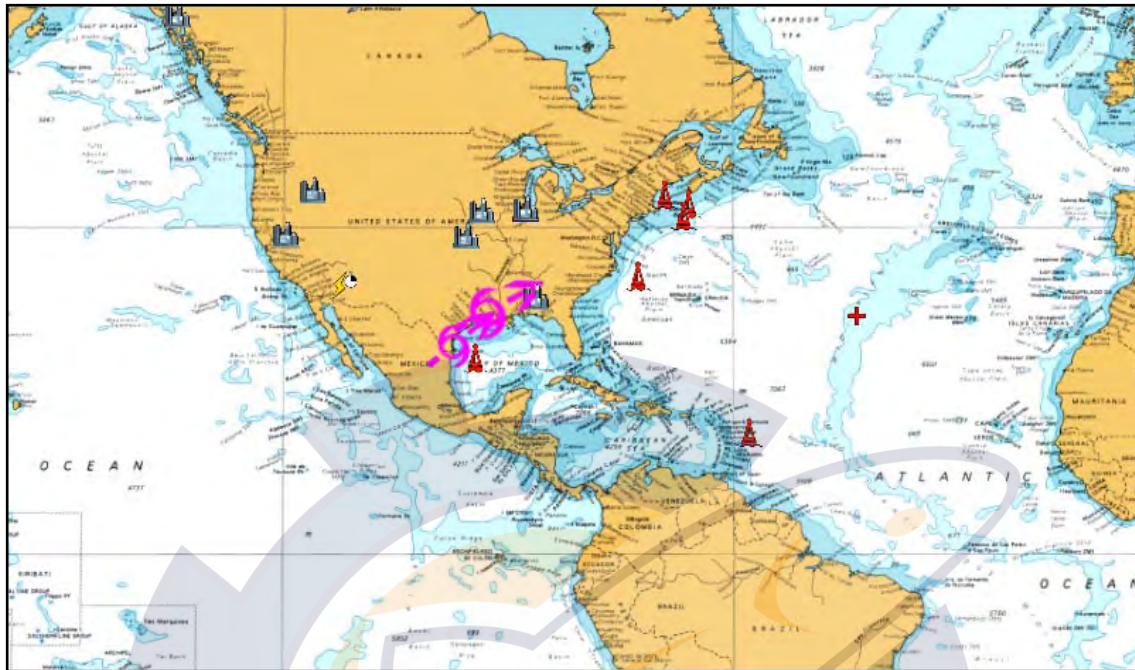
The weather data overlay offers up to the minute forecast data including weather radar, sea surface temperature, storm tracks, pop-up weather alerts, etc.





### Advance weather overlay

The advanced weather overlay provides weather data not included in the standard weather data overlay, such as buoys.



### Marine zone overlay

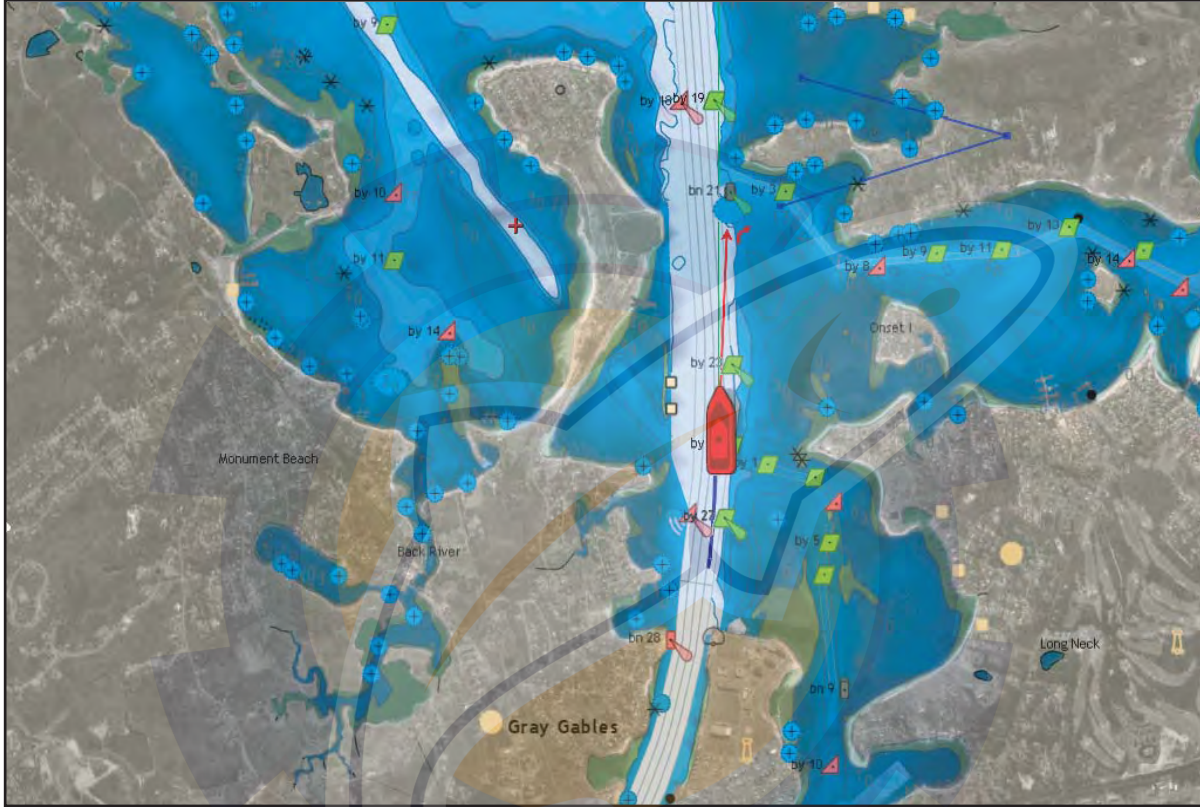
The coastal water is subdivided by zones for forecasts. These zones can be displayed on the screen with lines.



### 3.2.3 Satellite Photo Overlay

You can overlay the satellite photo for your area, on the 2D and 3D displays. Use the RotoKey to select Overlay and Sat Photo and then push the RotoKey to show or hide the satellite photo as appropriate.

High resolution satellite images for the USA coastline are available. They do not come preloaded but are available at no cost (other than shipping and handling). Users will be able to install multiple satellite photos on the hard drive of the NavNet®3D. The illustration below shows the vector chart with satellite photo overlay.



## Setting photo transparency on water

You can set the level of transparency for the satellite photo on water. Open the Chart-General menu. Use the RotoKey to choose Photo Transparency on Water and push the RotoKey. Rotate the RotoKey to set transparency level with the slider bar and push it confirm setting. You can see the results of the setting on the right half of the screen.



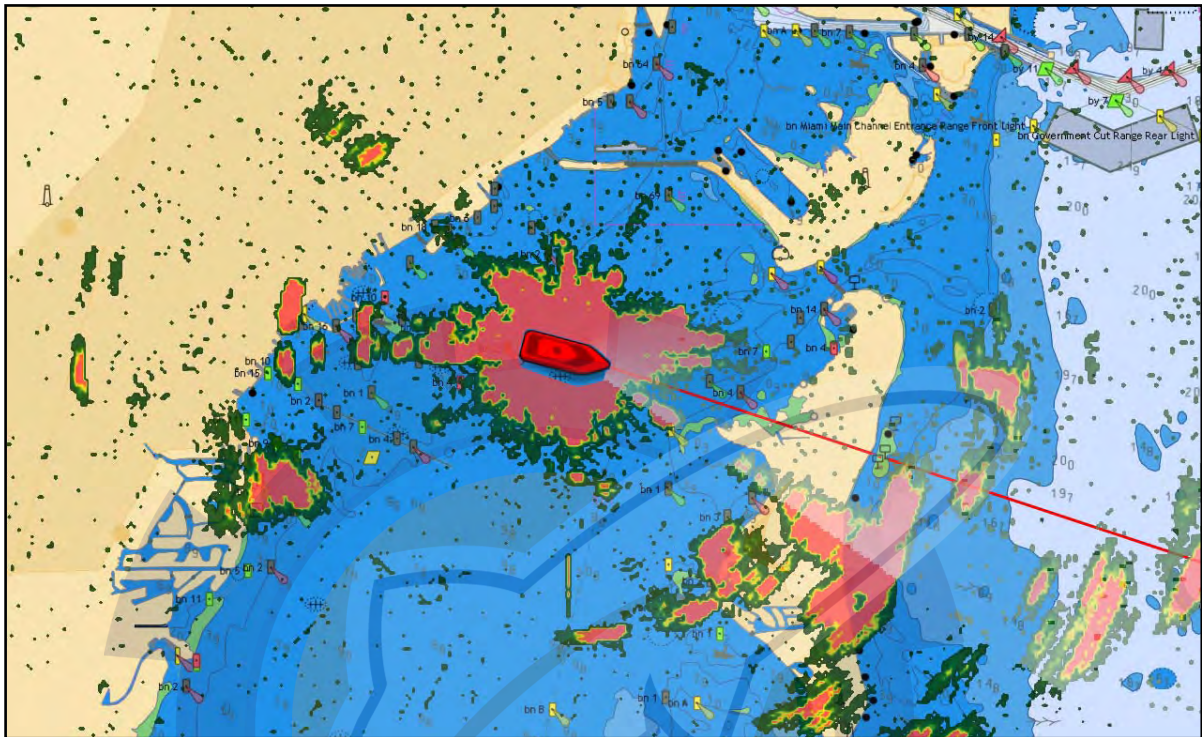
### 3.2.4 Animation Overlay

This feature provides animated loops of three (3) days in 3-hour incremental forecasts of wind, waves, or barometer. The source for the animation can be US NOWRAD or CAN NOWRAD, one of which you select with Weather Radar on the Weather-Sirius menu. Then, long-push the RotoKey, select Animate and push the RotoKey to enable or disable the animation feature.



### 3.2.5 Radar Overlay

The radar overlay display places the radar picture on top of the navigation chart. To display the radar overlay, use the RotoKey to select Overlay followed by Radar. Push the RotoKey to turn the radar overlay on or off as appropriate.



#### Setting the level of radar echo transparency

Open the Radar menu and use the RotoKey to select Echo Transparency for Overlay. Rotate the RotoKey to set the level of transparency and then push the RotoKey. You can see the result of the setting on the right half of the screen.




#### Synching overlay and radar ranges

Open the Radar menu, and use the RotoKey to turn Overlay Range Link on or off as applicable.

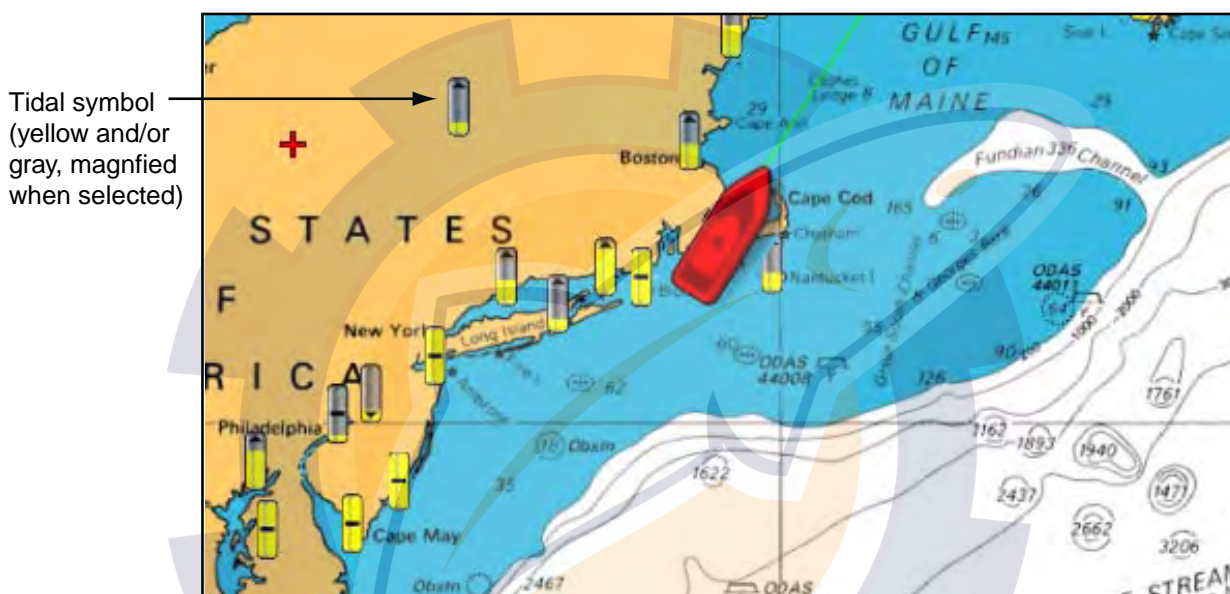
### 3.2.6 Tidal Information Overlay

The NavNet®3D comes preloaded with global tidal and tidal current information, which can be overlaid on the chart plotter display.

The tidal information symbol (  ) is displayed at the locations where tidal recording stations are located. By selecting a symbol you can get a graph for predictions for maximum and minimum tide heights, as well as times for sunrise and sunset.

#### Displaying the tidal information overlay

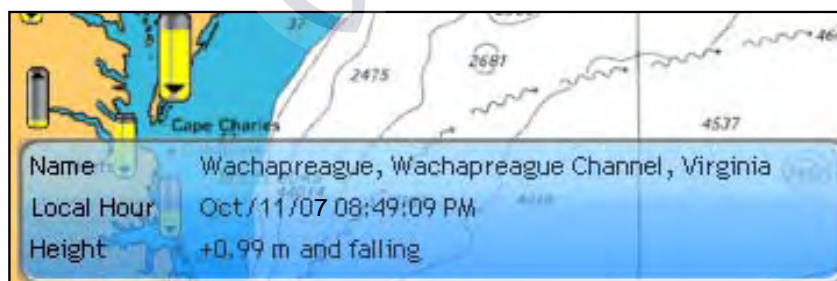
1. Push the RotoKey to show the soft controls.
2. Use the RotoKey to select Overlay followed by Tide Icons.
3. Push the RotoKey to turn the Tide Icons overlay on or off as appropriate.



The arrow on the symbol points upward or downward with tide rising or falling, respectively. The symbol is filled in gray and/or yellow according to tide state. It is completely filled in yellow when the tide is fully high and grey when it is fully low.

#### Showing simple tidal information

You can display simple information (name, local time and tide height) about a tide by placing the cursor on a tide icon.

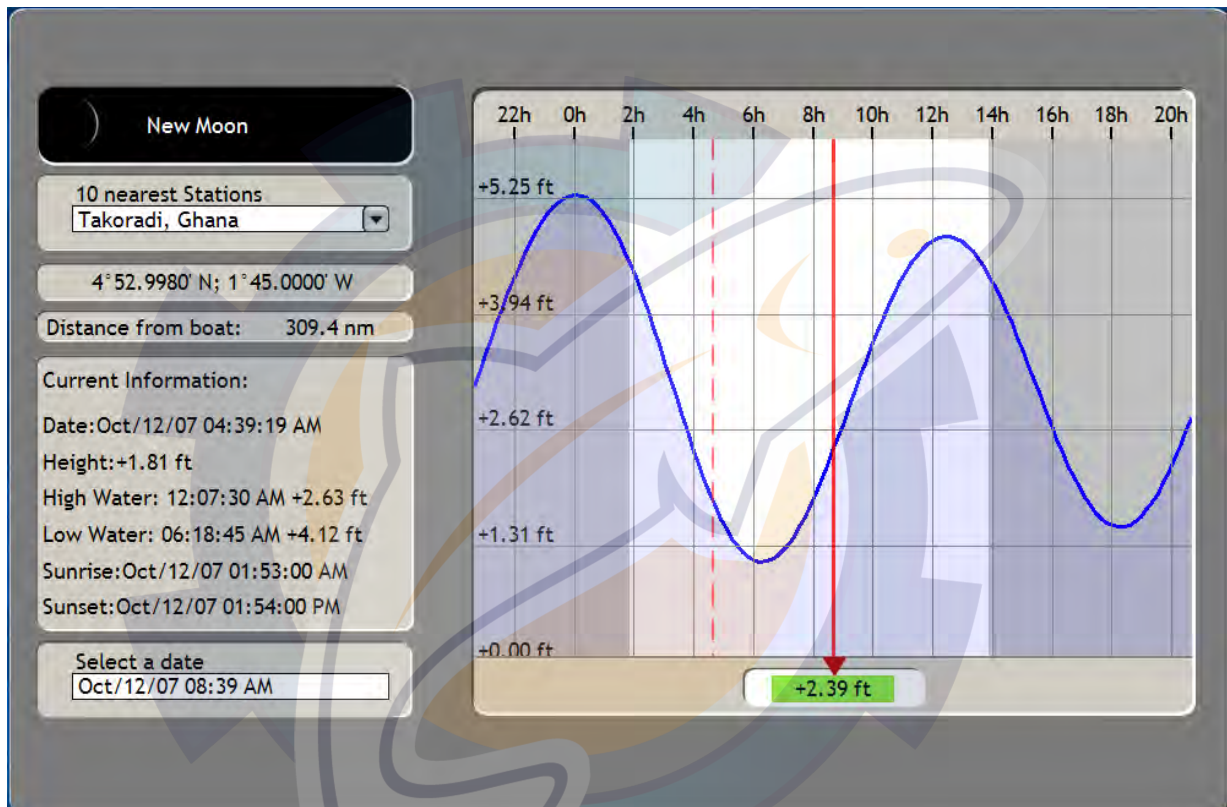




## Displaying the tide graph

The NavNet®3D comes preloaded with global tide and current information. The tide graph can be displayed three ways.

- Use the Cursorpad to select a tidal symbol and push the **left-click** button to show the tide graph.
- Use the Cursorpad to select a tidal symbol and push the **right-click** button and select Tide Graph from the pop-up menu.
- Select the Tide Graph soft control to show the tide graph and get tidal information for the 10 closest tidal stations to current position.



## Interpreting the tide graph display

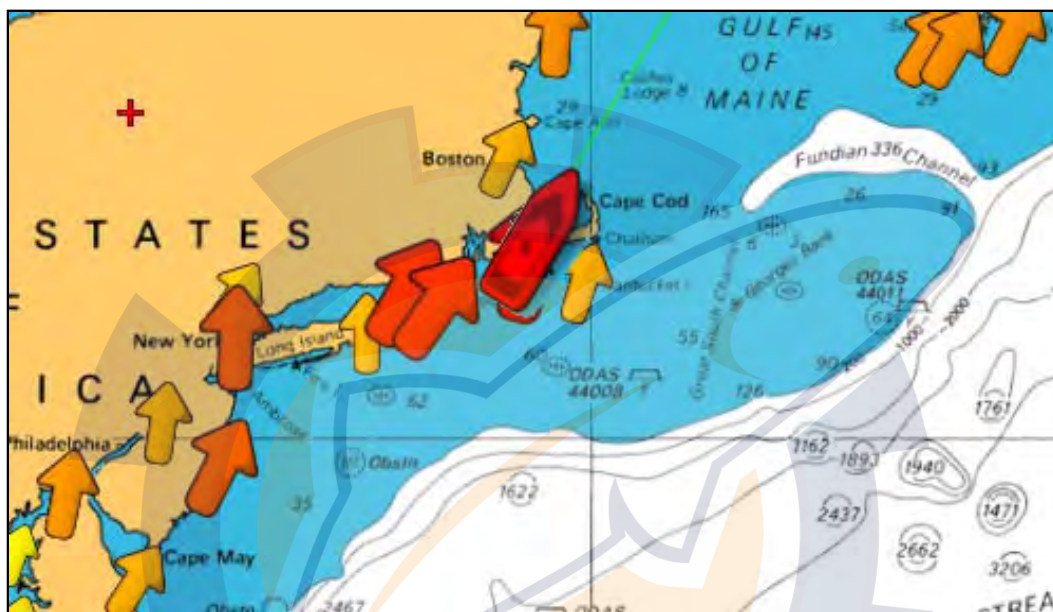
- The predictions are mostly accurate under moderate weather conditions. However, storms and weather fronts can influence forecasted tide times and heights.
- The dotted vertical line on the graph is used to select a time for which the tide height is displayed. To change the time, rotate the RotoKey.
- To find tide for 10 nearest stations, use the "10 Nearest Stations" combo box.
- To change the date, select "Select a date" and enter desired date.
- To erase the tide graph and return to the chart plotter display, press the **CANCEL** key twice.

### 3.2.7 Tidal Current Information Overlay

The tidal current overlay is generated from tidal current data received via NOAA satellites, available in North America.

1. Push the RotoKey to show the soft controls.
2. Use the RotoKey to select Overlay followed by Currents.
3. Push the RotoKey to turn the tidal current display on or off as appropriate.

You should see some arrows of several colors and sizes on the screen, pointing in various directions.



The arrow points in tidal current direction. The size and color of the arrow indicate tidal current speed: yellow, slow; orange, medium, and red, fast.

Simple and detailed NOAA-generated tidal current information is available. For simple information place the cursor on a tidal current marker. Click the **left-click** button to get detailed information.

Name	Abiels Ledge, 0.4 mile south of
Local Hour	03/Oct/07 13:54:45
Speed	1.0 kt increasing

*Simple tidal current information*

Name	Abiels Ledge, 0.4 mile south of
Local Hour	03/Oct/07 13:53:55
Speed	0.9 kt
Source	NOAA

*Detailed tidal current information*

# Chapter 4: Points

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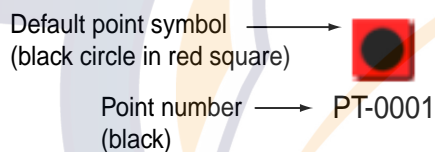
## 4.1 About Points

In navigation terminology, a point is a particular location on a voyage whether it be a starting, intermediate or destination point. A point is the simplest piece of information your equipment requires to get you to a destination, in the shortest distance possible. You can use points to mark good fishing spots, reference points, origin point, etc.

This unit has 2,000 points into which you can enter position information. There are several ways you can place a point:

- At own ship position
- At cursor position
- From the Points list

When you enter a point it is placed on the screen with the default point symbol and the youngest empty point number. Its position, symbol, navigation information (range, bearing, etc.) are saved to the Points list. In the default set up all points are displayed on the screen.



When it is necessary to edit a point you can select it directly on the screen, or go to the Points list and select it there. You can change the symbol and its color, change position, etc.

## 4.2 Placing a Point

You can place a point

- At own ship's position
- At cursor position
- From the Points list

### 4.2.1 Placing a Point at Own Ship Position

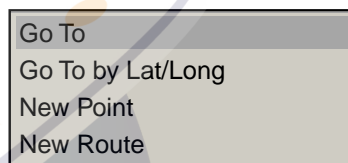
Press the **SAVE/MOB** key to place a point at own ship position. Then,

- The default point symbol is placed at current position
- The point is saved to the Points list under the youngest empty point number

### 4.2.2 Placing a Point at Cursor Position

Use the Cursorpad to put the cursor on the location where you want to place a point. Press the **POINTS/ROUTE** key. The default point symbol is placed at cursor position, the point is saved to the Points list and tagged with the youngest empty point number.

A point may also be placed at cursor position by using the Cursor Position popup menu, shown right. Use the RotoKey to select New Point and push it to place a point at cursor position.



### 4.2.3 Placing a Point from the Points List

A point placed from the Points list is initially marked at current position. The advantage of placing a point from the Points list is that you can edit point data (change symbol color, icon, position, etc.) before placing a point.

1. Long-push the **GO TO/LIST** key to show the Points menu.

- Use the RotoKey to select any tab at the top of the menu. (You can select any tab when placing a point.).

Sub menus (sort points according to name on tab)

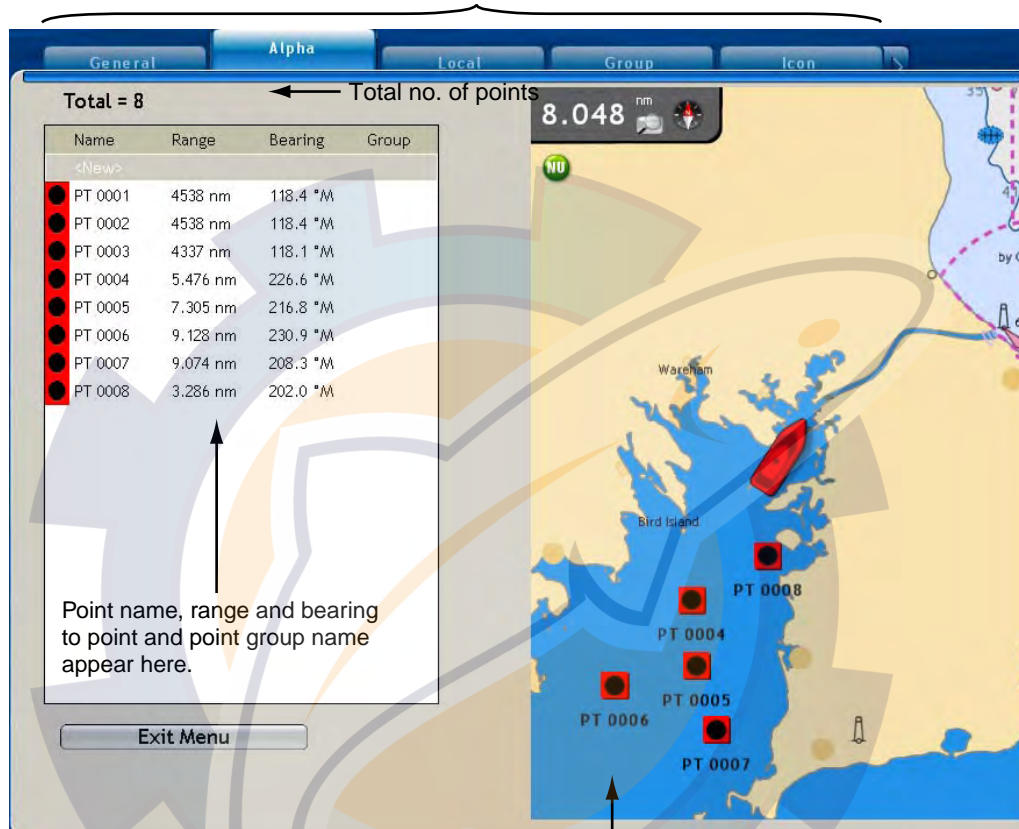
Alpha: Points sorted in alphanumeric order

Local: Points sorted in distance from own ship, from near to far

Group: Points sorted in group alphabetical order

Icon: Points sorted by icon shape number order

Color: Points sorted by color in order of red, yellow, green, cyan, purple, blue, white



Your chart appears here



3. The cursor is selecting Total; push the RotoKey twice. Then, the right side of the display shows point settings as below.

The screenshot shows the 'Alpha' menu with a list of points on the left and detailed settings for the selected point (PT 0009) on the right. The 'Point settings' section includes fields for Position, Name, Point Symbol, Point Color, Group, Depth, Water Temperature, Avoidance Circle Area, and Comment. Buttons for 'GoTo' and 'OK' are at the bottom right, and an 'Exit Menu' button is at the bottom left.

Name	Range	Bearing	Group
<New>			
PT 0001	4538 nm	118.4 °M	
PT 0002	4538 nm	118.4 °M	
PT 0003	4337 nm	118.1 °M	
PT 0004	5.448 nm	226.6 °M	
PT 0005	7.278 nm	216.8 °M	
PT 0006	9.100 nm	230.9 °M	
PT 0007	9.048 nm	208.2 °M	
PT 0008	3.261 nm	201.8 °M	
PT 0009	25 yd	46.1 °M	

**Point settings for PT 0009:**

- Position: 41° 42.6177' N, 070° 39.0695' W
- Name: PT 0009.....
- Point Symbol: Icon 1
- Point Color: Red
- Group:
- Depth: 046.9 ft
- Water Temperature: +67.6 °F
- Avoidance Circle Area: 000 yd
- Comment: 03OCT07 135412.....

4. If necessary, change point settings, referring to "4.8 Editing Points on the Points List" on page 4-11.
5. Use the RotoKey to click the OK button.
6. Press the **MENU** key to close the menu.

## 4.3 Finding Information About an On-screen Point

Place the cursor on the point for which you want to know its information. Simple point information (name, and range and bearing from own ship) appears. To find more detailed information, hit the **left-click** button. Detailed includes simple information plus comment, depth and time at time of entry, group name and avoidance circle area.

Name	PT 0019
Comment	Oct0307 021603 PM
Range	347 yd
Bearing	47.2 °T
Depth	0.0 ft
Temp	32.00 °F
Group	
Avoidance Circle Area	0 yd

*Detailed point information*

Name	PT 0019
Range	347 yd
Bearing	47.2 °T

*Simple point information*

## 4.4 Going to a Point

You can select a point to go to by choosing it

- directly on the screen
- from the Points list
- with the cursor

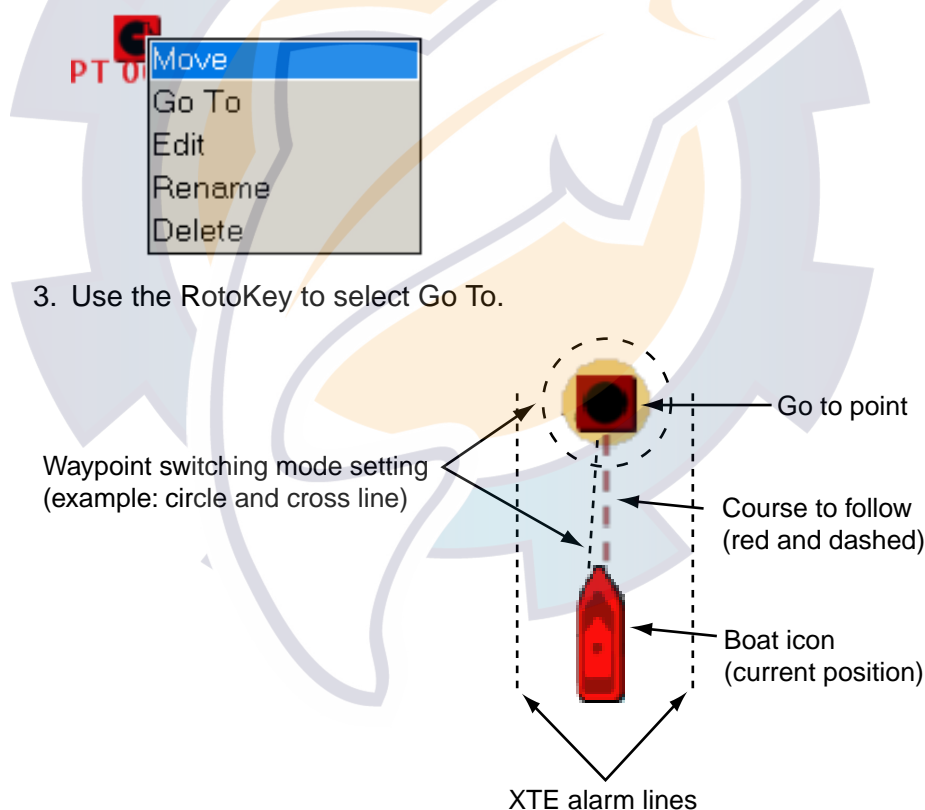
After selecting the point you can

- restart cross-track error (XTE) indication
- stop and restart Go To

Before attempting to follow a point, you should first check that the path along the way is safe. Be sure to zoom your chart to check for hazards which might not appear on a smaller scale.

### 4.4.1 Going to an On-screen Point

1. Use the Cursorpad to select the point you which to follow.
2. Push the **right-click** button to show the Points pop-up menu.



A red dashed line runs between current position and the point. This line is the course to follow to get to the point. The waypoint switching mode is shown with a circle, line, or both circle and line. You can select the desired mode with "Waypoint Switching Mode" in the Routes-General menu. (For details, see the illustration on the next page.) The XTE alarm lines denote the XTE alarm range, and they can be shown or hidden with "XTE Alarm Lines" in the Routes-General menu.

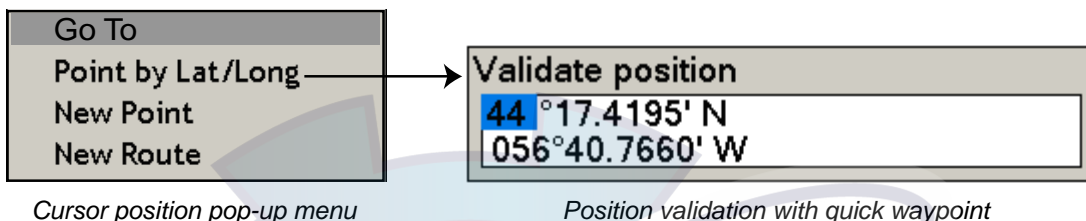
The route is temporarily saved to the Routes list, under the next sequential route number.

## 4.4.2 Going to Cursor Position

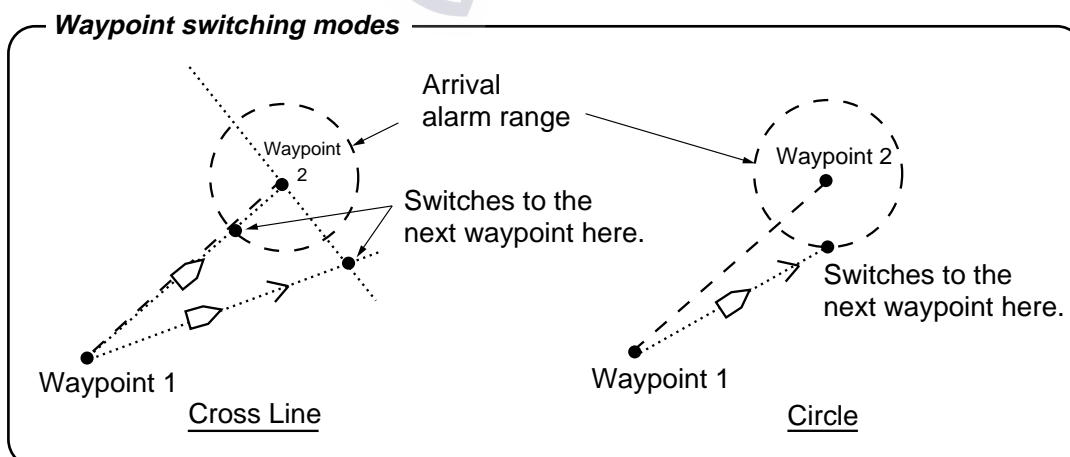
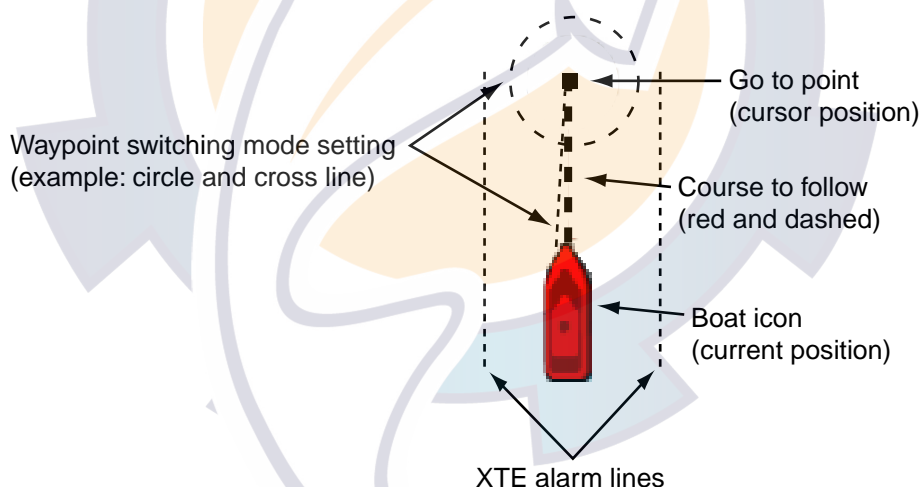
The advantage of going to cursor position is that you don't need to save a point beforehand. The point is erased when navigation is cancelled.

Place the cursor on the location where you want to go and push the **right-click** button to show the Cursor Position pop-up menu.

Use the RotoKey to select GoTo or Point by Lat/Long as applicable. Select Point by Lat/Long if you need to set position precisely. In this case you are asked to validate position, with the pop-up shown below. Use the RotoKey to change position. Push it to select location in the box, rotate it to set value, and push it to confirm.

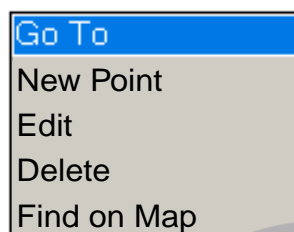


A red dashed line runs between current position and the point. This line is the course to follow to get to the point. The waypoint switching mode is shown with a circle, line, or both circle and line. You can select the desired mode with "Waypoint Switching Mode" in the Routes-General menu. The XTE alarm lines, red for port side, green for starboard side, denote the XTE alarm range. You can show or hide with "XTE Alarm Lines" in the Routes-General menu.



### 4.4.3 Going to a Point Selected from the Points List

1. Long-push the **GO TO/LIST** key to open the Points menu and then open the Alpha list.
2. Use the RotoKey to select a point.
3. Push the RotoKey to show the Points Menu pop-up. The cursor is selecting Go To; push the RotoKey.



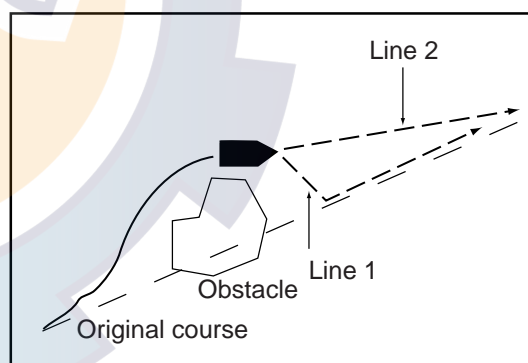
The menu is erased and the chart plotter display appears. A red dashed line runs between current position and the point selected. This line is the course to follow to get to the point. The route is temporarily saved to the Routes list, under the next sequential route number.

## 4.5 Point Following Options

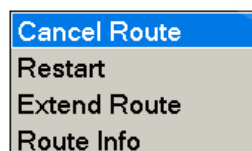
### 4.5.1 Restarting XTE

While you are following a point, you can restart the XTE. This will reset the XTE to zero and restart XTE from actual position.

When you steer to avoid an obstacle or the vessel drifts, you may go off your intended course, as in Line 1 in the figure at right. If you don't need to return to the original course, you can go directly to point, as in Line 2 in the figure.



1. Use the Cursorpad to place the cursor on the dashed line of the route.
2. Push the **right-click** button to show the Route Follow pop-up menu.



3. Use the RotoKey to select Restart.

The route origin shifts to current position and XTE becomes zero.

## 4.5.2 Stop Following a Point

1. Use the Cursorpad to place the cursor on the dashed line of the route.
2. Push the **right-click** button to show the Route Follow pop-up menu.
3. Use the RotoKey to select Cancel Route.

The dotted line from own vessel to the point is erased from the screen. If you want to once again follow the point:

- 1) Select the point on the screen.
- 2) Open the Points pop-up menu.
- 3) Select Go To and push the RotoKey.

Navigation is then restarted from the point at which it was stopped.

## 4.5.3 Showing Route Info on Screen

Place the Cursorpad on the route to find simple route information (name and length). Push the **left-click** button to find detailed information. The detailed information includes route name and length plus number of points, range and bearing from own ship and total route time to go.

Name	RTE 001
Length	2.981 nm
Number of Pts	1
Range	2.981 nm
Bearing	237.0 °M
Tot route TTG	23m50s

*Detailed route information*

Name	RTE 001
Length	3.001 nm

*Simple route information*



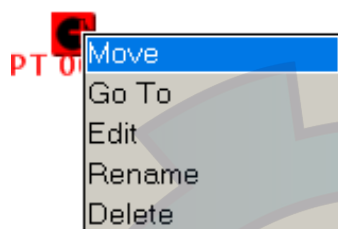
## 4.6 Moving a Point

You can move a point two ways:

- Drag its symbol to a new location
- Enter new position manually on the Points list

### 4.6.1 Moving On-screen Point

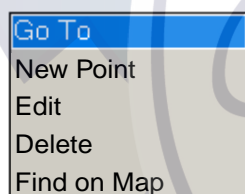
1. Set the cursor on the point you wish to move. When the point is correctly selected it is magnified.
2. Hit the **right-click** button to show the Point pop-up menu.



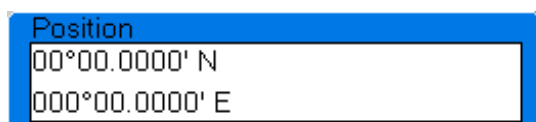
3. The cursor is selecting Move; push the RotoKey.
4. Using the Cursorpad, drag the symbol to new location and push the RotoKey to fix the symbol to the new location.

### 4.6.2 Moving Point from the Points List

1. Long-push the **GO TO/LIST** key to open the Points menu and then open the Alpha list.
2. Use the RotoKey to select the point to edit.
3. Push the **right-click** button or the RotoKey to show the Point edit pop-up menu.



4. Rotate the RotoKey to select Edit and push the RotoKey. The chart is then replaced with the point's attributes and details.
5. The cursor is selecting the Position combo box. Push the RotoKey.



6. Enter position with the RotoKey. Push the RotoKey to choose location, rotate the RotoKey to choose digit and push the RotoKey to confirm.
7. Rotate the RotoKey to select the OK button at the bottom of the display and then push the RotoKey.

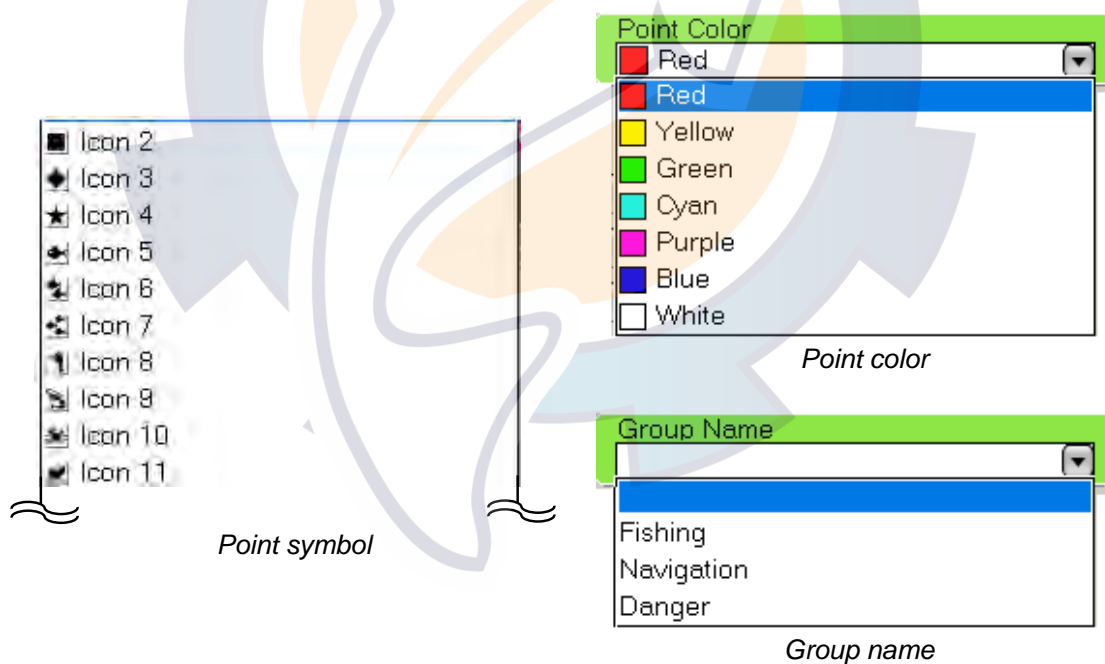
## 4.7 Setting Default Point Attributes

When you save a point it is saved with the shape, color and group name set on the Points-General menu. If the current attributes are not to your liking, change them as shown below.

1. Long push the **GOTO/LIST** key to show the Points menu.
2. Select the General sub menu, shown below.



3. Use the RotoKey to select Point Symbol, Point Color or Group Name as appropriate.

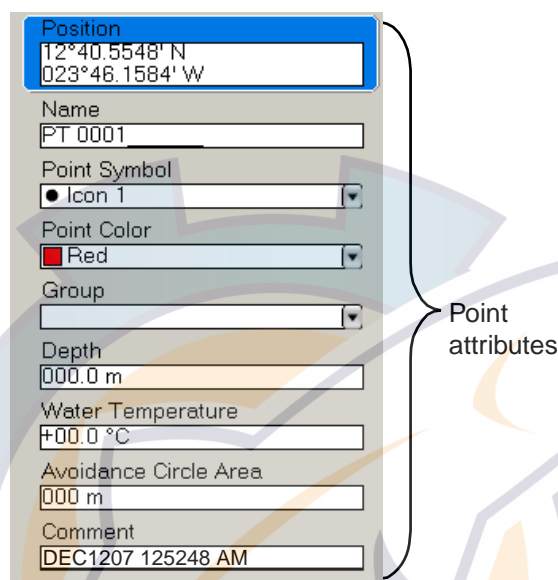


4. Use the RotoKey to select appropriate option.
5. Press the **MENU** key to close the menu.

## 4.8 Editing Points on the Points List

You can edit the attributes and details for any point you have entered, on the Points menu. The point to edit may be selected on-screen or on a Points list.

1. On the screen, use the Cursorpad to select the point to edit, push the **right-click** button and select Edit from the pop-up menu. (You can also display the Points list by long-pushing the **GOTO/LIST** key.) The point's attributes and details appear on the right-half of the screen.



Position  
12°40.5548' N  
023°46.1584' W

Name  
PT 0001

Point Symbol  
Icon 1

Point Color  
Red

Group

Depth  
000.0 m

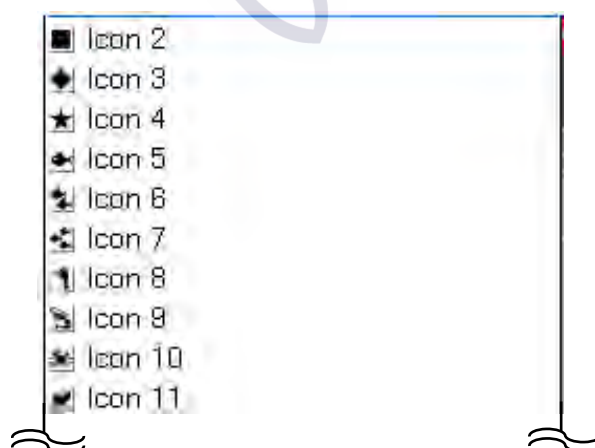
Water Temperature  
+00.0 °C

Avoidance Circle Area  
000 m

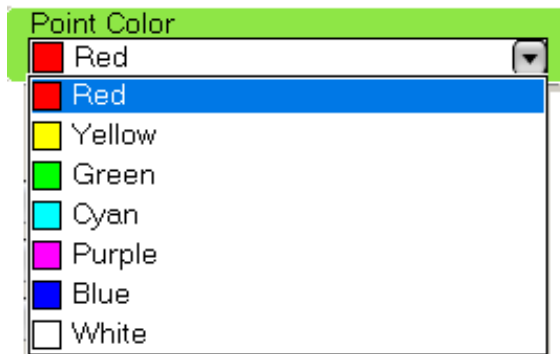
Comment  
DEC1207 125248 AM

Point attributes

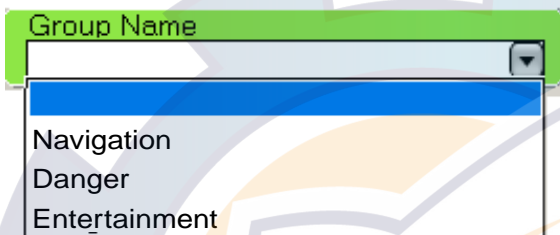
2. The cursor is selecting the Position combo box. If necessary, change position.
3. To change the name of the point, select the Name box. If necessary, change the name as follows:
  - 1) Push the RotoKey consecutively to select location (character) to edit and push the RotoKey.
  - 2) Rotate the RotoKey to select desired alphanumeric character and push the RotoKey.
  - 3) Repeat steps 1 and 2 to complete the name. A name can have up to 13 alphanumeric characters.
4. Select Point Symbol if you want to change the point symbol for the point selected, 32 symbols are available.



