

FURUNO



9" MULTI FUNCTION DISPLAY 14.1" MULTI FUNCTION DISPLAY

Model **TZT9/TZT14**



TZT9/TZT14 OPERATOR'S MANUAL

FURUNO ELECTRIC CO., LTD.



(Elemental Chlorine Free)

The paper used in this manual
is elemental chlorine free.

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IMPORTANT NOTICES

General

- This manual has been authored with simplified grammar, to meet the needs of international users.
- The operator of this equipment must read and follow the descriptions in this manual. Wrong operation or maintenance can cancel the warranty or cause injury.
- Do not copy any part of this manual without written permission from FURUNO.
- If this manual is lost or worn, contact your dealer about replacement.
- The contents of this manual and equipment specifications can change without notice.
- The example screens (or illustrations) shown in this manual can be different from the screens you see on your display. The screens you see depend on your system configuration and equipment settings.
- Save this manual for future reference.
- Any modification of the equipment (including software) by persons not authorized by FURUNO will cancel the warranty.
- All brand and product names are trademarks, registered trademarks or service marks of their respective holders.
- SD, SDHC, SDXC Logos are trademarks of SD-3C, LLC.

How to discard this product

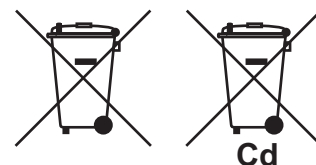
Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (<http://www.eiae.org/>) for the correct method of disposal.

How to discard a used battery

Some FURUNO products have a battery(ies). To see if your product has a battery, see the chapter on Maintenance. Follow the instructions below if a battery is used. Tape the + and - terminals of battery before disposal to prevent fire, heat generation caused by short circuit.

In the European Union

The crossed-out trash can symbol indicates that all types of batteries must not be discarded in standard trash, or at a trash site. Take the used batteries to a battery collection site according to your national legislation and the Batteries Directive 2006/66/EU.



In the USA

The Mobius loop symbol (three chasing arrows) indicates that Ni-Cd and lead-acid rechargeable batteries must be recycled. Take the finished batteries to a battery collection site according to local laws.



In the other countries

There are no international standards for the battery recycle symbol. The number of symbols can increase when the other countries make their own recycle symbols in the future.



SAFETY INSTRUCTIONS

Read these safety instructions before you operate the equipment.



WARNING

Indicates a condition that can cause death or serious injury if not avoided.



CAUTION

Indicates a condition that can cause minor or moderate injury if not avoided.



Warning, Caution



Prohibitive Action



Mandatory Action



WARNING



The radar antenna sends the electromagnetic radio frequency (RF) energy. This energy can be dangerous to you, especially your eyes. Do not look at the radiator or near the antenna when the antenna is rotating.

The distances at which RF radiation levels of 100 W/m² and 10 W/m² exist are shown in the table.

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



CAUTION



Check that no person is near the radar antenna before you turn on the radar.

Serious injury or death can occur if a person is hit by a rotating radar antenna.



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

Failure to turn off the equipment can cause fire or electrical shock.







The front panel is made of glass. Handle it with care.

Injury can result if the glass breaks.



Do not open the equipment.

Only qualified persons can work inside the equipment.

 WARNING	
	<p>Keep units other than the radar antenna away from the rain and water.</p> <p>Fire or electrical shock can occur if water gets inside the equipment.</p>
	<p>Do not disassemble or modify the equipment.</p> <p>Fire or electrical shock can occur if the equipment is disassembled or modified.</p>
	<p>Do not operate the equipment with wet hands.</p> <p>Electrical shock can occur.</p>







 WARNING	
	<p>Do not depend on one navigation device for the navigation of the vessel.</p> <p>Always check your position against all available aids to navigation, for the safety of vessel and crew.</p>
	<p>A radar is an excellent anti-collision aid, but remember to keep watch for possible collision conditions.</p> <p>Always keep a watch while underway.</p>
	<p>Do not leave any objects near the radar antenna.</p> <p>Fire, electrical shock or injury can occur if something gets caught in the radar antenna.</p>
	<p>Use the correct fuse.</p> <p>A wrong fuse can cause fire or serious damage to the equipment.</p>
	<p>Do not maneuver the vessel only from the depth indication.</p> <p>Grounding can occur.</p>

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FOREWORD

A Word to the Owner of the TZT9, TZT14

Congratulations on your choice of the TZT9, TZT14 Multi Function Display, an integral part of our new NavNet TZtouch series of multi-function displays. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

Since 1948, FURUNO Electric Company has enjoyed an enviable reputation for innovative and dependable marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

Your equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless properly installed and maintained. Please carefully read and follow the operation and maintenance procedures set forth in this manual.

We would appreciate feedback from you, the end-user, about whether we are achieving our purposes.

Thank you for considering and purchasing FURUNO.

Features

The NavNet TZtouch series, equipped with a touch screen with multi touch capacity, is a networked navigation system that gives you radar, chart plotter, fish finder, AIS receiver, etc. Information is transferred between NavNet TZtouch units through Ethernet or CAN bus. The plug and play format allows expansion and you can connect a maximum of six NavNet devices. Also, you can remote-control the NavNet TZtouch units and display the data on an iPhone, iPod or iPad.

Main features

- Intuitive touch control operation.
- Remote-control of the equipment with iPhone, iPod or iPad.
- Wireless LAN signal for connection to the internet.

Chart plotter

- TimeZero™ technology displays charts immediately with no load time.
- Loaded with full scale, complete Mapmedia NOAA raster and vector charts for all the United States.
- 3D display with controls for pitch and orientation.
- Points (Waypoints), routes, tracks, etc. are transferred between NavNet TZtouch units through the Ethernet.
- Large memory stores 30,000 track points, 30,000 points, and 200 routes.
- The overlay displays show depth shading, tide, tidal current, satellite photo (North America only), etc.

Radar sensor (option)

- The radar antennas are in radome or open-array type.
- The radar echoes appear in green, yellow or multi-colors.
- Automatic control of sea clutter, tuning and gain for easier operation.
- Guard zone checks for targets within the area you indicate.
- ARPA provided standard.
- Dual-range display for watch on short and long distances at the same time.

Fish finder (option)