5. Select Point Color to change the color of the square part of the point symbol. Seven colors are available: red, yellow, green, cyan, purple, blue, and white.



6. Select Group if you want to assign the point to a specific point group. Navigation, Danger and Entertainment are the default groups.



7. Depth and Water Temperature are the depth and water temperature at the point at the time of entry. Applicable sensors are necessary to display this data. If necessary you can change this data.
8. Use Avoidance Circle Area to specify the distance to use for the proximity alarm, which alerts you when own ship nears the point by the distance set here. For details about the proximity alarm, see the section on chart plotter alarms.
9. Use Comment to enter a comment about a point. A comment is entered in the same manner as Name, and may consist of 64 alphanumeric characters.
10. The GoTo button functions to set currently selected point as GoTo point. Select this button and push the RotoKey to go the point.
11. To finish, select the OK button and push the RotoKey.

## 4.9 Finding Points

### 4.9.1 Centering a Point on Screen

You can easily relocate a point to the screen center by simply selecting it on the Points menu.

1. In the chart plotter mode, long-push the **GO TO/LIST** key to open the Points menu and then open desired points list.
2. Select a point and push the RotoKey. The Points list pop-up menu appears.
3. Use the RotoKey to select Find on Map.
4. The menu is closed and the point selected at the center of the screen on the active chart plotter display.

### 4.9.2 Finding Point Location on Chart in Points Menu

Select a point on a Points list. The chart at the right-half of the screen puts the point at its center.

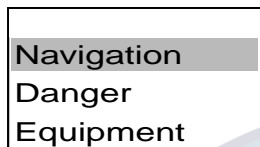




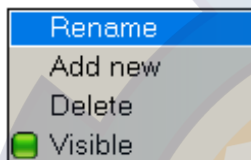
## 4.10 Managing Point Groups

For ease of finding points you may wish to group them according to usage. The default point groups are danger, fishing and navigation. You can delete these groups or add new groups as desired, and up to 10 groups are available, including the default groups.

1. Press the **MENU** key to open the menu.
2. Open the Points-General menu.
3. Use the RotoKey to select the Manage Groups button.



4. Use the RotoKey to select the group name to process and push the RotoKey.



5. Select applicable item and push the RotoKey.

- **Rename.** Rename the selected group. Use the RotoKey to change the name. Push the RotoKey to select location/confirm entry, rotate it to select character.



- **Add new.** Add new group. The default group name is GROUP XXX (XXX=next sequential three-digit group number).
  - **Delete.** Delete selected group name. Only the group name is deleted; any points assigned to that group name are not deleted.
  - **Visible.** Control visibility of points in a group.
6. Press the **MENU** key to close the menu.

## 4.11 Deleting Points

A point can be deleted two ways: on the screen and from the Points list.

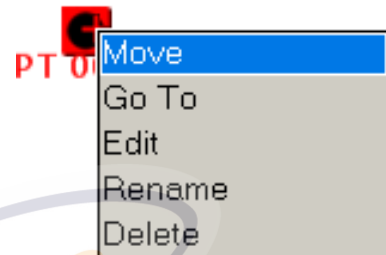
### 4.11.1 Deleting a Point on the Screen

#### Method 1: by CANCEL key

Put the cursor on the point to delete and press the **CANCEL** key.

#### Method 2: by Pop-up menu

1. Put the cursor on the point to delete.
2. Push the **right-click** button to show the Points pop-up menu.
3. Rotate the RotoKey to select Delete.
4. Push the RotoKey to delete the point from both the screen and the Points list.



**Note:** If you are using a short range, the icon below appears when there are several points are near each other and cannot be shown separately on the current range. In this case, zoom in to separate the points' icons and then select the point to delete.



### 4.11.2 Deleting a Point at the Points List

1. Long-push the **GO TO/LIST** key to show the Points menu and then open appropriate points list.
2. Use the RotoKey to select the point to delete and push the RotoKey. The Points list pop-up menu appears.
3. Rotate the RotoKey to select Delete.
4. Push the RotoKey to delete the point from both the screen and the Points list.

### 4.11.3 Deleting All Points

All points may be deleted, from the Points menu. A point currently being followed cannot be deleted.

1. Press the **MENU** key to open the menu.
2. Open the Points-General menu.
3. Use the RotoKey to select Delete All Points. You are asked to confirm if you are sure to delete all points.
4. Rotate the RotoKey to select Yes and push the RotoKey.

## 4.12 Globally Showing, Hiding Points

All points can be globally shown or hidden. A point which is currently being followed cannot be removed from the screen until following is stopped.

1. Long-push the RotoKey to show the soft controls.
2. Use the RotoKey to select Points.
3. Select Show and push the RotoKey to alternately show and hide all points.



# Chapter 5: Routes

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## 5.1 What is a Route?

Often a trip from one place to another involves several course changes, requiring a series of route points (up to 100) which you navigate to, one after another. The sequence of points leading to the ultimate destination is called a route. The route database stores 200 routes.

You create a route by pointing and clicking geographical positions on the screen. These positions are marked blue solid circles.

Once you have created a route you can follow it, using the GOTO feature. When you follow a route, the current leg is shown as a dotted line and previous legs are erased from the screen.

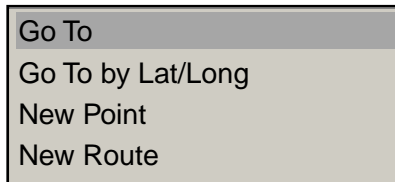
On-screen routes can easily be edited by displaying the Routes pop-up menu. With the pop-up menu, you can

- Insert a point
- Activate a route
- Reverse route direction
- Split the result
- Find details about the route
- Delete a route
- Add new point(s) at the end or beginning of a route
- Skip a route point when following a route

## 5.2 Creating a New Route

Route points are marked on the display with a blue square and a blue line runs between points.

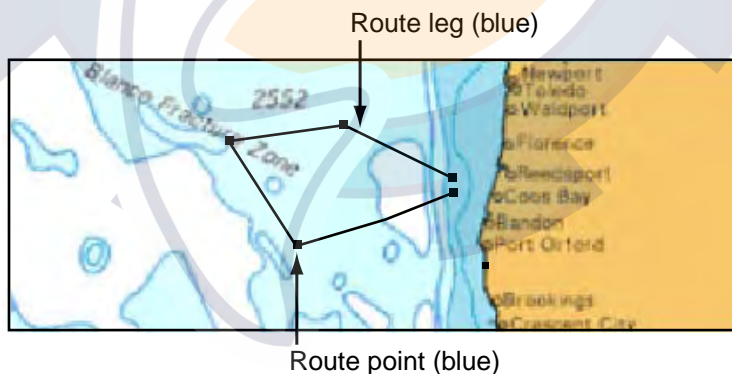
1. Locate the cursor on the 1st point for the route.
2. Push the **right-click** button to show the Cursor Position pop-up menu.



3. Use the RotoKey to select New Route.
4. Use the Cursorpad to drag the cursor to next point in the route. As you do so, a blue dashed line extends from the starting point to the cursor location, as in the figure below.



5. Press the **left-click** button to save the point. The line between the first point and second point is now solid.
6. Drag the cursor to the next point in the route and press the **left-click** button. Repeat this step to enter all route points.
7. At the final route point, push the RotoKey to complete the route and save it to the Routes list.



The route is saved to the Routes list under the youngest empty point number, with the prefix "RTE". A solid blue line runs between route points (blue squares).



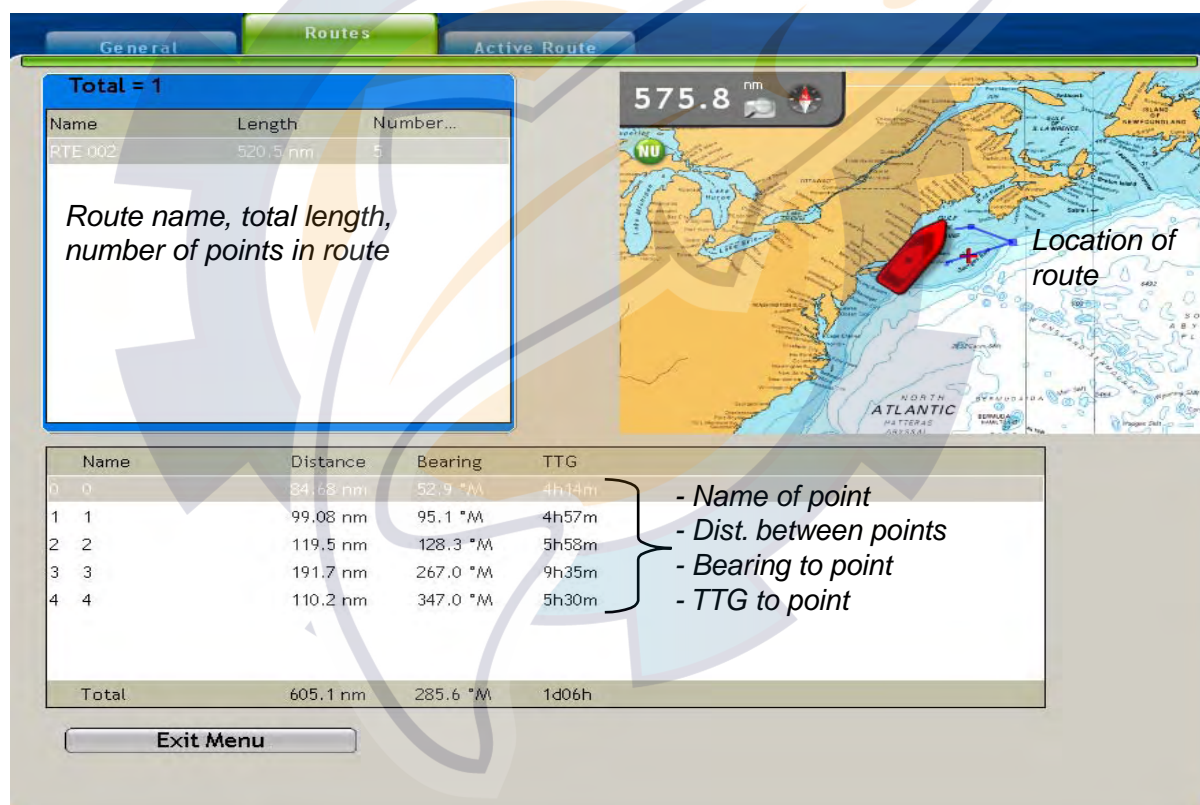
## 5.3 Routes List

Saved routes are stored in the Routes list. The list stores the following route data for each route:

- Name of route
- Length of route
- Number of route points
- Distance between legs and total distance
- Bearing between legs
- TTG between legs and total TTG

**To show the routes list:**

1. Press the **MENU** key to open the menu.
2. Open the Routes list.
3. Use the RotoKey to select the route to view.



The name of the route, the route's total length and its number of points are shown in the route box at the upper left 1/4 of the screen. The location of the route is shown on the map at the upper right 1/4 of the screen and route information (name of each point, distance between points, bearing to each point and TTG to each point) appears on the lower half of the screen.

4. Press the **MENU** key to close the menu.

## 5.4 Finding Information About a Route on Screen

Place the cursor on a route to get simple route information (name and length of route). Push the **left-click** button to get detailed information, which includes name of route, length of route, no. of points, range and bearing to next point, and total time to go.

Name	RTE 001
Length	251.6 nm
Number of Pts	6
Range	3.104 nm
Bearing	173.5 °M
Tot route TTG	1d12h

Detailed route information

Name	RTE 001
Length	251.6 nm

Simple route information

## 5.5 Following a Route

Before attempting to follow a route, you should first check that the path along the way is safe. Be sure to zoom your chart to check for hazards which might not appear on a smaller scale.

### 5.5.1 Following a Route Currently Displayed

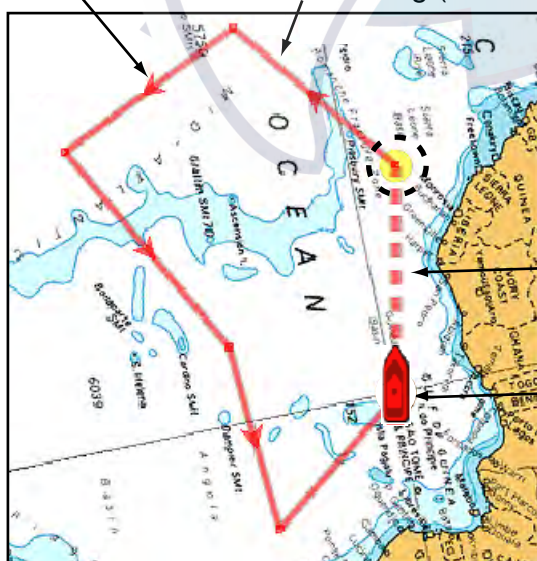
1. Put the cursor on a leg of the route to follow and push the **right-click** button to show the Route pop-up menu.
2. Use the RotoKey to select Activate.

When you select a route to follow:

- The color of all route legs changes from blue to red and a dashed line runs between current position and 1st route point.
- Arrows on the route legs point in the direction to follow the route.

Activate
Reverse
Insert point
Split
Details
Rename
Delete
Extend Route

Arrow points in direction to follow route      Route leg (red line)

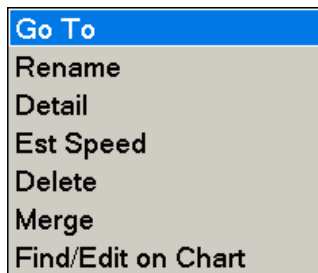


Course to 1st route point  
(red dashed line)

Current position

### 5.5.2 Following a Route Selected from the Routes List

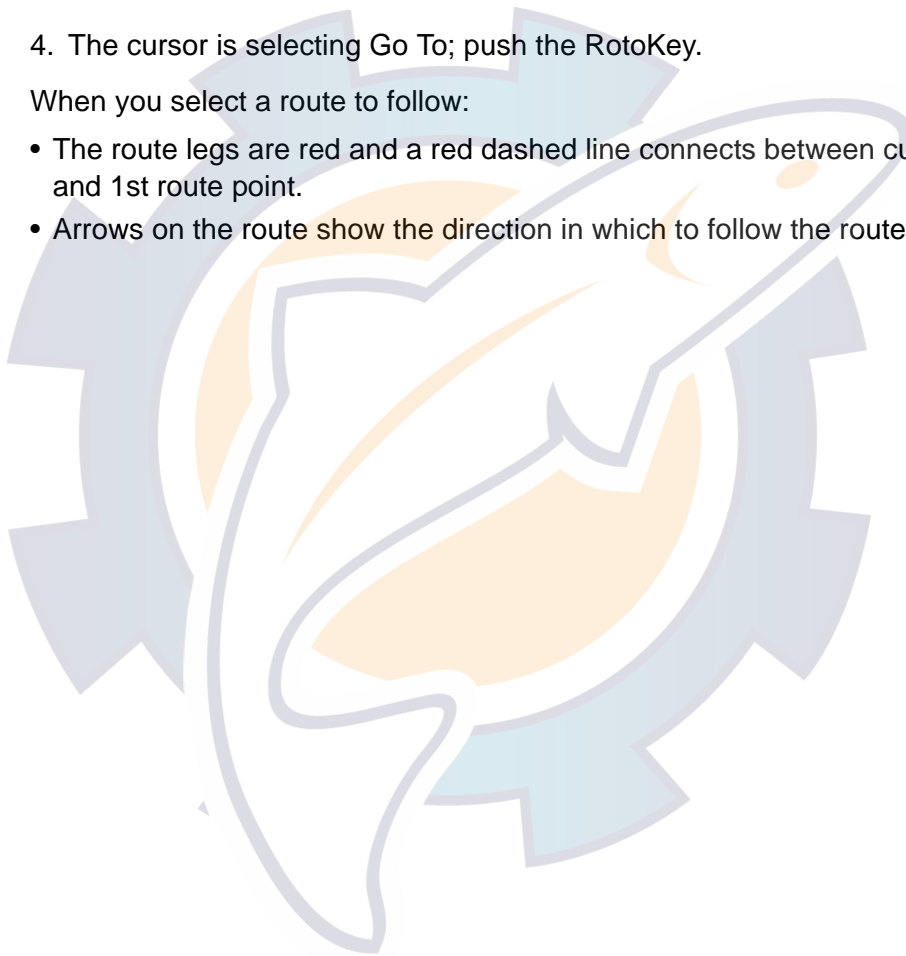
1. Press the **MENU** key to open the menu.
2. Open the Routes-Routes menu.
3. Use the RotoKey to select a route and push it to show the Route pop-up menu.



4. The cursor is selecting Go To; push the RotoKey.

When you select a route to follow:

- The route legs are red and a red dashed line connects between current position and 1st route point.
- Arrows on the route show the direction in which to follow the route.



## 5.6 Route Following Options

### 5.6.1 Restarting XTE

While you are following a point, you can restart the XTE. This will reset the XTE to zero and restart XTE from actual position. For further details, see "4.5.1 Restarting XTE" on page 4-7.

### 5.6.2 Reversing Following Direction

The current route can be followed in reverse of current following direction. This is useful when you want to retrace a route in reverse direction.

### 5.6.3 Inserting a Point

A new point can be inserted between legs on a route.

1. Put the cursor on a leg of the route.
2. Push the **right-click** button to show the Routes pop-up menu.
3. Use the RotoKey to select Insert point. A dashed line runs between two points on the selected leg.

Drag cursor to location where to insert point



4. Drag the cursor where to insert a point and then hit the **left-click** button. The dashed line is replaced with a solid one.

### 5.6.4 Extending a Route

You can extend a route from last-entered route point.

1. Put the cursor on any leg of the route.
2. Push the **right-click** button to show the Routes pop-up menu.
3. Use the RotoKey to select Extend Route. A dashed line runs from last-entered point.
4. Drag the cursor where to extend the route and then hit the **left-click** button.
5. To continue entering points, follow step 4.
6. When you have entered necessary points, push the RotoKey to finish.

### 5.6.5 Stop Following a Route

You can stop following a route in two ways: select the route directly on the screen, or select it at the routes list. Below is the method for selecting the route on the screen. For further details, see "4.5.2 Stop Following a Point" on page 4-8.

### 5.6.6 Moving a Point in a Route

1. Put the cursor on a route point of a route.
2. Push the **right-click** button to show the Routes pop-up menu.
3. Move is selected; push the RotoKey.
4. Drag the cursor to new location for the point and then push the RotoKey.

### 5.6.7 Skipping a Point

There are times when it may not be necessary to follow all legs in an active route. You can skip unnecessary legs as below. After you specify the point to skip, the route is redrawn, with the skipped point omitted.

1. Put the cursor on the route point you want to skip.
2. Push the **right-click** button to show the Routes pop-up menu.
3. Use the RotoKey to select Skip.



### 5.6.8 Flyover Feature (demo mode only)

The flyover feature lets you view an entire route from overhead, with the screen automatically scrolled as the flyover progress. Select the route, hit the **right-click** button to show the Routes pop-up menu and then choose Flyover.



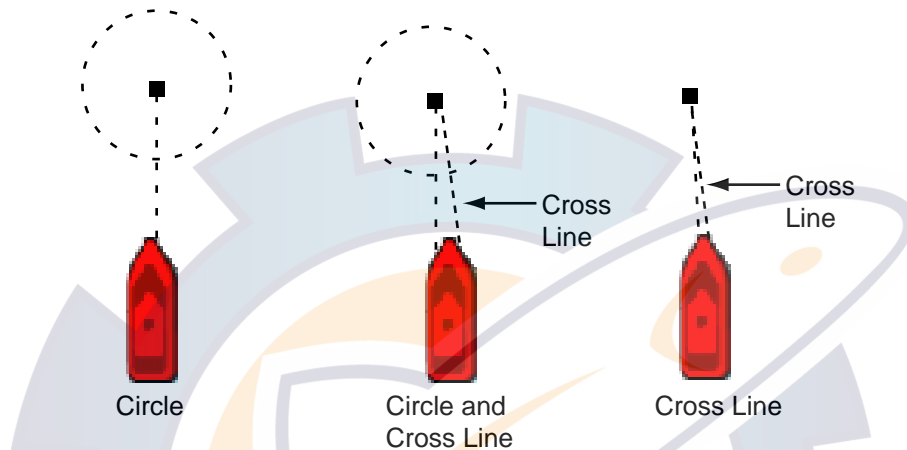
### 5.6.9 Route Point Switching Mode

When you arrive to a route point on a route, you can automatically switch to the next point by one of the three methods below.

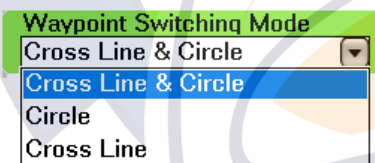
**Cross Line:** Automatically switch the destination point when the boat passes an imaginary cross line (perpendicular line) passing through the center of the destination point.

**Circle:** Destination point is automatically switched when the boat comes within the circle.

**Cross Line & Circle:** Destination point is automatically switched when either of the cross line or circle condition above is satisfied.



1. Press the **MENU** key to open the menu.
2. Open the Routes-General menu.
3. Use the RotoKey to select Waypoint Switching Mode.



4. Use the RotoKey to select appropriate option, referring to the description above.
5. Use the RotoKey to select Switching Mode Circle Radius.
6. Use the RotoKey to enter the distance from a route point at which to switch to next point.
7. Press the **MENU** key to close the menu.

### 5.6.10 Route Auto Zoom

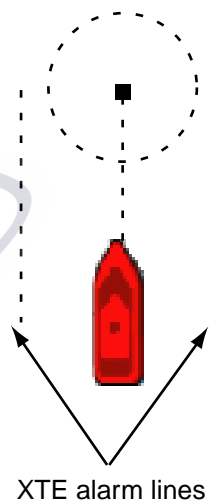
Range can be automatically zoomed to show the next point after passing current point. This is useful for locating the next point easily without changing the range.

1. Press the **MENU** key to open the menu.
2. Open the Routes-General menu.
3. Use the RotoKey to select Route Auto Zoom and push it to turn zoom on or off as desired.
4. Press the **MENU** key to close the menu.

### 5.6.11 XTE Alarm Lines on Chart

The XTE alarm lines denote the XTE alarm range set on the Alarm menu. They can be shown or hidden as desired, regardless of whether the XTE alarm is active or inactive.

1. Press the **MENU** key to open the menu.
2. Open the Routes-General menu.
3. Use the RotoKey to select Display XTE Alarm Lines and push it to turn the XTE alarm lines on or off as desired.
4. Press the **MENU** key to close the menu.



### 5.6.12 Waypoint Notification

You may wish to be alerted with audio and visual alarms when you are nearing a route point.

1. Press the **MENU** key to open the menu.
2. Open the Routes-General menu.
3. Use the RotoKey to select Waypoint Notification and push it to turn disable or enable waypoint notification as desired.
4. Press the **MENU** key to close the menu.

When are you are nearing a waypoint by the value set with Switching Mode Circle Radius on the Routes menu, the buzzer sounds and the message "Switching to next waypoint." appears in the status bar. The message is erased once you have passed the waypoint. You may silence the buzzer with the **CANCEL** key.

## 5.7 Finding Route Information on the Routes List

1. Place the cursor on a route leg of the active route and push the **right-click** button to show the Routes pop-up menu.
2. Use the RotoKey to select Route Info.

The display shows the Routes-Active Route menu, with the route info box.

- Each route point name
- Distances between points
- Total distance
- Bearings between points
- Time-to-go between points
- Total Time-to-go

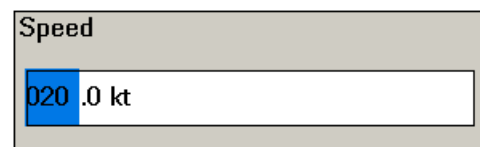
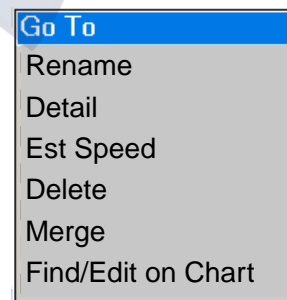
Name		Distance	Bearing	TTG
1	1	99.08 nm	95.1 °M	4h57m
2	2	119.5 nm	128.3 °M	5h58m
3	3	191.7 nm	267.0 °M	9h35m
4	4	110.2 nm	347.0 °M	5h30m
Total		605.3 nm	285.6 °M	1d06h

## 5.8 Reviewing Passage Plan

A navigation calculator is provided to help you plan navigation, by ship's speed. You enter a desired speed and then the calculator calculates the TTG between legs and the total TTG.

1. Press the **MENU** key to open the menu.
2. Open the Routes list on the Routes menu.
3. Use the RotoKey both to select a route and push it to show the Routes list pop-up menu.
4. Use the RotoKey to select Est Speed.
5. Use the RotoKey to set value; rotate it to select value, push it to set.
6. Press the **MENU** key to close the menu.

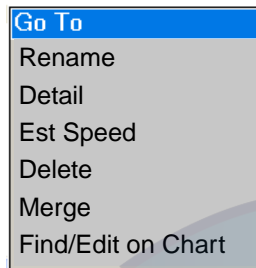
The results of the calculation appear at the bottom of the display.



## 5.9 Finding a Route on the Chart

You can easily find the location of a route by selecting it from the Routes list. When you do this the route selected is placed at the center of the active chart plotter display.

1. Press the **MENU** key to open the menu and then open the Routes list.
2. Use the RotoKey to select a route and push it to show the Routes list pop-up menu.

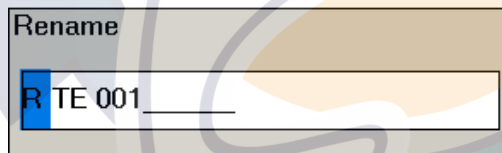


3. Use the RotoKey to select Find/Edit on Chart.

## 5.10 Renaming a Route

The default route number is the youngest empty route number (RTE-001 - RTE-200). If desired you can change route name.

1. Press the **MENU** key to open the menu and then open the Routes list.
2. Use the RotoKey to select the route to process and push it to show the Routes list pop-up menu.
3. Use the RotoKey to select Rename to show the Rename box.

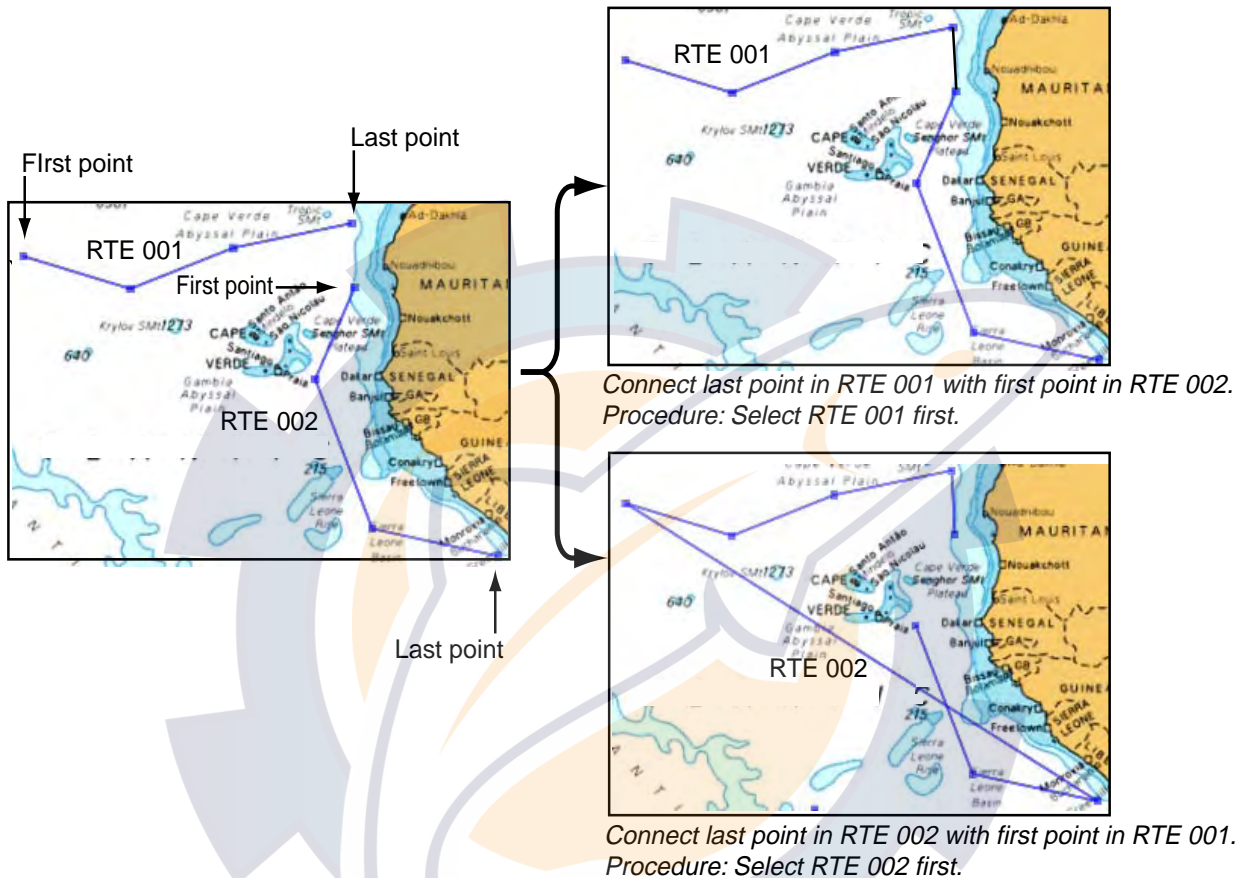


4. Use the RotoKey to enter new name and push the OK button. Rotate the RotoKey to select character and push it confirm selection.
5. Press the **MENU** key to close the menu.

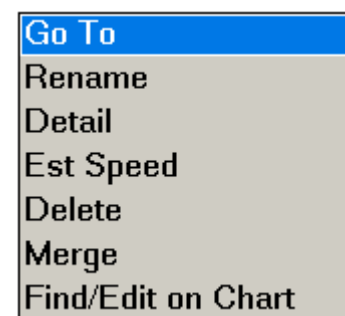
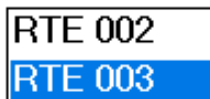
## 5.11 Merging Two Routes

Two routes can be merged. The newly created route takes the name of the 1st route selected and the 2nd route selected is deleted. All route data is updated accordingly.

How the routes are merged depends on route selection order. The last point of the 1st route selected is joined to the 1st point of the 2nd route selected. The example below shows how two routes are merged depending on selection order.



1. Press the **MENU** key to open the menu.
2. Select the Routes-Routes menu.
3. Use the RotoKey to select the 1st route. The Route pop-up menu appears.
4. Use the RotoKey to select Merge. A small pop-up lists all saved routes, like the one below.



5. Use the RotoKey to select the 2nd route. The routes are then merged.
6. Press the **MENU** key to close the menu.



## 5.12 Deleting Routes from the Routes List

Routes can be deleted individually or collectively. A route which is currently in use cannot be deleted.

### 5.12.1 Deleting a Specific Route

#### On-screen route

Place the cursor on the route to delete and push the **right-click** button to show the Routes pop-up menu. Use the RotoKey to select Delete.

#### From the Routes list

1. Press the **MENU** key to open the menu and then open the Routes list.
2. Use the RotoKey both to select the route and the push it to show the Routes list pop-up menu.
3. Use the RotoKey to select Delete.
4. Press the **MENU** key to close the menu.

### 5.12.2 Deleting All Routes

1. Press the **MENU** key to open the menu.
2. Open the Routes-General menu.
3. Use the RotoKey to select the Delete All Routes button and push the RotoKey. You are asked to confirm if you are sure to delete all routes.
4. Rotate the RotoKey to select Yes and push the RotoKey.
5. Press the **MENU** key to close the menu.

## 5.13 Globally Showing, Hiding Routes

All routes can be globally displayed or removed from the screen. A route which is currently being followed cannot be removed from the screen unless route following is stopped.

1. Long-push the RotoKey to show the soft controls.
2. Use the RotoKey to select Routes.
3. Use the RotoKey to select Show and push it to alternately show and hide all routes.

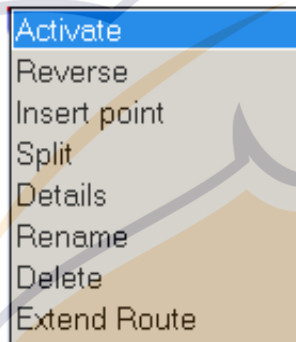
## 5.14 Using the Route Pop-up Menus

The Route pop-ups allow you to edit an on-screen route. You can edit a route by route leg or route point.

- Activate a route
- Reverse following direction
- Insert a point
- Split a route
- Find route information
- Rename the route
- Delete a route
- Extend a route, and
- Flyover a route (demo mode only)

### 5.14.1 Route Leg Pop-up Menu

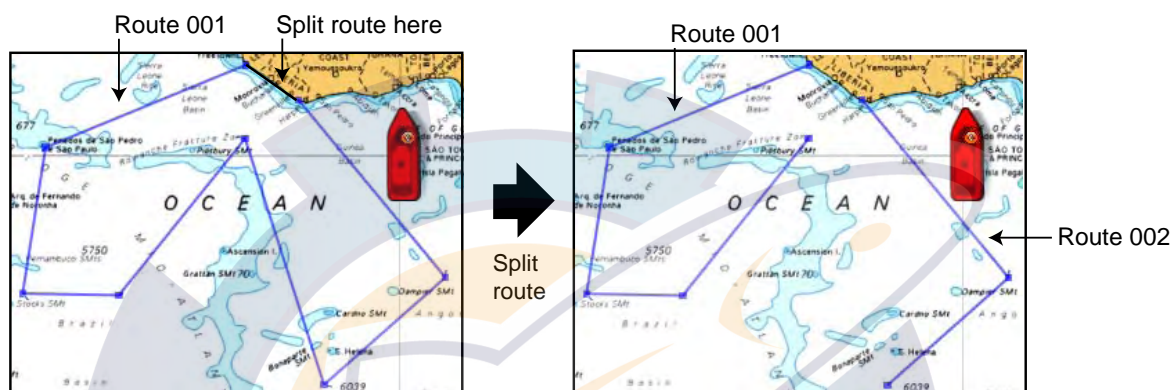
Put the cursor on the route leg to edit and push the **right-click** button. Use the RotoKey to select appropriate item and push it to execute function selected.



*Route pop-up (route leg)*

### Route Leg pop-up Menu Description

- **Activate.** Activate the chosen route to follow it.
- **Reverse.** Reverse the following direction of the route. For details, see "5.6.2 Reversing Following Direction" on page 5-6.
- **Insert point.** Insert a point in the route. For details, see "5.6.3 Inserting a Point" on page 5-6.
- **Split.** Use this feature to split a route into two routes. Place the cursor on the route leg where to split the route and push the RotoKey. When you split a route, the newly created route is assigned the next sequential route number. For example, split route 001 below to make a new route, route 002.



- **Rename.** Rename the route. Use the RotoKey to select Rename and push the RotoKey. Use the RotoKey to enter new name.

Rename

R

TE 001

**Delete.** Delete the route selected. The route is deleted from the screen and the routes database.

**Extend Route.** Add points to end of the route. See "5.6.4 Extending a Route" on page 5-6.

### 5.14.2 Route Point Pop-up Menu

Put the cursor on the route leg to edit and push the **right-click** button. Use the RotoKey to select appropriate function and push it to execute function selected.

Move

Activate Rte from this Point

Delete

*Route pop-up (route point)*

- **Move.** Select a new location for a point in a route. Select the point, use the Cursor-pad to drag it to a new location and then push the RotoKey.
- **Activate Rte from this Point.** Start following the route from the route point selected.
- **Delete.** Delete the route point selected.

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# Chapter 6: Radar

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This chapter provides the information necessary for radar operation. A few of the topics included are how to

- Adjust gain
- Suppress sea and rain clutter
- Measure range and bearing
- Suppress interference
- Stretch echoes
- Set a guard zone
- Interpret the radar display

## 6.1 Transmitting, Stand-by

When the power switch is turned on, the magnetron, the device in the antenna unit which transmits radar pulses, starts warming up. Warm-up takes about 1:30 (3:00 for DRS25A), and the timer at the center of the display counts down the time remaining for warming up. When the countdown reaches zero (0:00), Appears at the screen center, indicating the radar is now ready for operation. To transmit, long-push the **GAIN/TX** key. (This can also be done with Tx soft control and Tx in the Radar pop-up menu.)

When you won't need the radar for a long period, it is a good idea to set it in standby to conserve the magnetron. Long-push the **GAIN/TX** key to toggle between transmit and stand-by.



## 6.2 Adjusting the Gain

The **GAIN/TX** key adjusts the gain (sensitivity) of the radar receiver. It works in a manner similar to that of volume control of a broadcast receiver, which amplifies received signals.

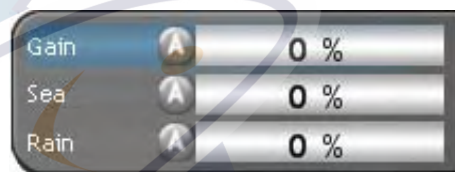
The proper setting is such that the background noise is just visible on the screen. If your gain setting is too low, weak echoes may be missed. On the other hand, excessive gain yields too much background noise; strong targets may be missed because of the poor contrast between desired echoes and the background noise on the display.

The gain and sea adjustment method is mutually switched between automatic and manual. For example, when gain is selected to automatic adjustment so is sea.

Gain can be adjusted manually or automatically as below.

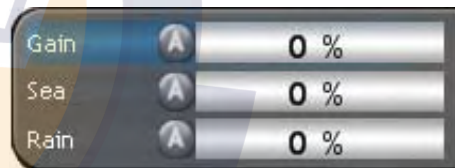
### Manual adjustment

1. Press the **GAIN/TX** key to show the Gain/Sea/Rain adjustment window.
2. Gain is selected; rotate the RotoKey to adjust the gain level. The length of the bar increases or decreases with rotation of the RotoKey.
3. Push the RotoKey to confirm the setting and close the window.



### Automatic adjustment

1. Press the **GAIN/TX** key to show the Gain/Sea/Rain adjustment window.
2. Gain is selected; rotate the RotoKey counterclockwise until "Auto" appears in the bar.

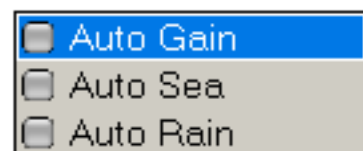


The Gain "A" icon is colored green when automatic gain is active.

**Note 1:** Alternatively, you can show the Gain/Sea/Rain adjustment window by placing the cursor near the window's location. Then, use the cursor to select Gain, push the **left-click** button and rotate the RotoKey to adjust.

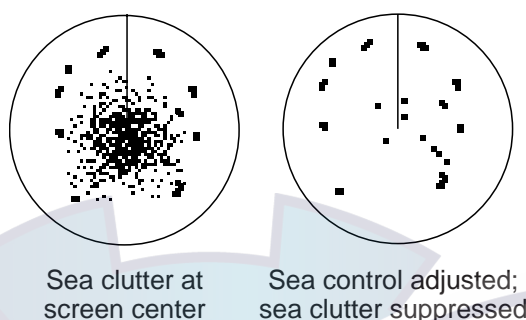
**Note 2:** The Gain/Sea/Rain pop-up allows you to switch between automatic and manual gain adjustment alternately:

1. Show the Gain/Sea/Rain adjustment window.
2. Push the **right-click** button to show the Gain/Sea/Rain pop-up menu, shown right.
3. Rotate the RotoKey to select Auto Gain and push it to enable and disable Auto Gain alternately.



## 6.3 Suppressing Sea Clutter

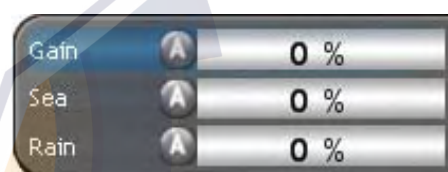
Echoes from waves can be troublesome, covering the central part of the display with random signals known as "sea clutter". The higher the waves and the higher the antenna above the water, the further the clutter will extend. Sea clutter may affect radar performance because real targets are sometimes hidden by the echoes of small waves. (See the left-hand figure in the figure below.) When sea clutter masks the picture, adjust the Sea control to reduce the clutter.



Sea clutter can be adjusted manually or automatically as below.

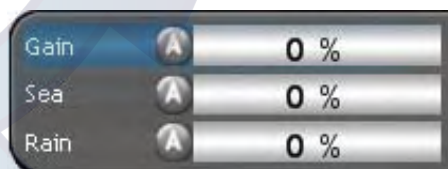
### Manual adjustment

1. Press the **GAIN/TX** key to show the Gain/Sea/Rain adjustment window.
2. Press the **GAIN/TX** key again to select Sea.
3. Rotate the RotoKey to adjust the sea clutter level.
4. Push the RotoKey to confirm the setting and close the window.



### Automatic adjustment

1. Press the **GAIN/TX** key to show the Gain/Sea/Rain adjustment window.
2. Press the **GAIN/TX** key again to select Sea.
3. Rotate the RotoKey counterclockwise until "Auto" appears in the bar.

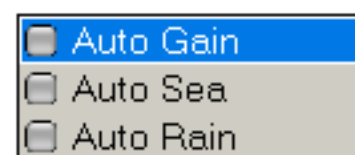


The Sea "A" icon is colored green when automatic sea is active.

**Note 1:** Alternatively, you can show the Gain/Sea/Rain adjustment window by placing the cursor near the window's location. Then, use the cursor to select Sea, push the **left-click** button and rotate the RotoKey to adjust.

**Note 2:** The Gain/Sea/Rain pop-up allows you to switch between automatic and manual sea clutter adjustment alternately:

1. Show the Gain/Sea/Rain adjustment window.
2. Push the **right-click** button to show the Gain/Sea/Rain pop-up menu, shown right.
3. Rotate the RotoKey to select Auto Sea and push it to enable and disable Auto Sea alternately.



## 6.4 Suppressing Rain Clutter.

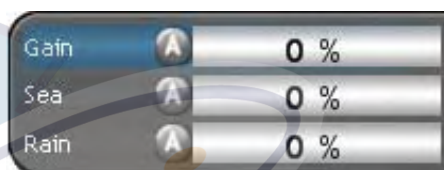
The vertical beamwidth of the antenna is designed to see surface targets even when the ship is rolling. However, by this design the unit will also detect rain clutter (rain, snow, hail, etc.) in the same manner as normal targets. Rain clutter shows as random dots on the screen.

When echoes from precipitation mask solid targets, adjust the Rain control to split up these unwanted echoes into a speckled pattern, making recognition of solid targets easier.

Rain clutter can be adjusted manually or automatically as below.

### Manual adjustment

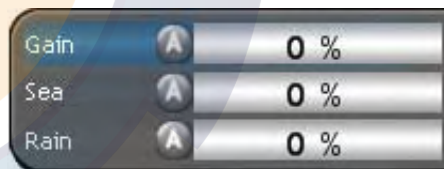
1. Press the **GAIN/TX** key to show the Gain/Sea/Rain adjustment window. (Alternatively, you can place the cursor near the Gain/Sea/Rain adjustment window to show it.)
2. Press the **GAIN/TX** key again to select Rain.
3. Rotate the RotoKey to adjust the rain clutter level.
4. Push the RotoKey to confirm the setting and close the window.



**Note:** Alternatively, you can adjust the rain clutter by placing the cursor near the Gain/Sea/Rain adjustment window. Use the cursor to select Rain, push the **left-button** key and rotate the RotoKey to adjust.

### Automatic adjustment

1. Press the **GAIN/TX** key to show the Gain/Sea/Rain adjustment window.
2. Press the **GAIN/TX** key again to select Rain.
3. Rotate the RotoKey counterclockwise until "Auto" appears in the bar.

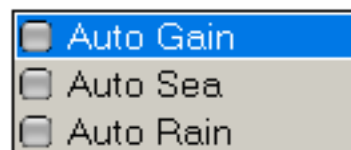


The Rain "A" icon is colored green when automatic sea is active.

**Note 1:** Alternatively, you can show the Gain/Sea/Rain adjustment window by placing the cursor near the window's location. Then, use the cursor to select Rain, push the **left-click** button and rotate the RotoKey to adjust.

**Note 2:** The Gain/Sea/Rain pop-up allows you to switch between automatic and manual rain clutter adjustment alternately:

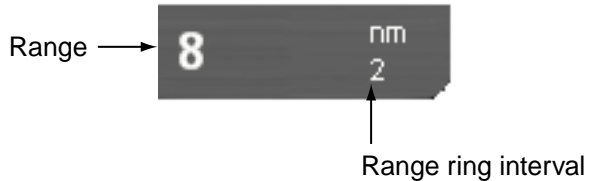
1. Show the Gain/Sea/Rain adjustment window.
2. Push the **right-click** button to show the Gain/Sea/Rain pop-up menu, shown right.
3. Rotate the RotoKey to select Auto Rain and push it to enable and disable Auto Rain alternately.



# 6.5 Range Scale

The range setting determines the size of the area (in nautical miles, kilometers or miles<sup>2</sup>) that will appear on your display. In addition, the range setting will also automatically adjust the range ring interval so that accurate range measurements may be made while operating on any range setting.

The range and range ring interval appear at the top left-hand corner of the display.

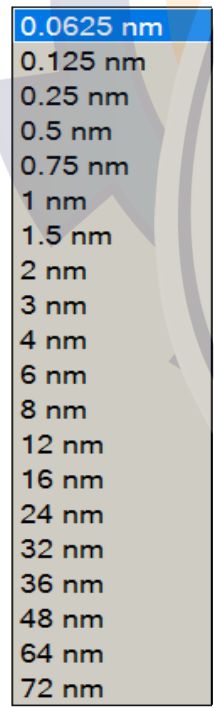


There are three ways to select a range:

**RANGE key:** Hit **RANGE OUT** to increase the range; **RANGE IN** to decrease the range.

**Left-click button:** Place the cursor on the range indication. Hit the **left-click** button, and the range box turns green. Rotate the RotoKey to select a range and push it to confirm selection.

**Right-click button:** Place the cursor on the range indication. Push the **right-click** button to show the Range pop-up menu, shown below. Rotate the RotoKey to select a range and push it to confirm selection.

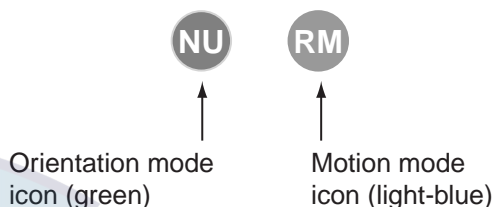


## 6.6 Orientation Mode

The orientation mode determines the relation between your boat and other targets, moving and stationary.

Heading data is required in modes other than head-up. When heading data is lost, the presentation mode automatically goes to head-up, and the compass icon on the status bar has a red X through it. Restore compass signal to show heading indication. Re-select orientation mode if necessary.

To select an orientation mode, use the RotoKey to select Head Up, Course Up or Nor Up as appropriate. Alternatively, put the cursor on the orientation mode icon at the left side of the screen and hit the **left-click** button. (Note that you can also select a presentation mode from the Radar pop-up menu or with the RotoKey.)



To select a motion mode, use the motion mode icon.

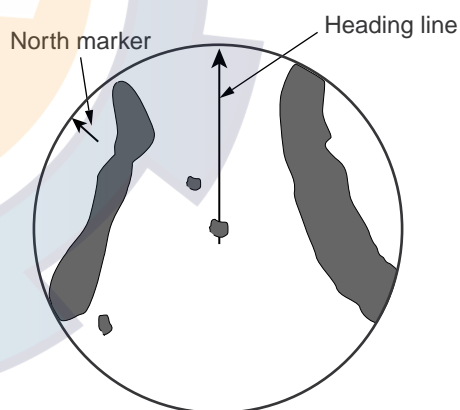
### 6.6.1 Description of Orientation Modes

#### Relative motion displays

In the relative motion display the origin of the display is stationary and movement of all targets is shown with respect to the observing vessel, normally at the screen center.

#### Head-up

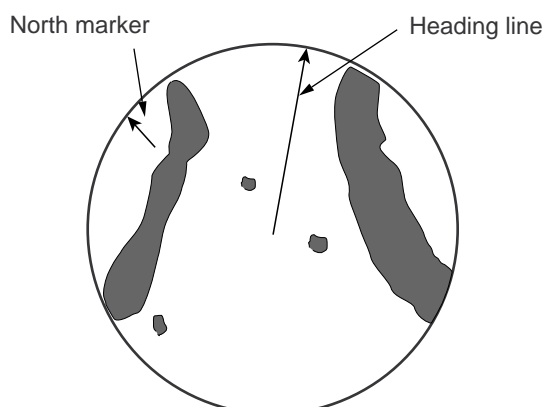
A display without azimuth stabilization in which the line connecting the center with the top of the display indicates own ship's heading. Targets are painted at their measured distances and in their directions relative to own ship's heading. The short line with an arrow on the bearing scale is the north marker.



#### Course-up

The radar picture is stabilized and displayed with the currently selected course at the top of the screen. As you change heading, the ship's heading line moves. If you select a new course, the picture resets to display the new course at the top of the display.

Targets are painted at their measured distances and in their directions relative to the intended course which is main-

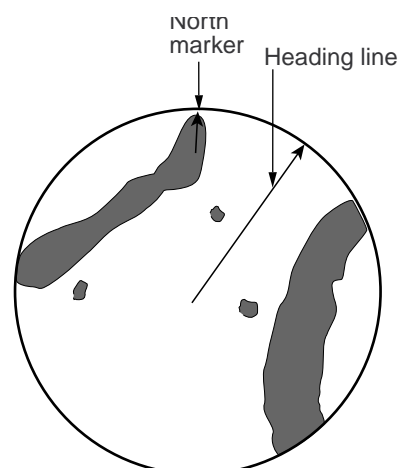




tained at the 0-degree position. The heading line moves in accordance with ship's yawing and course changes.

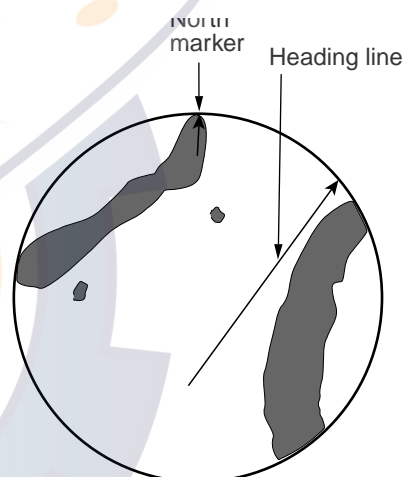
### North-up

In the north-up mode, targets are painted at their measured distances and in their true (compass) directions from own ship. North is maintained at the top of the screen. The heading line changes its direction according to ship's heading.



### **True motion display**

Own ship and moving ships move across the radar image at the correct speed and heading. A map-like image is displayed, with all moving vessels traveling in true perspective to each other and to fixed landmasses. As your ship's position approaches the edge of the screen, the radar display is automatically reset to reveal the area ahead of your ship. You can manually return your ship's position to the screen center at any time by pressing the **SHIP/3D** button.



## 6.7 Measuring the Range

You can measure the range to a radar target three ways: by the range rings, by the cursor, and by the Variable Range Marker (VRM).

Use the fixed range rings to obtain a rough estimate of the range to a target. They are the concentric solid circles about own ship, or the sweep origin. The number of rings is automatically determined by the selected range scale and their interval is displayed at the upper-left position of the screen. Count the number of rings between the center of the display and the target. Check the range ring interval and judge the distance of the echo from the inner edge of the nearest ring.

### 6.7.1 Displaying the Range Rings

If the rings are not displayed, push the **right-click** button to show the Radar pop-up menu. Use the RotoKey to select Rings and push it to alternately turn the rings on and off.

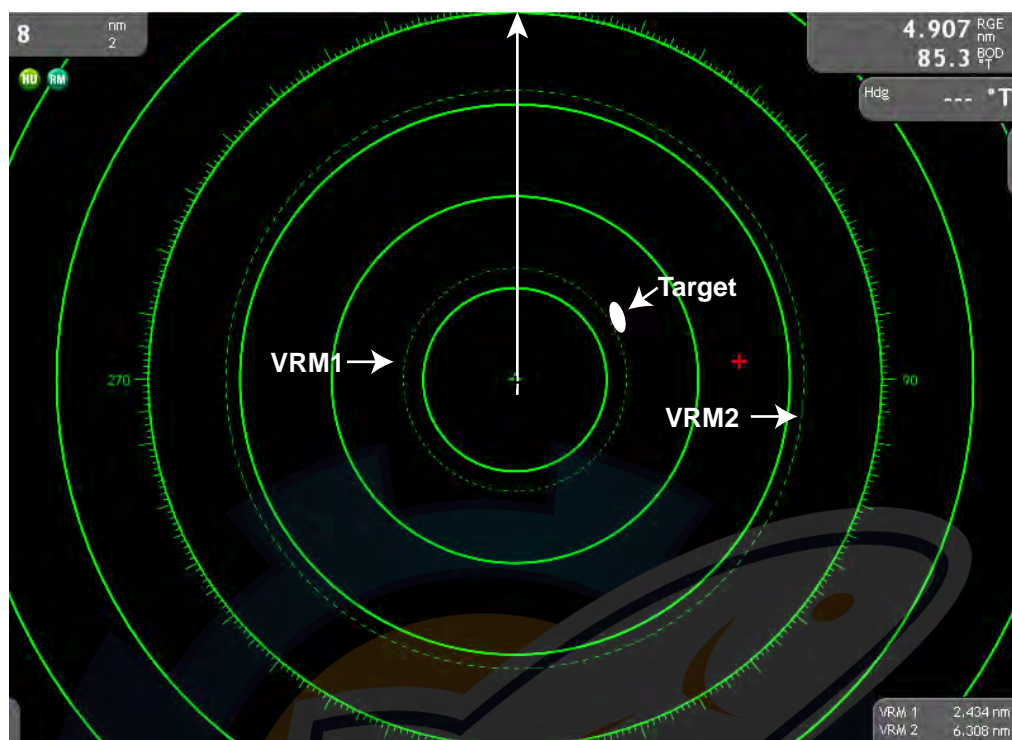


### 6.7.2 Measuring Range with a VRM

There are two VRMs, No. 1 and No. 2, which appear as dashed rings so that you can discriminate them from the fixed range rings. The two VRMs can be distinguished from each other by different lengths of dashes. The dashes of the No. 1 VRM are shorter than those of the No. 2 VRM.

#### To measure the range to a target with a VRM

1. Push the RotoKey to show the soft controls. (In the default arrangement, a short and long push enables access to VRM1 and VRM1/VRM2, respectively.)
2. Use the RotoKey to select VRM followed by VRM1 or VRM2 as appropriate to show the VRM box. The indication of the selected VRM is highlighted in green in the box.
3. Rotate the RotoKey (or use the Cursorpad) to place the VRM on the inner edge of the target. Read the range to the target at the VRM box. Distances shorter than 0.500 nm are shown in yards (default arrangement).
4. Push the RotoKey to finish. The VRM is then anchored at the range selected.



VRM 1	2.434 nm
VRM 2	6.308 nm

VRM box

### 6.7.3 Erasing a VRM

1. Push the RotoKey to show the soft controls. (In the default arrangement, a short and long push enables access to VRM1 and VRM1/VRM2, respectively.)
2. Select VRM and Clear 1 or Clear 2 as appropriate.

The selected VRM and its indication are erased.

A VRM can also be erased with the EBL/VRM pop-up menu. Put the cursor in the VRM box and push the **right-click** button to show the EBL/VRM pop-up menu. Rotate the RotoKey to select the VRM to erase and push it to erase.

Clear EBL1
Clear EBL2
Clear VRM1
Clear VRM2

## 6.8 Measuring Bearing

The Electronic Bearing Line (EBL) measures the bearing to radar targets.

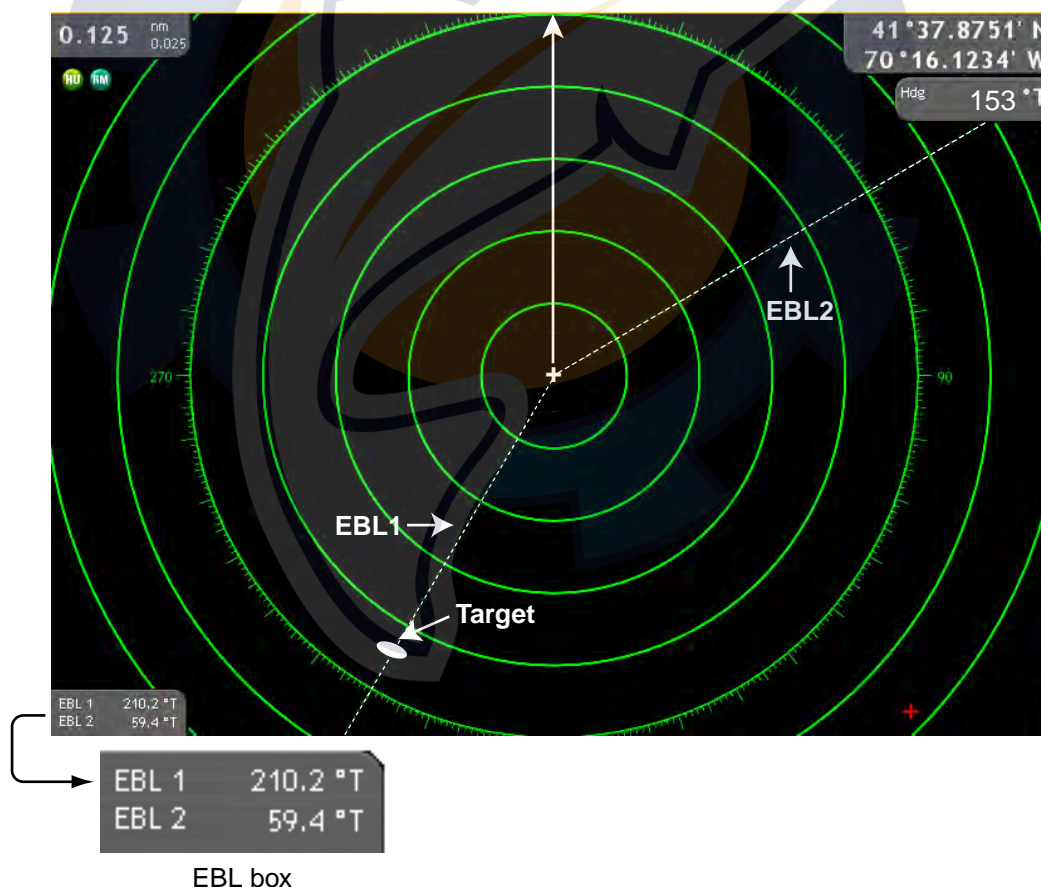
### 6.8.1 Measuring Bearing with an EBL

There are two EBLs, No. 1 and No. 2. Each EBL is a straight dashed line extending from the own ship position to the edge of the screen. The dashes of the No. 1 EBL are shorter than those of the No. 2 EBL.

The control box for the EBLs is hidden unless a EBL is active or the cursor is placed at the control box location.

#### To measure the bearing to a target with an EBL

1. Push the RotoKey to show the soft controls. (In the default arrangement, a short and long push enables access to EBL1 and EBL1/EBL2, respectively.)
2. Use the RotoKey to select EBL followed by EBL1 or EBL2 as appropriate to show the EBL box. The indication of the selected EBL is highlighted in green in the box.
3. Rotate the RotoKey (or use the Cursorpad) to bisect the target with the EBL. Read the bearing to the target at the EBL box.
4. Push the RotoKey to finish. The EBL is then anchored at the bearing selected.

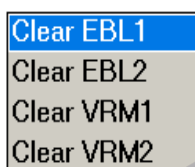


## 6.8.2 Erasing an EBL

1. Push the RotoKey to show the soft controls. (In the default arrangement, a short and long push enables access to EBL1 and EBL1/EBL2, respectively.)
2. Select EBL and Clear1 or Clear2 as appropriate.

The selected EBL and its indication are erased.

An EBL can also be erased with the EBL/VRM pop-up menu. Put the cursor in the EBL box and push the **right-click** button to show the EBL/VRM pop-up menu. Rotate the RotoKey to select the EBL to erase and push it to erase.



## 6.8.3 Selecting True or Relative Bearing

The EBL readout is affixed by "T" (true) if it is referenced to the north, and "M" when Bearing Display in the Global-General menu is set for Magnetic. (There is no indication in relative bearing.) You may select relative or true in the head-up modes as follows:

1. Press the **MENU** key to open the menu.
2. Open the Radar menu.
3. Use the RotoKey to select EBL Reference.



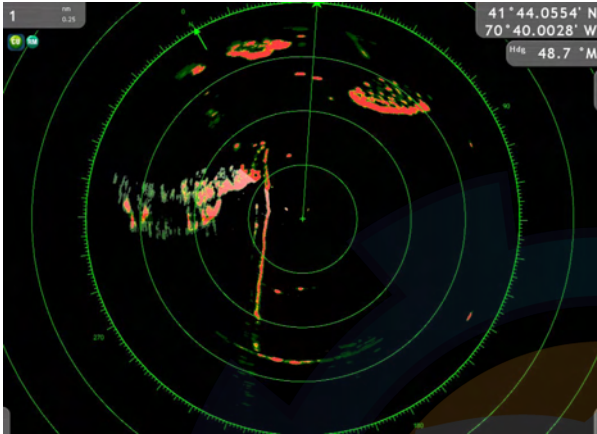
4. Use the RotoKey to select Relative or True as applicable.
5. Press the **MENU** key to close the menu.



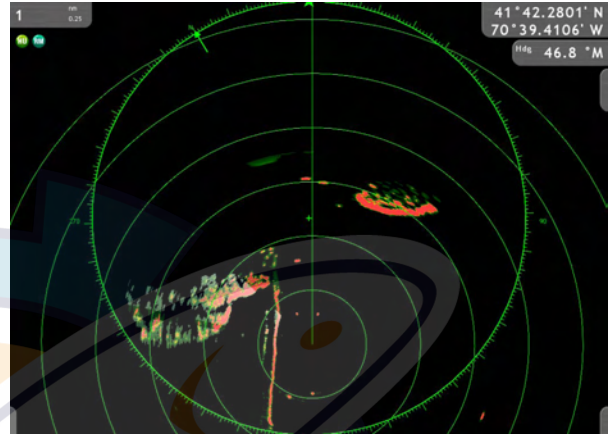
## 6.9 Off-centering the Picture

Own ship position, or sweep origin, can be off-centered to expand the view field without switching to a larger range scale. The sweep origin can be off-centered in the bow, stern, port or starboard direction, but not more than 75% of the range in use.

To off-center the radar picture, operate the Scrollingpad. To return own ship to screen center, press the **SHIP/3D** button.



Normal picture



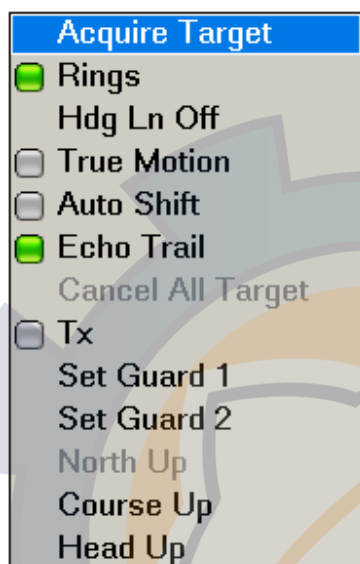
Picture off-centered in stern direction

## 6.10 Heading Line

The heading line indicates the ship's heading in all orientation modes. It is a line from the own ship position to the outer edge of the radar display area and appears at zero degrees on the bearing scale in head-up mode; it changes its orientation in the north-up, course-up and true motion modes with ship's movement.

**To show or hide the heading line:**

1. Put the cursor somewhere not occupied by a context-sensitive item and push the **right-click** button. The Radar pop-up menu appears.

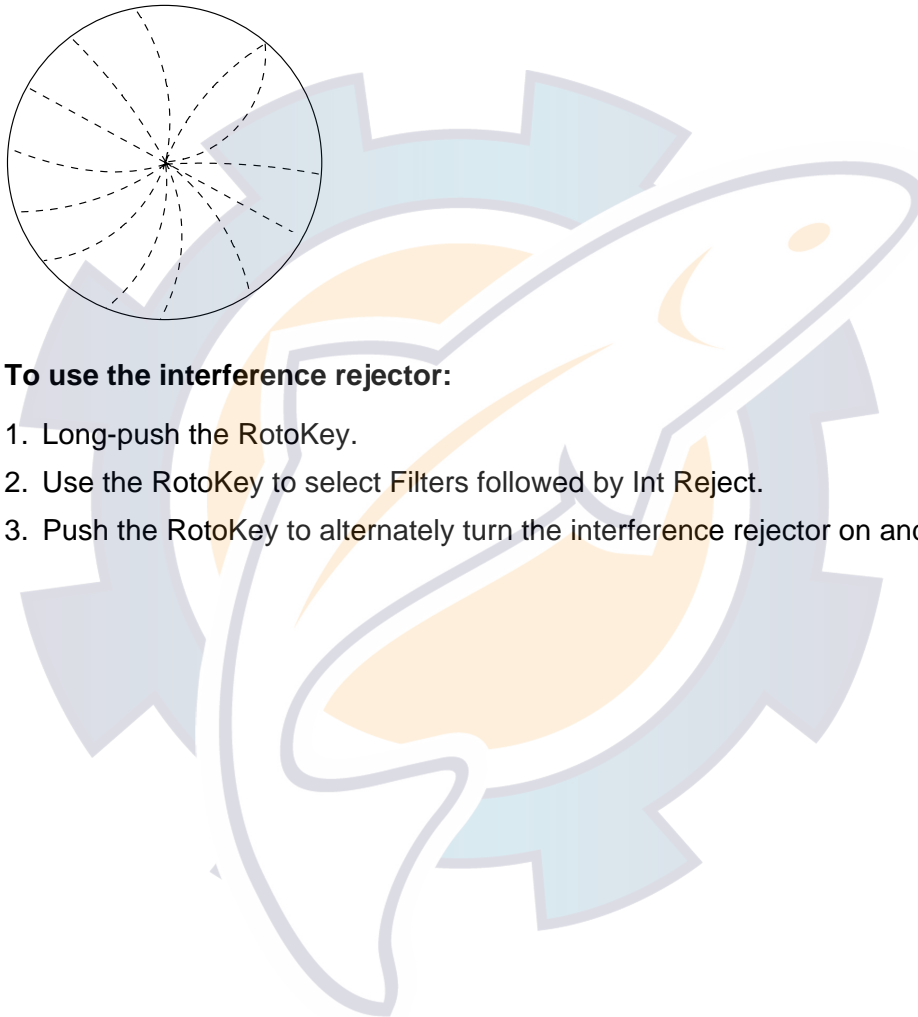


2. Use the RotoKey to select Hdg Ln Off and push it to hide and show the heading line alternately.

## 6.11 Reducing Radar Interference

Radar interference may occur when near another shipborne radar that is operating in the same frequency band as your radar. Its on-screen appearance looks like many bright dots either scattered at random or in the form of dotted lines extending from the center to the edge of the display. Interference effects are distinguishable from normal echoes because they do not appear in the same place on successive rotations of the antenna.

Be sure to turn off the interference rejector when no interference exists - weak targets may be missed.



### To use the interference rejector:

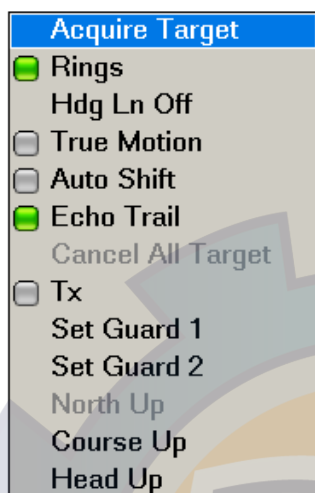
1. Long-push the RotoKey.
2. Use the RotoKey to select Filters followed by Int Reject.
3. Push the RotoKey to alternately turn the interference rejector on and off.

## 6.12 Guard Alarm

The purpose of the guard alarm is to provide audio and visual alerts against targets (ships, islands, landmasses, etc.) entering a specific area.

### 6.12.1 Setting a Guard Zone

1. Push the **right-click** button to show the Radar pop-up menu.



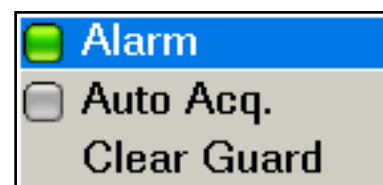
2. Use the RotoKey to select Set Guard 1 or Set Guard 2, whichever you want to set.
3. Use the Cursorpad to put the cursor at the top left corner for the guard zone (Point A below) and push the **left-click** button.
4. Use the Cursorpad to drag the cursor to the bottom right corner (Point B below) for the guard zone and push the **left-click** button.



### 6.12.2 Activating, Deactivating the Guard Zone

Put the cursor on a line of the guard zone you want to activate or deactivate and push the **right-click** button to show the Guard Alarm pop-up menu. Use the RotoKey to turn Alarm on or off as appropriate.

If a target enters the zone, the buzzer sounds and the message "Target enters Guard Zone 1 (or 2), Press Menu Button." appears in the text area. The buzzer may be silenced with the **CANCEL** key or **MENU** key. The visual alarm continues until the target exits the guard zone or the guard alarm is deactivated or cancelled.

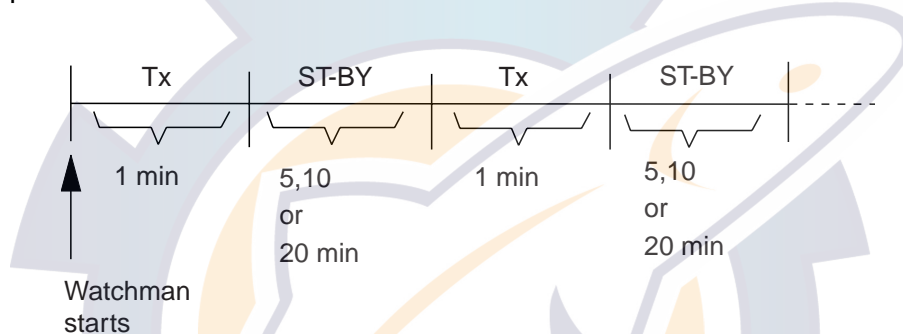


### 6.12.3 Clearing a Guard Zone

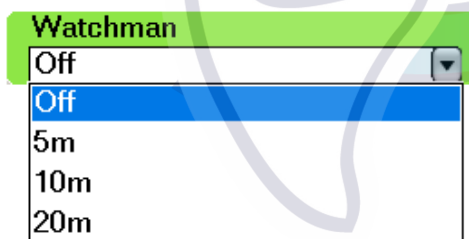
1. Put the cursor on a line of the guard zone you want to clear and push the **right-click** button to show the Guard Alarm pop-up menu.
2. Use the RotoKey to select Clear Guard and push it to clear the guard zone from the screen.

## 6.13 Watchman

The watchman function periodically transmits radar pulses for one minute to check for targets in a guard zone. If a target is found in the zone, watchman is cancelled and the radar continues transmitting. If no target is found the radar goes into standby for the number of minutes specified on the Radar menu. This feature is useful when you do not need the radar's function continuously but want to be alerted to radar targets in a specific area.



1. Set a guard zone, referring to “6.12.1 Setting a Guard Zone” on page 6-15. (Watchman is inoperative unless a guard zone is active.)
2. Press the **MENU** key to open the menu.
3. Open the Radar-General menu.
4. Use the RotoKey to select Watchman and set Watchman rest interval.

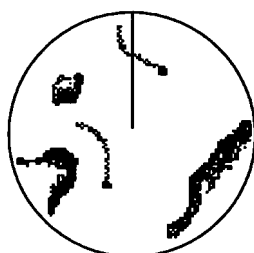


5. Press the **MENU** key to close the menu.

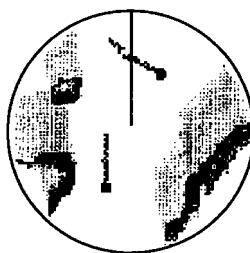


## 6.14 Echo Trails

Echo trails are simulated afterglow of target echoes that represent their movements relative or true to own ship. This function is useful for alerting you past possible collision situations.



(a) True target trails  
(No smearing of  
stationary targets)



(b) Relative target trails  
Targets moving relative  
to own ship

### 6.14.1 Hiding/Showing Trails

Long-push the RotoKey to show the soft controls. Use the RotoKey to select Trail and push it to alternately hide and show trails.

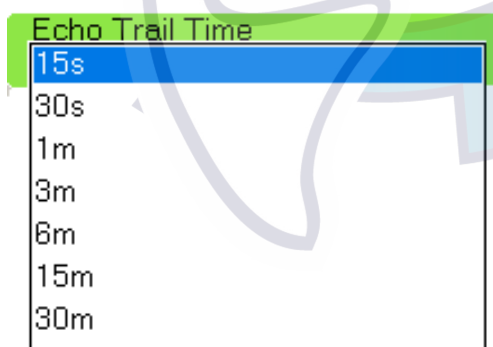
### 6.14.2 Clearing Trails to Start New Trails

Use the RotoKey to select Clr Trail to clear trails and restart with new trails.

### 6.14.3 Trail Time

Set the trail time on the Radar menu. Trails are painted to the end of the selected trail time, at which point they are erased and restarted.

1. Press the **MENU** key to open the menu.
2. Open the Radar-General menu.
3. Use the RotoKey to select Echo Trail Time and set time interval.

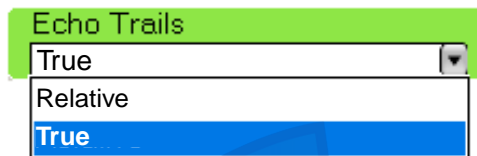


4. Press the **MENU** key to close the menu.

### 6.14.4 Trail Reference

Trail movement can be selected to relative or true. Relative trails show relative movements between targets and own ship. True motion trails show targets' movements according to their over-the-ground speeds and courses. True trails require position and heading information.

1. Press the **MENU** key to open the menu.
2. Open the Radar-General menu.
3. Use the RotoKey to select Echo Trails and trail reference desired.



4. Press the **MENU** key to close the menu.

### 6.14.5 Trail Color

Trail color can be chosen among blue, yellow and green.

1. Press the **MENU** key to open the menu.
2. Open the Radar-General menu.
3. Use the RotoKey to select Echo Trail Color and color desired.



4. Press the **MENU** key to close the menu.

### 6.14.6 Trail Gradation

Trails may be shown in single or multiple gradation. Multiple gradation provides gradual shading over time.



## 6.15 Echo Stretch

Normally, the reflected echoes from long range targets appear on the display as weaker and smaller blips even though they are compensated by the radar's internal circuitry. The echo stretch function magnifies these small blips in all ranges.

This function magnifies not only targets but also sea clutter and radar interference. For this reason, be sure sea clutter and radar interference are properly suppressed before activating the echo stretch.

**To turn the echo stretch on or off:**

1. Long-push the RotoKey.
2. Use the RotoKey to select Filters.
3. Use the RotoKey to select Stretch and push it to alternately enable and disable the echo stretch.

## 6.16 Automatic Shift

Own ship position, or sweep origin, can be displaced automatically to expand the view field without switching to a larger scale.

The amount of automatic shift is calculated according to ship's speed, and the amount of shift is limited to 50% of the range in use. For example, if you set the auto shift speed for 15 knots and the ship is running at 10 knots, the amount of shift will be about 34%. The formula for determining auto shift amount is as shown below. Automatic shift is only available in the head-up mode.

$$\frac{\text{Ship's speed}}{\text{Auto shift speed setting}} \times 0.5 = \text{Amount of offcenter(\%)}$$

### 6.16.1 Setting Auto Shift Speed

1. Press the **MENU** key to open the menu.
2. Open the Radar-General menu.
3. Use the RotoKey to select Auto Shift Maximum Speed.
4. Use the RotoKey to set the speed at which auto shift is activated.
5. Press the **MENU** key to close the menu.

### 6.16.2 Enabling, Disabling Auto Shift

#### Method 1

Press the **SHIP/3D** button.

#### Method 2

1. Long-push the RotoKey.
2. Use the RotoKey to select Auto Shift and push it to alternately turn auto shift on and off.

## 6.17 Sweep Fade

The sweep fade feature automatically suppresses the brilliance of weak signals (noise, sea clutter, rain clutter, etc.) and unwanted signals such as radar interference to clear the picture of unwanted echoes. Use this when unwanted echoes cannot be suppressed by other methods.

1. Press the **MENU** key to open the menu.
2. Open the Radar-General menu.
3. Use the RotoKey to select Sweep Fade and push it to alternately turn the sweep fade feature on and off.
4. Press the **MENU** key to close the menu.

## 6.18 Showing/Cancelling Active Route

You can show or hide the active route on the radar display. Further, you can cancel route navigation from the radar display. To display the active route, long-push the RotoKey, select Active Rte and push the RotoKey to show or hide the active route as desired.

To cancel route navigation, set the cursor on the line extending from the boat icon and push the **right-click** button. The "Cancel Route" pop-up appears; push the RotoKey to cancel the route.



## 6.19 Showing/Hiding Own Ship Icon

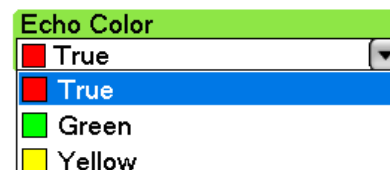
You can show or hide the own ship icon on the radar display. The icon is not shown when the range is shorter than 0.25 nm/0.5 km.

1. Press the **MENU** key to open the menu.
2. Open the Radar-General menu.
3. Use the RotoKey to select Own Ship Icon.
4. Push the RotoKey to turn the icon on or off as applicable.
5. Press the **MENU** key to close the menu

## 6.20 Echo Color

Echo color is available in single colors of yellow, green, or True. "True" paints echoes in colors from red, green and yellow in order of ascending echo strength.

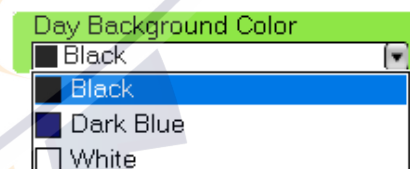
1. Press the **MENU** key to open the menu.
2. Open the Radar-General menu.
3. Use the RotoKey to select Echo Color.
4. Use the RotoKey to select color desired.
5. Press the **MENU** key to close the menu.



## 6.21 Background Color

The background color can be changed for daytime and nighttime operations. Automatic selection is available when Day/Night Mode in the Global-General menu is set for Auto.

1. Press the **MENU** key to open the menu.
2. Open the Radar-General menu.
3. Use the RotoKey to select Day Background Color or Night Background Color, whichever you want to set. Below are the options for the day background color. (The options for night background color are the same.)
4. Use the RotoKey to select color desired.
5. Press the **MENU** key to close the menu.



## 6.22 Radar Overlay Range Link

The radar overlay range link feature automatically keeps the chart scale and radar range in sync. This makes it easier to understand the radar in context with the chart. You can turn this feature on or off as follows:

1. Press the **MENU** key to open the menu.
2. Open the Radar-General menu.
3. Use the RotoKey to select Radar Overlay Range Link.
4. Push the RotoKey to enable or disable synchronization as appropriate.
5. Press the **MENU** key to close the menu.

**Note:** The radar picture may blur slightly on long ranges, This is not a sign of malfunction; it is a characteristic of the digital zoom.



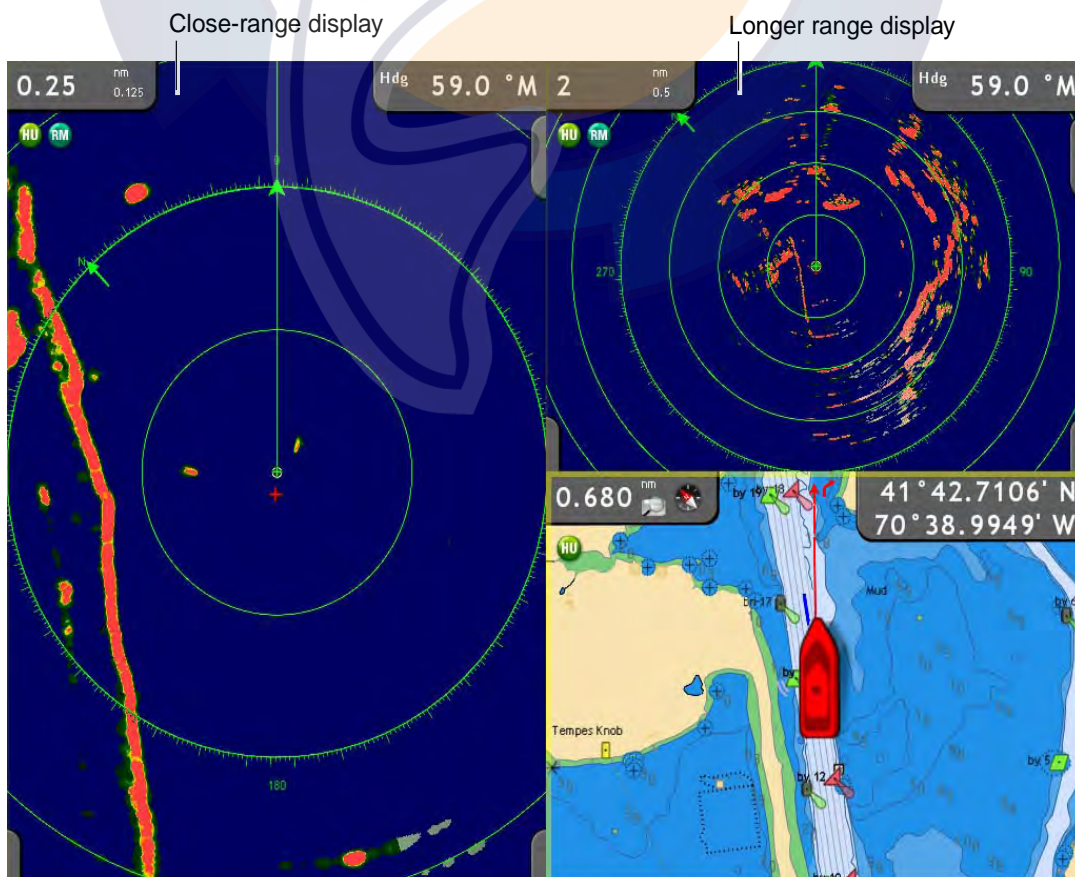
## 6.23 Dual Range Display

The dual range display scans and displays two different radar ranges simultaneously with no time lag, with independent control of each picture. This is useful when, for example, you need to keep a close watch on short range navigation but also want to look for birds on the water (sign of presence of fish school) on a long range.

The radar functions that can be adjusted independently are as follows:

- Active route (show/hide)
- Auto shift
- Echo stretch
- Echo trail (enable/disable))
- Gain
- Heading line (show/hide)
- Motion mode (true, relative)
- Orientation mode (course-up, head-up, north-up)
- Rain (rain clutter)
- Range
- Range rings (show/hide)
- Sea (sea clutter)
- Tuning (manual)

To get the dual radar display, set up for dual radar screens, by referring to “13.3 Setting up the Display Selection Window” on page 13-8. You can arrange the displays in two-way, three-way or four-way split screens.



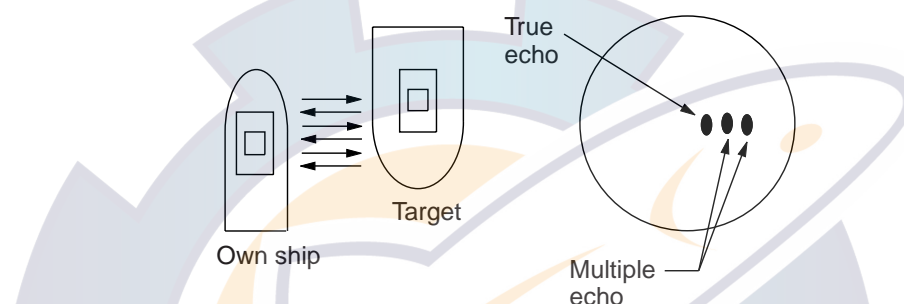
## 6.24 Interpreting the Radar Display

### 6.24.1 False Echoes

Occasionally echo signals appear on the screen at positions where there is no target or disappear even if there are targets. False target situations may be recognized, however, if you understand why they are displayed. Typical false echoes are shown below.

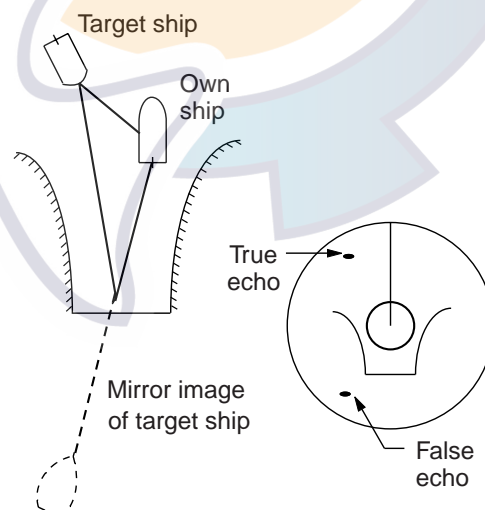
#### Multiple echoes

Multiple echoes occur when a transmitted pulse returns from a solid object like a large ship, bridge, or breakwater. A second, a third or more echoes may be observed on the display at double, triple or other multiples of the actual range of the target as shown below. Multiple reflection echoes can be reduced and often removed by decreasing the gain (sensitivity) or properly adjusting the Sea control.



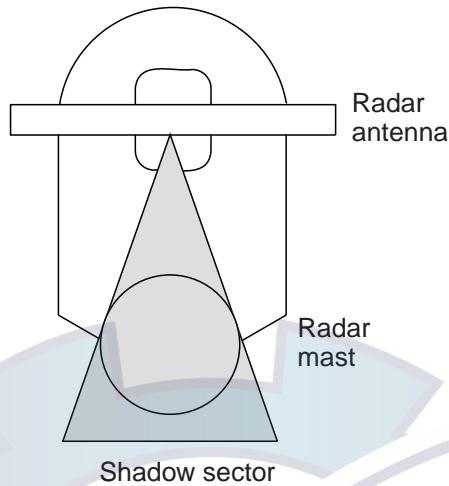
#### Virtual image

A relatively large target close to your ship may show at two positions on the screen. One of them is the true echo directly reflected by the target and the other is a false echo which is caused by the mirror effect of a large object on or close to your ship as shown in the figure below. If your ship comes close to a large metal bridge, for example, such a false echo may temporarily be seen on the screen.



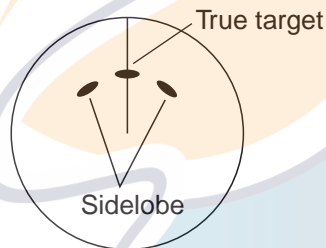
### Shadow sector

Funnels, stacks, masts, or derricks in the path of the antenna block the radar beam. If the angle subtended at the antenna is more than a few degrees, a non-detecting sector or blind spot may be produced. Within this sector, targets can not be detected.



### Sidelobe echoes

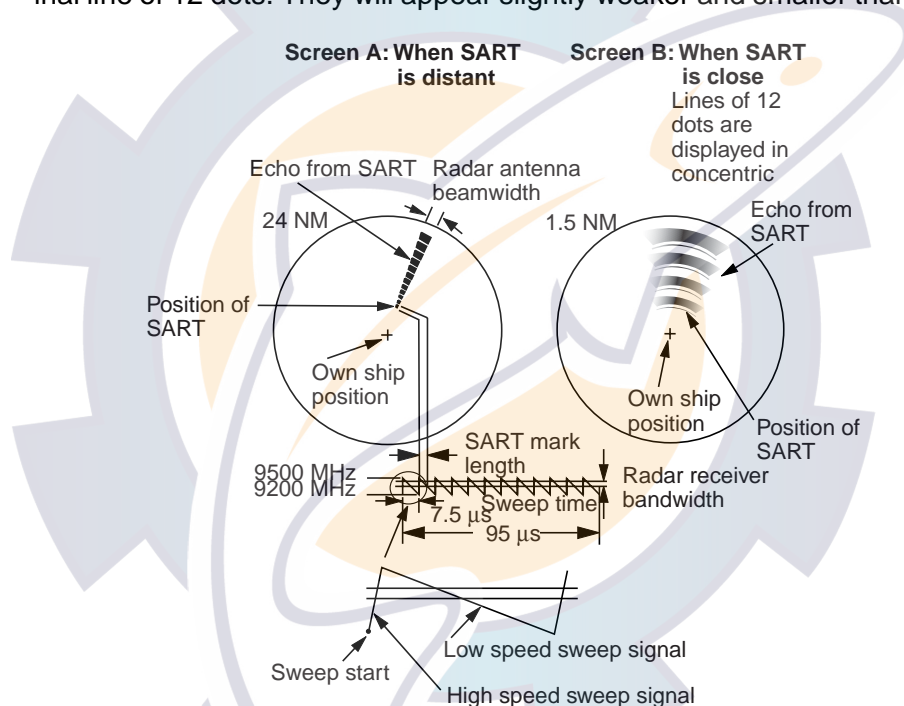
Every time the radar pulse is transmitted, some radiation escapes on each side of the beam, called "sidelobes." If a target exists where it can be detected by the sidelobes as well as the main lobe, the side echoes may be represented on both sides of the true echo at the same range. Side lobes show usually only on short ranges and from strong targets. They can be reduced through careful reduction of the gain or proper adjustment of the Sea control.



### 6.24.2 Search and Rescue Transponder (SART)

A SART may be triggered by any X-Band (3 cm) radar within a range of approximately 8 nm. Each radar pulse received causes it to transmit a response which is swept repetitively across the complete radar frequency band. When interrogated, it first sweeps rapidly (0.4 ms) through the band before beginning a relatively slow sweep (7.5 ms) through the band back to the starting frequency. This process is repeated for a total of twelve complete cycles. At some point in each sweep, the SART frequency will match that of the interrogating radar and be within the pass band of the radar receiver. If the SART is within range, the frequency match during each of the 12 slow sweeps will produce a response on the radar display, thus a line of 12 dots equally spaced by about 0.64 nautical miles will be shown.

When the range to the SART is reduced to about 1 nm, the radar display may show also the 12 responses generated during the fast sweeps. These additional dot responses, which also are equally spaced by 0.64 nm, will be interspersed with the original line of 12 dots. They will appear slightly weaker and smaller than the original dots.



#### General procedure for detecting SART response

- Use the range scale of 6 or 12 nm as the spacing between the SART responses is about 0.6 nm (1125 m) to distinguish the SART.
- Turn off all automatic clutter suppression.
- Turn off the interference rejector.

### 6.24.3 Racon (Radar Beacon)

A racon is a radar transponder which emits a characteristic signal when triggered by a ship's radar (usually only the 3 centimeter band). The signal may be emitted on the same frequency as that of the triggering radar, in which case it is superimposed on the ship's radar display automatically.

The racon signal appears on the radar as a radial line originating at a point just beyond the position of the radar beacon or as a Morse code signal (see figure below) displayed radially from just beyond the beacon.



## 6.25 ARPA Operation

The ARPA (Automatic Radar Plotting Aid) tracks the movement of up to 30 radar targets. Targets can be acquired manually or automatically. All 30 targets can be acquired manually when the ARPA acquisition area is inactive. With the acquisition area enabled, that total is equally divided between manual and auto acquisition.

ARPA requires speed and heading data. The symbols used in this radar comply with IEC 60872-1.



### WARNING

**No one navigational aid should be relied upon for the safety of vessel and crew. The navigator has the responsibility to check all aids available to confirm position. Electronic aids are not a substitute for basic navigational principles and common sense.**

- This auto plotter automatically tracks an automatically or manually acquired radar target and calculates its course and speed, indicating them by a vector. Since the data generated by the auto plotter are based on what radar targets are selected, the radar must always be optimally tuned for use with the auto plotter, to ensure required targets will not be lost or unwanted targets such as sea returns and noise will not be acquired and tracked.
- A target does not always mean a land-mass, reef, ships or other surface vessels but can imply returns from sea surface and clutter. As the level of clutter changes with environment, the operator should properly adjust the Sea, Rain and Gain to be sure target echoes are not eliminated from the radar screen.



### CAUTION

**The plotting accuracy and response of this auto plotter meets IMO standards. Tracking accuracy is affected by the following:**

- Tracking accuracy is affected by course change. One to two minutes is required to restore vectors to full accuracy after an abrupt course change. (The actual amount depends on gyrocompass specifications.)
- The amount of tracking delay is inversely proportional to the relative speed of the target. Delay is on the order of 15–30 seconds for high relative speed; 30–60 seconds for low relative speed.

**Display accuracy is affected by the following:**

- Echo intensity
- Radar transmission pulsewidth
- Radar bearing error
- Gyrocompass error
- Course change (own ship or target)



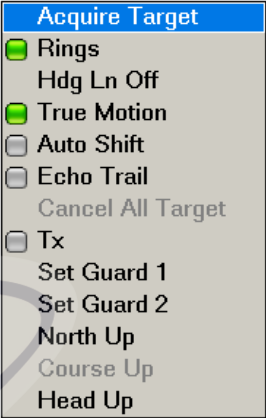
6.25.1 Enabling, Disabling ARPA





- 1. On the chart plotter or radar display, long-push the RotoKey.
- 2. Use the RotoKey to select Targets followed by ARPA.
- 3. Push the RotoKey to alternately enable and disable the ARPA display.

6.25.2 Manually Acquiring a Target

- 1. On the radar display, use the Cursorpad to put the cursor on the target you want to acquire.
- 2. Press the **right-click** button to show the Radar pop-up menu, shown right.
- 3. The cursor is selecting Acquire Target; push the RotoKey to acquire the target.

A target just acquired is marked with a broken square and a vector appears within 30 s of the antenna to indicate the target's motion trend. Within 90 s, the initial tracking stage is finished and the target becomes ready for stable tracking. At this point, the broken square mark changes to a solid circle.