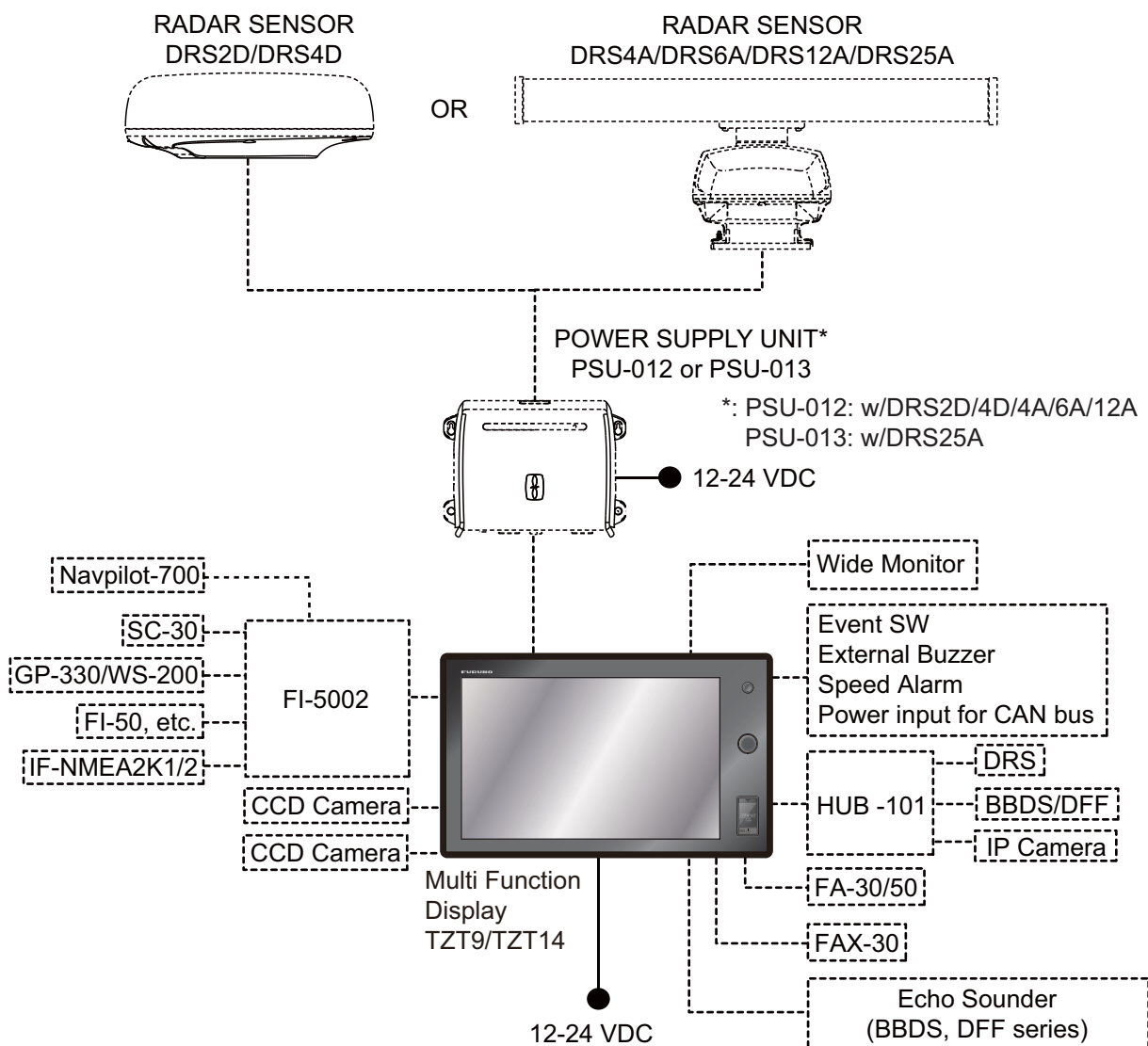
- Measures the depth to the bottom and displays underwater conditions in multi-colors according to echo strength.
- The zoom mode enlarges fish echoes.
- Automatic and manual operation. Auto mode automatically adjusts range, gain and clutter according to purpose, fishing or cruising.
- ACCU-FISH™ estimates length and depth of individual fish.
(Requires appropriate transducer and Bottom Discrimination Sounder BBDS1, Network Sounder DFF1 or DFF3.)
- The bottom discrimination display helps identify probable bottom composition. (Requires Bottom Discrimination Sounder BBDS1.)

Other

- The AIS function receives AIS data from other ships, shore stations and navigational aids and displays this data.
- The DSC (Digital Selective Calling) message information feature provides the MMSI no. and position of ships that have transmitted a DSC message to you. (Requires DSC capable radiotelephone.)
- USB port connects the plug and play USB devices (mouse, etc.).
- Instrument displays (steering, engine, weather, and wind) with connection of the correct sensors:
- The weather information display available with connection of Sirius weather receiver.
- You can download the latest weather data with internet connection.
- The sensor data is transferred to units through the Ethernet or CAN bus.
- IP camera (local supply) monitors activity on the ship.
- CAN bus for the connection of GPS receiver, Weather Station, FI-50 (instrument series), Satellite Compass, etc.

SYSTEM CONFIGURATION

TZT9/14



Environmental category

Sensor units: Exposed to the weather

All other units: Protected from the weather


—— : Standard Supply

Note: When you connect an external monitor to the TZT unit, use a monitor whose aspect ratio is same as the TZT unit (5:3 for TZT9, 16:10 for TZT14). The pictures may be stretched or shrunk with different aspect ratio.

1. SYSTEM INTRODUCTION

This chapter provides the information necessary to get you started using your system. Some of the topics are how to turn on the equipment and an introduction to the main screens.

Standards used in this manual

- There are three keys on the control panel; Home, RotoKey™ and Power. The **Home** and **RotoKey™** are shown in bold face. The power key is indicated as  key. Other items that appear on the screen with touch controls or the **RotoKey™**, are shown in brackets in normal typeface. For example, [Head Up].

- The menu system has main menus and related sub menus.