ARPA Symbol	Meaning
	Immediately after acquisition.
	Within 30 s of the antenna after acquisition, a vector appears to show a trend of movement.
	Within 90 s of the antenna after acquisition, the plotting symbol changes to a small circle, indicating steady-state tracking condition.
	<b>Lost target</b> is indicated by a diamond symbol. The diamond is formed from two equal triangles.

**Note 1:** For successful acquisition, the target to be acquired should be within 0.05 to 16 nm from own ship and not obscured by sea or rain clutter.

**Note 2:** When the capacity for manual acquisition is reached, no more targets can be acquired. Cancel tracking of non-threatening targets if you wish to acquire additional targets manually.

### 6.25.3 Displaying Target Data

The course, speed, range, bearing, etc. of an ARPA target can be displayed. For simple data, simply place the cursor on the ARPA target for which you want to find its data. For detailed data, place the cursor on the target and push the **left-button** key.

ID	1
COG/SOG	56.2°T/6.8 kt
CPA/TCPA	3 nm/55m03s
Range/Bearing	6.366 nm/26.7°T

*ARPA simple target data*

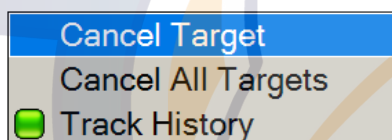
ID	1
COG	56.2°T
SOG	6.8 kt
CPA	3 nm
TCPA	55m03s
Range	6.366nm
Bearing	26.7°T
Position	34°37.1715'N; 135°10.2459

*ARPA detailed target data*

### 6.25.4 Cancelling Tracking of Targets

ARPA targets can be cancelled individually or collectively as shown below. Tracking on all ARPA targets can also be done from the Radar pop-up menu, by selecting Cancel All Target.

1. Use the Cursorpad to put the cursor on the target you want to cancel tracking.
2. **Right-click** to show the ARPA pop-up menu.

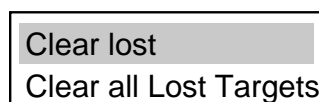


3. Use the RotoKey to select Cancel Target or Cancel All Targets as appropriate and push the RotoKey.

Tracking is cancelled and targets are erased from the screen.

### 6.25.5 Clearing a Lost Target

Place the cursor on the lost target and hit the **right-click** button to show the lost target popup. Use the RotoKey to select Clear lost or Clear all Lost Targets as applicable.



### 6.25.6 CPA/TCPA Alarm

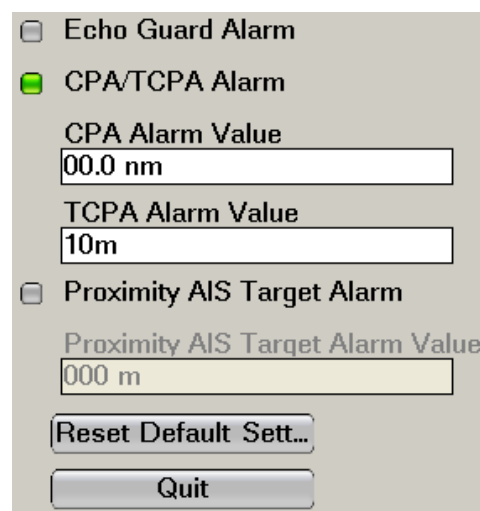
The CPA/TCPA alarm is useful for alerting you to possible collision situations. With the alarm active, the ARPA continuously monitors the predicted range at the Closest Point of Approach (CPA) and predicted time to CPA (TCPA) of each tracked target to own ship. When the predicted CPA of any target becomes smaller than a preset CPA alarm range and its predicted TCPA less than a preset TCPA alarm limit, the buzzer sounds and an appropriate text message appears. In addition, the ARPA symbol changes to a (red) triangle.

Provided that this feature is used correctly, it will help prevent the risk of collision by alerting you to threatening targets. However, it is important that gain, sea and rain controls are properly adjusted.

CPA/TCPA alarm ranges must be set up properly taking into consideration the size, tonnage, speed, turning performance and other characteristics of own ship.

### Setting the CPA/TCPA Alarm

1. Press the **MENU** key to open the menu.
2. Open the Alarm-Targets menu, shown right.
3. Use the RotoKey to select CPA/TCPA Alarm and push it to turn the alarm on (status icon in green).
4. Use the RotoKey to set CPA and TPCA values at CPA Alarm Value and TPCA Alarm Value.
5. Press the **MENU** key to close the menu.



The screenshot shows the 'Alarm-Targets' menu with the following options and settings:

- ☐ Echo Guard Alarm
- ☒ CPA/TCPA Alarm
  - CPA Alarm Value: 00.0 nm
  - TCPA Alarm Value: 10m
- ☐ Proximity AIS Target Alarm
  - Proximity AIS Target Alarm Value: 000 m
- Reset Default Sett...
- Quit

### Acknowledging the CPA/TCPA Alarm

The CPA/TCPA alarm sounds when the CPA and TPCA of an ARPA target is within the CPA/TCPA alarm range. To acknowledge the alarm and silence the audio alarm, press the **CANCEL** key. Note that the ARPA vector must be displayed at least 30 seconds to calculate CPA and TPCA.

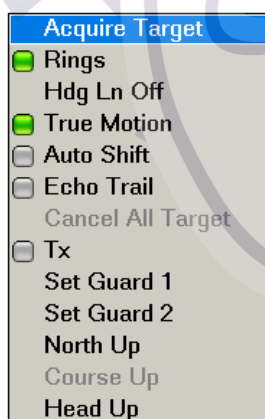
### Disabling the CPA/TCPA Alarm

Show the status icon of CPA/TCPA Alarm in the Alarm-Target menu in gray to disable the alarm.

## 6.25.7 Setting ARPA Acquisition Area

Any target entering the ARPA acquisition area will be automatically acquired and tracked. When a target transits the area, the buzzer sounds. You can silence the buzzer with the **CANCEL** key.

1. On the radar display, push the **right-click** button to show the Radar pop-up menu.

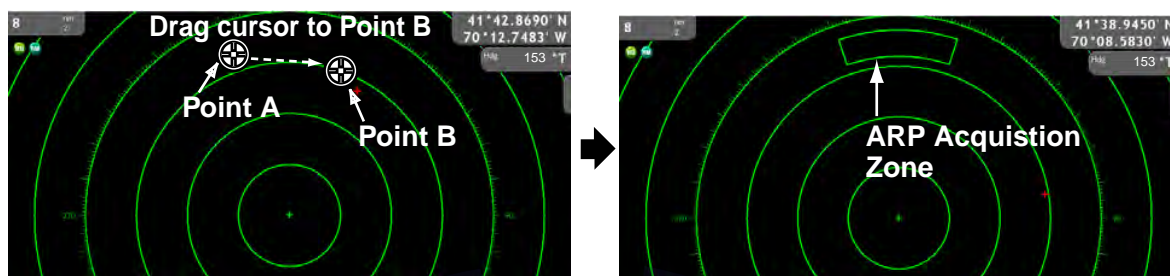


The screenshot shows the 'Radar pop-up menu' with the following options:

- Acquire Target
- ☒ Rings
- Hdg Ln Off
- ☒ True Motion
- ☐ Auto Shift
- ☐ Echo Trail
- Cancel All Target
- ☐ Tx
- Set Guard 1
- Set Guard 2
- North Up
- Course Up
- Head Up

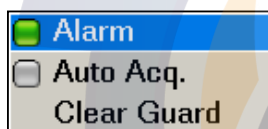
2. Use the RotoKey to select Set Guard 1 or Set Guard 2, whichever you want to set. The point placement cursor appears at cursor location.

3. Use the Cursorpad to put the point placement cursor at the top left corner for the guard zone (Point A below).
4. Press the **left-click** button.
5. Use the Cursorpad to drag the point placement cursor to the bottom right corner (Point B below) for the guard zone and push the **left-click** button.



**To use the guard zone as an acquisition area**, open the Targets menu and turn on "Guard Zone AUTO Acq."

**To erase the guard zone (and return to full manual acquisition)**, put the cursor on a line of the guard zone and push the **right-click** button to show the Guard Zone pop-up. (The line becomes thicker if correctly selected.) Use the RotoKey to select Clear Guard.



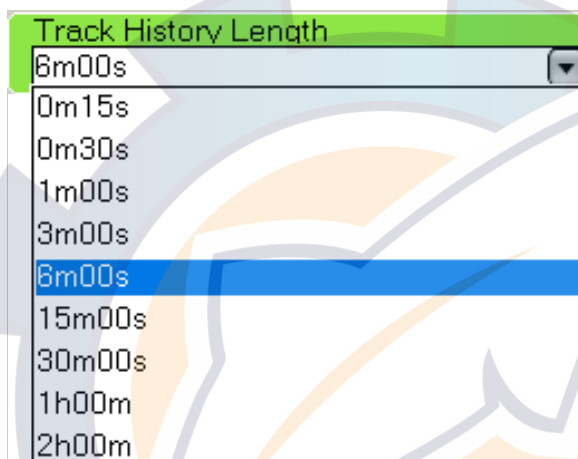
## 6.25.8 Track History Display

The track of ARPA targets can be shown on the display.

### Selecting Track History Plotting Interval

You can select the track history plotting interval from the times shown below. For long plotting intervals, the time at which a point is added to the track is calculated by dividing the total length in seconds by 20 (points). For example, a point would be added every 18 s if the plotting interval is 6 m (360 divided by 20 is 18). Note that track history is reset whenever its plotting interval is changed.

1. Press the **MENU** key to open the menu.
2. Open the Targets menu.
3. Use the RotoKey to select Track History Length.



4. Use the RotoKey to select plot interval desired.
5. Press the **MENU** key to close the menu.

### Showing, Hiding the Track History Display

On the radar display or the chart plotter display, long-push the RotoKey to show the soft controls. Select Targets followed by History. Push the RotoKey to alternately show and hide the track history display.

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# Chapter 7: Fish Finder

With connection of an external fish finder (ETR-6/10, ETR-30, DFF series), images of underwater objects, such as fish, can be shown on the display. This chapter acquaints you with the functions of the fish finder, from the various displays to how to fine tune the fish finder image. Topics include

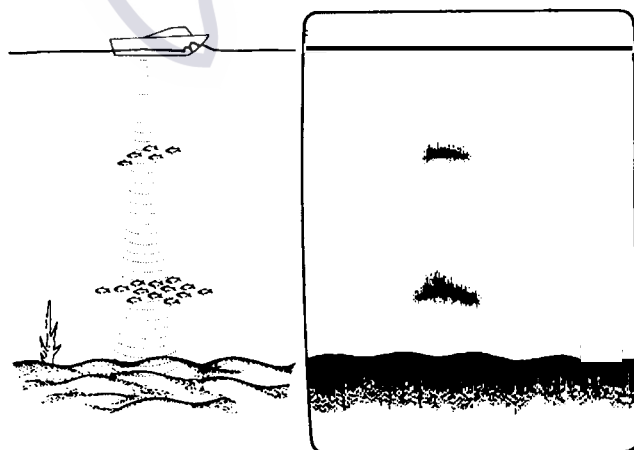
- Display selection
- Automatic and manual operation
- Frequency selection
- Picture advancement speed
- Interference rejection
- Measuring range with the VRM

## 7.1 How the Fish Finder Works

The fish finder determines the distance between its transducer and underwater objects such as fish, lake bottom or seabed and displays the results in different colors or shades gray according to echo strength.

Ultrasonic waves transmitted through water travel at a nearly constant speed of 4800 feet (1500 meters) per second. When a sound wave strikes an underwater object such as fish or sea bottom, part of the sound wave is reflected back toward the source. Thus by calculating the time difference between the transmission of a sound wave and the reception of the reflected sound wave, the depth to the object can be determined.

The picture displayed by the fish finder is made up of a series of vertical scan lines, one for each transmission. Each line represents a "snapshot" of what has occurred beneath the boat. The series of snapshots are accumulated side by side across the screen, and the resulting contours of the bottom and fish between the bottom and surface are displayed. The amount of history of objects that have passed beneath the boat over a series of transmission varies from less than a minute to a few minutes, depending on how you adjust the unit.



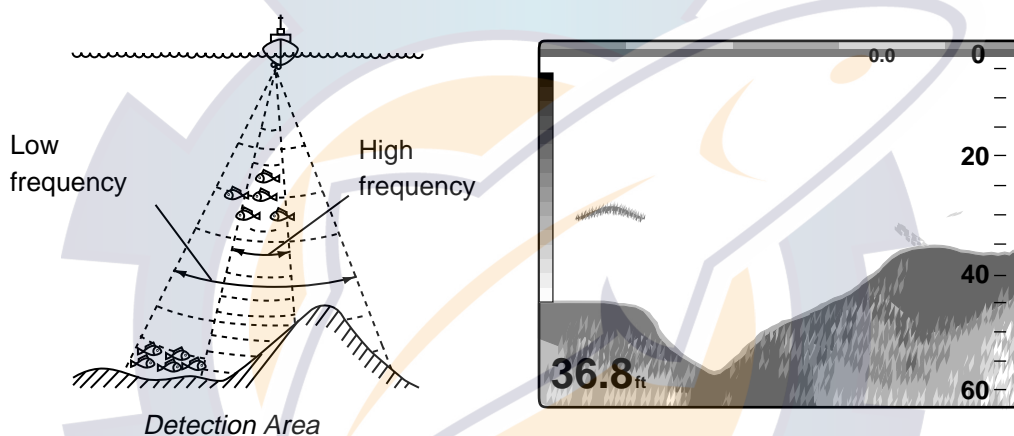
## 7.2 Selecting a Display

There are six display modes from which to select: dual frequency, single frequency, marker zoom, bottom zoom, bottom lock, and A-scope.

### 7.2.1 Single Frequency Display

The single frequency display shows either the low frequency or high frequency picture over the entire screen. In deciding which frequency to select keep the following points in mind:

- The lower the frequency of the ultrasonic pulse, the wider the detection area. Therefore the low frequency is useful for general detection and judging bottom conditions
- The higher the frequency of the ultrasonic pulse, the better the resolution, thus the high frequency is ideal for detailed observation of fish schools.

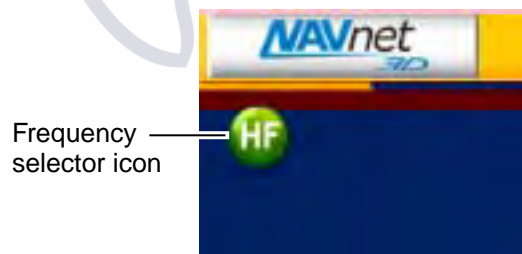


#### Selecting a single-frequency display

Push the RotoKey to show the soft controls. Use the RotoKey to select Mode, LF (Low Frequency) or HF (High Frequency) as appropriate.

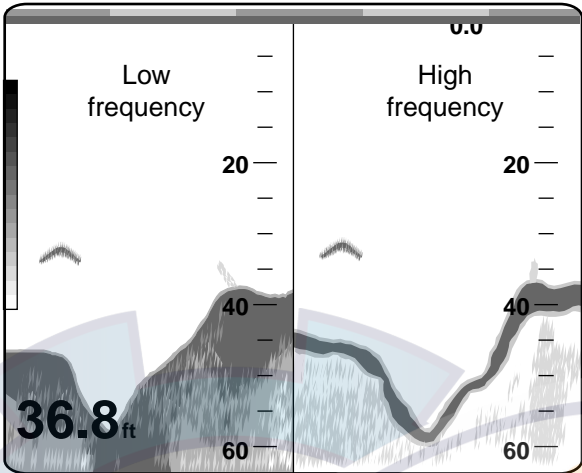
#### Changing active TX frequency with the frequency selector icon

Put the cursor on the icon and push the **left-click** button to switch between high and low frequencies.



7.2.2 Dual Frequency Display

The dual frequency display provides both low and high frequency pictures. This display is useful for comparing the same picture with two different sounding frequencies. The low frequency picture is on the left, and the high frequency on the right.



Freq. (kHz)	Beamwidth	Resolution	Detection range	Bottom tail
50	Wide	Low	Deep	Long
200	Narrow	High	Shallow	Short

Selecting the dual frequency display

Use the RotoKey to select Mode and Dual.

Switching to single frequency display with the frequency selector icon

Click either frequency selector icon. The dual mode is cancelled and the high frequency display appears.

## 7.2.3 Zoom Displays

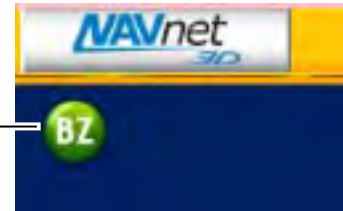
### Selecting a zoom display

Push the RotoKey to show the soft controls. Select Zoom, Btm Lock, Btm Zoom or Mkr Zoom to select respective zoom display, or Off to quit the zoom display and go to the high frequency display.

### Changing active zoom display, Tx frequency

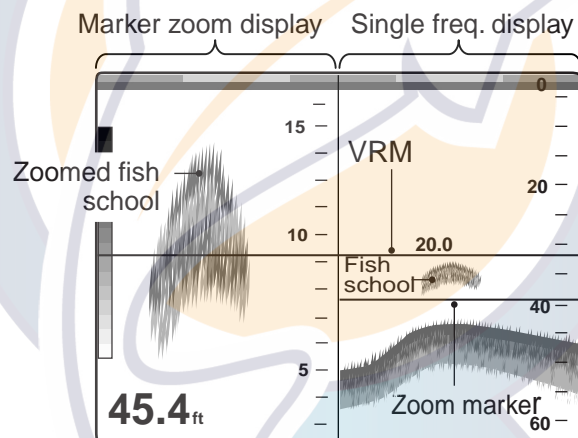
Click the zoom display selector icon at the top left corner of the display with the **left-click** button to change the active zoom display. To switch the active Tx frequency, click the frequency selector icon with the **left-click** button.

Zoom display selector icon



### Marker zoom display

The marker zoom display expands a selected area of the normal fish finder picture to full vertical size of the screen on the left-half window. You may specify the portion to expand by operating the VRM (Variable Range Marker), which you can shift with the Cursorpad. The area between the VRM and zoom marker is expanded. The length of the segment is equal to one division of the depth scale.

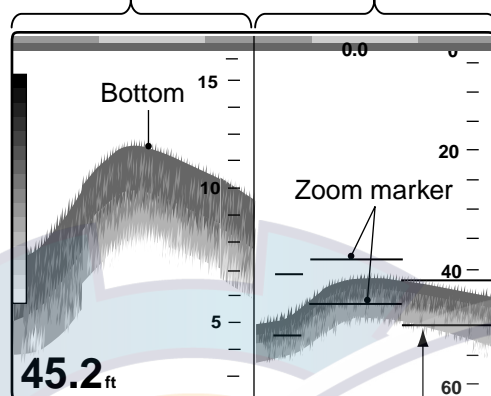


\* This area zoomed on left half of screen.

## Bottom zoom display

The bottom zoom display expands bottom and bottom fish echoes by the zoom range selected on the Fish Finder menu, and is useful for determining bottom hardness. A bottom displayed with a short echo tail usually indicates it is a soft, sandy bottom. A long echo tail indicates a hard bottom.

Bottom zoom display    Single freq. display

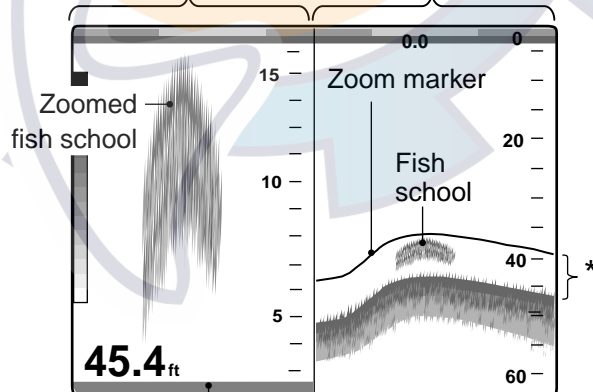


Zoom marker automatically follows change in depth.

## Bottom-lock display

The bottom-lock display provides a compressed normal picture on the right half of the screen and a 7 or 400 feet (3 or 120 meter) wide layer in contact with the bottom is expanded onto the left half of the screen. This mode is useful for discriminating bottom fish from the bottom echo. You may select the bottom lock range with Bottom Lock Range Span in the Fish Finder-DFF (or ETR) menu.

Bottom lock display    Single freq. display

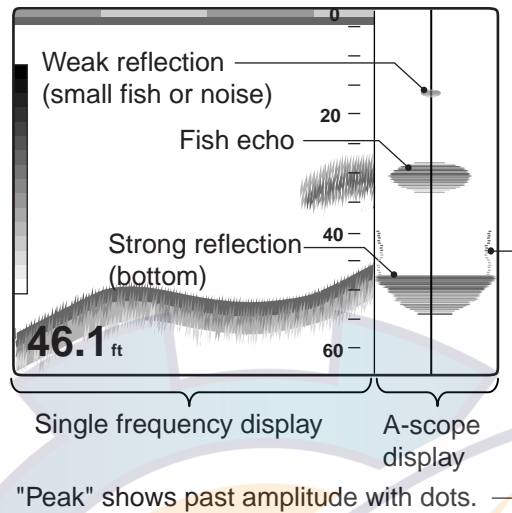


Bottom shown as a straight line

\*This area zoomed and displayed on left 1/2 of screen.

## 7.2.4 A-scope Display (display only)

The A-scope display, available in all modes, shows echoes at each transmission with amplitudes and tone proportional to their intensities, on the right 1/16 of the screen. It is useful for estimating fish species and bottom composition.



### Selecting the A-scope display

Use the RotoKey to select A-scope and push it to alternately turn the A-scope display on and off.

### A-scope peak hold

The A-scope display shows echoes at each transmission with amplitudes and tone proportional to their intensities. Additionally you can show the "normal" A-scope display plus peak-hold amplitude picture for last five seconds in dots. To do this, open the Fish Finder-General menu. Use the RotoKey to select A-Scope Peak Hold and push it turn peak hold on or off as applicable.



## 7.3 Automatic Fish Finder Operation

Automatic fish finder operation is useful when you are preoccupied with other tasks and do not have the time to adjust the display.

### 7.3.1 How the Automatic Fish Finder Works

The automatic fish finder function automatically selects the proper gain, range scale (DFF only) and clutter suppression level according to the depth. It works as follows:

- The range changes automatically to locate the bottom on the lower half of the screen. The range jumps to one step shallower range when the bottom echoes reach a half way point of the full scale from the top and to one step deeper range when they come to the lower edge of the scale.
- The gain is automatically adjusted to display the bottom echo in reddish brown (default color arrangement).
- Clutter, which suppresses low level noise, is automatically adjusted.

### 7.3.2 Selecting an Automatic Fish Finder Mode

Two types of automatic fish finder modes are available: Cruising and Fishing. Cruising is for tracking the bottom, and Fishing is for searching fish schools. Cruising uses a higher clutter rejection setting than Fishing therefore it is not recommended for fish detection - weak fish echoes may be erased by the clutter suppression circuit.

**To select an automatic fish finder mode:**

1. Push the RotoKey.
2. Use the RotoKey to select Auto followed by Fishing or Cruising as appropriate.

## 7.4 Manual Fish Finder Operation

Manual operation is useful for observing fish schools and bottom using a fixed gain setting.

The gain, range and range shift functions used together give you the means to select the depth you can see on the screen. The basic range can be thought of as providing a "window" into the water column and range shifting as moving the "window" to the desired depth.

### 7.4.1 Selecting the Manual Mode

Use the RotoKey to select Auto followed by Off.

### 7.4.2 Selecting a Display Range

#### Selecting Automatic or Manual Range Selection

1. Push the RotoKey.
2. Select Auto Range and push the RotoKey to enable and disable automatic range selection alternately.

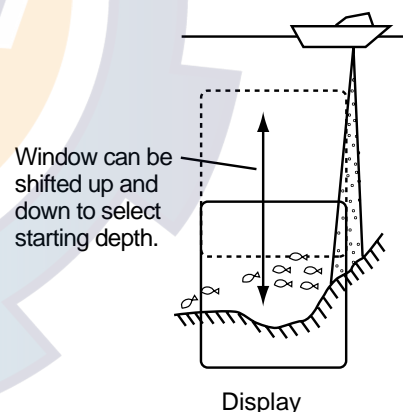
#### Manual Range Selection

Use the **RANGE** key to select a range, that is, the maximum depth to display. Note that the range cannot be changed in the automatic mode.

### 7.4.3 Shifting the Range

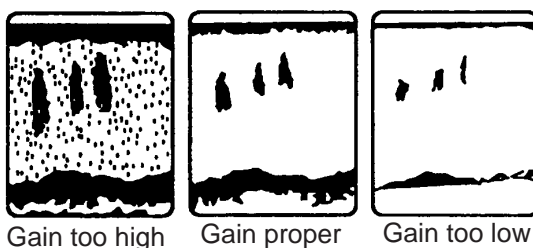
The basic range and range shifting functions used together give you the means to select the depth you can see on the screen. The basic range can be thought of as providing a "window" into the water column and range shifting as moving the "window" to the desired depth. This function is inoperative when the Auto range mode is active.

The basic range may be shifted up or down with ▲ or ▼ on the Scrollingpad.



### 7.4.4 Adjusting the Gain

The gain determines how echoes of different strengths are displayed. Normally, set the gain to the point where excessive noise does not appear on the screen. Use a higher gain setting for greater depths and a lower setting for shallow waters.



Gain too high

Gain proper

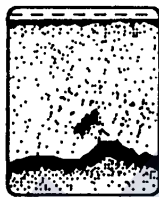
Gain too low

Press the **GAIN/TX** key to show the gain window. Gain HF is selected. To adjust the low frequency, push the key again to select Gain LF. Rotate the RotoKey to adjust the gain and then push it to set. Current level is shown on the bar, and the setting range is 0-100(%).



## 7.4.5 Rejecting Clutter

Low intensity "speckles" may appear over most of screen. This is mainly due to sediment in the water or noise. These can be suppressed by adjusting Clutter on the Fish Finder menu.



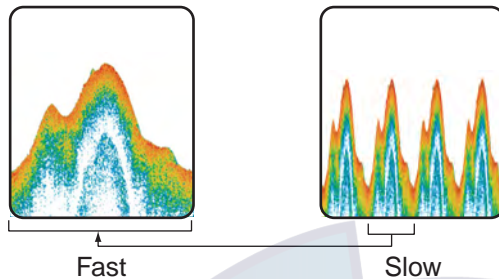
1. Press the **MENU** key to open the menu.
2. Open the Fish Finder-DFF (or ETR) menu as applicable.
3. Use the RotoKey to select Clutter.



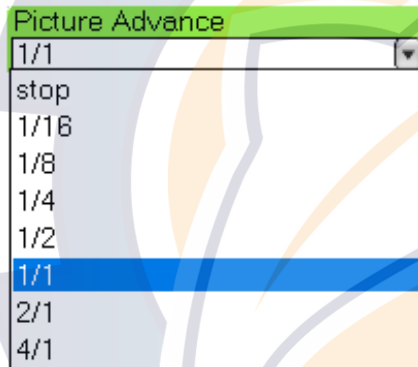
4. Rotate the RotoKey to adjust the clutter percentage level and push the RotoKey knob.
5. Press the **MENU** key to close the menu.

## 7.5 Picture Advance Speed

The picture advance speed determines how quickly the vertical scan lines run across the screen. When choosing a picture advance speed, keep in mind that a fast advance speed will expand the size of the fish school horizontally on the screen and a slow advance speed will contract it. A fast advance speed is useful for observing the rugged bottom minutely. A slow advance speed is useful for observing the smooth bottom.



1. Press the **MENU** key to open the menu.
2. Open the Fish Finder-DFF (or ETR) menu as applicable.
3. Use the RotoKey to select Picture Advance.



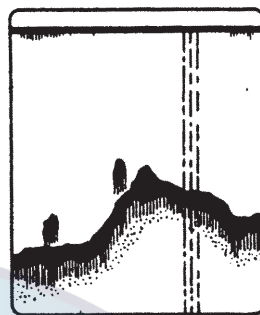
4. Use the RotoKey to select a picture advance speed. The fractions in the window indicate the number of scan lines produced per transmission. For example, "1/2" produces once scan line per two transmissions. 1/16 is the slowest advancement speed and 4/1 the fastest. "Stop" freezes the picture, and is useful for taking a photo of the screen.
5. Press the **MENU** key to close the menu.

## 7.6 Rejecting Interference

Interference from other fish finders and electrical interference may show itself on the screen as in the illustration below. When interference is present, you can reject it with the interference rejector. Four levels are available including off. Turn off the noise limiter when no interference exists, so as not to eliminate weak echoes.

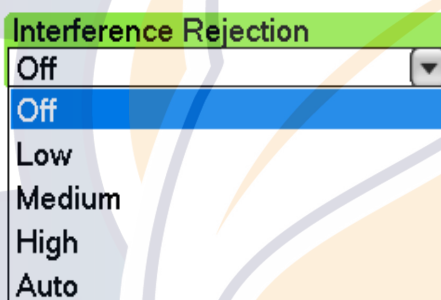


Interference from  
other sounder

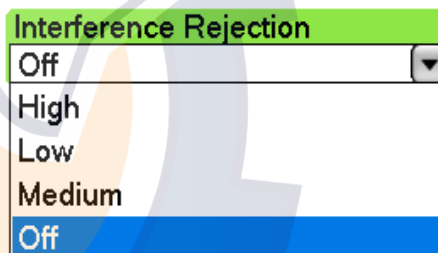


Electrical interface

1. Press the **MENU** key to open the menu.
2. Open the Fish Finder-DFF (or ETR) menu as applicable.
3. Use the RotoKey to select Interference Rejection.



DFF menu



ETR-6/10N, ETR-30N menu

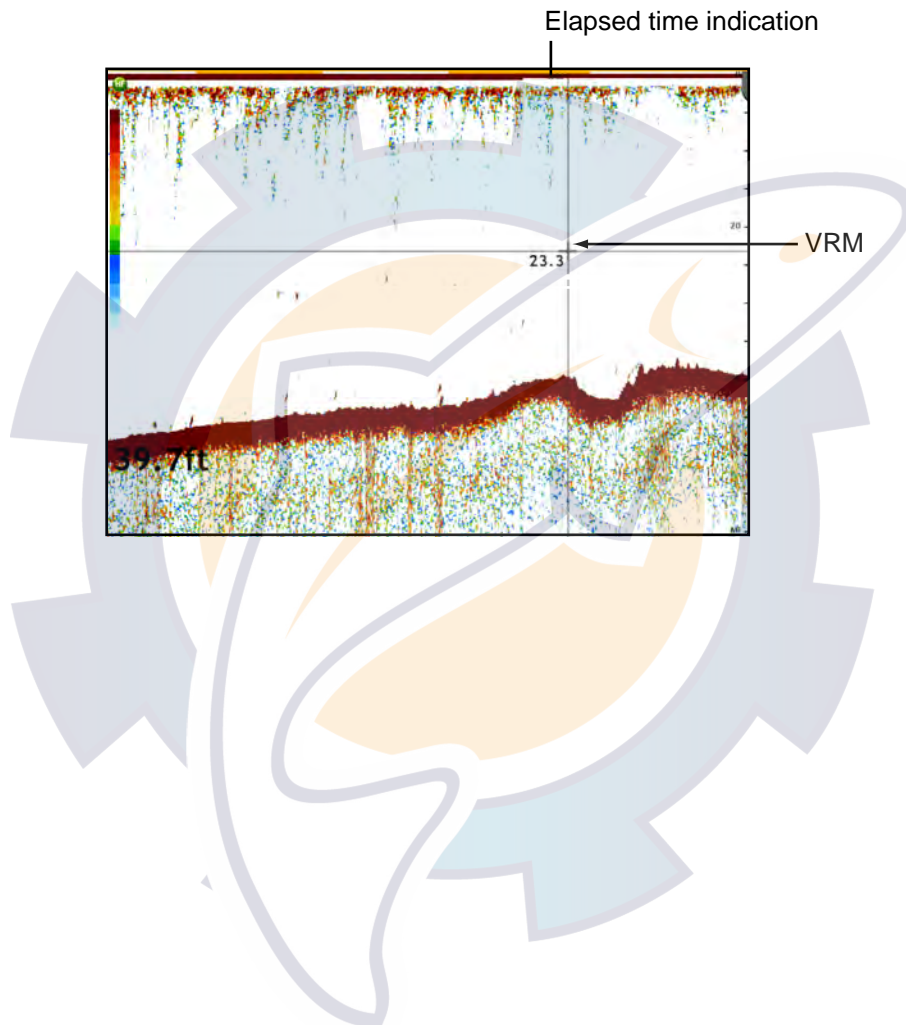
4. Use the RotoKey to select Off, Low, Medium, High or Auto (DFF only) as applicable.
5. Press the **MENU** key to close the menu.

## 7.7 Measuring Depth, Elapsed Time

You can measure the depth to a fish school or bottom with the VRM. Further, you can also measure elapsed time from the right edge. For example, you can measure how many minutes before the current time a fish echo appeared.

To measure depth, elapsed time, operate the Cursorpad to place the VRM on the object for which you want to measure depth, elapsed time. Read the depth below the VRM and the elapsed time at the top of the screen.

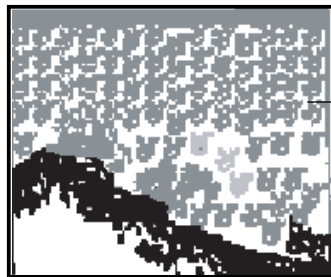
Note that the VRM is inoperative when the Gain adjustment window is active.





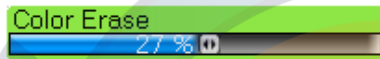
## 7.8 Erasing Weak Echoes

Sediment in the water or reflections from plankton may be painted on the display in low intensity tones. You can suppress this form of interference from the Fish Finder menu.



Weak  
echoes

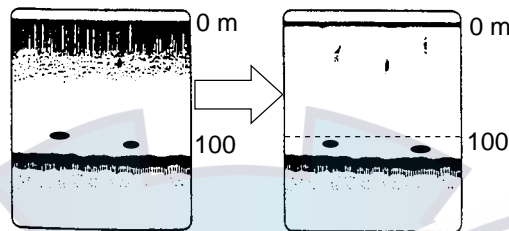
1. Press the **MENU** key to open the menu.
2. Open the Fish Finder-DFF (or ETR) menu as applicable.
3. Use the RotoKey to select Color Erase.



4. Rotate the RotoKey to select the percentage of colors to erase and then push the RotoKey to confirm setting. Select a low percentage to erase weak echoes. Raise the percentage to erase strong echoes.
5. Press the **MENU** key to close the menu.

## 7.9 Equalizing Echoes

A fish school at a deep depth is displayed in weak colors even if it is equal in strength to one in shallow waters. This is due to propagation attenuation of the ultrasonic wave. To compensate for this difference, use TVG. TVG automatically adjusts the gain with depth so that echoes of the same strength and different depths are shown in the same colors regardless of their depths. The gain is increased with depth to display echoes of equal strengths in the same colors. In the figure below, for example, the TVG is set for 100 m and the TVG level is adjusted. Then, unwanted echoes at a distance less than 100 m are deleted and echoes at depths greater than 100 m are not affected.



1. Press the **MENU** key to open the menu.
2. Open the Fish Finder-DFF (or ETR) menu as applicable.
3. Select TVG HF (high frequency) or TVG LF (low frequency) as appropriate and push the RotoKey.

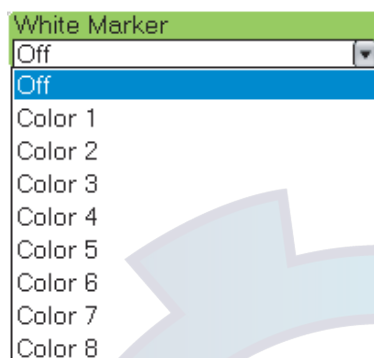


4. Rotate the RotoKey to adjust the level. The higher the level the less the gain at near distance.
5. Press the **MENU** key to close the menu.

## 7.10 White Marker

The white marker displays the chosen echo color in white. This can be useful for distinguishing bottom fish from the bottom echo.

1. Press the **MENU** key to open the menu.
2. Open the Fish Finder-DFF (or ETR) menu as applicable.
3. Use the RotoKey to select White Marker.



4. Use the RotoKey to select the echo color to display in white. Color 8 is the strongest color.
5. Press the **MENU** key to close the menu.

## 7.11 Fish Alarms

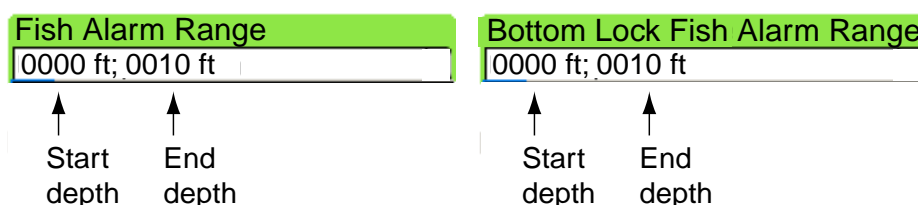
There are two types of fish alarms which release audio and visual alarms to inform you to the presence of fish in a specific area: fish alarm and bottom lock fish alarm.

The **fish alarm** tells you when an echo above a certain strength (selectable) is within the preset alarm range or on the screen.

The **bottom lock fish alarm** informs you when fish are within a certain distance from the bottom. Note that the bottom lock display must be active in order to use this alarm.

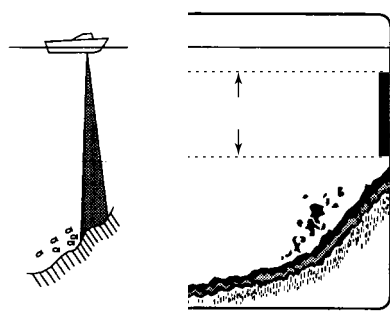
### 7.11.1 Setting an Alarm

1. Press the **MENU** key to open the menu.
2. Select the Alarms-Fish Finder menu.
3. Select Fish Alarm Range for the fish alarm, or turn on Fish Alarm for Bottom to enable entry of bottom lock alarm range at Bottom Lock Fish Alarm Range.

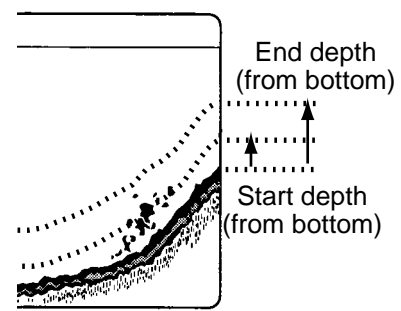


4. Push the RotoKey to enable entry of alarm value.

5. Use the RotoKey to set the start depth. Rotate the knob to set numeric and push it to confirm.



Scenario for fish alarm



Scenario for bottom-lock alarm

6. Set the end depth similarly.
7. Press the **MENU** key to finish.

## 7.11.2 Enabling/Disabling the Alarm

### Fish alarm

Long push the RotoKey to show the soft controls. Select Fish Alarm and push the RotoKey to enable and disable the alarm alternately.

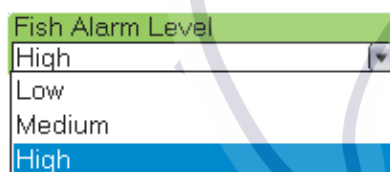
### Fish alarm for bottom lock

Open the Alarm-Fish Finder menu and turn Fish Alarm for Bottom Lock on or off as appropriate.

## 7.11.3 Alarm Sensitivity

You can select which strength of echoes to trigger the fish alarms.

1. Press the **MENU** key to open the menu.
2. Select the Alarms-Fish Finder menu.



3. Use the RotoKey to select which echo strength triggers the fish and bottom lock alarms, referring to the description below.

**Low:** Light-blue or stronger echoes

**Medium:** Yellow or stronger echoes

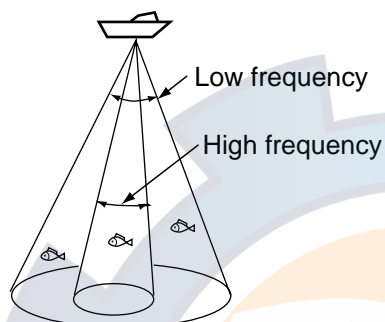
**High:** Red and reddish-brown echoes

4. Press the **MENU** key to finish.

## 7.12 ACCU-FISH

The ACCU-FISH feature, which requires a DFF network fish finder, estimates fish length, displaying an appropriately sized fish symbol together with depth value or fish length. The information presented by this feature is only intended for reference purposes; it is not a completely accurate measurement of fish length.

Both high and low frequencies returning at the center of the transducer beam are used to calculate fish length. Fish to be used for size calculation are taken from the high frequency beam and their size is calculated from their strength found with the low frequency beam. In the example below, the fish at the center of the figure are used to calculate length.



### Considerations for ACCU-FISH

- Echo intensity depends on fish specie. If the indicated value is different from the actual fish, you can compensate for this on the Fish Finder-DFF menu.
- When Fish Symbols or Fish Info are enabled, 50 kHz and 200 kHz beams are transmitted alternately, even if a single frequency mode is in use.
- To reduce error, the detection area should be 2 to 100 meters from the surface.
- With the inside-hull transducer, signal attenuation is different between 50 kHz and 200 kHz. Therefore, a fish may not be detected or the fish length indicated may be smaller than actual length.
- In case of a fish school, echoes overlap one another, so the margin of error will be greater.
- The fish symbol indication is not shown when the bottom is not displayed on the screen.

### 7.12.1 Setting up ACCU-FISH

1. Press the **MENU** key to open the menu.
2. Open the Fish Finder-DFF menu as applicable.
3. Use the RotoKey to select Measurement.



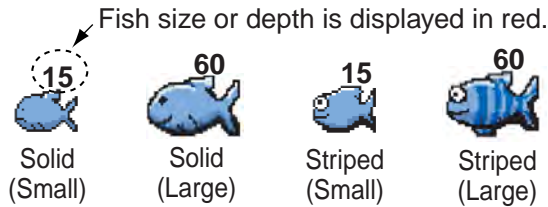
4. Use the RotoKey to select Accu Fish to turn on ACCU-FISH, or Off to turn it off.



5. Select Fish Info.



6. Select Fish Size or Depth as appropriate.

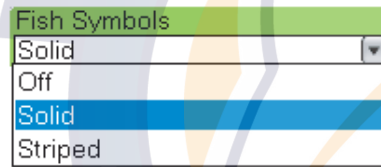


7. Select Info Size.



8. Select the size for fish info (fish size or depth).

9. Select Fish Symbols.



10. Select Solid, Striped or Off (turn off fish symbol) as appropriate.

Fish size	Solid	Striped
Large fish symbol (more than 51 cm (20.08 inch))		
Small fish symbol (10 to 50 cm (3.93 to 19.69 inch))		

11. Press the **MENU** key several times to close the menu.

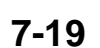
## 7.12.2 Fish Size Correction

If the fish size shown on the display is different from actual fish size, you can compensate for the difference on the menu. Use the RotoKey to select Fish Size Correction on the Fish Finder-DFF menu, rotate the RotoKey to set correction percentage and then push the RotoKey. The setting range is -80% to +100%, in intervals of 10.



The water temperature graph, which requires a temperature sensor, plots surface water temperature across the screen, from right to left. The water temperature scale is available in degrees Celsius or Fahrenheit, selectable on the Global-Units menu.

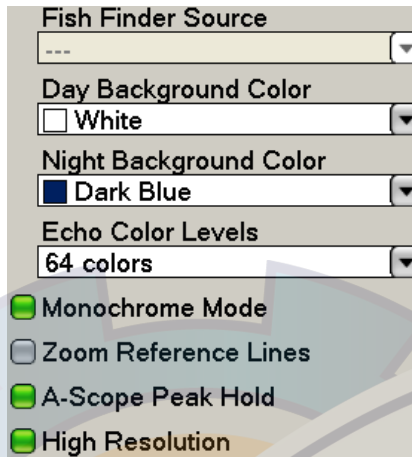
## Water temperature scale and graph



## 7.14 Fish Finder Menu Operation

This section provides descriptions for those fish finder functions not mentioned in previous sections.

### 7.14.1 Fish Finder-General Menu



**Fish Finder Source:** Shows the name of the network fish finder connected to the network.

**Day Background Color:** Select the background color for use during daylight hours. The choices are black, dark blue, light blue, and white.

**Night Background Color:** Select the background color for use at nighttime. The choices are black and dark blue.

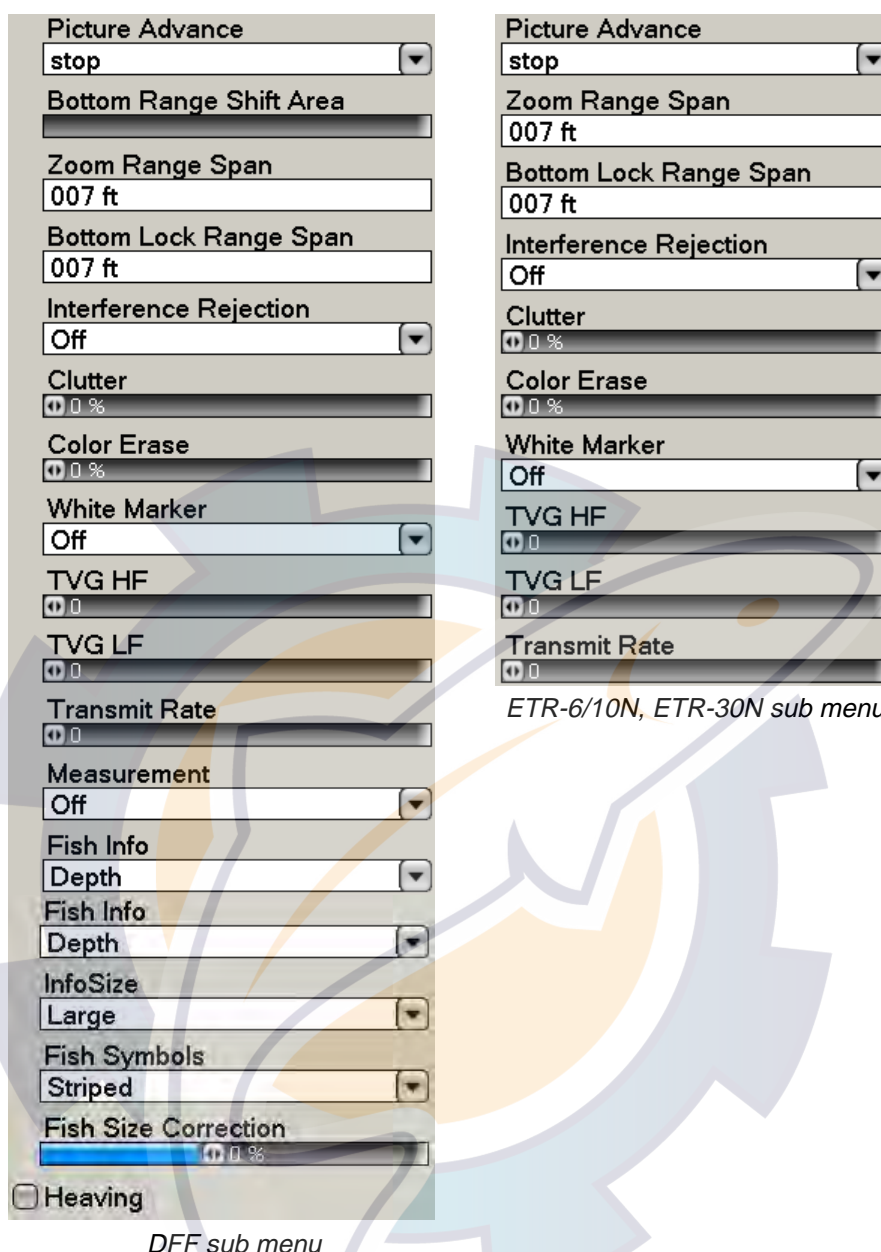
**Monochrome Mode:** Show echoes in shades of gray.

**Zoom Reference Lines:** Show/hide the zoom marker, which appears in the bottom zoom and marker zoom modes.

**A-Scope Peak Hold:** See "7.2.4 A-scope Display (display only)" on page 7-6.

**High Resolution:** Turn this feature on when echoes appear "jagged", to smooth the echo presentation.

## 7.14.2 Fish Finder-DFF, -ETR-6/10N and -ETR-30N Menus



### DFF, ETR-6/10N, ETR-30N

**Picture Advance:** See "7.5 Picture Advance Speed" on page 7-10.

**Bottom Range Shift Area:** Select the area where to show the bottom echo, when Auto Range is active. For example, setting 75% would place the bottom echo at a position equivalent to 75% from the top of the display.

**Zoom Range Span:** Set the zoom range for the bottom zoom and marker zoom displays. The available range is 7-400 (ft).

**Bottom Lock Range Span:** Set the bottom lock range for the bottom lock display. The available range is 7-400 (ft).

**Transmit Rate:** Change pulse repetition rate, in 20 levels and Auto\*. Normally, the highest rate (20) is used. When in shallow waters second reflection echoes may appear between surface and actual bottom echo. In this case, lower the Tx rate level.

\* DFF series only.

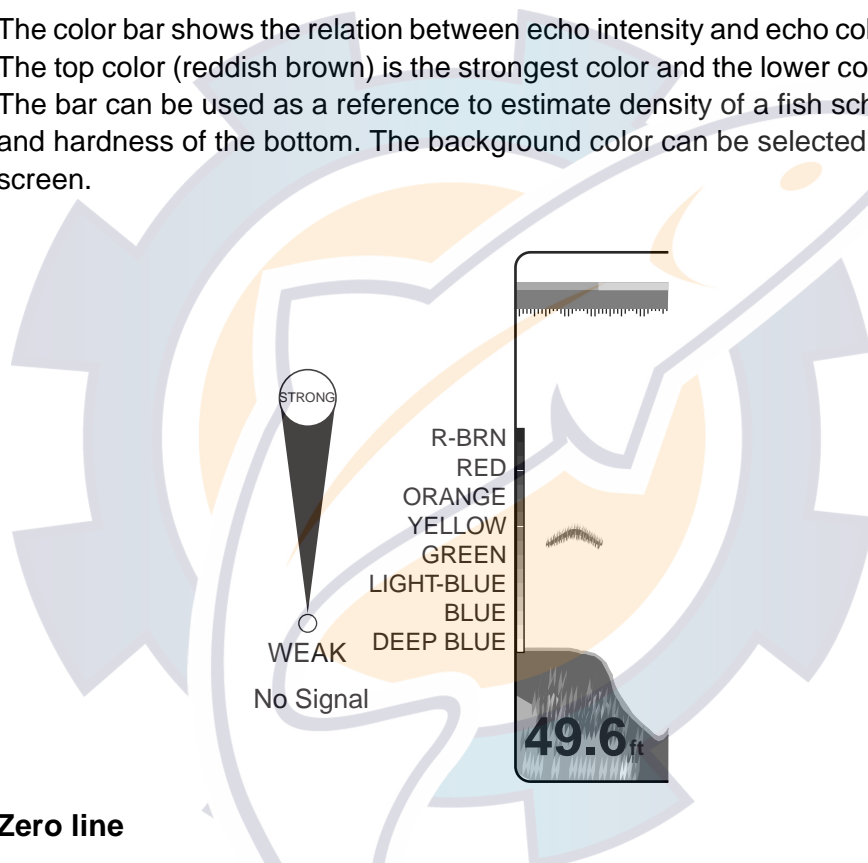
## DFF

**Heaving:** If this MFD is interfaced with a FURUNO satellite compass and network fish finder DFF1 or DFF3, you can compensate for the effects of heaving by turning on Heaving. When the boat is in rough seas, the bottom echo and fish echoes are displayed unstably because the distance to the bottom changes often. The satellite compass outputs pitch and roll data to compensate the fish finder's Tx and Rx beams, providing a stable picture.

## 7.15 Interpreting the Display

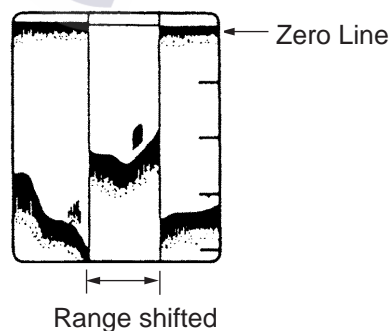
### Color bar

The color bar shows the relation between echo intensity and echo color on the screen. The top color (reddish brown) is the strongest color and the lower colors the weakest. The bar can be used as a reference to estimate density of a fish school, fish species and hardness of the bottom. The background color can be selected on the menu screen.



### Zero line

The zero line represents the transducer's position. It moves off the screen when a shifted range is used, or is shown at draft depth when ship's draft is entered

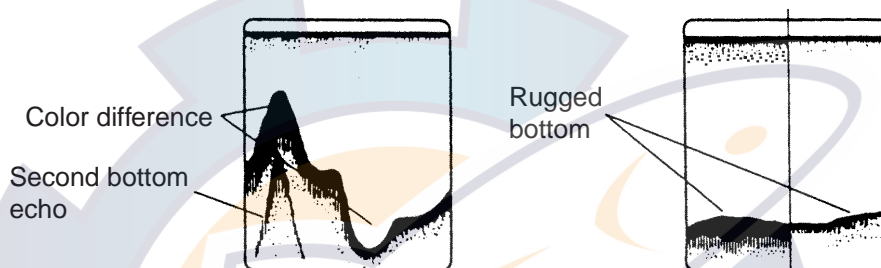


## Bottom echoes

Bottom echoes are normally strongest and displayed in reddish brown or red, but colors and width will vary with bottom material, depth, sea condition, installation, frequency, pulse length and sensitivity.

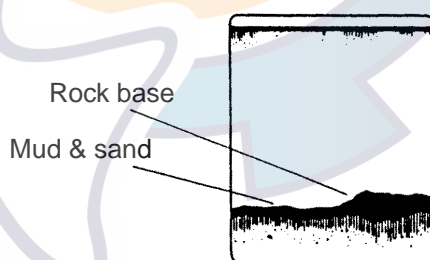
## Bottom profile

A hard and rough bottom appears with a longer tail because it reflects more of the ultrasonic pulse. Because of their stronger return, shallow echoes appear wider than deep ones even when all bottom conditions are equal. Also, a longer bottom tail appears on slopes because of the difference in traveling time at both edges of the beam angle. In the rugged bottom, echoes are reflected on many different planes, overlapping to present a 3D effect.



## Bottom nature

The nature of the bottom is known from the intensity and length of the bottom tail. Generally, when observing the bottom nature, the lower sounding frequency is used, the pulse length is set to long, and the gain setting is not disturbed. In the hard and craggy bottom, the bottom appears in reddish brown with a long tail. In the muddy or sandy bottom, the bottom appears less reddish and with a short tail. However, the bottom with sediment may give a long tail if a low frequency sounding is used.



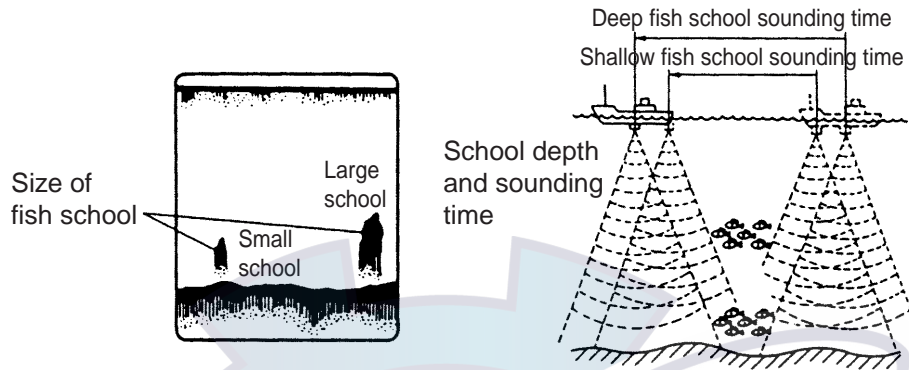
## Fish quantity

Fish quantity can be estimated to a certain extent from fish echoes on the screen if fish school size and fish school density are kept in mind.



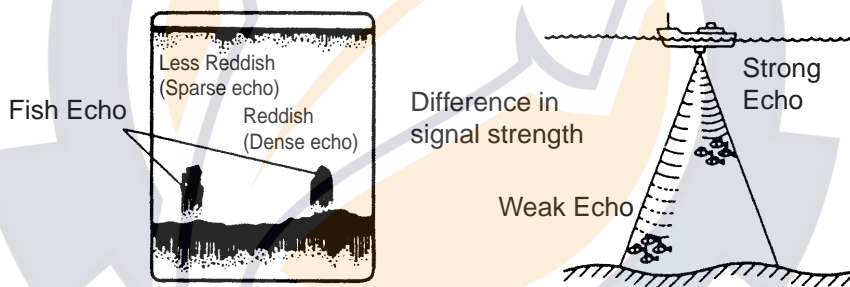
### Fish school size

Usually the size of fish echoes on the screen is proportional to the actual size of the fish school. However, if two fish echoes appear at different depths with the same size, the fish school at shallower depth is smaller because the ultrasonic beam widens as it propagates and a fish school in deep water is displayed larger.



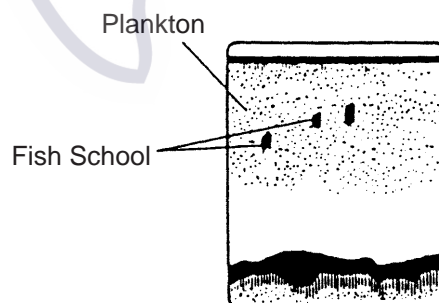
### Fish school density

If two schools appear with the same color at different depth, the one in deeper water is denser because the ultrasonic wave attenuates as it propagates and the fish school in deep water tends to be displayed in a weaker color.



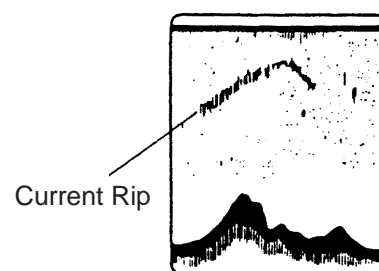
### Plankton

A plankton layer, a likely place to find fish, is displayed in green or blue dots. It usually descends in the day and rises at night.



### Current rip

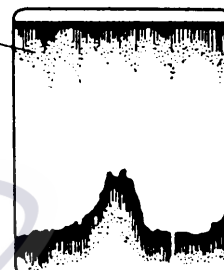
When two ocean currents meet with different speeds, directions and water temperatures, a current rip develops. A current rip's on-screen appearance is as shown below.



### Surface noise

When the sea is rough or the ship passes over a wake, surface noise may appear at the top of the screen.

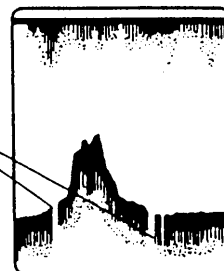
Surface Noise



### Aerated water

When the sea is rough or the ship makes a quick turn, gaps in the bottom echo on the screen may appear. This is caused by air bubbles which block propagation of the sound wave. Generally low frequency ultrasonic waves are interrupted more easily than high ones.

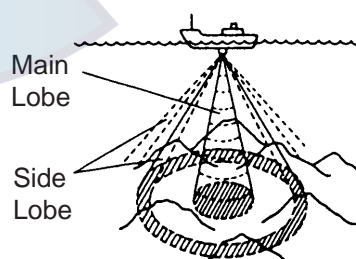
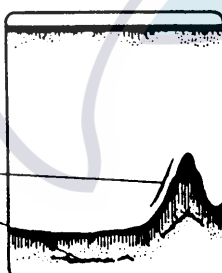
Ultrasonic wave blocked by aerated water



### False echo

Every time ultrasonic pulse is transmitted, some radiation escapes on each side of the beam, called "side lobes." Echoes from side lobes show on the display as false images as below.

False Image



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# Chapter 8: File Operations

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This chapter covers file operations, using SD cards. Topics include

- How to import tracks, routes, points and user setup
- How to export tracks, routes, points and user setup
- How to manage files on hard disk and SD card
- How to request and import update files

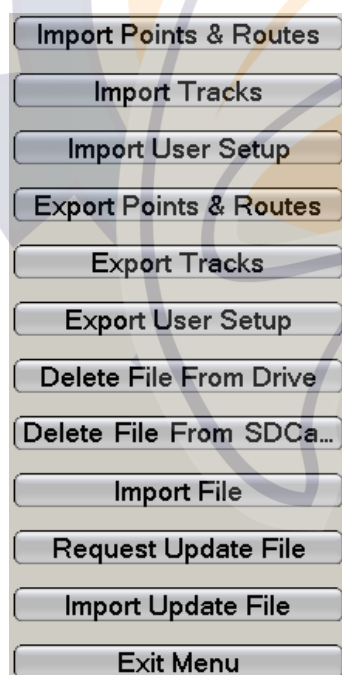
We recommend that you use SD cards whose capacity is 128 MB to 2 GB. (For downloading software updates from the NavNet® homepage ([www.navnet.com](http://www.navnet.com)) the capacity should be 2 GB). For compatible SD cards, see the NavNet® homepage.

## 8.1 Formatting SD Cards

Before you can use an SD card in the NavNet system it must be formatted. Format your cards on a PC, in file system FAT16 or FAT32.

## 8.2 Files Menu Operation

The Files menu is where all importing and exporting of data and files are done.



### 8.2.1 Files Menu Description

#### Import Points & Routes

Import points and routes from an SD card. Points and routes loaded from an SD card are displayed together with current points and routes. In case of identical names, the point or route data on the display is written over with the matching data on the SD card.

### **Import Tracks**

Import track from an SD card. This is useful when you want to create a route using past tracks. Like with Import Points & Routes, imported tracks are displayed together with current tracks. Any identical track data is written over with the track data on the SD card

### **Import User Setup**

This feature imports user settings (all menu settings) from an SD card to the HDD. The current user settings are written over.

### **Export Points & Routes**

This unit holds 2,000 points and 200 routes in its hard disk. When the capacity for points or routes is reached, a new point or route cannot be entered unless an unnecessary one is erased. For those reasons, you may wish to export needed points and routes to an SD card.

### **Export Tracks**

This unit holds 12,000 points of tracks. When that total is reached, the oldest track is deleted to make room for the latest. If you require the track, save it to an SD card.

### **Export User Setup**

Export user settings to an SD card. This is useful when you want to setup another multi-function display with the same settings as another.

### **Delete File from Drive**

Delete unnecessary files from the HDD.

### **Delete File from SDCard**

Delete unnecessary files from an SD card.

### **Import File**

Reserved for future use.

### **Request Update File**

This feature saves application version numbers of the system software and charts to an SD card. This data is uploaded to the NavNet homepage to determine if you need to update your software or not.

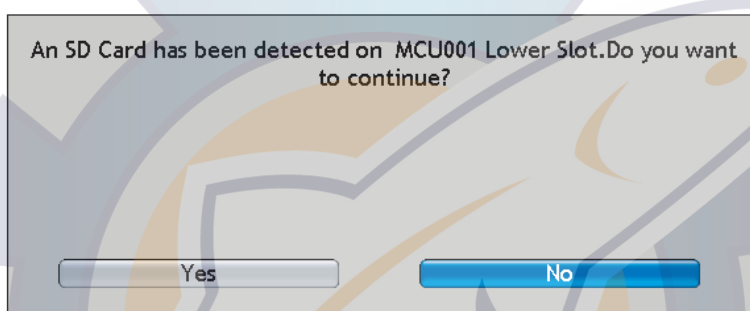
### **Import Update File**

Select this item to update the NavNet® software and/or charts.

## 8.3 Exporting Tracks, Points and Routes, User Setup

Tracks cannot be stored endlessly; the oldest track is erased to make room for the latest when the track memory becomes full. New points and routes cannot be entered when their respective memories are full. For those reasons you may want to export tracks, points or routes to an SD card. It is also possible to save user settings to an SD card to use them on other MFD units.

1. Insert a blank formatted SD card in either card slot.
2. Press the **MENU** key to open the menu.
3. Open the Files menu.
4. Select Export Tracks, Export Points and Routes or Export User Setup as applicable. The screen announces where you have inserted the SD card and you are asked if you are ready to continue.



5. Rotate the RotoKey to select Yes and then push it. You are asked to enter a file-name in case of Points and Routes or User Setup, or choose a track file in case of Track.



*For Points & Routes User Setup*



*For Track*

6. Do one of the following:  
**Points and Routes, User Setup:** Use the RotoKey to enter a file name.  
**Track:** Use the RotoKey to select the track file to export.
7. After the exporting is completed, press the **MENU** key to close the menu.



## 8.4 Importing Tracks, Points and Routes, User Setup

You can import tracks, points, routes and user setup to the NavNet unit's HDD. This is useful when you want all MFD units in a network to share the same data.

1. Insert applicable SD card in either card slot.
2. Press the **MENU** key to open the menu.
3. Open the Files menu.
4. Select Import Tracks, Import Points and Routes or Import User Setup as applicable. The screen announces where you have inserted the SD card and you are asked if you are ready to continue.
5. Rotate the RotoKey to select Yes and then push it.
6. A list of applicable files appears; rotate the RotoKey to choose the file to import and then push it to import the selected file.
7. After the importing is completed, press the **MENU** key to close the menu.

## 8.5 Deleting Files

You can delete unnecessary tracks, routes, points and user setup data from the HDD and SD card.

1. Insert the SD card which contains the file you want to delete into the card drive.
2. Press the **MENU** key to open the menu.
3. Open the Files menu.
4. Select Delete File from Drive or Delete File from SDCard as applicable. If you choose Delete File from SDCard you are prompted to continue. Use the RotoKey to choose Yes.

Files stored on the hard disk or SD card are listed, and the file lists look something like those shown below.

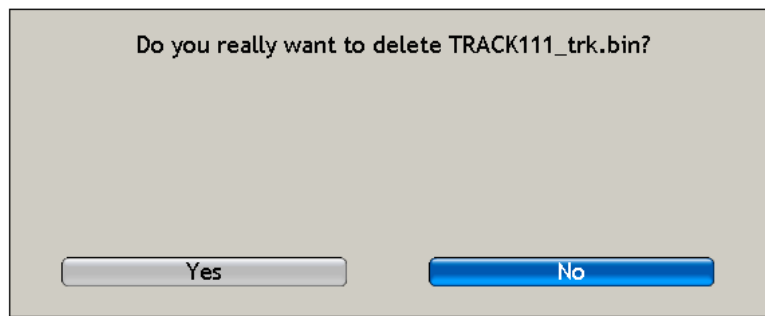
777_grp.csv
777_rte.csv
777_twp.csv
777_wpt.csv
SDUS00V557MAP01.catv
SDUS01RMAP01.catr
SDUS02RMAP01.catr
SDUS03RMAP01.catr
SDUS04RMAP01.catr
SDWW00RMAP01.catr
SDWW00V557MAP01.catv
USERSETUP1_stp0.bin
USERSETUP1_stp1.bin
USERSETUP1_stp2.bin

*Files on SD card*

ACTIVET1_trk.bin
ACTIVETR_trk.bin
Demo_CapeCod.nnd
TRACK111_trk.bin

*Files in the hard drive*

5. Use the RotoKey to select the file to delete and push the RotoKey. You are asked if you are sure to delete the selected file.



6. Rotate the RotoKey to select Yes and then push it to delete selected file.
7. Press the **MENU** key to close the menu.

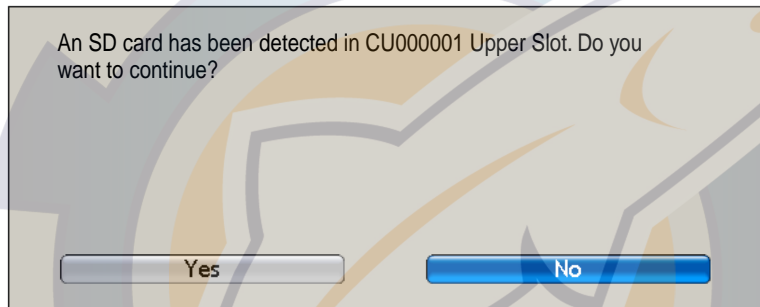


## 8.6 Updating System Software

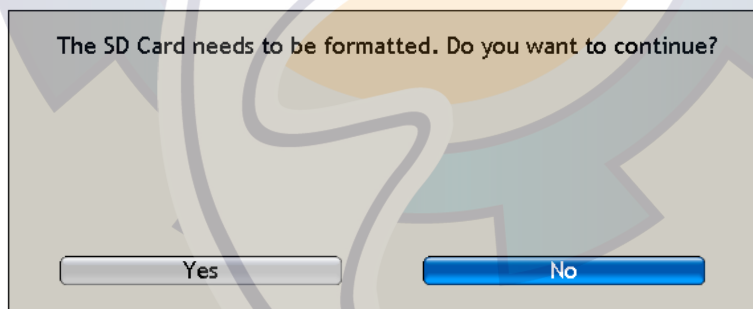
You can download the latest software and chart for the NavNet® 3D from [www.navnet.com](http://www.navnet.com), using the "request update file" feature. This feature saves your system's information (program and chart version numbers) to an SD card. You load the file saved to the SD card on your PC and open the NavNet® homepage. Follow the instructions on the homepage to check your software and chart version numbers. If the version(s) on the homepage are newer, download and install respective software updates. We recommend that you use an SD card having a capacity of at least 2GB when doing this procedure.

### Copying system information to an SD card

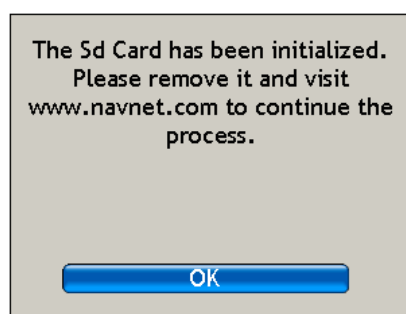
1. Insert a blank SD card into either slot in the card drive.
2. Press the **MENU** key to open the menu.
3. Open the Files menu.
4. Select Request Update File.



5. Use the RotoKey to select Yes and push it. The prompt below appears, asking you to format the card.



6. Use the RotoKey to select Yes and push it. After the card is formatted the message shown below appears.



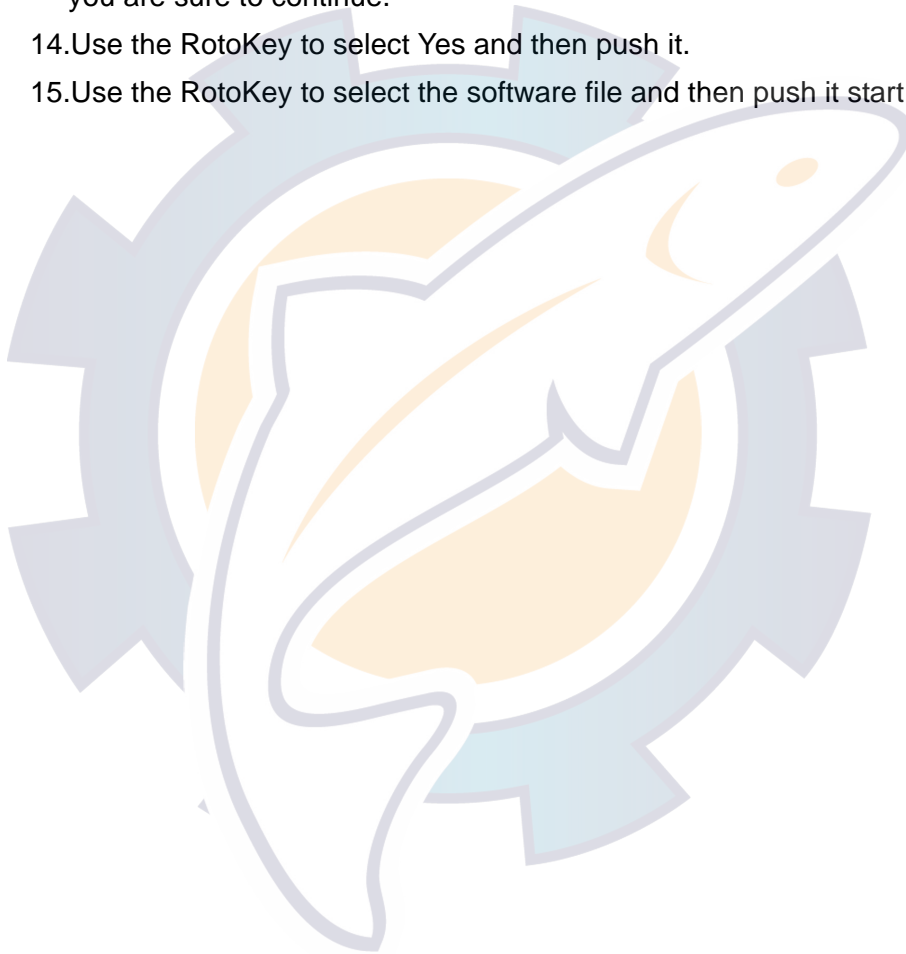
7. Use the RotoKey to click the OK button.
8. Press the **MENU** key to close the menu.

9. Go to [www.navnet.com](http://www.navnet.com) and follow the instructions for downloading the update file. Then, follow the procedure on the next page.

### Importing update file

After you have downloaded the latest software and/or chart from the NavNet® home-page, import it into your system as follows:

10. Insert the SD card that contains the software and/or chart into either slot in the card drive.
11. Press the **MENU** key to open the menu.
12. Open the Files menu.
13. Use the RotoKey to select Import Update File and then push it. You are asked if you are sure to continue.
14. Use the RotoKey to select Yes and then push it.
15. Use the RotoKey to select the software file and then push it start uploading.



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## Chapter 9: Camera/Video

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The camera/video function allows you to use your unit to playback images from a video player, on-board camera, network camera or DVD player. Network camera images are viewable across the entire NavNet®3D network. Video signal can be seen only on the MFD that receives the video signal.

Up to two IP cameras can be connected and you can view up to two of them, on the full screen or 1/4 screen. You can also set up the video application to cycle the display of each video input. Further, you can also adjust the brightness, contrast and color of each image.

### 9.1 Displaying a Video Image

The camera application is included in the default display selection window. Press the **DISP** key to show the display selection window. Rotate the RotoKey to choose the Camera Display and push it to confirm selection.





## 9.2 Customizing the Video Display

### 9.2.1 Selecting the Input Source

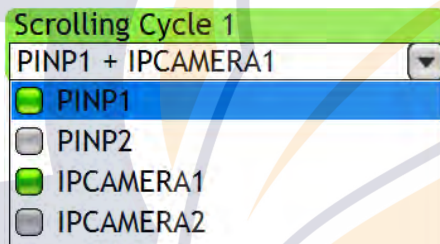
You can select the input source from the menu or with the RotoKey. Below is the procedure with the RotoKey.

1. With the camera display active, push the RotoKey.
2. Rotate the RotoKey to select Vid Source and push the RotoKey. The choices are as follows:
3. Select individual input source (PINP1 -PINP2) or network camera (IPCAMERA1 - IPCAMERA2).
4. Push the RotoKey to select or deselect the input as applicable.

### 9.2.2 Cycling Through Your Video Inputs

You can cycle through all the images being received. This is useful for monitoring the area around your boat, engine room, etc. with an on-board camera.

1. Press the **MENU** key.
2. Open the Camera menu.
3. Use the RotoKey to select Scrolling Cycle 1.



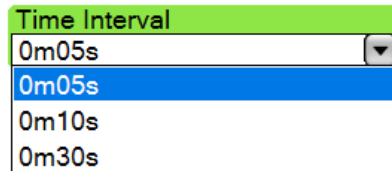
4. Use the RotoKey to select the inputs to cycle.
5. Set up Scrolling Cycle 2 similarly.
6. Press the **MENU** key to close the menu.

To choose the cycle, show the soft controls, use the RotoKey to select Vid Cycle followed by Cycle 1 or Cycle 2 as applicable.

### 9.2.3 Setting the Cycle Period

The default cycle period is five seconds. The cycle times of 10 and 30 seconds also are available.

1. Press the **MENU** key.
2. Open the Camera menu.
3. Use the RotoKey to select Time Interval.



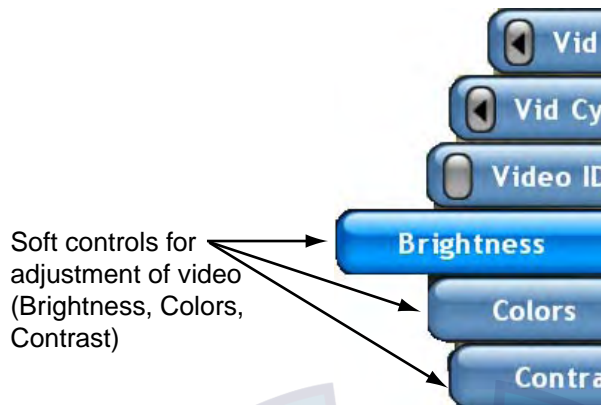
4. Use the RotoKey to select desired and interval.
5. Press the **MENU** key to close the menu.

## 9.3 Showing Video ID

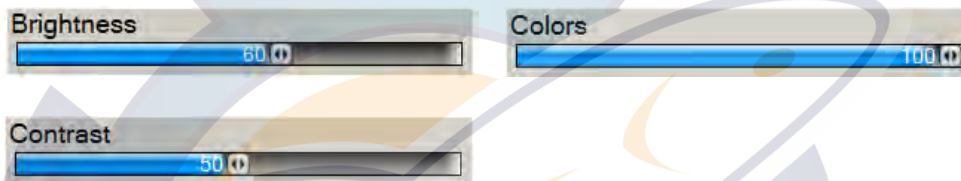
The video ID can be shown at the top left corner. Use the RotoKey to select Video ID and push it to show or hide the video ID as appropriate.

## 9.4 Adjusting the Video Image

1. Long push the RotoKey to show the soft controls for adjustment of video.



2. Rotate the RotoKey to select Brightness, Colors or Controls and then push it.



3. Rotate the RotoKey to adjust the slider bar and push it to confirm setting.

## 9.5 Controlling Axis IP Camera

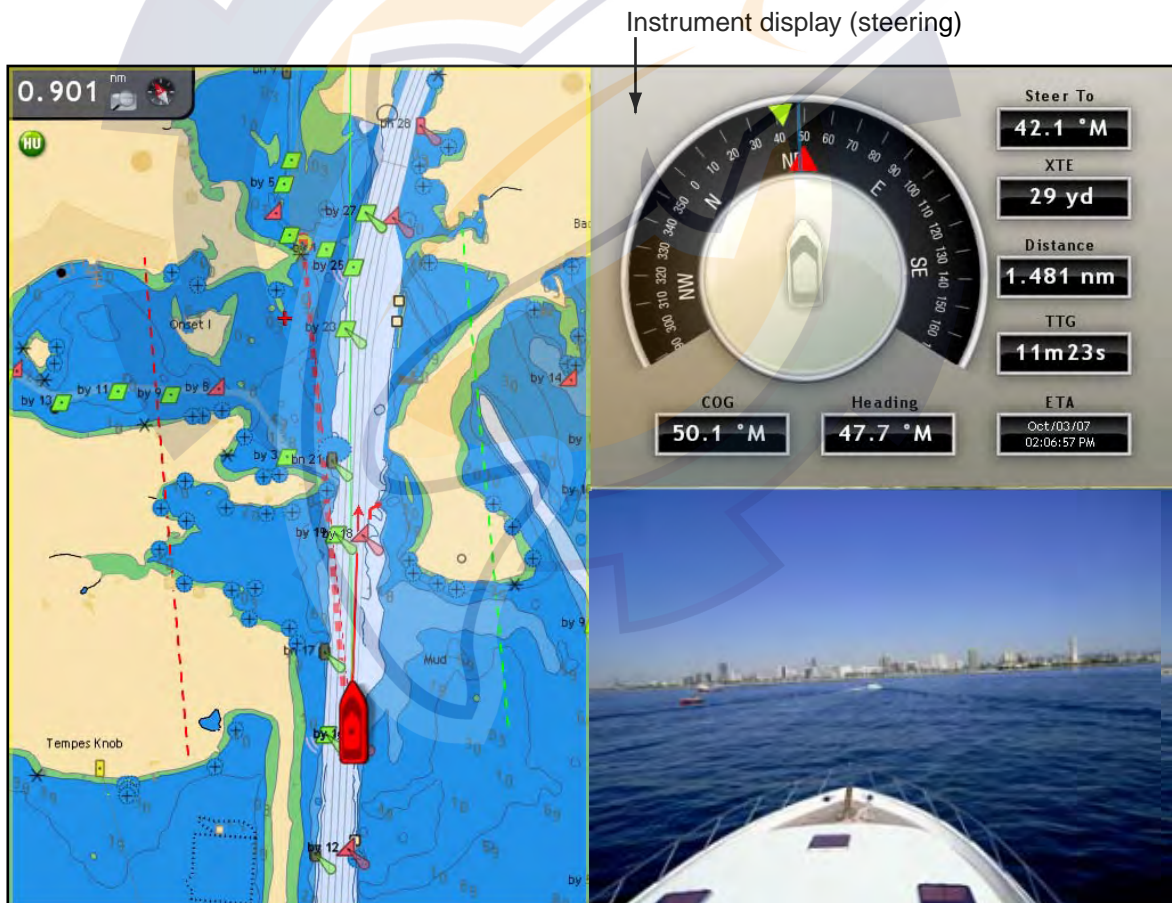
An Axis IP camera can be easily controlled from the NavNet display. Use the RANGE control to zoom in or zoom out. Scroll the camera image with the Scrollingpad.

# Chapter 10: Instrument Display

With connection of applicable instruments, the instrument display provides you with up to five navigation and environment displays:

- Engine
- Steering
- True wind
- Apparent wind
- True wind and weather

In the default arrangement, the instrument display is available when the number of hot pages (display selections) is nine or ten, set on the My NavNet-General menu. The instrument display may also be programmed to a three-way or four-way split screen, and up to four displays may be shown simultaneously. (The size of any instrument display is fixed to quarter screen.)



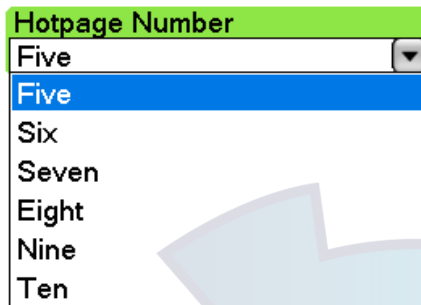
*Instrument display (steering)*



## 10.1 Enabling the Instrument Display

In the default arrangement, the instrument display is available when the number of hot pages in the display selection window is nine or ten.

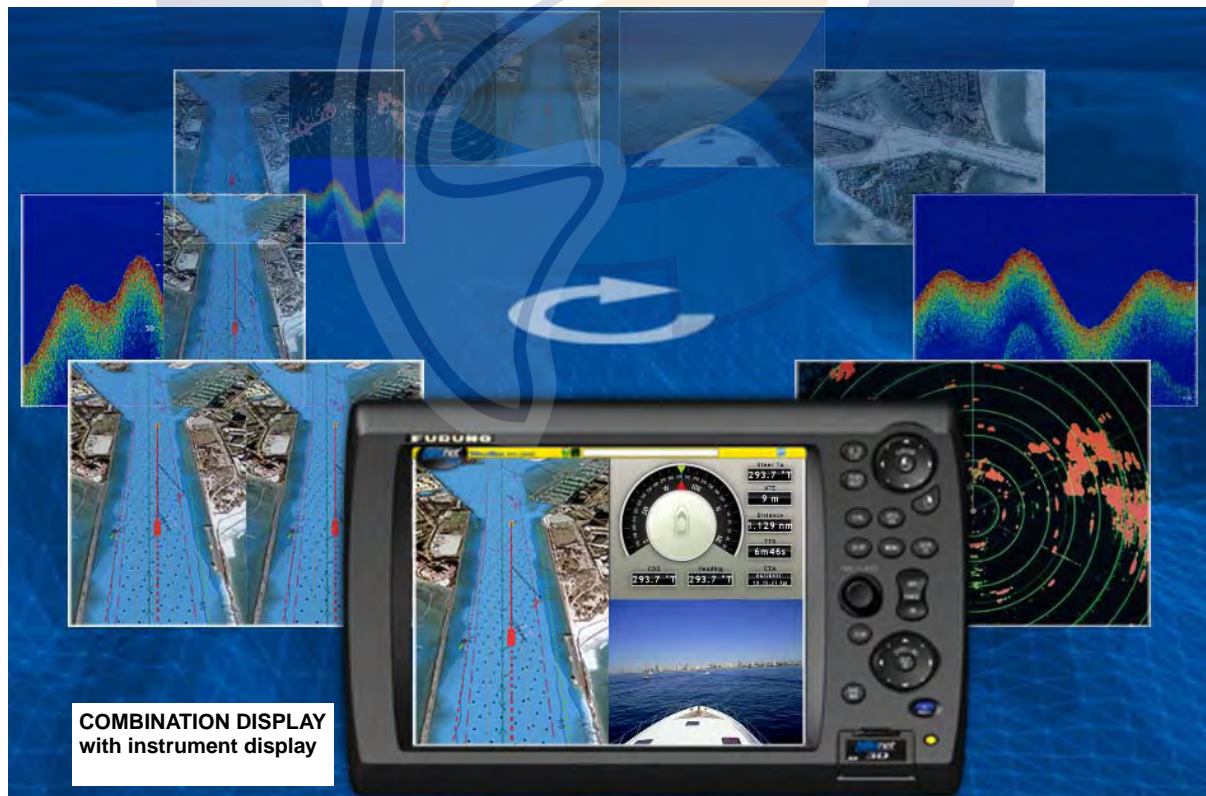
1. Press the **MENU** key to open the menu.
2. Open the My NavNet-General menu.
3. Use the RotoKey to select Hotpage Number.



4. Use the RotoKey to choose Nine or Ten to enable the instrument display.
5. Press the **MENU** key to close the menu.

## 10.2 Showing the Instrument Display

Press the **DISP** key to show the display selection window. Rotate the RotoKey to choose the combination display which contains the instrument display. Push the RotoKey to show the chosen display.



## 10.3 Selecting an Instrument Display

Depending on your system configuration, you can shown engine, steering, wind or wind/weather data in the instrument display. Select the data to display as follows:

1. Push the **CTRL** key to select the instrument display with the yellow cursor.
2. Push the RotoKey to show the soft controls for selection of instrument display.
3. Rotate the RotoKey to choose desired display and then push it to confirm selection.

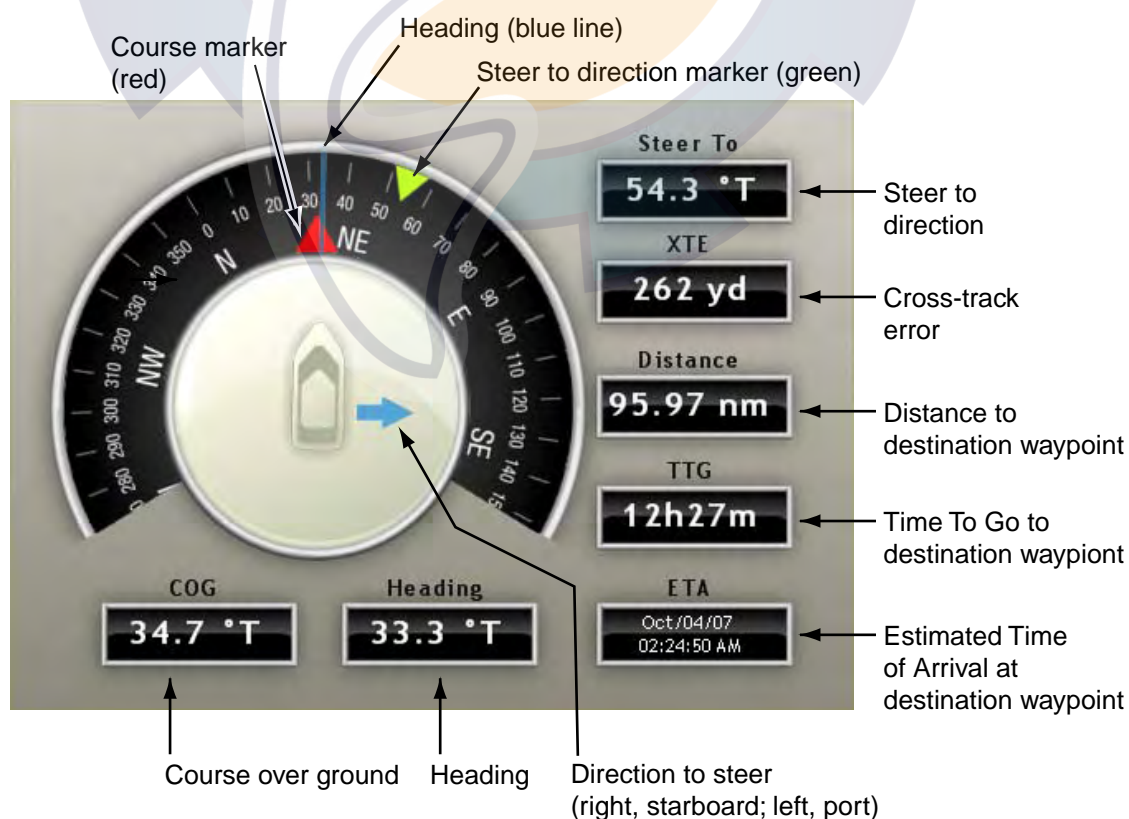


## 10.4 Instrument Displays

### 10.4.1 Steering Display

The steering display provides analog and digital indications of

- Heading
- Direction to steer
- Cross-track error
- Distance to destination waypoint
- Time To Go to destination waypoint
- Estimated Time of Arrival at destination waypoint
- Course over ground





## 10.4.2 Engine Display

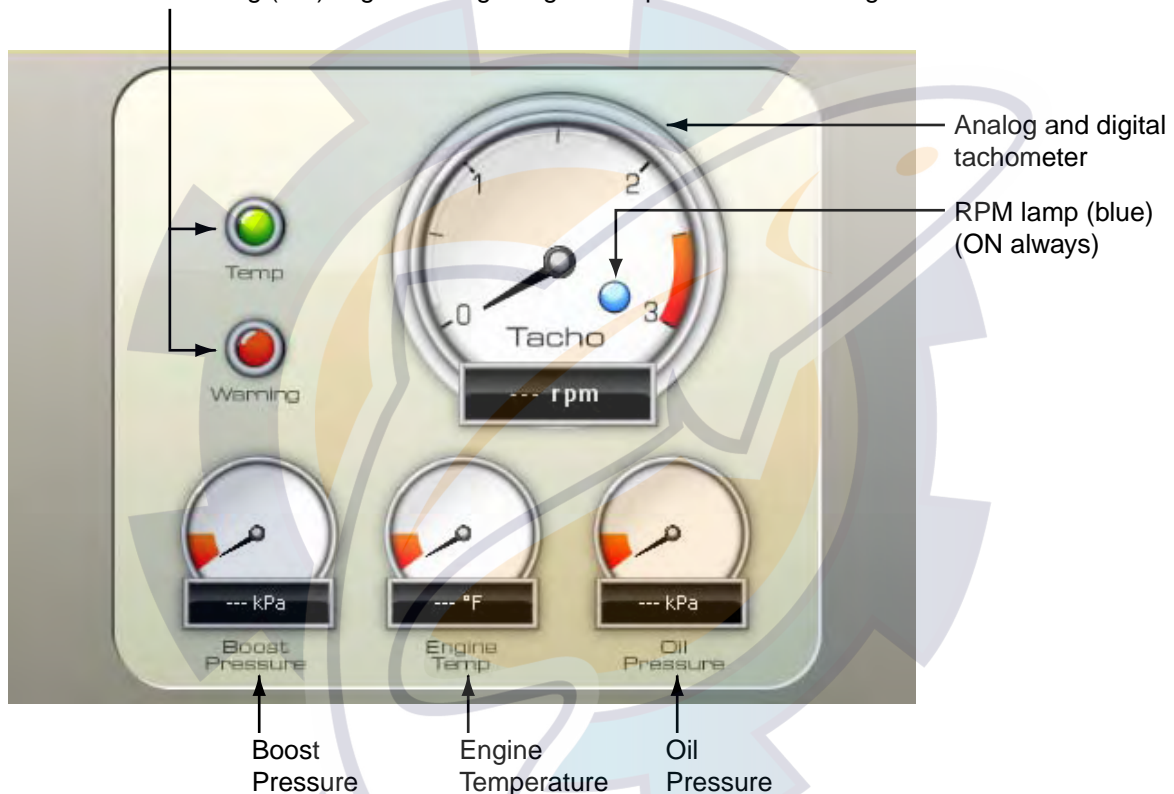
The engine display shows the information listed below. The engine must output engine data in NMEA 2000 format to show engine data.

- Abnormal engine temperature and engine trouble lamps
- Tachometer
- Oil pressure
- Engine temperature
- Boost pressure

### Engine-related warning lamps

Temp (green): Lights for high engine temperature.

Warning (red): Lights for high engine temperature and/or engine trouble.



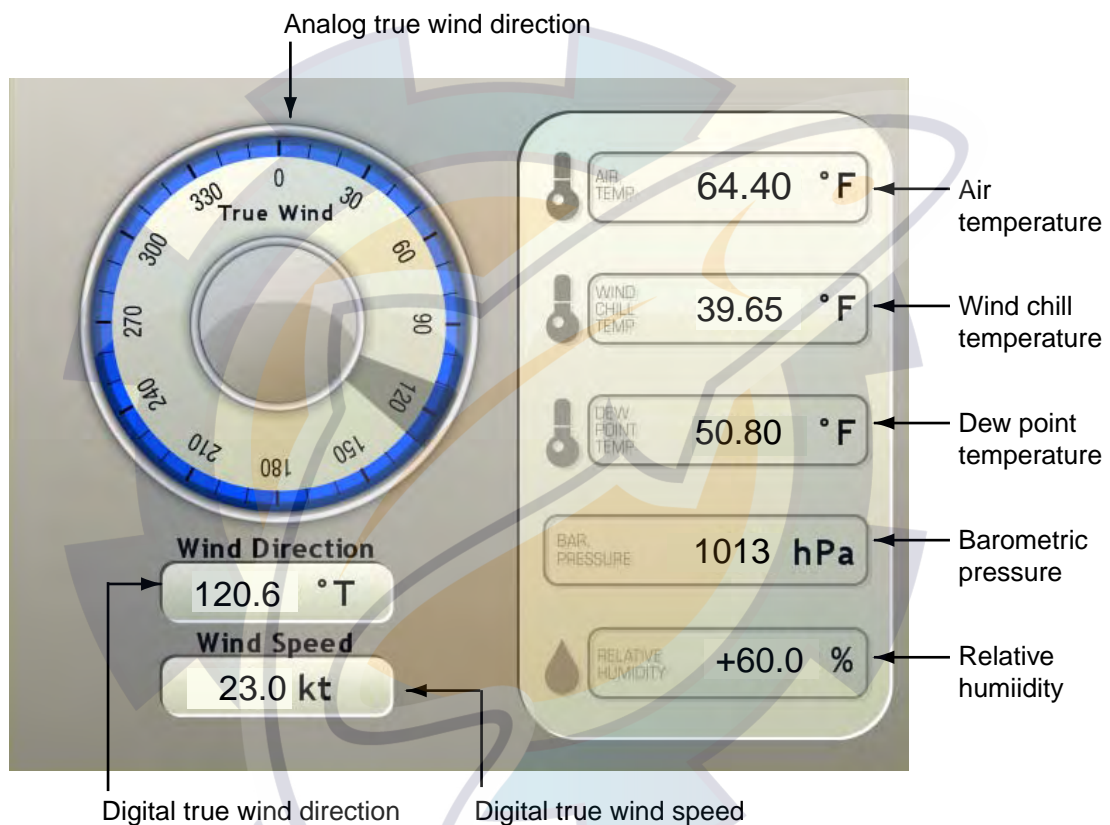
### ***Engine-related warning lamps***

- Both lamps flash when there is no engine data for approx. 30 seconds.
- Both lamps light at power-up if there was no engine data when the power was turned off.