How to operate the main menu

1. Press the **Home** key to display the menu icon bar (see section 1.12).
2. Select (tap) the [Menu] icon to open the main menu.
This manual states these two procedures as "Select [Menu] on the menu icon bar to open the main menu."
3. Drag the main menus to display a menu desired. The selected menu is indicated with a yellow highlight. The sub menus for the selected menu appear. (As for main menus and sub menus, see section 1.12.)

When you are asked to select a menu item for main menu, the name of the main menu and sub menu are given, separated by a hyphen. For example, "Select the [Routes] - [Default Route Color] menu".

- This equipment has a RotoKey menu, a revolving set of soft controls that gives you access to full control of the NavNet TZtouch system.

How to operate the RotoKey menu

1. Push the **RotoKey™** to open the RotoKey menu.
2. There are two methods to select a menu item as follows:
 - **RotoKey™**: Rotate the **RotoKey™** to select a menu desired then push the **RotoKey™** to do the function marked on the soft control.
 - **Touch control**: Drag the RotoKey menu to display a menu desired then select (tap) it to do the function marked on the soft control.

This manual states this operation procedure as "Select [menu name] from the RotoKey menu."

- The colors mentioned for track, route, point, etc. are the default colors.

1.1 Controls

The TZT9 and TZT14 are operated by three keys and touch control.

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

- Keys
- Touch control
- 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. If you do not need the key beep, deactivate the beep sound from the [General] - [Key Beep] menu of the main menu.

Key control description


The key controls of your system are in the figures shown below. The key controls are illuminated for nighttime use.



TZT9




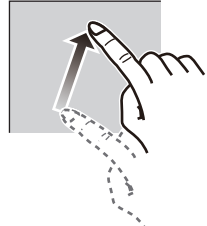
TZT14

No.	Label	Function
1		<ul style="list-style-type: none"> • Turns the power on. • Adjusts the brilliance of the display. • Turns the power off. (Device or Network)
2	Card drive	Card drive for memory cards.
3	RotoKey™	<ul style="list-style-type: none"> • Push: Opens the RotoKey menu or validates the selected item. • Rotate: <ul style="list-style-type: none"> • Selects an item on the RotoKey menu. • Selects the range scale on the chart plotter or the radar screen.
4	Home	<ul style="list-style-type: none"> • Opens the display selection window. • Displays the menu icon bar.

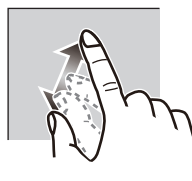

Touch control description

The touch control depends on the screen type. The basic operations are in the tables that follow.

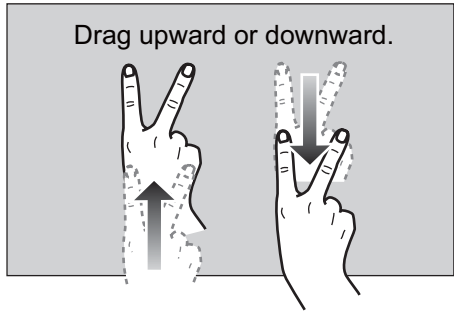
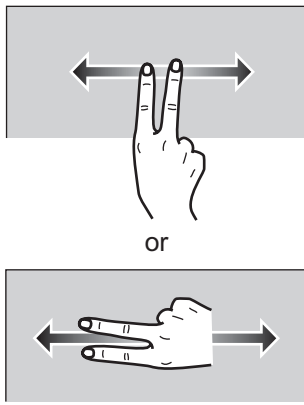

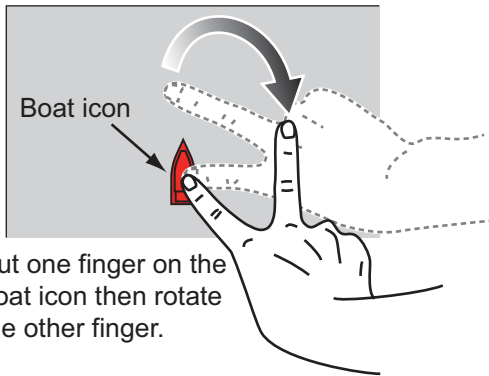
Operation with a finger

Operation with a finger		Function
Tap		<ul style="list-style-type: none"> • Select a menu item. • Select an object or position to display the corresponding pop-up menu.
Drag		<ul style="list-style-type: none"> • Pan the charts. • Scroll the menu.

Operation with two fingers

Operation with two fingers		Function
Pinch	  <div style="display: flex; justify-content: space-around; margin-top: 5px;"> Zoom in Zoom out </div>	<ul style="list-style-type: none"> • Zoom in or out the chart scale in the 2D/ 3D modes or weather display. • Select radar range on the radar display.

1. SYSTEM INTRODUCTION

Operation with two fingers	Function
<p>Drag</p>	<p>Switch from 2D to 3D.</p>  <p>Drag upward or downward.</p> <p>Orientate 3D view.</p> 
<p>Tap</p>	<p>Execute the function which is selected in [General] - [Function Gesture] of the main menu (see section 1.14).</p> 
<p>Rotate</p>	<p>Switch between head up and north up in the 2D/3D modes.</p>  <p>Boat icon</p> <p>Put one finger on the boat icon then rotate the other finger.</p>


When both **Rotokey**TM and touch control are available for the same function, this manual states the operation by touch control.

Notes for touch control


- A large amount of waterdrops on the screen can cause misoperation and slow touch response. Wipe the screen with a dry cloth to remove the water.
- This equipment uses a capacitive touch screen. Tap the screen with your fingertips directly. Do not use sharp objects (needle, pen, nail) or a stylus pen. Be careful not to scratch the screen.

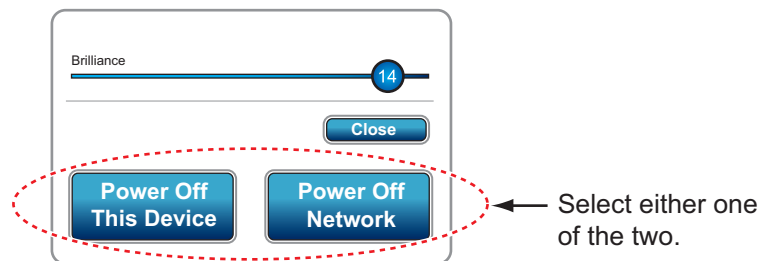
- Do not tap the screen with gloved fingers. Misoperation or no response can result.
- Do not put objects (stickies, etc.) on the screen. The touch control can fail to work properly.
- Keep the equipment away from a radio antenna, fluorescent light, solenoid valve or other electronic devices to prevent false operation from noise.
- The front panel is made of glass. If the front panel is damaged, do not try to repair it yourself. Unauthorized repair will void the warranty. Contact your dealer about repair or replacement.

1.2 Power ON and OFF

Press the  key to turn the power ON.

When you turn on the power, a beep sounds and the start-up screen appears. Approximately 90 seconds after you apply the power, the chart plotter display appears.

To turn the power OFF, press the  key. The following window appears.




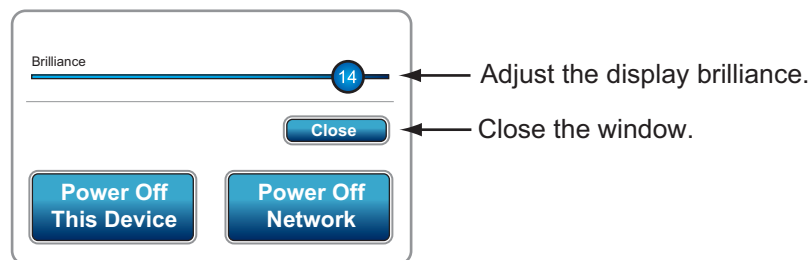
Select [Power Off This Device] or [Power Off Network]. 15 seconds after the screen goes blank, the power turns off. (The power is on for this 15 seconds.)

Note 1: Do not turn off the power during the start-up. Wait until the start-up is completed before you turn the power off.


Note 2: The screen refreshes slower in low ambient temperature.

1.3 How to Adjust Display Brilliance

Press the  key to show the following window.