### 10.4.3 Wind and Weather Display

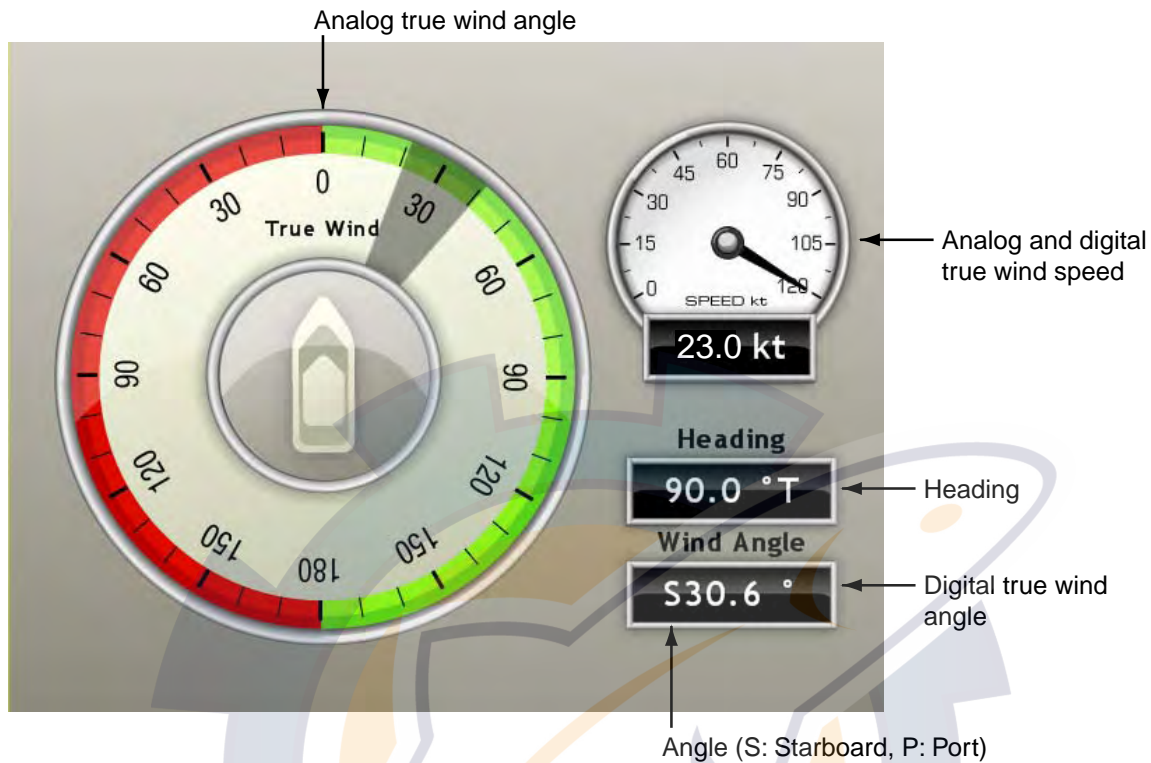
The wind and weather display shows

- Wind direction
- Air temperature
- Wind chill temperature
- Dew point temperature
- Barometric pressure
- Relative humidity
- Wind speed and direction



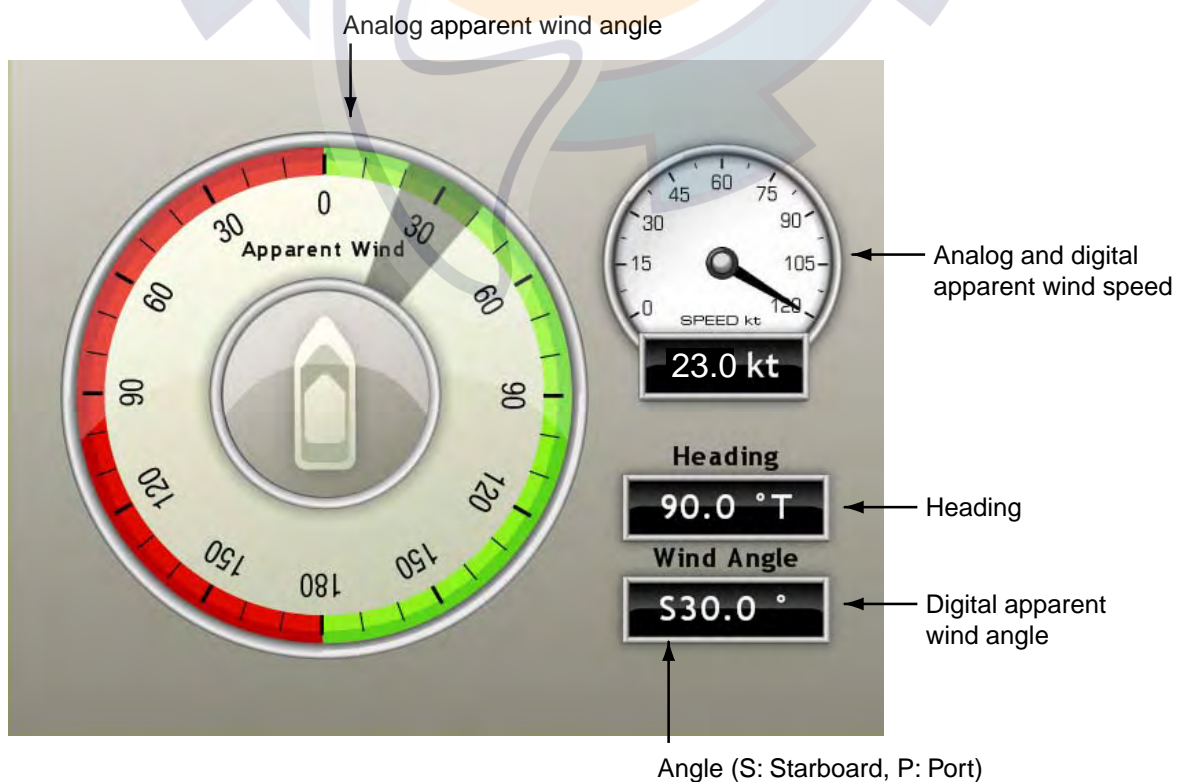
### 10.4.4 True Wind Display

The true wind display provides digital and analog indications of true wind speed and angle, and heading.



### 10.4.5 Apparent Wind Display

The apparent wind display provides digital and analog indications of apparent wind speed and angle, and heading.



# Chapter 11: Weather

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## 11.1 Weather Display Overview

When connected to the Sirius Weather Receiver BBWX1, this MFD will display current and forecasted weather information for your area. Real time updating ensures that you have up-to-the-minute weather information for your area, as well as any other area in the U.S.



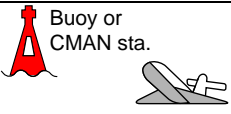







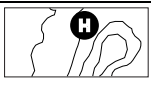

Information provided by the Sirius Marine Weather service is advisory nature only. You, the customer, agree to release FURUNO ELECTRIC CO., LTD., Sirius Satellite Radio Inc., Navcast Inc. and WSI Corporation from any and all claims arising from the use of this service, and you acknowledge that you have read the terms of your subscription agreement and agree to all the terms therein. If you do not have the subscription agreement, you will find a copy at: [www.sirius.com/marineweatheragreement](http://www.sirius.com/marineweatheragreement) or call 1-800-869-5480 to have a copy sent to you.

### **Before using the weather application:**

- Obtain an optional Sirius Weather Receiver BBWX1.
- Obtain a Sirius weather service subscription. Contact Sirius Satellite Radio INC., for further details.
- After connecting and powering up both the BBWX1 and the associated MFD displays, it may take up to 30 minutes for your MFD to receive/accumulate WX data from the BBWX1.
- If, during the installation of the equipment, the Installation Wizard fails to acknowledge the existence of the BBWX1, Sirius-related menus will not appear. Confirm that the equipment acknowledges the Sirius receiver.

## 11.2 Weather Icons

The table below shows the weather icons that appear the Sirius Satellite Weather display. These icons can be shown or hidden from the Weather menu.

Icon	Color	Meaning
	Pink	Storm cast
	Dark yellow (recorded in last 0-5 min.) Medium yellow (recorded in last 5-10 min.) Light yellow (recorded in last 10-15 min.)	Lightning
	Buoy: Red CMAN station: Grey Airplane: White	Surface observation stations
	Pink	Wind
	Grey	Cities
	Dark blue	Waves
	Green-red	CANRAD (Canadian radar)
	Red-blue	Sea surface temperature
	Green (Rain) Blues (Snow) Pinks (Mixture)	NOWRAD (USA RADAR)
	Grey (Historical) Red (Current) Orange (Forecast)	Storm tracks
  <i>etc.</i>	For details, see page 7-6.	Surface pressure

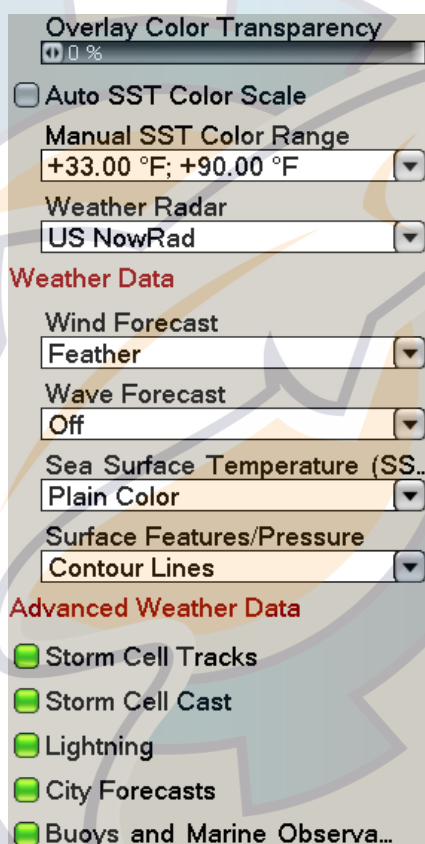
## 11.3 Weather Menu

The Weather menu lets you adjust the following weather-related items:

- Overlay transparency
- Color scale
- Weather radar (US or Canada)
- Standard weather data
- Advanced weather data

### 11.3.1 Displaying the Weather Menu

1. Press the **MENU** key to open the menu.
2. Use the RotoKey to open the Weather-Sirius menu.



3. Use the RotoKey to select the weather item that you want to show or hide.
4. Push the RotoKey to alternately turn the item on and off.
5. Press the **MENU** key to close the menu.



## 11.3.2 Weather Menu Description

### Overlay Color Transparency

Adjust the transparency level of the weather overlay. Select this item with the RotoKey and push the RotoKey. Rotate the RotoKey to set and then push it to confirm setting. The higher the value the greater the transparency of the overlay.

### Auto SST Color Scale

Enable/disable automatic adjustment of sea surface temperature color scale according to sea surface temperature.

### Manual SST Color Range

Set the SST color range when Auto SST Color Scale is disabled. The setting range is +00.00 to 99.99 (degrees Fahrenheit).

### Weather Radar

Select the weather radar to use USA NOWRAD (USA) or CANRAD (Canada). NOWRAD shows the type and level of precipitation. The "Level" number shown below is a figure of reflectivity from a weather radar. The larger the level number, the stronger the precipitation.

#### Precipitation indication on NOWRAD.

Weather radar color	Precipitation type	Level
Light green	Rain	15-19 dBz
Medium green	Rain	20-29 dBz
Dark green	Rain	30-39 dBz
Yellow	Rain	40-44 dBz
Orange	Rain	45-49 dBz
Light red	Rain	50-54 dBz
Dark red	Rain	over 55 dBz
Light blue	Snow	5-19 dBz
Dark blue	Snow	over 20 dBz
Light pink	Mixed	5-19 dBz
Dark pink	Mixed	over 20 dBz

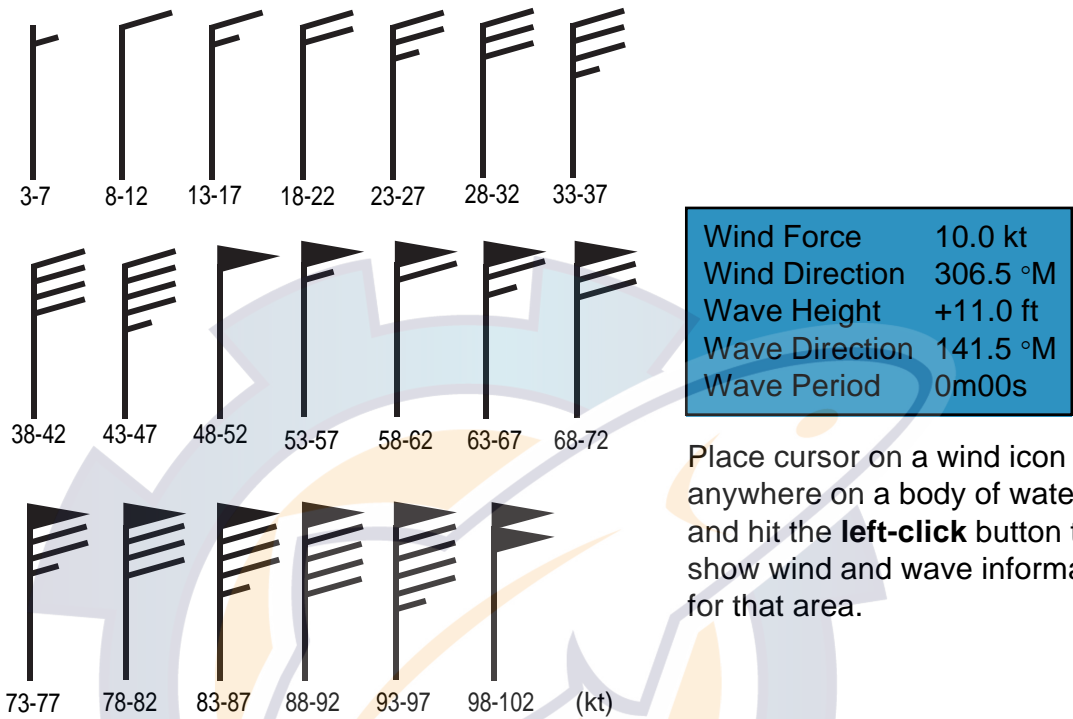
#### Precipitation indication on CANRAD

Weather radar color	Level (mm per hour)
Transparent (low precipitation)	0.00 to 0.20 mm/hr
Light green	0.21 to 1.00 mm/hr
Medium green	1.01 to 4.00 mm/hr
Dark green	4.01 to 12.00 mm/hr
Yellow	12.01 to 24.00 mm/hr
Orange	24.01 to 50.00 mm/hr
Light red	50.01 to 100 mm/hr
Dark red	over 100.01 mm/hr

**Weather Data**

**Wind Forecast**

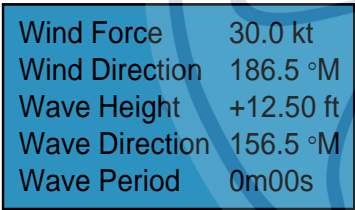
Select how to show the wind forecast. There are two types of wind icon styles: Vane feathers and Plain colors. Vane feathers also show you wind speed and direction, but give you more details about the wind speed per the description shown below.



Place cursor on a wind icon or anywhere on a body of water and hit the **left-click** button to show wind and wave information for that area.

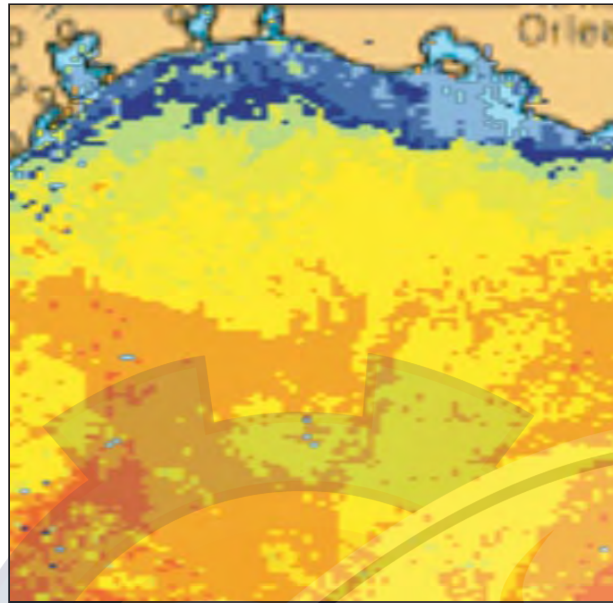
**Waves Forecast**

The Waves layer depicts wave height, with a dark blue arrow whose length increases with wave height. To find wave information place the cursor on a wave symbol and hit the **left-click** button.



## Sea Surface Temperature

This data layer shows the temperature of the sea surface in shades of red and blue, in order of descending temperature.



## Surface Features/Pressure




Enable this feature to get surface pressure with meteorological symbols. The cursor may be placed on an surface pressure icon to show the name of the surface pressure.

Seasurface temp icon	Color	Meaning
	Blue	High pressure
	Red	Low pressure
	Red	Warm front
	Blue	Cold front
	Purple	Occluded front
	Red-blue	Stationary front
	Brown	Trough
	Red	Squall line
	Brown	Dry line
	Grey	Isobars

## Advanced Weather Data

### Storm Tracks

The storm track icons show significant storms in your area. These include tropical disturbances, depressions, storms and cyclones, hurricanes, typhoons and super typhoons. These symbols are displayed in three different colors: Grey, historical; Red-current, and Orange, forecast.

Storm tracks icons	Meaning
	Hurricane (Category 1-5)
	Tropical storm
	Tropical disturbance, Tropical depression

To find simple storm tracks information, place the cursor on the icon. For more detailed information, press the **left-click** button.

Type	Typhoon
Wind Speed	8.0 kt
True Direction	111.5 °M
Wind Gust Speed	35.0 kt
Max Wind Speed	25.0 kt
Pressure	1008 hPa
Track Position Type	Current
Date of Observation	Oct/12/06
Position	17°36.0000' N; 121°54.0000' W

Simple storm tracks information

Name	OLIVIA
Type	Typhoon
Wind Speed	8.0 kt
True Direction	111.5 °M
Wind Gust Speed	35.0 kt
Max Wind Speed	25.0 kt
Pressure	1008 hPa
Track Position Type	Current
Date of Observation	Oct/12/06
Position	17°36.0000' N; 121°54.0000' W

Detailed storm tracks information

## Storm Cell Cast

You can find the direction and speed of a storm by placing by placing the cursor on the icon. For more detailed information, press the **left-click** button.

Speed	14.0 kt
True Direction	66.0 °T
Position	24°29.2800' N; 82°59.8800' W

*Simple storm cell cast information*

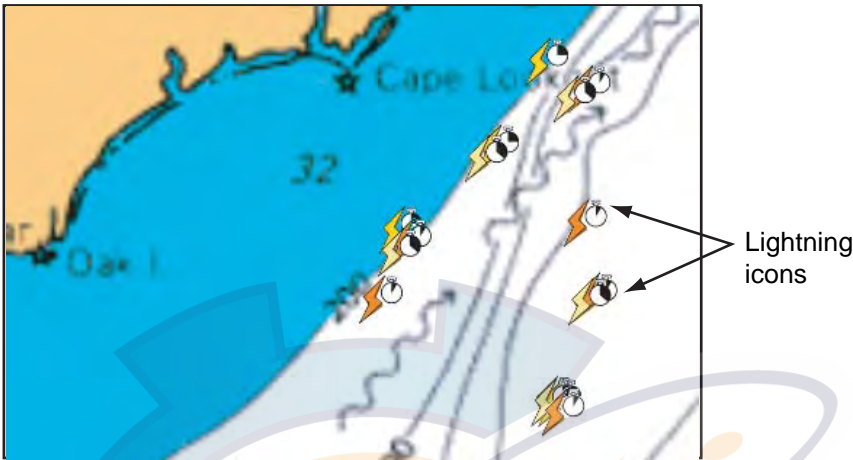
Speed	20.0 kt
True Direction	81.0 °T
Date of Observation	Dec/18/07
Echo Top	+25000.00 ft
Type	Unknown
Position	24°32.4000' N; 83°15.5400' W

*Detailed storm cell cast information*



Lightning

The lightning icons show where lightning has struck, within the last 5, 10 and 15 minutes. The icon's fill color indicates how recent the lightning strike was, as shown in the table below. The number of lightning bolt markers indicates the number of times lightning has struck.



.Description of lightning icons

Lightning icon	Color	Period
	Orange	Last 0-5 min.
	Medium yellow	Last 5-10 min.
	Light yellow	Last 10-15 min.

To find simple lighting information, place the cursor on it. For more detailed information, push the **left-click** button.

Period

0 - 5 minutes

Position

39°48.6000' N; 112°10.2000' W

Simple lightning information

Period

0 - 5 minutes


Position

40°40.8000' N; 109°31.8000' W

Detailed lightning information



## City Forecasts

City weather forecasts are available wherever city icons are shown. For simple information, place the cursor on the city icon (  ). For more detailed information, push the **left-click** button.

Name	Sacramento, CA
Position	38°34.8000' N; 121°29.4000' W


*Simple city information*

Name Sacramento, CA  
Thursday  
Considerable clouds this morning. Some decrease in clouds later in the day. High 68F. Winds SW at 5 to 10 mph.  
Thursday night  
Some clouds. Low near 40F. Winds SSW at 5 to 10 mph.  
Friday  
Intervals of clouds and sunshine. High 68F. Winds SW at 5 to 10 mph.

*Detailed city information*

Buoys

You can check the historical or current weather information at buoys.

For simple information, place the cursor on the buoy icon (  ), etc. For more detailed information, push the **left-click** button.

Type

Buoy

Position

36°48.0000' N; 121°54.0000' W

Simple buoy information

Name	
Type	Buoy
Date of Observation	Mar/08/07
Ship Speed	0.0 kt
Ship Direction	0.0 °T
Wind Speed	5.8 kt
Wind Direction	80.0 °T
Wind Gust Speed	9** kt
Wind Speed At 10 Meters	5.1 kt
Wind Speed At 20 Meters	5.1 kt
Peak Wind Date	---
Peak Wind Dir	255.0 °T
Peak Wind Speed	9** kt
Variable Wind First Dir	255.0 °T
Variable Wind Second Dir	255.0 °T
Water Tmp	54.23 °F
Air Tmp	48.11 °F
Dewpoint Tmp	5**.* °F
Max Tmp in last 24 hours	5**.* °F
Max Tmp in last 6 hours	5**.* °F

↓  
Scroll for  
more data

Detailed buoy data

## 11.4 Weather Reports

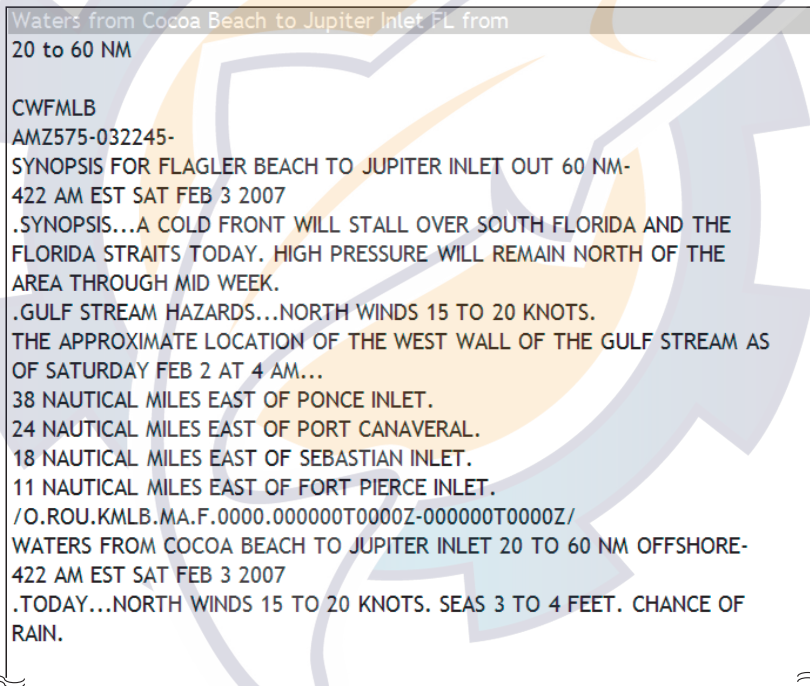
Marine zone forecasts, marine warnings, tropical information and weather alerts are sent to your unit. You can view them on the Weather menu, by opening respective sub menu.

Sirius sends warning messages to alert you to bad weather. You can view these messages by opening the Weather-Alert Box menu.

### 11.4.1 Marine Zone Forecast

These forecasts cover the following areas.

- US coastal weather forecasts
- US offshore forecasts
- High seas forecasts
- Great Lakes forecasts
- Near Shore forecasts
- Canadian coastal weather forecast.



Waters from Cocoa Beach to Jupiter Inlet FL from  
20 to 60 NM

CWFMLB  
AMZ575-032245-  
SYNOPSIS FOR FLAGLER BEACH TO JUPITER INLET OUT 60 NM-  
422 AM EST SAT FEB 3 2007  
.SYNOPSIS...A COLD FRONT WILL STALL OVER SOUTH FLORIDA AND THE  
FLORIDA STRAITS TODAY. HIGH PRESSURE WILL REMAIN NORTH OF THE  
AREA THROUGH MID WEEK.  
.GULF STREAM HAZARDS...NORTH WINDS 15 TO 20 KNOTS.  
THE APPROXIMATE LOCATION OF THE WEST WALL OF THE GULF STREAM AS  
OF SATURDAY FEB 2 AT 4 AM...  
38 NAUTICAL MILES EAST OF PONCE INLET.  
24 NAUTICAL MILES EAST OF PORT CANAVERAL.  
18 NAUTICAL MILES EAST OF SEBASTIAN INLET.  
11 NAUTICAL MILES EAST OF FORT PIERCE INLET.  
/O.ROU.KMLB.MA.F.0000.000000T0000Z-000000T0000Z/  
WATERS FROM COCOA BEACH TO JUPITER INLET 20 TO 60 NM OFFSHORE-  
422 AM EST SAT FEB 3 2007  
.TODAY...NORTH WINDS 15 TO 20 KNOTS. SEAS 3 TO 4 FEET. CHANCE OF  
RAIN.

*Marine zone forecast*

### 11.4.2 Marine warning

Display the marine warnings (US coastal or near shore).

Waters from Cocoa Beach to Jupiter Inlet FL from  
20 to 60 NM

NOWMLB  
AMZ555-575-031045-  
SHORT TERM FORECAST  
NATIONAL WEATHER SERVICE MELBOURNE FL  
243 AM EST SAT FEB 3 2007  
COCOA BEACH TO JUPITER INLET OUT TO 20 NM-INDIAN RIVER-MARTIN-  
OKEECHOBEE-OSCEOLA-SOUTHERN BREVARD-ST. LUCIE-  
243 AM EST SAT FEB 3 2007  
.NOW...  
THROUGH 6 AM...LIGHT RAIN OR SPRINKLES WILL EXTEND FROM FAR SOUTHERN  
SECTIONS OF BREVARD AND OSCEOLA COUNTIES SOUTH TO AROUND LAKE  
OKEECHOBEE. THE AREA WILL CONTINUE TO WORK SOUTH DURING THE EARLY  
MORNING HOURS.  
\$\$

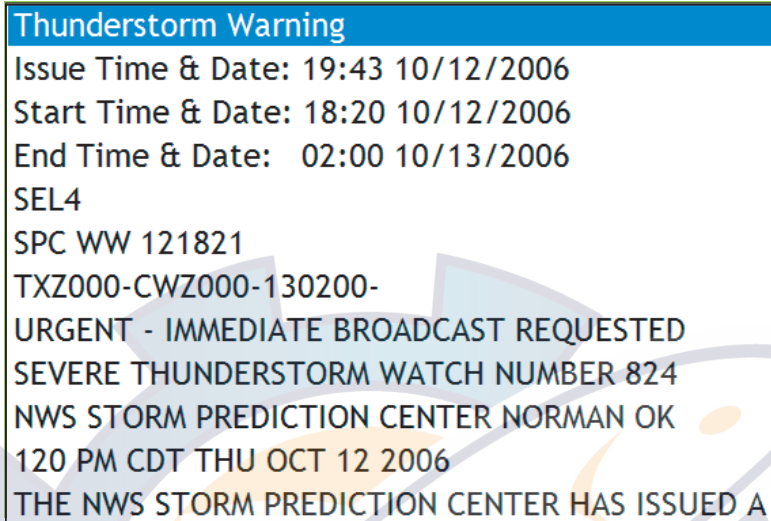
### 11.4.3 Tropical Statement

Below is an example of a tropical weather statement.

TWDAT  
TROPICAL WEATHER DISCUSSION  
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL  
105 AM EST SAT FEB 03 2007  
TROPICAL WEATHER DISCUSSION FOR NORTH AMERICA...  
CENTRAL AMERICA...THE GULF OF MEXICO...THE CARIBBEAN SEA...  
NORTHEASTERN SECTIONS OF SOUTH AMERICA...AND THE ATLANTIC  
OCEAN TO THE AFRICAN COAST FROM THE EQUATOR TO 32N.  
THE FOLLOWING INFORMATION IS BASED ON SATELLITE IMAGERY...  
METEOROLOGICAL ANALYSIS...WEATHER OBSERVATIONS...AND RADAR.  
BASED ON 0000 UTC SURFACE ANALYSIS AND SATELLITE IMAGERY THROUGH  
0515 UTC.  
...THE ITCZ...  
ITCZ AXIS IS CENTERED ALONG 8N13W 3N23W 1N30W CROSSING THE  
EQUATOR NEAR 34W CONTINUING ALONG 2540W INTO NE BRAZIL.  
SCATTERED MODERATE CONVECTION IS WITHIN 150 NM S OF THE AXIS  
BETWEEN 20W-24W. ISOLATED MODERATE IS WITHIN 180 NM N W OF 32W.  
...DISCUSSION...

#### 11.4.4 Marine WatchBox

The message "Weather Alarm, Press Menu Button" appears on the status bar when a tornado or thunderstorm warning is received. To view the details of the warning, press the **MENU** key to open the Alert Box in the Weather menu. The message is automatically opened in the Alert Box. A typical warning message is shown below.



**Thunderstorm Warning**  
Issue Time & Date: 19:43 10/12/2006  
Start Time & Date: 18:20 10/12/2006  
End Time & Date: 02:00 10/13/2006  
SEL4  
SPC WW 121821  
TXZ000-CWZ000-130200-  
URGENT - IMMEDIATE BROADCAST REQUESTED  
SEVERE THUNDERSTORM WATCH NUMBER 824  
NWS STORM PREDICTION CENTER NORMAN OK  
120 PM CDT THU OCT 12 2006  
THE NWS STORM PREDICTION CENTER HAS ISSUED A

You can show or hide the WatchBox warning message with Sirius Marine WatchBox in the Alarm-General menu.

# Chapter 12: Automatic Identification System (AIS)

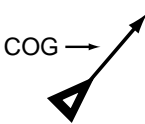


## 12.1 AIS Overview

An AIS transponder (optional) uses VHF frequencies, and broadcasts your own vessel's position, name, callsign, along with detailed parameters like length, beam, draft, and tonnage. It also broadcasts details of the current navigation system: speed, course, rate of turn, destination, and ETA. The transponder receives this same information from other ships, and displays it on radar and chart plotter displays. The positions and intentions of nearby vessels are available to you unambiguously and in real time.

## 12.2 Enabling, Disabling AIS

1. On the radar display or chart plotter display, push the RotoKey to show the soft controls. (In the default setting, long push to show the soft controls.)
2. Use the RotoKey to select Targets.
3. Use the RotoKey to select AIS and push it to alternately turn the AIS function on and off.

## 12.3 AIS Target Symbols

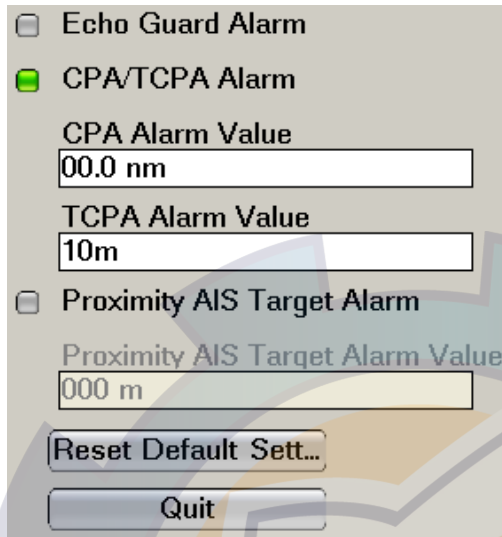
Symbol	Target type	Color	Description
	AIS target	Blue	COG is shown with a solid line and arrow.
	Dangerous AIS target	Red	An AIS target whose CPA and TCPA put it on a collision course with own ship.
	Lost AIS target	Blue	<p>If no signal is received from an AIS target for x* minutes it is declared a lost target. If no signal is received for another x* minutes the lost target symbol is erased.</p> <p>* The time depends on the AIS transponder used. For the FA-150 it is 10 minutes. Check your AIS transponder's operator's manual for information about lost targets.</p>



## 12.4 Proximity AIS Target Alarm

The proximity AIS target alarm alerts you with audio and visual alarms when an AIS target is within the distance you set here.

1. Press the **MENU** key to open the menu.
2. Open the Alarm-Targets menu.



The screenshot shows a menu with the following options and settings:

- ☐ Echo Guard Alarm
- ☒ CPA/TCPA Alarm
  - CPA Alarm Value: 00.0 nm
  - TCPA Alarm Value: 10m
- ☐ Proximity AIS Target Alarm
  - Proximity AIS Target Alarm Value: 000 m

At the bottom of the menu are two buttons: "Reset Default Sett..." and "Quit".

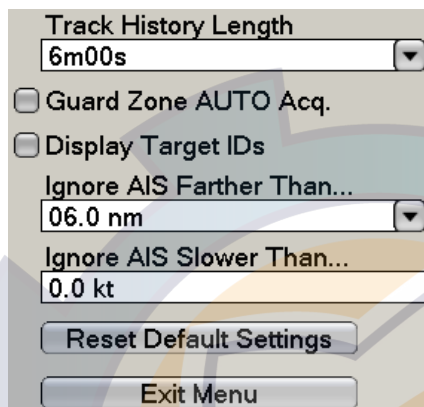
3. Use the RotoKey to select Proximity AIS Target Alarm and push it to turn the alarm on (status icon colored green).
4. Use the RotoKey to set the alarm value at Proximity AIS Target Alarm Value.
5. Press the **MENU** key to close the menu.

## 12.5 Ignoring AIS Targets

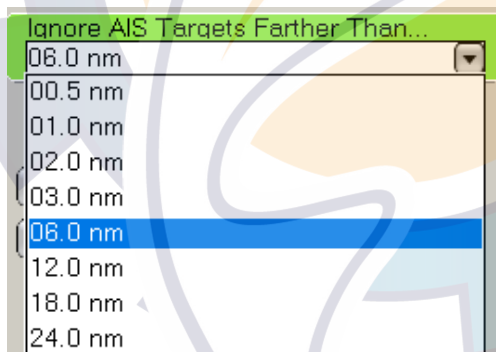
In the default setting, all AIS targets within 12 nm from your boat are shown on the display. If the screen becomes cluttered with AIS targets, you may wish to remove some of them from the display by specifying a different display range.

Slow-moving targets within the AIS proximity alarm range will cause frequent triggering of the AIS proximity alarm. You may wish to prevent this by ignoring targets within the alarm range that are slower than a threshold value.

1. Press the **MENU** key to open the menu.
2. Open the Targets menu.



3. Use the RotoKey to select Ignore AIS Targets Father Than.... This item removes targets from the display whose distances from own ship are greater than the threshold value.



4. Use the RotoKey to select desired range.
5. Select Ignore AIS Targets Slower Than.... This item prevents triggering of the AIS proximity alarm against AIS targets whose speeds are slower than the threshold value set here.
6. Use the RotoKey to set desired speed. The setting range is 0.0 - 9.9 (kts).
7. Press the **MENU** key to close the menu.

## 12.6 Displaying Target Data

The name, course, speed, range, bearing, etc. of an AIS target can be displayed. For simple data, simply place the cursor on the AIS target for which you want to find its data. For detailed data, place the cursor on the target and push the **left-click** button.

Name	PEGASUS
COG/SOG	56.2°T/6.8 kt
CPA/TCPA	3 m/55m03s
Range/Bearing	6.366 nm/26.7°T

*AIS simple target data*

Name	VOYAGER
MMSI	MSN3456098
COG	56.2°T
SOG	6.8 kt
ROT	+0.7°/m
CPA	0.8593 nm
TCPA	23m08s
Range	6.366nm
Bearing	26.7°T
Destination	NISHINOMIYA
Nav Status	Normal
Call Sign	HQZE4509
Beam	8.0 m
Length	30.1 m
Position	34°37.1715'N; 135°10.2459

*AIS detailed target data*

## 12.7 Track History Display

The track of AIS targets can be shown on the display, with a line extending from the rear of the target. You can select the track history plotting interval from the Targets menu. For further details and the operating procedure, see “6.25.8 Track History Display” on page 6-31.

## 12.8 Displaying Target IDs

You can show or hide the target ID (MMSI) of AIS targets. Open the Targets menu and turn Display Target IDs on or off as appropriate.

# Chapter 13: Customizing, Initial Settings

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After you have become familiar with your equipment's basic operating procedures, you will need to

- set it up according to equipment connected to it, and
- tailor how it operates and displays information

All tailoring is done from the menu, which is opened and closed with the **MENU** key. Once you have set the values, they are retained in the processor, even when the system is powered off. If you decide to return to default settings, a convenient, "Set Default" button is provided on each sub menu to quickly restore all default settings for the the selected sub menu.

A few of the items which you can customize are

- RotoKey
- Data boxes
- Units of measurement
- System settings
- Hot pages
- Charts



## 13.1 RotoKey

The user can select how many soft controls to make available with the RotoKey in the chart plotter, radar, fish finder and camera modes. Three pre-set amounts are available: basic, standard and full. A "custom" setting is also available, and it allows you to select which soft controls to use.

The table below shows soft control availability in the chart plotter, radar, fish finder and camera modes.

*Soft controls available in the chart plotter mode*

Control label	Level 1	Function	Basic	Standard	Full
<b>North-Up</b>	North-up/Course-up/Head-up	Presentation mode selection.	Yes	Yes	Yes
Course Up			Yes	Yes	Yes
Head Up			Yes	Yes	Yes
<b>Auto Shift</b>	Autoshift on/off		No	No	Yes
<b>3D</b>	3D displays	3D/2D display selection.	No	Yes	Yes
2D View		2D view.	No	Yes	Yes
Aerial View		3D aerial view.	No	Yes	Yes
Underwater		3D underwater view.	No	No	Yes
3D Pan/Tilt		3D display orientation tool.	No	No	Yes
<b>Chart</b>	Chart	Chart selection.	Yes	Yes	Yes
Raster		Show/hide raster chart.	Yes	Yes	Yes
Vector		Show/hide vector chart.	Yes	Yes	Yes
<b>Overlay</b>	Overlay	Overlay display selection.	Yes	Yes	Yes
Radar		Show/hide radar overlay.	No	Yes	Yes
Sat Photo		Show/hide sat photo.	Yes	Yes	Yes
Dpth Shade		Show/hide depth shade.	Yes	Yes	Yes
Tide Icons		Show/hide tide icons.	Yes	Yes	Yes
Currents		Show/hide tidal currents.	Yes	Yes	Yes
<b>Weather</b>	Weather	Weather displays.	Yes	Yes	Yes
Wx Radar		Show/hide weather radar.	Yes	Yes	Yes
Wx Data		Show/hide weather data.	Yes	Yes	Yes
Adv Wx Data		Show/hide adv. weather data.	Yes	Yes	Yes
Marine Zone		Show/hide marine zone.	Yes	Yes	Yes
<b>Track</b>		Track on/off.	Yes	Yes	Yes
<b>Targets</b>		ARPA/AIS target processing.	No	No	Yes
ARPA		Show/hide ARPA display.	No	No	Yes
AIS		Show/hide AIS display.	No	No	Yes
History		Show/hide history display.	No	No	Yes
Cancel All		Cancel tracking of all targets.	No	No	Yes
Clear Lost		Clear lost target.	No	No	Yes
<b>Points</b>	Point processing		No	Yes	Yes
List		Show Points list.	No	Yes	Yes
Create		Enter a point.	No	Yes	Yes
Points		Show/hide points.	No	No	Yes
<b>Routes</b>	Route processing		No	Yes	Yes
New		Create new route.	Yes	Yes	Yes
List		Show Routes list.	Yes	Yes	Yes
Reset Nav		Restart XTE.	Yes	Yes	Yes
Cancel Nav		Stop following a route.	Yes	Yes	Yes
Reverse		Reverse route following direction.	Yes	Yes	Yes
Show		Show/hide routes currently displayed.	No	Yes	Yes
<b>Animate</b>	Animate	Animate weather/tidal current.	No	No	Yes
<b>Countdown</b>		Start/stop countdown timer.	Yes	Yes	Yes
<b>Ruler</b>	Ruler tool	Measure range/bearing to a location.	No	Yes	Yes
<b>Tide Graph</b>		Show tide graph.	Yes	Yes	Yes

Soft controls available in the radar mode

Control label	Level1	Basic	Standard	Full
<b>North-Up</b>	North-up/Course-up/Head-up.	No	Yes	Yes
North Up		No	Yes	Yes
Course Up		No	Yes	Yes
Head Up		No	Yes	Yes
<b>True motion</b>	True motion on/off.	No	No	Yes
<b>Auto Shift</b>	Autoshift on/off.	No	No	Yes
<b>Tx</b>	Tx on/off.	Yes	Yes	Yes
<b>Filters</b>	Radar image processing.	No	No	Yes
Int Rej	Interference rejector on/off.	No	No	Yes
Stretch	Echo stretch on/off.	No	No	Yes
<b>Rings</b>	Show/hide range rings.	Yes	Yes	Yes
<b>Hdg Ln Off</b>	Show/hide heading line.	No	Yes	Yes
<b>Echo Trail</b>	Echo trail on/off.	No	No	Yes
<b>Clr Trail</b>	Clear echo trails.	No	No	Yes
<b>EBL</b>	EBL processing.	No	Yes	Yes
EBL 1	Activate EBL1.	No	Yes	Yes
EBL 2	Activate EBL2.	No	No	Yes
Clear 1	Deactivate EBL1.	No	Yes	Yes
Clear 2	Deactivate EBL2.	No	No	Yes
<b>VRM</b>	VRM processing.	No	Yes	Yes
VRM 1	Activate VRM1.	No	Yes	Yes
VRM 2	Activate VRM2.	No	No	Yes
Clear 1	Deactivate VRM1.	No	Yes	Yes
Clear 2	Deactivate VRM2.	No	No	Yes
<b>Guard Zone</b>	Guard Zone processing.	No	No	Yes
Zone 1	Enable guard zone 1.	No	No	Yes
Zone 2	Enable guard zone 2.	No	No	Yes
Clear 1	Disable guard zone 1.	No	No	Yes
Clear 2	Disable guard zone 2.	No	No	Yes
<b>Targets</b>	ARPA/AIS target processing.	No	No	Yes
ARPA	Show/hide ARPA display.	No	No	Yes
AIS	Show/hide AIS display.	No	No	Yes
History	Show/hide track history display.	No	No	Yes
Cancel All	Cancel tracking on all ARPA targets.	No	No	Yes
Clear Lost	Clear lost ARPA target.	No	No	Yes
<b>Active Route</b>	Show/hide active route.	No	No	Yes



Soft controls available in the fish finder mode

Control label	Level1	Basic	Standard	Full
<b>Mode</b>	Mode selection.	Yes	Yes	Yes
HF		Yes	Yes	Yes
LF		Yes	Yes	Yes
Dual		Yes	Yes	Yes
<b>Auto</b>	Enable/disable automatic operation.	No	No	Yes
Fishing	Enable fishing automatic mode.	Yes	Yes	Yes
Cruising	Enable cruising automatic mode.	Yes	Yes	Yes
Off	Enable manual mode.	Yes	Yes	Yes
<b>Zoom</b>	Zoom display selection.	Yes	Yes	Yes
Btm Lock	Select bottom lock display.	Yes	Yes	Yes
Btm Zoom	Select bottom zoom display	Yes	Yes	Yes
Mkr Zoom	Select marker zoom display.	Yes	Yes	Yes
Off	Turn off zoom display.	No	No	Yes
<b>Auto Range</b>	Turn auto range on/off.	Yes	Yes	Yes
<b>A-Scope</b>	Show/hide A-scope display.	No	No	Yes
<b>Temp</b>	Show/hide temperature graph display.	Yes	Yes	Yes
<b>Fish Alarm</b>	Enable/disable fish alarm.	No	Yes	Yes

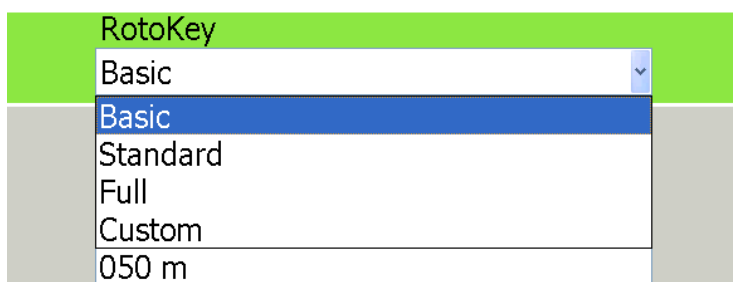
Soft controls available in the camera mode

Control label	Level1	Basic	Standard	Full
<b>Vid Source</b>	Select video source	Yes	Yes	Yes
<b>PINP1</b>	Input 1	Yes	Yes	Yes
<b>PINP2</b>	input 2	Yes	Yes	Yes
<b>IPCAMERA1</b>	Network camera 1	Yes	Yes	Yes
<b>IPCAMERA2</b>	Network camera 2	Yes	Yes	Yes
<b>Vid Cycle</b>	Select video switching cycle	Yes	Yes	Yes
<b>Cycle 1</b>		Yes	Yes	Yes
<b>Cycle 2</b>		Yes	Yes	Yes
<b>Video ID</b>	Show/hide video ID.	Yes	Yes	Yes
<b>Brightness</b>	Adjust brightness	No	No	Yes
<b>Colors</b>	Select no. of colors to show.	No	No	Yes
<b>Contrast</b>	Adjust contrast	No	No	Yes

### 13.1.1 Selecting the RotoKey Set to Use

There are four RotoKeys sets to choose from: Basic, Standard, Full, and Custom. Select the set to use as follows:

1. Press the **MENU** key to open the menu.
2. Open the My NavNet-Settings menu.
3. Use the RotoKey to display the RotoKey options window.