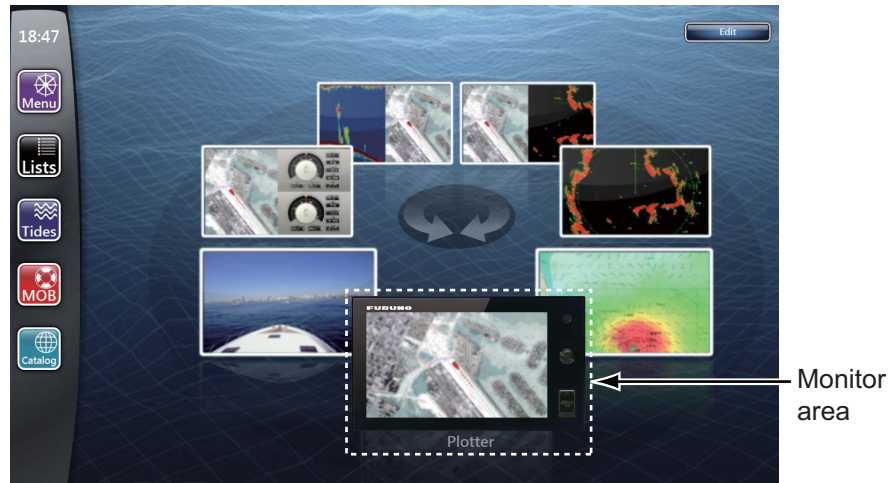
Drag the circle icon to adjust the display brilliance. The brilliance level is indicated on the icon.

You can also adjust the display brilliance with short press of the  key repeatedly.

1.4 How to Select a Display

Use the **Home** key and the **RotoKey™** (or touch control) to select a display, from the display selection window.

1. Press the **Home** key to show the display selection window.



2. Do one of the following.
 - **RotoKey™**: Rotate the **RotoKey™** to put the required display in the monitor area at the bottom of the screen then push the key.
 - **Touch control**: Select (tap) the required display.

For details, see section 13.2.

1.5 SD Cards

The SD card stores the tracks, routes, points, settings, etc. Set and remove SD cards as shown below. The Secure Digital Extended Capacity (SDXC) cards can also be used.

How to format an SD card

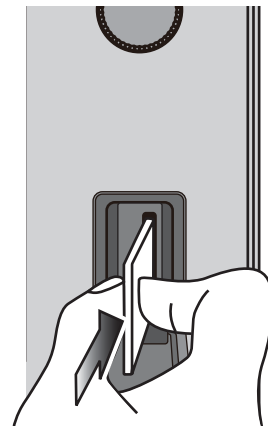
You do not normally need to format an SD card for use with the system. If the card becomes corrupted, format the card with a formatting program that is compatible with the specifications of the SD card. The SD Memory Card Formatting Software made by Panasonic is an example.

How to set an SD card

- 1) Pull the tab on the card drive cover to open the card drive.
- 2) As shown in the right figure, put the SD card in the right card drive with the label right. If the card does not set easily, do not use force.

Note: The left card drive has a cover.

- 3) Push the card until the card is in position.



How to remove an SD card

- 1) Pull the tab on the card drive cover to open the card drive.
- 2) Push the card to release the card from the card drive.
- 3) Remove the card with your fingers then close the cover.

About the SD cards

- Use SD cards carefully. Wrong use can damage the card and destroy its contents.
- Make sure the cover is closed at all times.
- Remove a card with only your fingers. Do not use metal instruments (like tweezers) to remove the card.
- Do not remove a card during the reading of the card or writing to the card.
- If there is water at the bottom of the card cover, DO NOT open the cover. Remove the water with a dry cloth completely and then open the cover.
- The memory cards in the tables below have been tested:



Type	Capacity	Maker
LSD64GCBJP133	64 GB	Lexar
SD-E064GUA	64 GB	TOSHIBA
SD6A/64GB	64 GB	Kingston
RP-SDW32G	32 GB	Panasonic
SD-E032GUX	32 GB	TOSHIBA
RP-SDM16GK1K	16 GB	Panasonic
RP-SDM08GK1K	8 GB	Panasonic
RP-SDV08GK1K	8 GB	Panasonic
SDSDRH-8192-903	8 GB	SANDISK
RP-SDV04GK1K	4 GB	Panasonic
RP-SDM04GK1K	4 GB	Panasonic
SDSDBR-4096-J85	4 GB	SANDISK
SDSDRH-4096-903	4 GB	SANDISK
SDSDRX-4096-903	4 GB	SANDISK
AD-SDH2G	2 GB	ADTEC
HPC-SD2GM2	2 GB	HAGIWARA SYS-COM
HPC-SD2GT	2 GB	HAGIWARA SYS-COM
QSDS-2G	2 GB	PQI
RP-SDK02GJ1A	2 GB	Panasonic
RP-SDR02GJ1A	2 GB	Panasonic
RSDC-G2G	2 GB	BUFFALO
RSDC-S2G	2 GB	BUFFALO