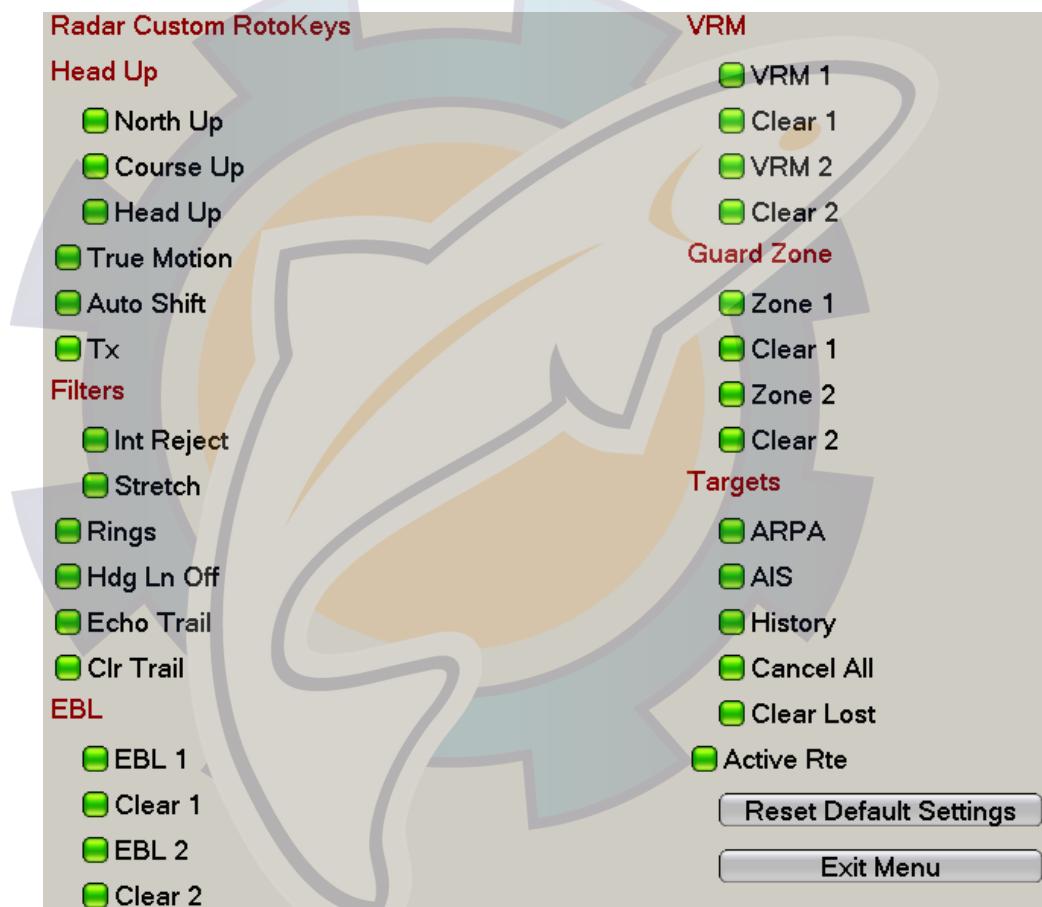


4. Use the RotoKey to select Basic, Standard, Full or Custom as applicable. (For Custom, see the next section for how to customize the RotoKey.)
5. Press the **MENU** key to close the menu.

### 13.1.2 Customizing the RotoKey

If the Basic, Standard or Full set of soft controls is not to your liking, you can specify what soft controls to make available with the RotoKey, on the My NavNet menu. Then, to use these soft controls, set RotoKey in the My NavNet-General menu to Custom.

1. Press the **MENU** key to open the menu.
2. Open the My NavNet-General menu.
3. Open the Chart, Radar, Fish Finder or Instruments sub menu as appropriate. For example, open the Radar sub menu.



4. Use the RotoKey to turn soft controls on or off as applicable.
5. Press the **MENU** key to close the menu.

## 13.2 Data Boxes

Earlier you learned how to select what data to show in the data boxes directly on-screen. This section shows you how to further customize the boxes, from the DataBox menu.

### 13.2.1 Setting up the Data Boxes

1. Press the **MENU** key to open the menu.
2. Open the DataBox menu.

Data Box 1  
Off

Data Box 1 Value  
COG + SOG

Data Box 2  
Single

Data Box 2 Value  
Depth

Data Box 3  
Off

Data Box 3 Value  
Pos

Data Box 4 (Goto)  
Split

Data Box 4 Value  
Cross Track Error + Distanc.

Cursor Data Box  
Split

Cursor Data Box Value  
Bearing + Pos + Range

Scrolling Time Delay  
0m03s

Reset Trip Log

☐ DataBox Display

Reset Default Settings

Exit Menu

3. Use the RotoKey to select the data box number (1-4) to process and push the RotoKey. For example, select Data Box 1.

Data Box 1

Off

Off

Single

Split

Single

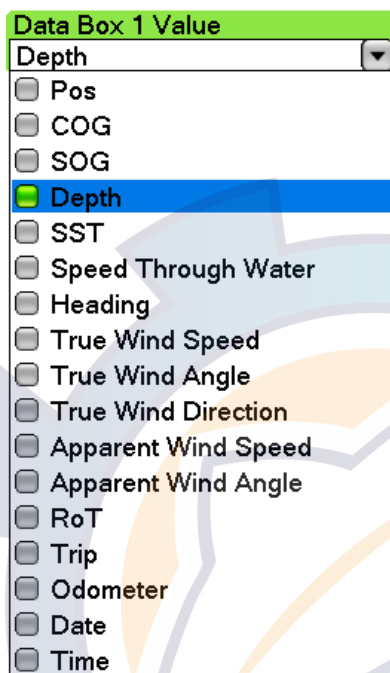
*Data box options*

Cursor data box

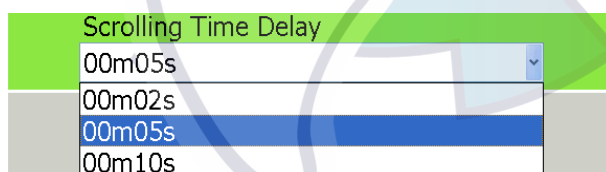
1 2 3 4

*Data box location*

4. Select how to show data in the data box.  
**Off:** Turn off the data.  
**Single:** Display each data individually.  
**Split:** Display two items per box. For example, if you choose SOG and COG, both items are shown in one box. (The exception is "Pos," which is shown alone because it is a two-line display.)
5. Use the RotoKey to select the "Data Box Value" combo box corresponding to the data box number selected at step 3.



6. Use the RotoKey to select or deselect data as appropriate.
7. Set the #2, #3 and #4 data boxes similarly.
8. If you have some boxes that are set for split display, select the amount of time to show each data pair, with scrolling time delay. Select Scrolling Time Delay and push the RotoKey.



9. Use the RotoKey to select the amount of time to display each data pair.
10. Press the **MENU** key to close the menu.

### 13.2.2 Globally Turning Data Boxes On/Off

Data boxes can be globally turned on and off from the DataBox menu. Select DataBox Display at the bottom of the DataBox-General menu and push the RotoKey to globally turn the data boxes on or off as appropriate. This can also be done with the **DATA/VOL** key.

## 13.3 Setting up the Display Selection Window

Earlier you learned how to select a display, at the display selection window. The default display selection window provides five displays, called "hot pages," in configurations according to the equipment you have in your network. If the arrangement of the hot pages is not to your liking you may customize them to suit your needs. You can select the number of hot pages to show from five to ten and split a hot page as many as four ways. For example, you may wish to show the radar and fish finder displays in a two-way split screen.

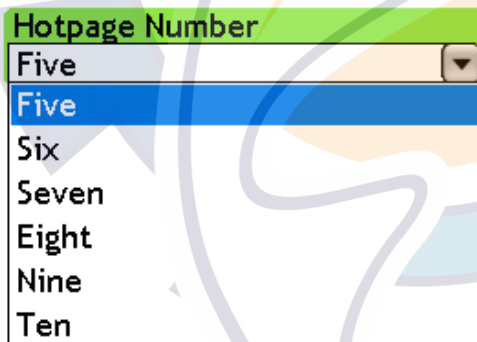
You can split a hot page four different ways: full-screen, two-way, three-way and four-way. The displays available depend on the screen division selected and your system configuration. The table below outlines screen division and possible display.

Screen division	Possible display
Full	Chart plotter, radar, camera, fish finder, weather facsimile
1/2 screen	Chart plotter, radar, fish finder
1/4 screen	Chart plotter, radar, camera, fish finder, instrument

### 13.3.1 Setting Number of Hot Pages to Show

Set the number of hot pages to show on the display selection window as follows:

1. Press the **MENU** key to open the menu.
2. Open the My NavNet-General menu.
3. Use the RotoKey to select Hotpage Number.



4. Use the RotoKey to select desired number of hot pages.
5. Press the **MENU** key to close the menu.

### 13.3.2 Arranging Hot Pages

The procedure below shows how to put the radar, chart plotter and fish finder displays in a three-way split screen.

1. Press the **DISP** key to show the display selection screen.
2. Long-push the RotoKey to show the hot page arrangement screen, shown below.



3. Rotate the RotoKey to select the three-way split icon at the left side of the screen and then push the RotoKey. Your screen should now look something like the one below, with the chart plotter display shown on left-half of the screen.



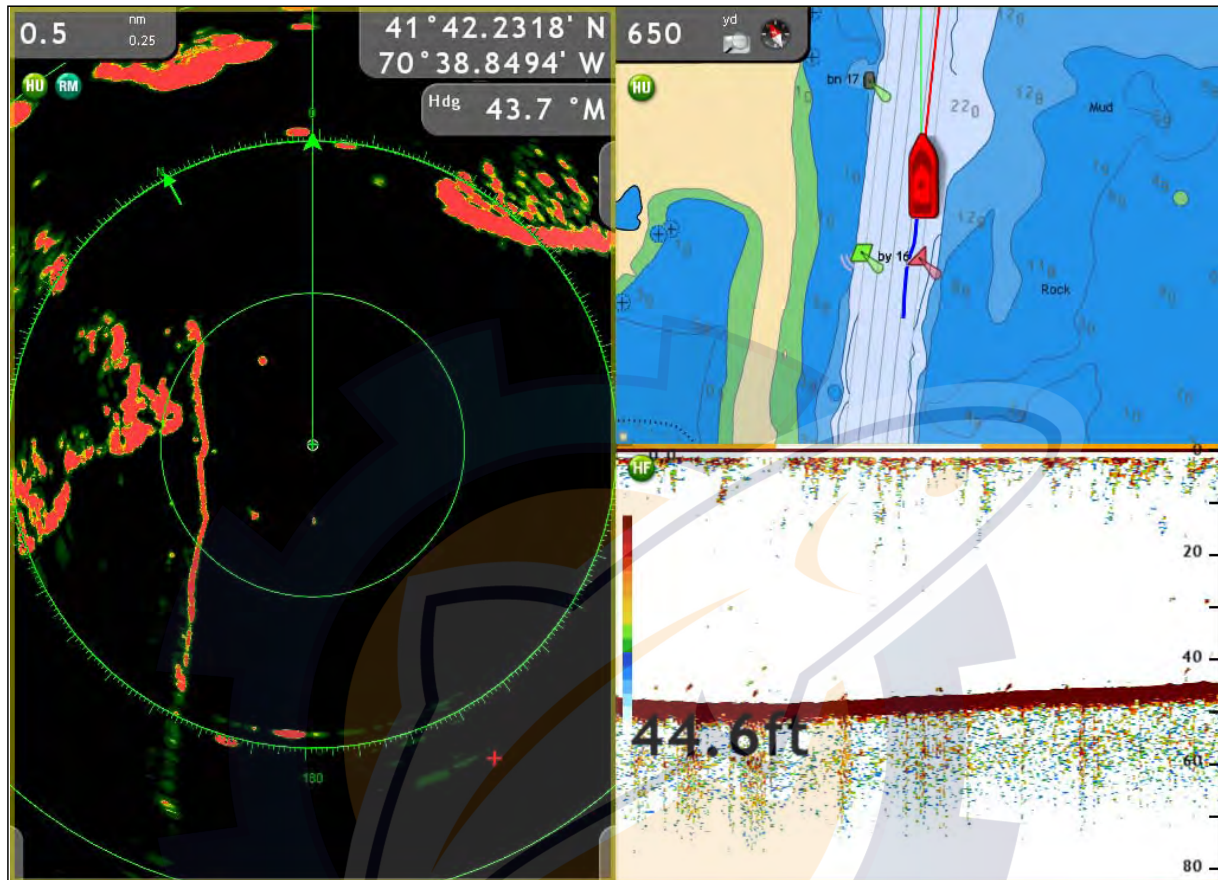
4. Rotate the RotoKey to select one of the display icons (for example, the radar display) at the bottom of the screen and push the RotoKey.
5. The yellow rectangle jumps to the top right 1/4 of the screen. Rotate the RotoKey to select a display (for example, the chart plotter display) and then push the RotoKey.

**Note:** To go back one step, use the **CANCEL** key.



6. The yellow rectangle jumps to the bottom right 1/4 screen. Rotate the RotoKey to select a display (for example, the fish finder display) and then push the RotoKey.

The newly arranged display appears on the screen and the display selection window is updated according to your arrangement.

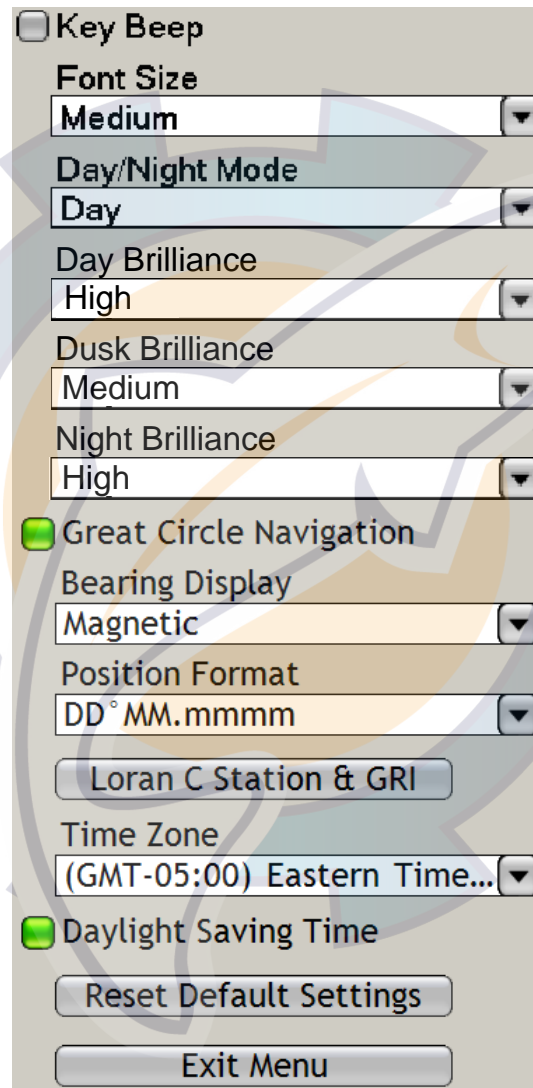


## 13.4 Global Menu

The Global menu has two sub menus for general set up of the equipment. The Global-General menu contains such items as key beep on/off, brilliance presets, time display format, position format, etc. The Global-Units menu is for selecting units of measurement for range, depth, height, speed, etc.

### 13.4.1 Global-General Menu

The Global-General menu is where you can turn off key beep, select position format, select time display format, select font size, etc. See the next page for full description.



☐ Key Beep

Font Size  
Medium

Day/Night Mode  
Day

Day Brilliance  
High

Dusk Brilliance  
Medium

Night Brilliance  
High

☒ Great Circle Navigation

Bearing Display  
Magnetic

Position Format  
DD° MM.mmmm

Loran C Station & GRI

Time Zone  
(GMT-05:00) Eastern Time...

☒ Daylight Saving Time

Reset Default Settings

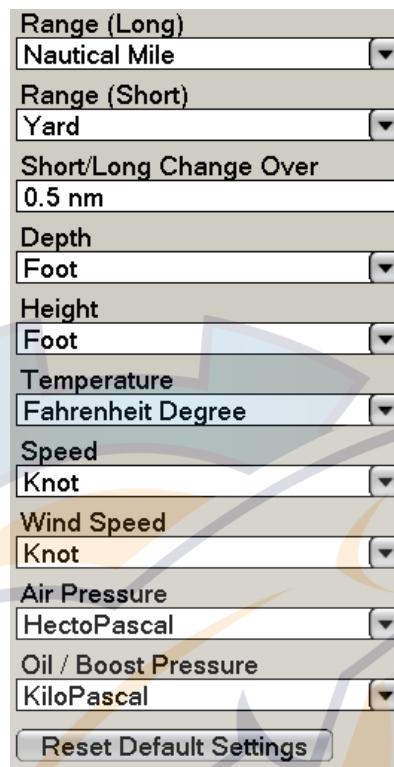
Exit Menu

Global-General menu description

Menu item	Function	Options	Default setting
Key Beep	Select to sound or not sound a beep when a key is pressed.	ON, OFF	OFF
Font Size	Select font size for all indications, menus, etc. Note that it is necessary to re-start the system when changing the font size.	Medium, Large	Medium
Day/Night Mode	Automatically set the brilliance for optimum viewing in day, dusk or night hours. You set the brilliance to use with Day Brilliance, Dusk Brilliance, and Night Brilliance.	Day, Dusk, Night	Day
Day Brilliance	Automatically set the display brilliance to desired level during daytime hours.	Low, Medium, High	High
Dusk Brilliance	Automatically set the display brilliance to desired level during dusk hours.	Low, Medium, High	Medium
Night Brilliance	Automatically set the display brilliance to desired level during nighttime hours.	Low, Medium, High	Low
Great Circle Navigation	There are two methods for measuring course distances: great circle and rhumb line. Great circle is the shortest line joining two points on the earth's surface. Rhumb line is a straight line compass course between two points. The great circle path is short but requires you to constantly change heading.	ON, OFF	ON
Bearing Display	The mode (magnetic or true) of all heading and bearing data.	True, Magnetic	True
Position Format	Select how to display position data.	DDD.ddddddd DD°MM.mmmm Loran-C	DD°MM.mmmm
Loran C Station & GRI	Select the Loran C stations and GRIs from which to obtain Loran C position.		
Time Zone	Set your time zone.	GMT times zones for the world	Eastern time (USA)
Daylight Saving Time	Turn on when daylight savings time is in effect for your area.	ON/OFF	OFF

## 13.4.2 Global-Units Menu

The Global-Units menu lets you select the desired units of measurement for range, length, depth, height, sea surface temperature, speed, wind speed, air pressure, oil / boost pressure, and volume



The screenshot shows a vertical menu with the following items and their current selections:

- Range (Long): Nautical Mile
- Range (Short): Yard
- Short/Long Change Over: 0.5 nm
- Depth: Foot
- Height: Foot
- Temperature: Fahrenheit Degree
- Speed: Knot
- Wind Speed: Knot
- Air Pressure: HectoPascal
- Oil / Boost Pressure: KiloPascal
- Reset Default Settings (button)

Global-Units menu description

Menu item	Options	Default setting
Range (Long)	Nautical mile, kilometer, mile	Nautical mile
Range (Short)	Foot, meter, yard	Yard
Short/Long Change Over	Set the threshold for switching between short and long range. Set the long range here.	Nautical mile
Depth	Foot meter, fathom, passi, braza	Foot
Height	Foot, meter	Foot
Temperature	Celsius degree, Fahrenheit degree	Fahrenheit degree
Speed	Knot, kilometer per hour, mile per hour, meter per second	Knot
Wind Speed	Knot, kilometer per hour, mile per hour, meter per second	Knot
Air Pressure	Ectoplasmic, millibar, millimeter of mercury, inch of mercury	Ectoplasmic
Oil / Boost Pressure	Kielbasas, bar, pound per square inch	Kielbasas

## 13.5 System Menu

The System menu has several sub menus for general system settings, sensor calibration, radar, fish finder (under development).

### 13.5.1 System-General Menu

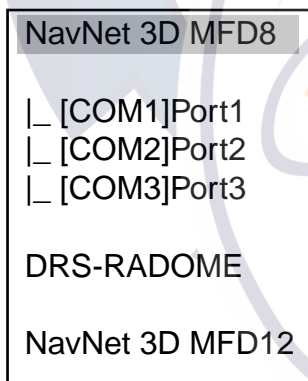
The System-General menu provides for selection of language, message window display time and mouse type.



**Language:** Choose language to use. For details, see "1.13 Selecting Language."

**Message Window Dwell Time:** Set the number of seconds to leave a message window open before it is automatically closed.

**Connection Diagram:** Display the components of your network. For use by service technicians.

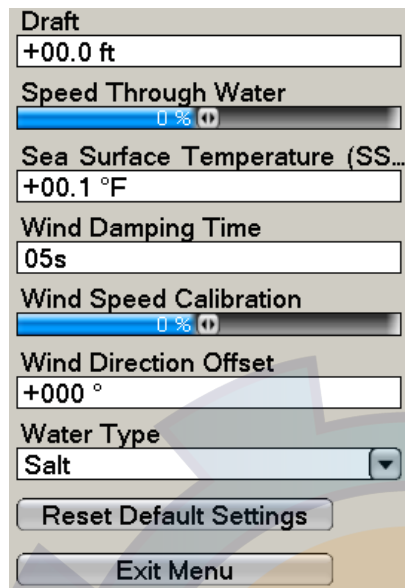


**Installation Wizard:** Launch the installation wizard to install the system.

**Reset Default Settings:** Restore all default settings for this menu.

### 13.5.2 System-Calibration Menu

The System-Calibration menu mainly lets you enter offsets for external sensors (speed, wind, temperature) to show true values on the display.



The screenshot shows a vertical menu with the following items: 'Draft' with a text input field containing '+00.0 ft'; 'Speed Through Water' with a slider control set to '0 %'; 'Sea Surface Temperature (SS...' with a text input field containing '+00.1 °F'; 'Wind Damping Time' with a text input field containing '05s'; 'Wind Speed Calibration' with a slider control set to '0 %'; 'Wind Direction Offset' with a text input field containing '+000 °'; 'Water Type' with a dropdown menu showing 'Salt'; 'Reset Default Settings' button; and 'Exit Menu' button.

**Draft:** In the default setting the fish finder shows the depth from the transducer. If you would rather get depth from the surface, set your ship's draft here. The setting range is -99.9 to +99.9 (ft).

**Speed Through Water:** Add an offset to measured speed if it is wrong. For example, if the speed indication is 10 kt and actual speed is 11 kt, enter +10%. The setting range is -50 to +50 (%).

**Sea Surface Temperature:** Add an offset to measured sea surface temperature if it is wrong. For example, if the measured temperature is 60 degrees and the actual temperature is 54 degrees, enter -10. The setting range is -99.9 to +99.9 (degrees Fahrenheit).

**Wind Damping Time:** Set wind damping time. The setting range is 0-99 (seconds).

**Wind Speed Calibration:** Apply an offset to measured wind speed if it is wrong. The range of offset is -50 to +50.

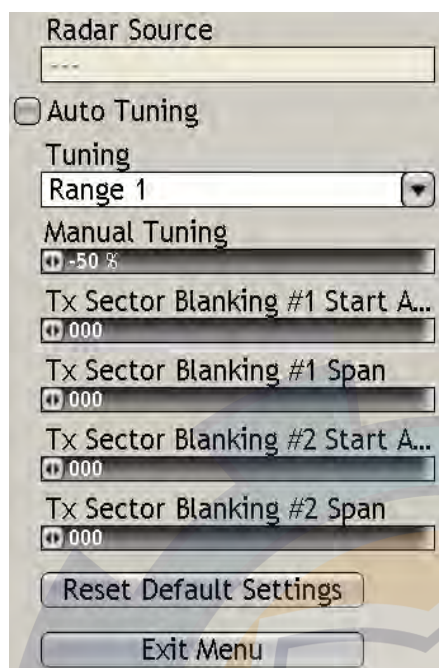
**Wind Direction Offset:** Add a wind direction offset to measured wind direction if it is wrong.

**Water Type:** Select the type of water the vessel is used in, saltwater or freshwater.



### 13.5.3 System-Radar Menu

The System-Radar menu has facilities for manual tuning, tx sector blanking (area of no transmission) creation and pulse length selection.



**Manual Tuning:** If you require manual tuning, do the following:

1. Use the **RANGE** key to select the 24-mile range.
2. Press the **MENU** key to open the menu.
3. Open the System-Radar menu.
4. Turn off Auto Tuning.
5. At the menu item Tuning, select Range 1 (range 1 in dual range mode) or Range 2 (range 2 in dual mode) as applicable and push the RotoKey.
6. Use the RotoKey to select Manual Tuning and push the RotoKey.
7. Rotate the RotoKey to adjust the tuning. The range is -50 to +50(%).
8. Push the RotoKey to confirm the setting.
9. Press the **MENU** key to close the menu.

**Tx Sector Blanking #1(#2) Start Angle:** It may be necessary to prevent the radar from transmitting within a certain sector. For example, you would want to mark a blind sector on the display for the area where transmission is blocked by a mast. This is usually done by the installer of the equipment.

Two sectors may be set. One sector should be less than 135 degrees in width and the total width of two sectors should not exceed 270 degrees.

**Tx Sector Blanking #1(#2) Span:** Set the width of the blind sector (in degrees) here.

### 13.5.4 System-DFF Menu



**Transmission:** Turn transmission on/off. Leave on normally.

**Transmission Power:** Interference may appear on the screen when a fish finder having the same frequency as your own is being operated in the vicinity of your vessel. In this case, lower your Tx power and contact the vessel to request them to reduce their Tx power. Tx power is available in Off, Min, 1-10. The higher the value the more the Tx power.

**Gain Adjust HF (LF):** If the gain is too high or low in the automatic gain mode, or there is a difference in the gain between the low and high frequencies, you can compensate for it here.

**Auto Gain Offset HF (LF):** If the auto gain offset is too high or too low in spite of adjustment with auto gain offset, or there is a difference in the gain between the low and high frequencies, you can compensate for it here.

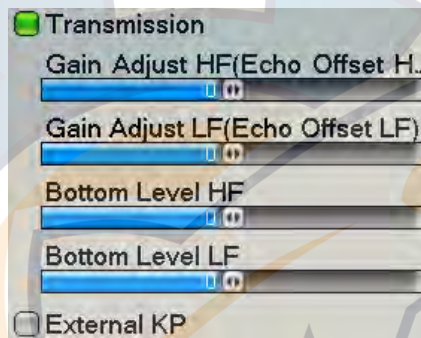
**Bottom Level HF (LF):** In the default bottom level setting (0), the equipment judges consecutive strong echoes to be bottom echoes. If, in that setting, the depth indication is unstable, adjust the bottom level. If vertical lines extend upward from the bottom echo in the bottom lock display, lower the bottom level to erase the vertical lines. If the level is too low, however, it may be difficult to distinguish bottom fish from the bottom echo.

**External KP:** Turn on to sync with external keying pulse.

**Stc HF (LF):** Delete unwanted echoes (plankton, air bubbles, etc.) near the surface. This is useful to clear the surface of unwanted echoes to look for surface fish. The setting range is 0-10, and 0 is Off. The larger the value the more surface echoes are erased. In setting 10, STC deletes unwanted echoes from the surface to about 16 ft. Avoid setting the STC too high; fish echoes near the surface may be erased.

**Frequency Adjust HF (LF):** The frequency of the high and low frequency transducer can be adjusted. This is useful when there is another fish finder nearby and it is operating at the same frequency as your own, causing interference. In this case, you can shift the frequency of your transducer by a few percentage points to remove the interference.

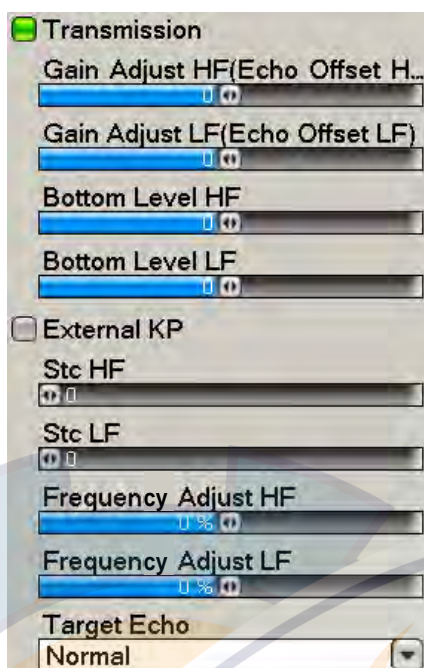
### 13.5.5 System-ETR-6/10N Menu



**External KP:** Turn on to sync with external keying pulse.

For Transmission, Gain Adjust and Bottom Level, see the descriptions in section 13.5.4.

### 13.5.6 System-ETR-30N Menu



**Stc HF (LF):** Delete unwanted echoes (plankton, air bubbles, etc.) near the surface. This is useful to clear the surface of unwanted echoes to look for surface fish. The setting range is 0-10, and 0 is Off. The larger the value the more surface echoes are erased. In setting 10, STC deletes unwanted echoes from the surface to about 16 ft. Avoid setting the STC too high; fish echoes near the surface may be erased.

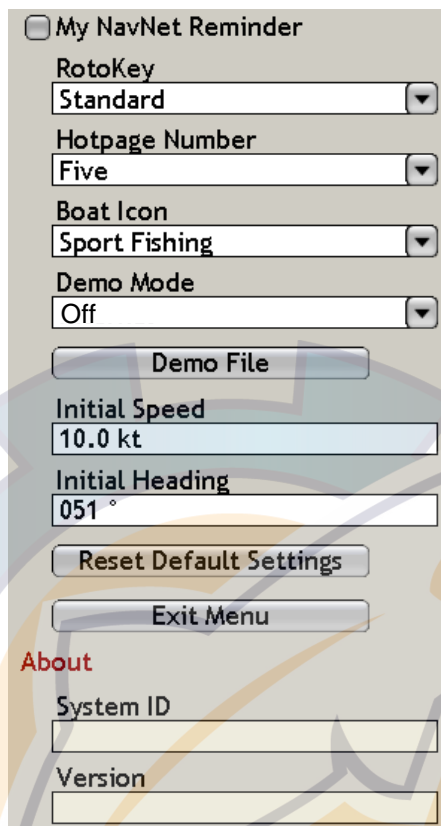
**Frequency Adjust HF (LF):** The frequency of the high and low frequency transducer can be adjusted. This is useful when there is another fish finder nearby and it is operating at the same frequency as your own, causing interference. In this case, you can shift the frequency of your transducer by a few percentage points to remove the interference.

**Target Echo:** Set your fishing objective, Normal or Surface. Select Surface when your objective is finding fish near the surface.

For Transmission, Gain Adjust, Bottom Level, see "13.5.4 System-DFF Menu" on page 13-17. For External KP, see "13.5.5 System-ETR-6/10N Menu" on page 13-18.

## 13.6 My NavNet-General Menu

This section provides the information the items in the My NavNet-General menu that are not mentioned earlier.



☐ My NavNet Reminder

RotoKey  
Standard

Hotpage Number  
Five

Boat Icon  
Sport Fishing

Demo Mode  
Off

Demo File

Initial Speed  
10.0 kt

Initial Heading  
051 °

Reset Default Settings

Exit Menu

About

System ID

Version

### My NavNet Reminder

Every 10th power up you are prompted to check your My NavNet settings. You can turn this prompt on or off as desired.

### Demo Mode

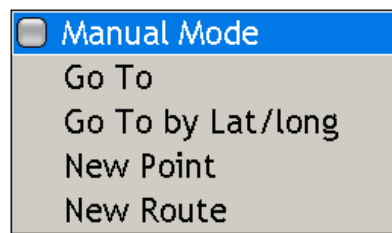
A demo mode is provided to help acquaint you with the many features your system has to offer. No connection of radar, fish finder or position-fixing equipment is necessary. Most functions are operative so you can learn all about your system in your leisure time. Any data you save will be retained in the memory, thus you could create and save routes in your leisure time.

#### To enable the demonstration mode:

1. Use the RotoKey to select Demo Mode and push it to open the options window.
2. Use the RotoKey to select Internal and push the RotoKey to confirm selection.
3. Use the RotoKey to select Demo File and push it. The demo file provided with the equipment has the initial position as Cape Cod, Massachusetts, USA.
4. Push the RotoKey again.
5. Set Initial Speed and Initial Heading as appropriate.
6. Press the **MENU** key to close the menu.

**To turn on/off the demonstration mode from the chart plotter display:**

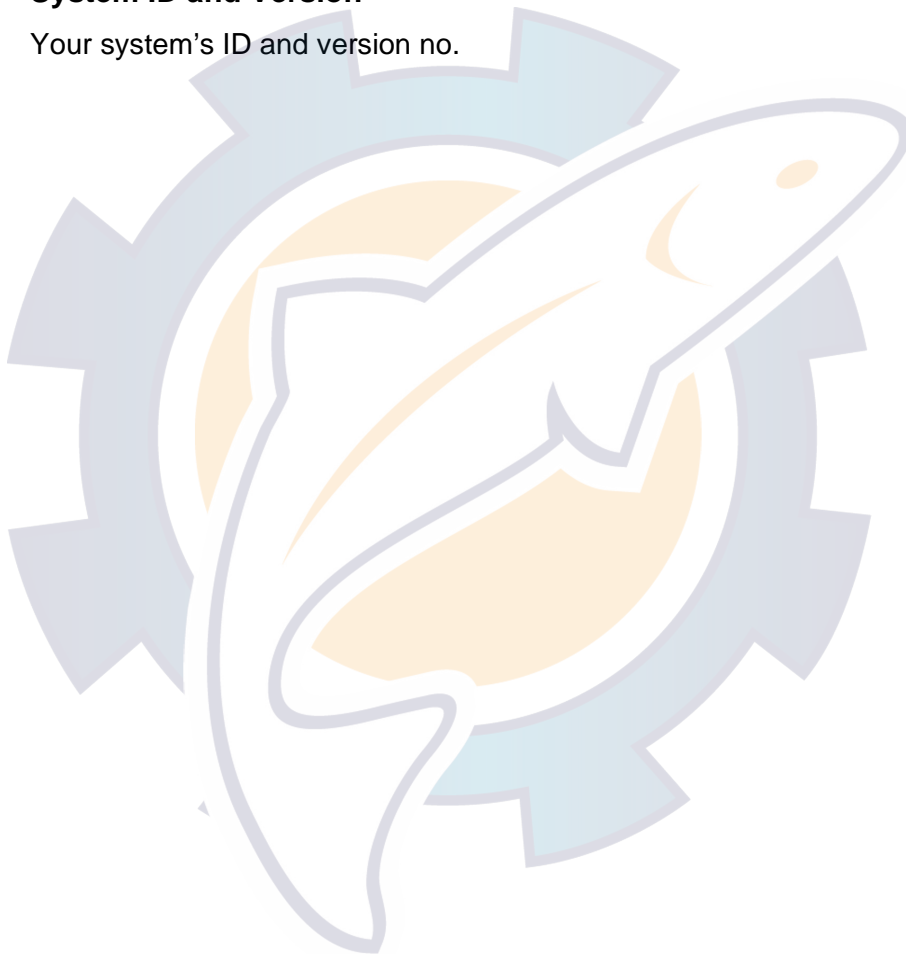
1. Right-click the plotter screen to show the pop-up menu.



2. Use the RotoKey to select Manual Mode and push it to turn the demonstration mode on and off alternately.

**System ID and Version**

Your system's ID and version no.



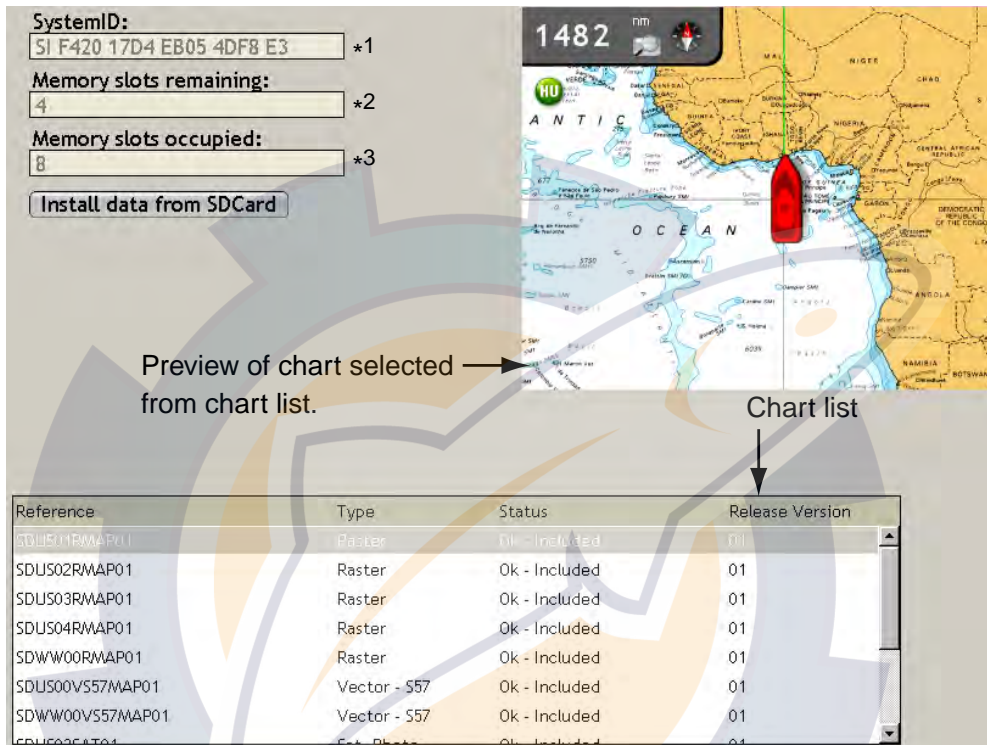


## 13.7 Managing Charts

This section shows you how to manage your chart catalog, from the Chart-Data Catalog menu. From this menu you can browse, update, add and delete charts.

### 13.7.1 Browsing Your Charts

1. Press the **MENU** key to open the menu.
2. Open the Chart-Data Catalog menu.



\*1 Navnet ID

\*2, \*3 One (chart) memory slot=2 GB. A total of 24 GB in the hard drive is allotted for charts.

3. Rotate the RotoKey until the chart list is circumscribed with a rectangle (blue), as below.

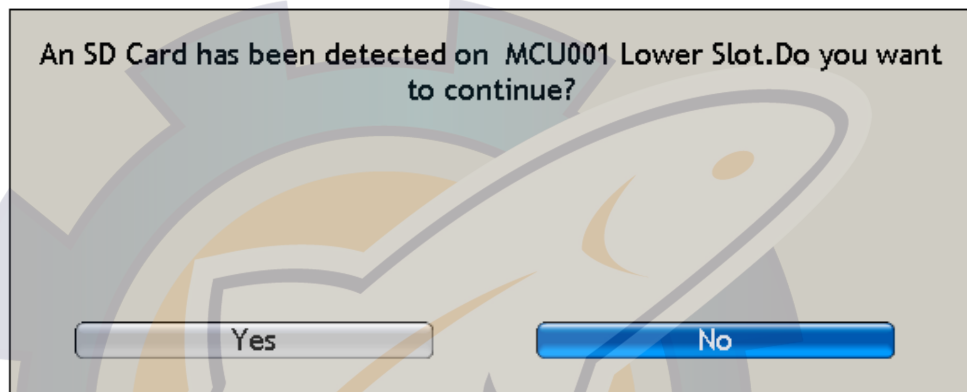
Reference	Type	Status	Release Version
SDUS01RMAP01	Raster	Ok - Included	01
SDUS02RMAP01	Raster	Ok - Included	01
SDUS03RMAP01	Raster	Ok - Included	01
SDUS04RMAP01	Raster	Ok - Included	01
SDWW00RMAP01	Raster	Ok - Included	01
SDUS00VS57MAP01	Vector - S57	Ok - Included	01
SDWW00VS57MAP01	Vector - S57	Ok - Included	01
SDUS00SAT01	Sat. Photo	Ok - Included	01

4. Push the RotoKey.
5. Rotate the RotoKey to select a chart. A preview of the chart appears at the upper 1/4 of the screen.
6. Press the **MENU** key to close the menu.

### 13.7.2 Updating Charts

The charts that come with your system and any ones you have purchased can be updated from the [www.navnet.com](http://www.navnet.com). Follow "Copying system information to an SD card" on page 8-6 and then do the following.

1. Insert the SD card that contains applicable chart data into one of the slots in the card drive.
2. Press the **MENU** key to open the menu.
3. Open the Chart-Data Catalog menu.
4. Rotate the RotoKey to choose the "Install data from SDcard" button and then push the RotoKey. The screen displays location of card and you are asked if you want to continue.



5. Rotate the RotoKey to choose Yes and then push it.
6. A list of chart(s) in the SD card appears. Rotate the RotoKey to choose the chart to import and then push it to import the chart.

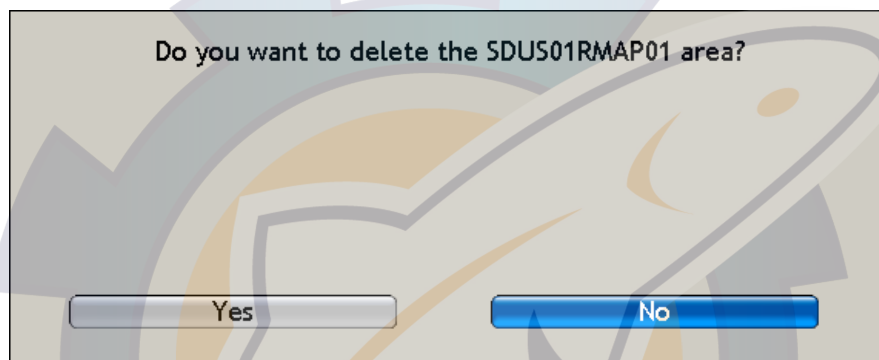
### 13.7.3 Adding Charts

You can purchase charts for your area from [www.navnet.com](http://www.navnet.com). Download desired chart to an SD card and then follow the instructions in section 13.7.2.

### 13.7.4 Deleting Charts

You can delete unnecessary charts from the hard drive. For example, you may not require a chart of Europe if you do your boating along the US coastline.

1. Press the **MENU** key to open the menu.
2. Open the Chart-Data Catalog menu.
3. Rotate the RotoKey until the chart list is circumscribed with a blue rectangle.
4. Push the RotoKey.
5. Rotate the RotoKey to select a chart. A preview of the chart appears at the upper 1/4 of the screen.
6. Push the RotoKey and the "Delete" pop-up appears.
7. Push the RotoKey again. You are asked to confirm if you are sure to delete the chart.



8. Rotate the RotoKey to select Yes and then push it to delete the chart.
9. Press the **MENU** key to close the menu.

# Chapter 14: Maintenance, Troubleshooting

This chapter provides information on maintenance and possible causes of problems that you may experience.

<p><b>⚠ WARNING</b></p> <p><b>ELECTRICAL SHOCK HAZARD</b> Do not open the equipment.</p> <p>Only qualified personnel should work inside the equipment.</p>	<p><b>NOTICE</b></p> <p>Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.</p> <p>Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.</p>
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## 14.1 Maintenance


Regular maintenance is necessary to maintain performance. Check the items listed in the table below monthly to keep your unit in good working order.

### Routine maintenance

Check item	Check point	Remedy
Cabling	Check that all cabling is securely fastened and is free from rust and corrosion.	Reconnect if necessary. Replace if damaged.
Cabinet	Dust on cabinet(s)	Remove dust with a dry clean cloth. Do not use commercial cleaners for cleaning - they may remove paint and markings and deform the equipment.
LCD	The LCD will, in time, accumulate a coating of dust which tends to dim the picture.	Wipe the LCD carefully to prevent scratching, using tissue paper and an LCD cleaner. To remove dirt or salt deposits, use an LCD cleaner, wiping slowly with tissue paper so as to dissolve the dirt or salt. Change paper frequently so the salt or dirt will not scratch the LCD.
Radar antenna	Foreign material on the radar antenna can reduce sensitivity.	Foreign material on the radar antenna can reduce sensitivity. Clean the radiator (or radome) with a freshwater-moistened cloth. Do not use commercial cleaners to clean the radiator, as they can remove paint and markings.

## 14.2 Replacing Fuses

The multi function display has a fuse which protects it from overcurrent and equipment fault. If the power cannot be turned on a fuse may have blown. Find out the reason for blown fuse before replacing it. If a fuse blows again after replacement, contact your dealer for advice.

 **WARNING**

**Use the proper fuse.**

Use of a wrong fuse can result in damage to the equipment and cause fire.

### Fuse information

Name	Type	Code No.	Remarks
Fuse	FGB0-A 125V 5A PBF	000-155-853-10	For MFD8, 24 V
Fuse	FGB0 125V 10A PBF	000-155-826-10	For MFD8, 12 V
Fuse	FGB0 125V 10A PBF	000-155-826-10	For MFD12, 24 V
Fuse	FGB0 125V 20A PBF	000-155-780-10	For MFD12, 12 V

## 14.3 Replacing the Magnetron

When the life of the magnetron has expired, distant targets do not appear on the radar display. When you feel that long range performance has decreased, contact a FURUNO agent or dealer about replacement of the magnetron.

### Magnetron ordering information

Radar sensor	Magnetron type	Code no.
DRS2D	E3590	000-164-574-10
DRS4D	E3571	000-146-867-00
DRS4A	MAF1421B	000-158-786-10
DRS6A	MAF1422B	000-158-788-10
DRS12A	E3566	000-164-418-10
DRS25A	MG5436(E2V)	000-140-762-10

## 14.4 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.

### 14.4.1 General Troubleshooting

Symptom	Remedy
Cannot turn on the power.	<ul style="list-style-type: none"> <li>• Check for blown fuse.</li> <li>• Check that the power connector is firmly fastened.</li> <li>• Check for corrosion on the power cable connector.</li> <li>• Check for damaged power cable.</li> <li>• Check battery for proper voltage output (10.8 to 31.2 V).</li> </ul>
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.

### 14.4.2 Radar Troubleshooting

Symptom	Remedy
You pressed the power switch followed by the <b>GAIN/TX</b> key to transmit but nothing appears on the display	<ul style="list-style-type: none"> <li>• Be sure to push the key for several seconds.</li> <li>• Check that the antenna cable is firmly fastened.</li> <li>• Check if radar source is correct.</li> </ul>
Marks, legends appear but no echoes.	Check that the antenna cable is firmly fastened.
Picture is not updated or it freezes.	<ul style="list-style-type: none"> <li>• Check antenna cable.</li> <li>• For freeze up, turn the display unit on and off again.</li> </ul>
You tuned the receiver but sensitivity is poor.	• Magnetron may need to be replaced. Contact your dealer.
You changed the range but the radar picture does not change.	<ul style="list-style-type: none"> <li>• Try to hit the <b>RANGE</b> keys again.</li> <li>• Turn the display unit off and on again.</li> </ul>
Poor discrimination in range.	• Adjust the Sea control.
True motion mode is not working properly.	<ul style="list-style-type: none"> <li>• Reselect true motion mode.</li> <li>• Check if heading and speed are input.</li> </ul>
Range rings are not displayed.	Use the Rings soft control to turn on the range rings.
<b>GAIN/TX</b> key is pressed and the "TX screen" appears. However the radar soon goes into stand-by.	This symptom indicates that overload protection has activated. In this case, turn off all equipment in the NavNet network. Wait several seconds and then turn on all equipment.



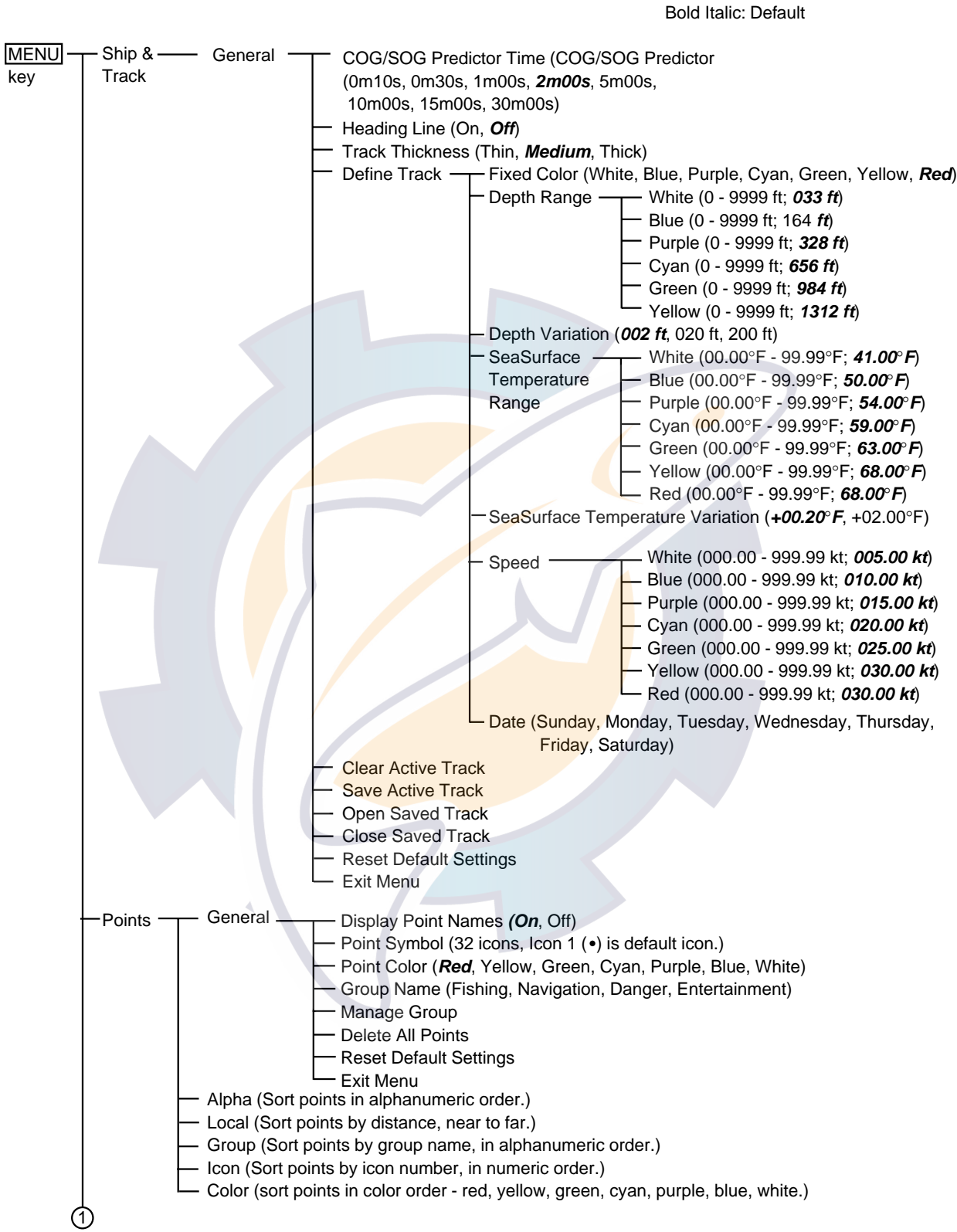
### 14.4.3 Chart Plotter Troubleshooting

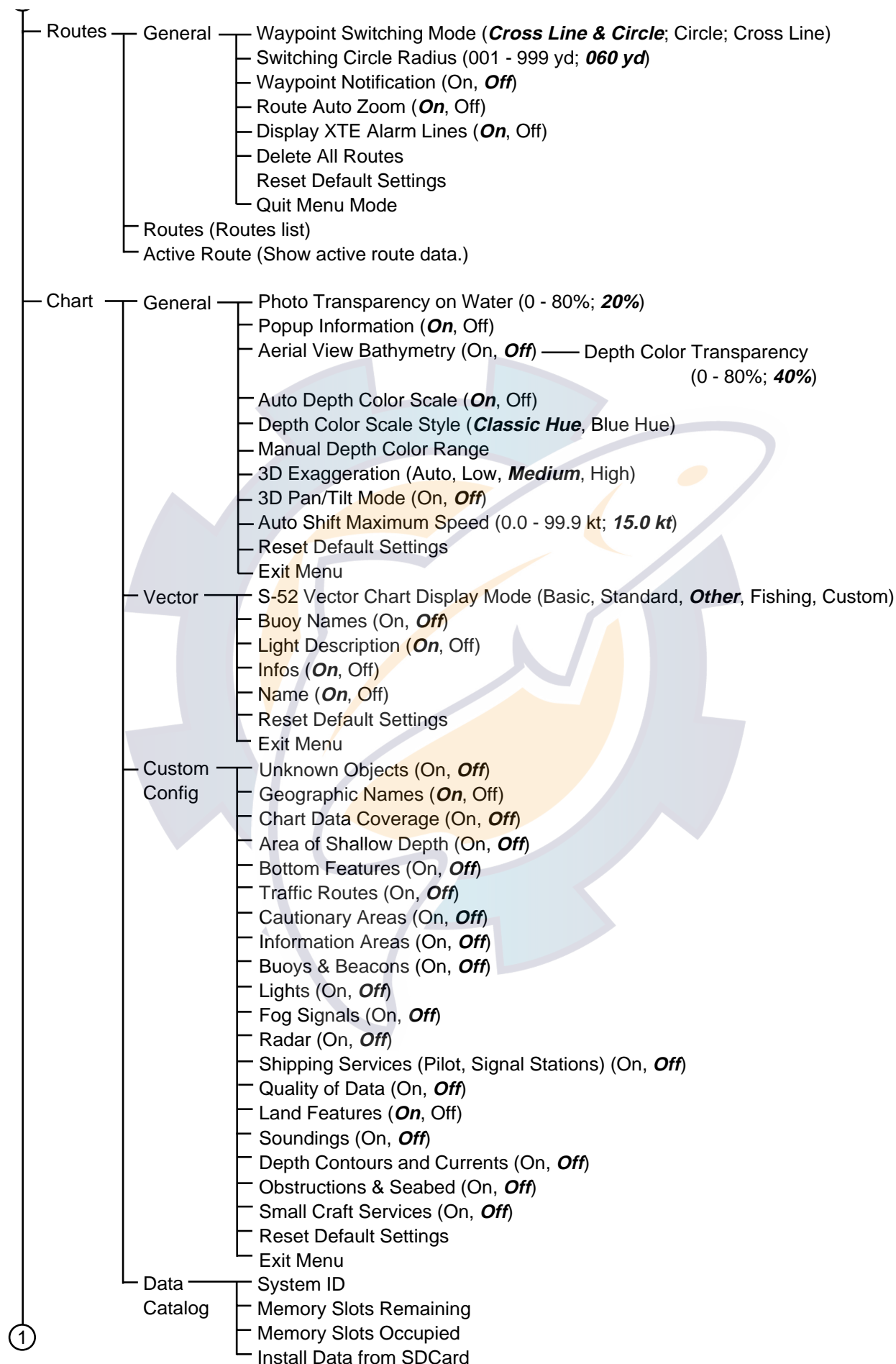
Symptom	Remedy
Position is not fixed.	Check that antenna connector is firmly fastened and navigator is properly connected.
Your vessel's track is not plotted.	Check that track is turned on. (Put cursor on boat icon to open pop-up and check that "Tracks" is on.)

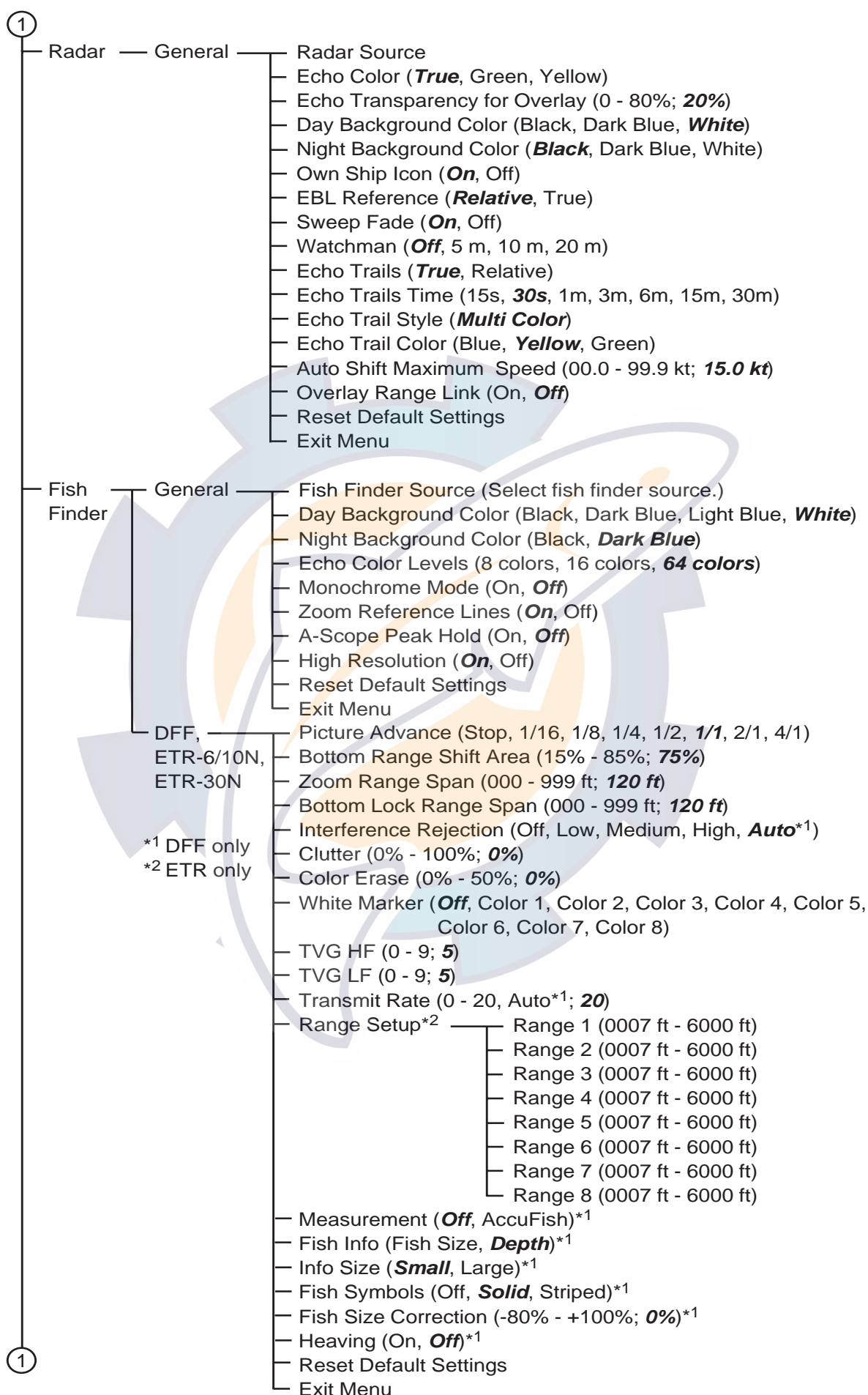
### 14.4.4 Fish Finder Troubleshooting

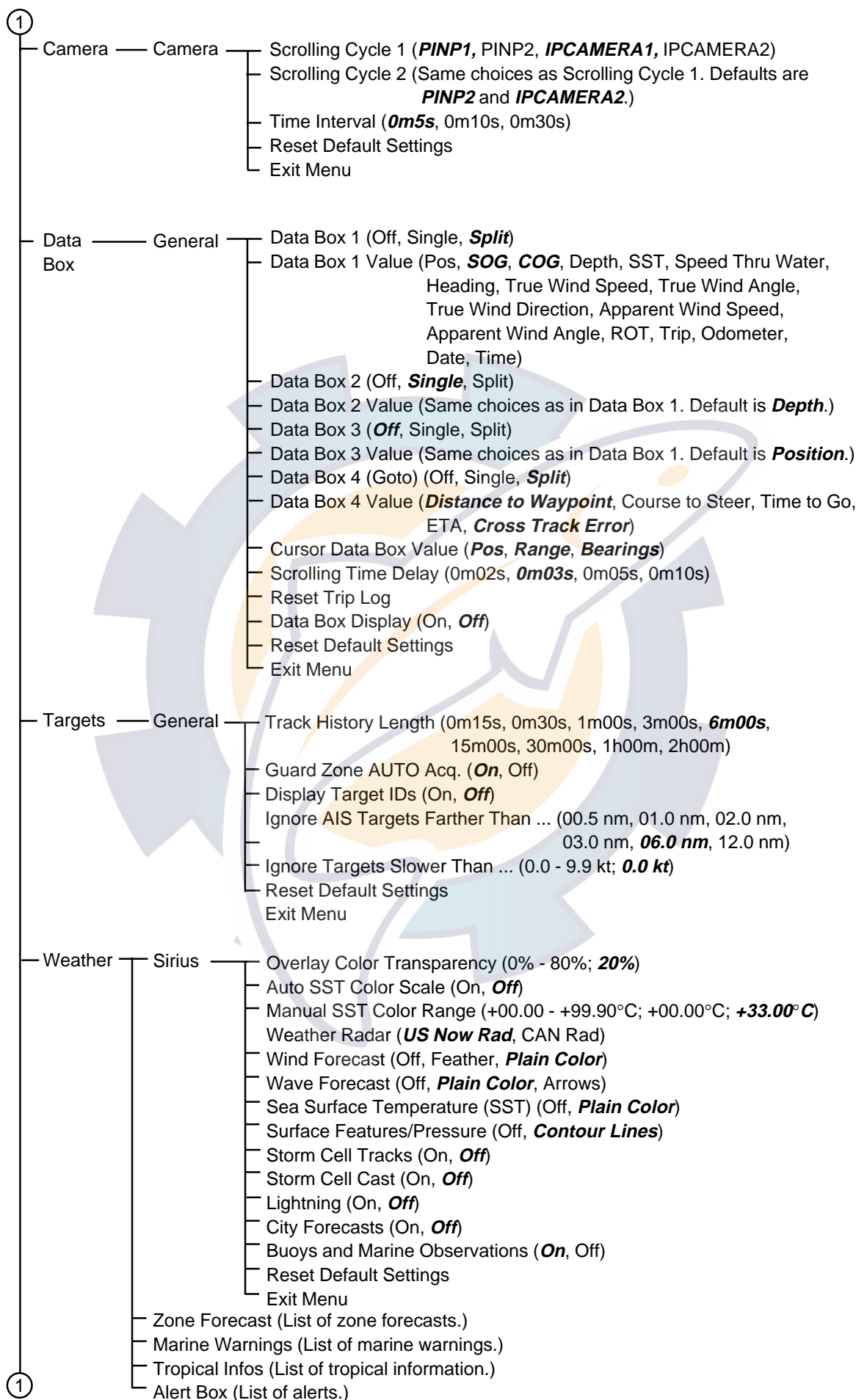
Symptom	Remedy
You selected a fish finder display with the <b>DISP</b> key but no picture appears.	<ul style="list-style-type: none"> <li>• Check that the network fish finder's signal cable is firmly fastened.</li> <li>• Check that fish finder source is correct.</li> <li>• Check that the network fish finder is plugged in.</li> </ul>
Marks and characters appear but no picture appears.	Check if transducer cable is properly connected.
Picture appears but zero line does not appear.	<ul style="list-style-type: none"> <li>• The picture is shifted. Confirm shift setting.</li> <li>• Check if draft is set to zero (Menu→System→Calibration).</li> </ul>
Picture sensitivity is too low.	<ul style="list-style-type: none"> <li>• Check gain setting, if using manual operation.</li> <li>• Marine life or air bubbles may be clinging to transducer face.</li> <li>• Bottom may be too soft to return a suitable echo.</li> </ul>
Depth indication is not displayed.	<ul style="list-style-type: none"> <li>• For manual operation, adjust gain and range to display the bottom echo (in reddish brown).</li> <li>• Adjust bottom level HF/LF (Menu→System→DFF(ETR).</li> </ul>
Noise or interference shows on the display.	<ul style="list-style-type: none"> <li>• Check to be sure the transducer cable is not near ship's engine.</li> <li>• Check the ground.</li> <li>• Other fish finders of the same frequency as yours may be operating near you.</li> <li>• Try to adjust the interference rejector (Menu→Fish Finder→DFF(ETR)→ Interference Rejector).</li> </ul>
Water temperature graph appears but data is wrong.	Check that sensor cable is tightly fastened.

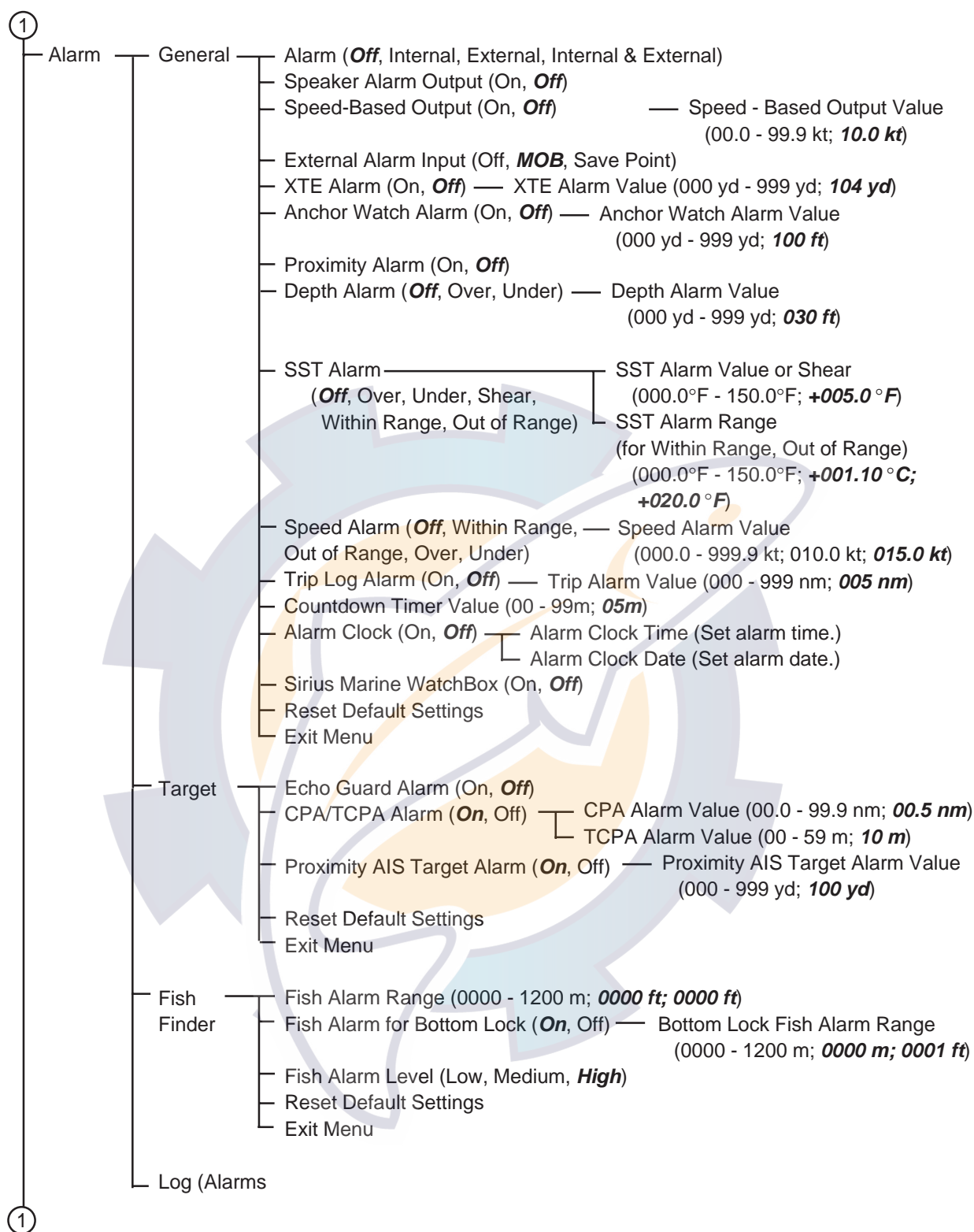
# Menu Tree



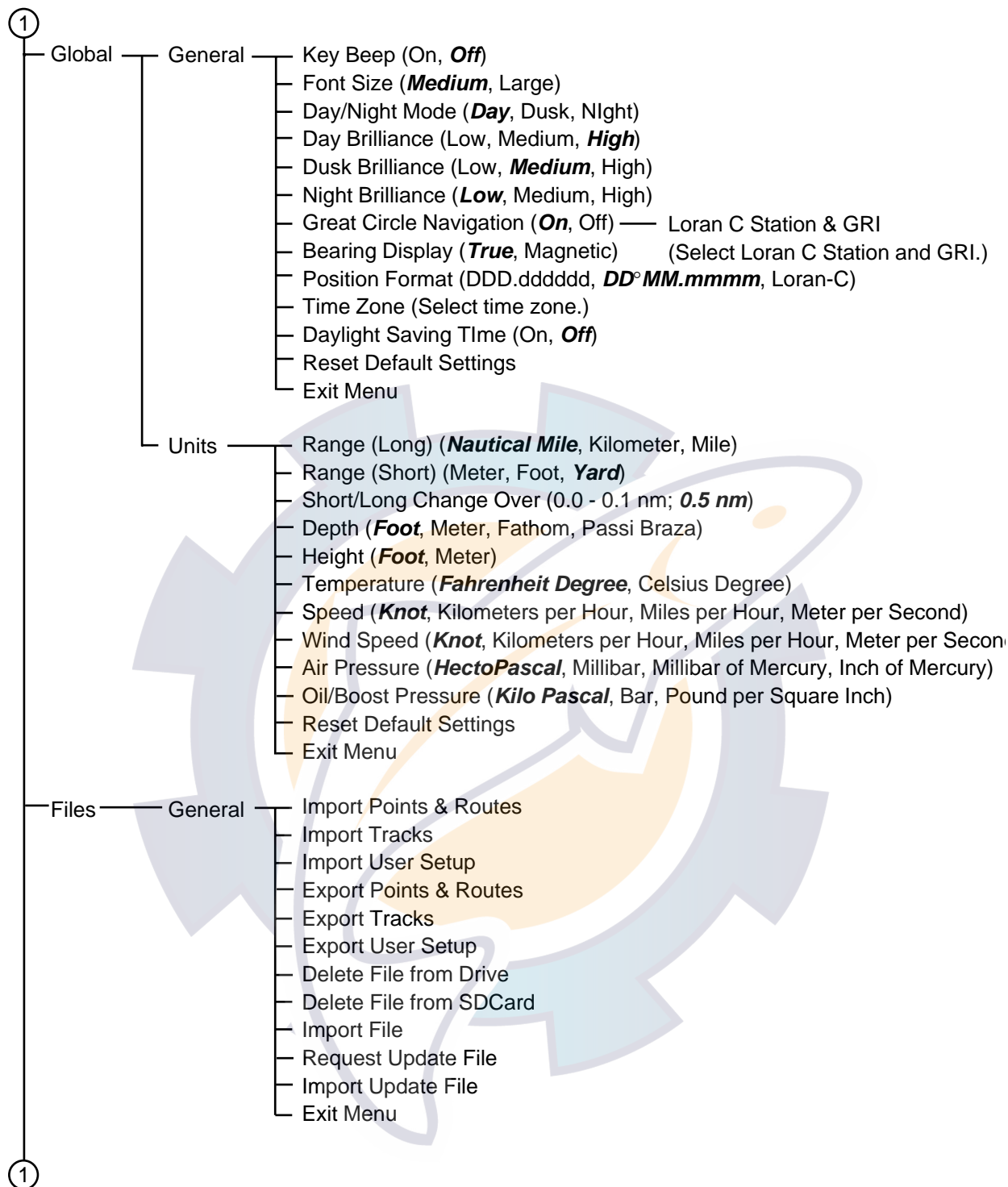


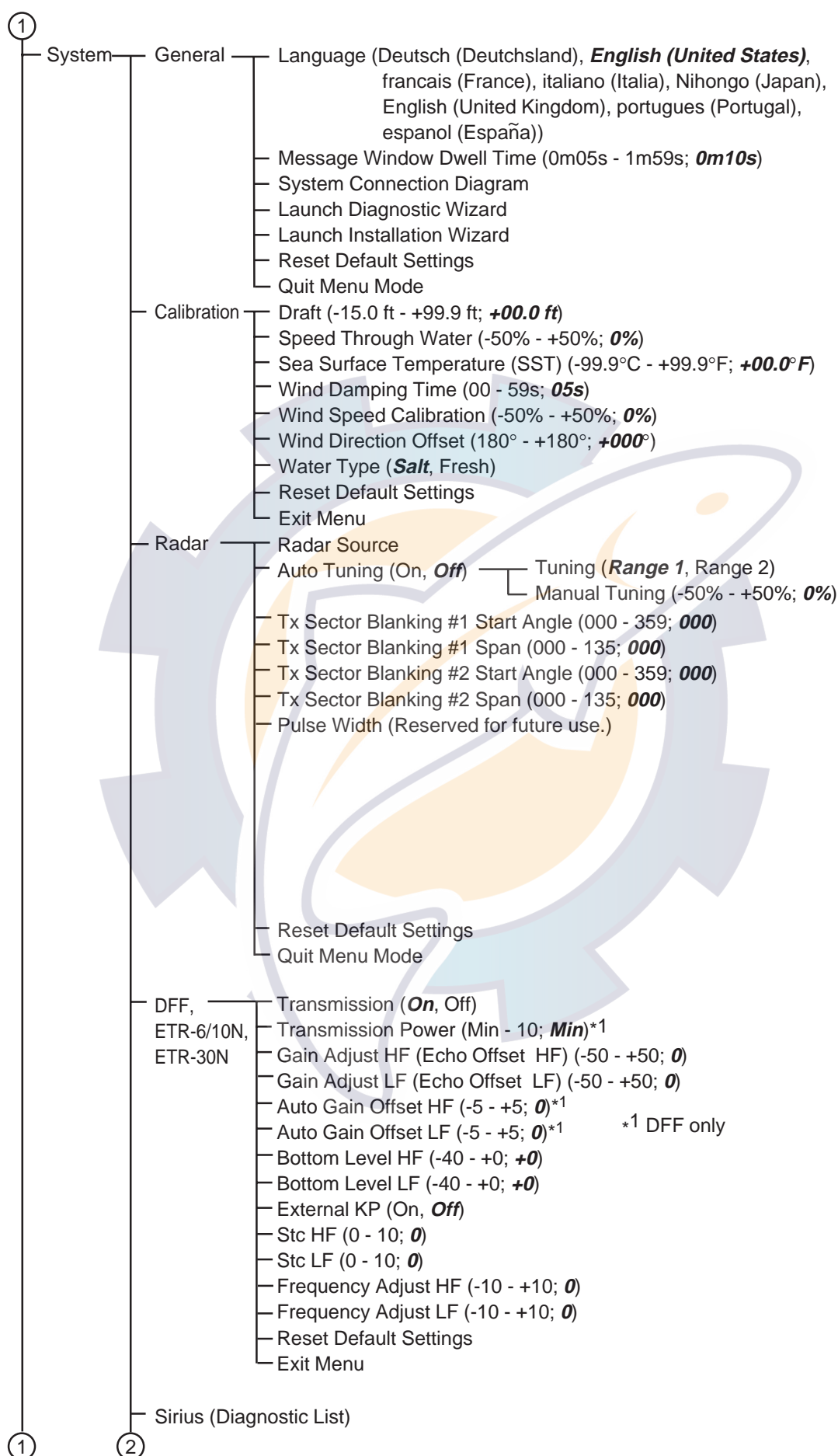


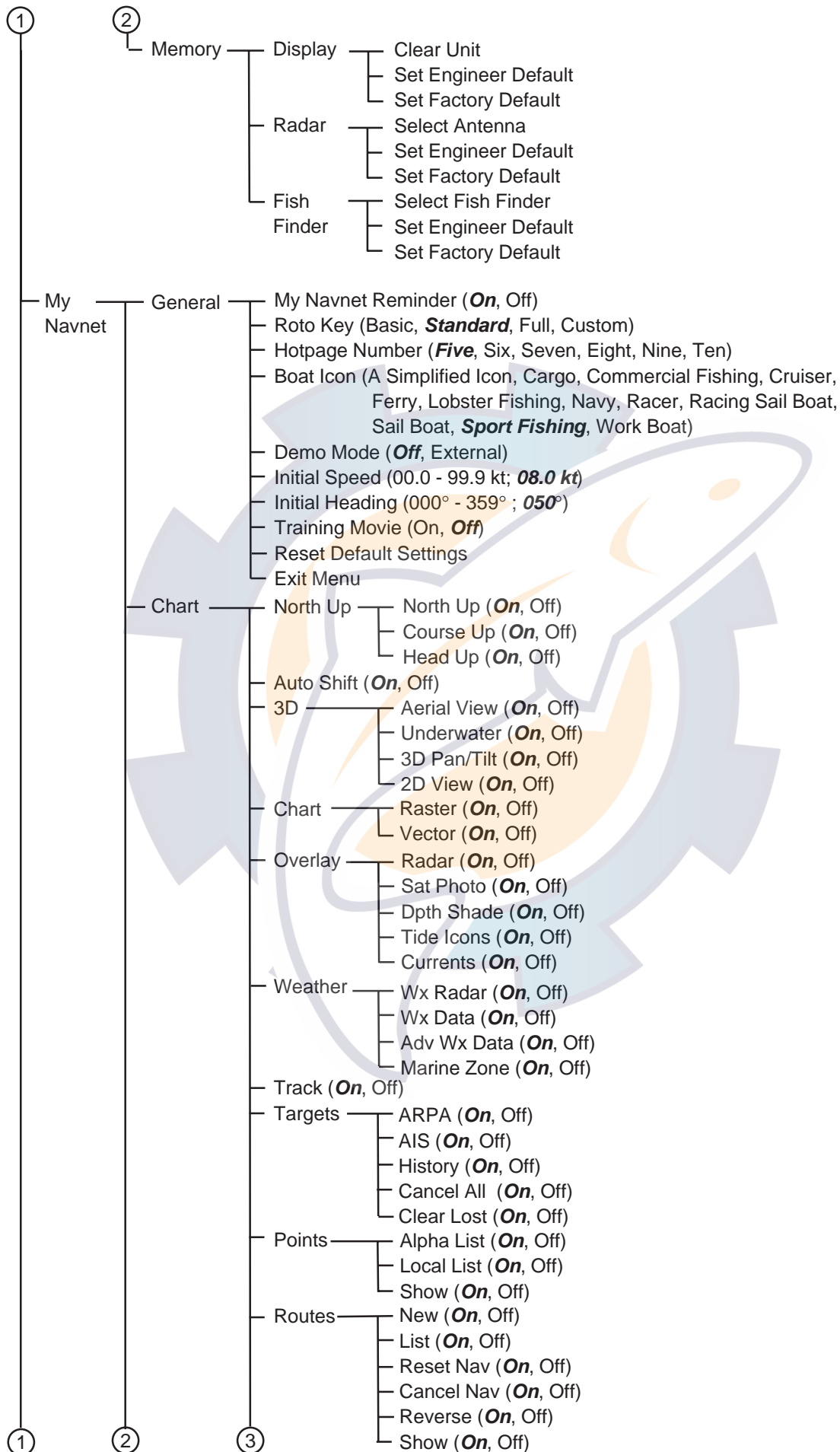


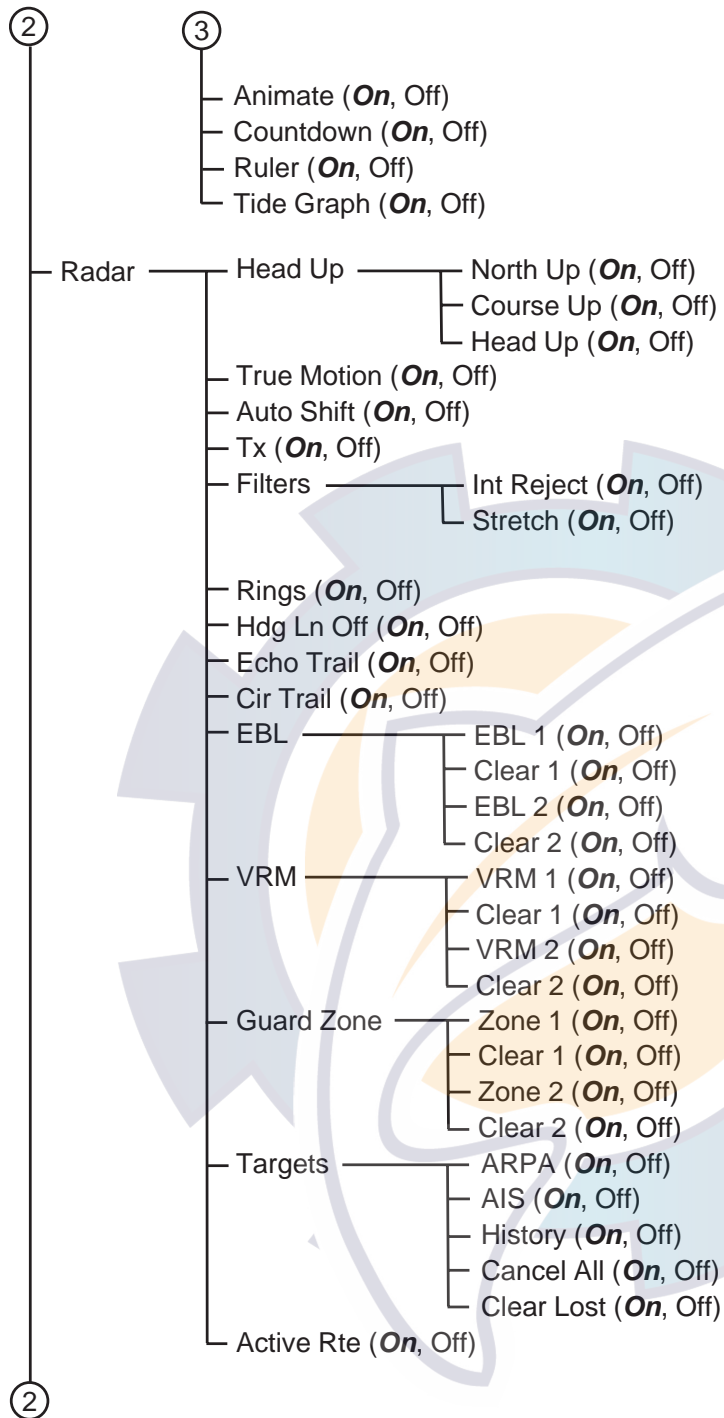


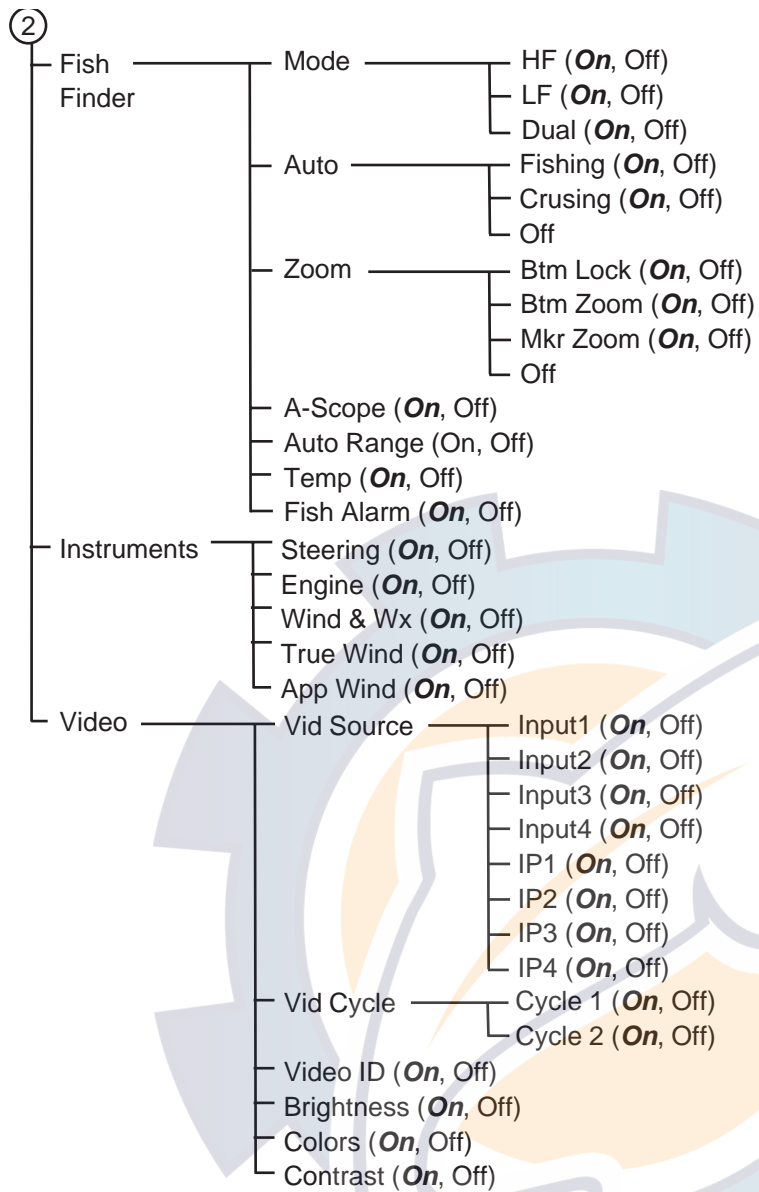












## SPECIFICATIONS OF MULTI FUNCTION DISPLAY MFD8

### 1 GENERAL

- |     |                   |   |
|-----|-------------------|---|
| 1.1 | Display           | 8.4-inch color LCD, 170.2 x 128.2mm                             |
| 1.2 | Resolution        | 640 x 480 dots (VGA)  |
| 1.3 | Indication system | Raster-scan, non-interlace, Horizontal: 31.5kHz, Vertical: 60Hz |
| 1.4 | Brightness        | 700 cd/m <sup>2</sup> typical                                   |
| 1.5 | Display colors    | 65,536 colors (plotter), 64 colors (echo), 16 colors (radar)    |

### 2 PLOTTER FUNCTION

- |     |                 |  |
|-----|-----------------|--|
| 2.1 | Display mode    | Course plot, NAV data, NAV instrument data*, Engine monitoring*  |
| 2.2 | Projection      | Mercator   |
| 2.3 | Usable area     | 85° latitude or below  |
| 2.4 | Memory capacity | Track: 12,000 points, Point: 2,000 points<br>Route: 200 courses w/ 100 waypoints each  |
| 2.5 | MOB             | 1 point  |
| 2.6 | Language        | Dutch, Danish, Finish, French, German, Italian, Norwegian, Portuguese, Spanish, Swedish, UK/US   |
| 2.7 | Alarms          | Waypoint notification and anchor watch, Cross track error, Proximity, Clock, Ship's speed in/out*, Sea surface temperature*, Trip*, Fish*, Bottom lock fish* |
- \*: External data required

### 3 RADAR INDICATION

- |     |                   |   |
|-----|-------------------|---|
| 3.1 | Presentation mode | Head-up, Course-up*, North-up*, Relative motion, True motion**<br>*: Heading data required, **: Heading and speed data required |
| 3.2 | Echo trail        | Interval: 15/30s, 1/3/6/15/30 min. and continuous   |
| 3.3 | ARPA              | Tracks: 30 targets, CPA/TCPA alarm  |

### 4 INTERFACE

- |     |                            |  |
|-----|----------------------------|--|
| 4.1 | Number of port             |  |
|     | LAN                        | 1 ports, Ethernet 100Base-TX                           |
|     | NMEA                       | NMEA0183: 3 ports, NMEA2000: 1 port                    |
|     | USB                        | 1 ports, USB2.0  |
|     | VGA output                 | 1 ports, DVI-D   |
|     | Video input                | 2 ports, NTSC/PAL                                      |
|     | SD card slot               | 2 slots  |
| 4.2 | NMEA0183 (Ver.1.5/2.0/3.0) |  |
|     | Input sentences            | DBK, DBS, DBT, DPT, DTM, GGA, GLL, GNS, HDG, HDM, HDT, |



		MDA, MTW, MWV, RMA, RMC, ROT, VDM, VHW, VTG, VWR, VWT, ZDA
	Output sentences	AAM, APB, BOD, BWC/BWR, DBT, DPT, DTM, GGA, GLL, GNS, GTD, HDG, HDT, MTW, MWV, RMA, RMB, RMC, ROT, VHW, VTG, WPL, XTE, ZDA, ZTG
4.3	NMEA2000	
	Input PGN	059392/904, 060928, 061184, 065280, 126208/720/992/996, 127245/250/251/257/488/489, 128259/267, 129025/026/029/033/038/039/040/044/538/540/792/793/794/798/808, 130306/310/311/577/817/818/819/820
	Output PGN	059392/904, 060928, 061184, 126208/720/992/996, 127245/251/258, 128259/267, 129025/026/029/033/283/284, 130306/310/311/577/816/817/818/819
4.4	Ethernet	
	I/O sentences	Same as NMEA0183 format
<b>5</b>	<b>POWER SUPPLY</b>	
5.1	Multi function display	12-24 VDC: 2.4-1.2A
	w/ radar sensor	DRS2D: 6.1-3.0 A, DRS4D: 6.4-3.2 A
5.2	Rectifier (option)	
	PR-62	100/110/220/230 VAC, 1 phase, 50/60Hz
	RU-3423	100-115/220-230 VAC, 1 phase, 50/60Hz
<b>6</b>	<b>ENVIRONMENTAL CONDITION</b>	
6.1	Ambient temperature	-15°C to +55°C
6.2	Relative humidity	95% at 40°C
6.3	Degree of protection	IP56 (front panel), IP22 (rear side)
6.4	Bearing vibration	IEC 60945
<b>7</b>	<b>COATING COLOR</b>	
		N2.5 (not changed)

## SPECIFICATIONS OF MULTI FUNCTION DISPLAY MFD12

### 1 GENERAL

- |     |                   |   |
|-----|-------------------|---|
| 1.1 | Display           | 12.1-inch color LCD, 246 x 184.5 mm                             |
| 1.2 | Resolution        | 800 x 600 dots (SVGA)   |
| 1.3 | Indication system | Raster-scan, non-interlace, Horizontal: 35.1kHz, Vertical: 60Hz |
| 1.4 | Brightness        | 1,100 cd/m <sup>2</sup> typical                                 |
| 1.5 | Display colors    | 65,536 colors (plotter), 64 colors (echo), 16 colors (radar)    |

### 2 PLOTTER FUNCTION

- |     |                 |   |
|-----|-----------------|---|
| 2.1 | Display mode    | Course plot, NAV data, NAV instrument data*, Engine monitoring*   |
| 2.2 | Projection      | Mercator  |
| 2.3 | Usable area     | 85° latitude or below   |
| 2.4 | Memory capacity | Track: 12,000 points, Point: 2,000 points<br>Route: 200 courses w/ 100 waypoints each   |
| 2.5 | MOB             | 1 point   |
| 2.6 | Language        | Dutch, Danish, Finish, French, German, Italian, Norwegian,<br>Portuguese, Spanish, Swedish, UK/US   |
| 2.7 | Alarms          | Waypoint notification and anchor watch, Cross track error,<br>Proximity, Clock, Ship's speed in/out*, Sea surface temperature*,<br>Trip*, Fish*, Bottom lock fish*<br>*: External data required |

### 3 RADAR INDICATION

- |     |                   |   |
|-----|-------------------|---|
| 3.1 | Presentation mode | Head-up, Course-up*, North-up*, Relative motion, True motion**<br>*: Heading data required, **: Heading and speed data required |
| 3.2 | Echo trail        | Interval: 15/30s, 1/3/6/15/30 min. and continuous   |
| 3.3 | ARPA              | Tracks: 30 targets, CPA/TCPA alarm  |

### 4 INTERFACE

- |     |                            |  |
|-----|----------------------------|--|
| 4.1 | Number of port             |  |
|     | LAN                        | 1 ports, Ethernet 100Base-TX                           |
|     | NMEA                       | NMEA0183: 3 ports, NMEA2000: 1 port                    |
|     | USB                        | 1 ports, USB2.0  |
|     | VGA output                 | 1 ports, DVI-D   |
|     | Video input                | 2 ports, NTSC/PAL                                      |
|     | SD card slot               | 2 slots  |
| 4.2 | NMEA0183 (Ver.1.5/2.0/3.0) |  |
|     | Input sentences            | DBK, DBS, DBT, DPT, DTM, GGA, GLL, GNS, HDG, HDM, HDT, |

		MDA, MTW, MWV, RMA, RMC, ROT, VDM, VHW, VTG, VWR, VWT, ZDA
	Output sentences	AAM, APB, BOD, BWC/BWR, DBT, DPT, DTM, GGA, GLL, GNS, GTD, HDG, HDT, MTW, MWV, RMA, RMB, RMC, ROT, VHW, VTG, WPL, XTE, ZDA, ZTG
4.3	NMEA2000	
	Input PGN	059392/904, 060928, 061184, 065280, 126208/720/992/996, 127245/250/251/257/488/489, 128259/267, 129025/026/029/033/038/039/040/044/538/540/792/793/794/798/808, 130306/310/311/577/817/818/819/820
	Output PGN	059392/904, 060928, 061184, 126208/720/992/996, 127245/251/258, 128259/267, 129025/026/029/033/283/284, 130306/310/311/577/816/817/818/819
4.4	Ethernet	
	I/O sentences	Same as NMEA0183 format
5	<b>POWER SUPPLY</b>	
5.1	Multi function display w/ radar sensor	12-24 VDC: 3.4-1.7A DRS2D: 7.2-3.6 A, DRS4D: 7.6-3.8 A, DRS4A: 11-5.5 A, DRS6A: 12-6 A
5.2	Rectifier (RU-3423, option)	100-115/220-230 VAC, 1 phase, 50/60Hz
6	<b>ENVIRONMENTAL CONDITION</b>	
6.1	Ambient temperature	-15°C to +55°C
6.2	Relative humidity	95% at 40°C
6.3	Degree of protection	IP56 (front panel), IP22 (rear side)
6.4	Bearing vibration	IEC 60945
7	<b>COATING COLOR</b>	
		N2.5 (not changed)

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