1. SYSTEM INTRODUCTION

Type	Capacity	Maker
SD/2GBFE	2 GB	Kingston
SD-2G	2 GB	I/O DATA
SDP-2G	2 GB	I/O DATA
SD-B002GT4	2 GB	TOSHIBA
SDSDB-2048-J60	2 GB	SANDISK
SDSDH-2048-903	2 GB	SANDISK

Note: Use an SD card class 6 or above for storing chart data.

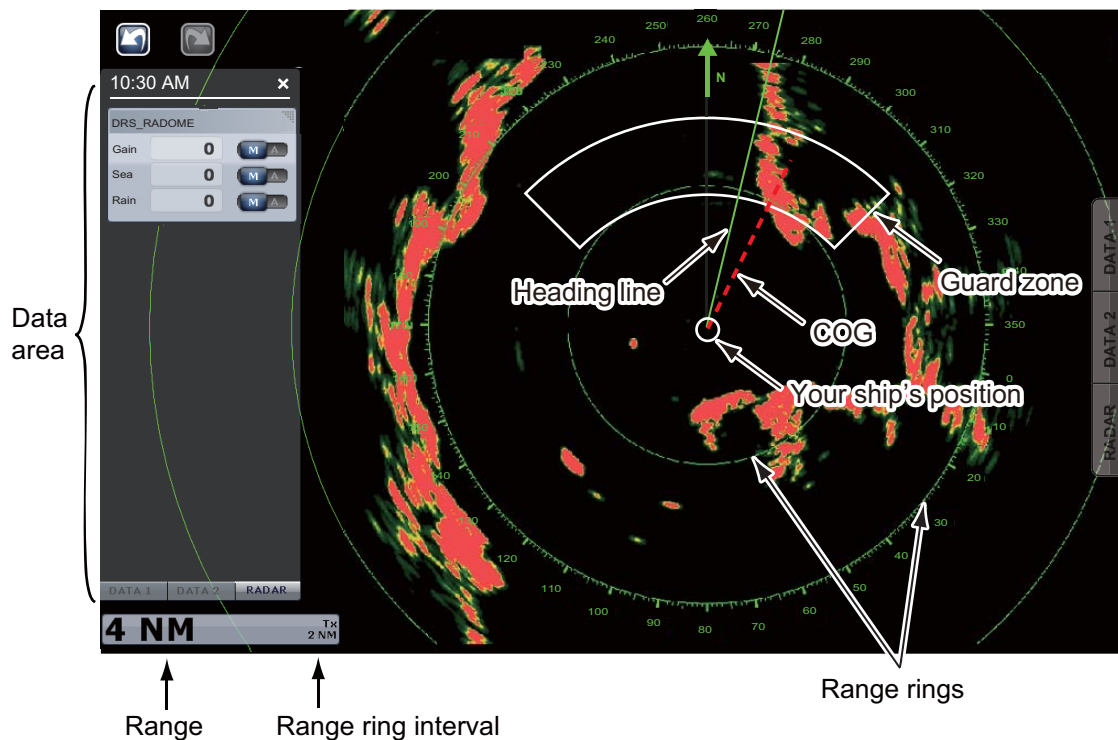
1.7 Radar Introduction

A radar system operates in the microwave part of the radio frequency (RF) range. The radar detects 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 and north-up modes and orientation in true and relative motion. The relative motion display shows other ships movement relative to your ship. The true motion display shows your ship and other objects in motion according to their true courses and speeds.

A guard zone tells you when the radar targets are in the area you indicate. The trail of targets can be shown in afterglow to monitor their movements.

The dual range display scans and displays two different radar ranges at the same time. This display lets you watch on both short and long ranges at the same time.



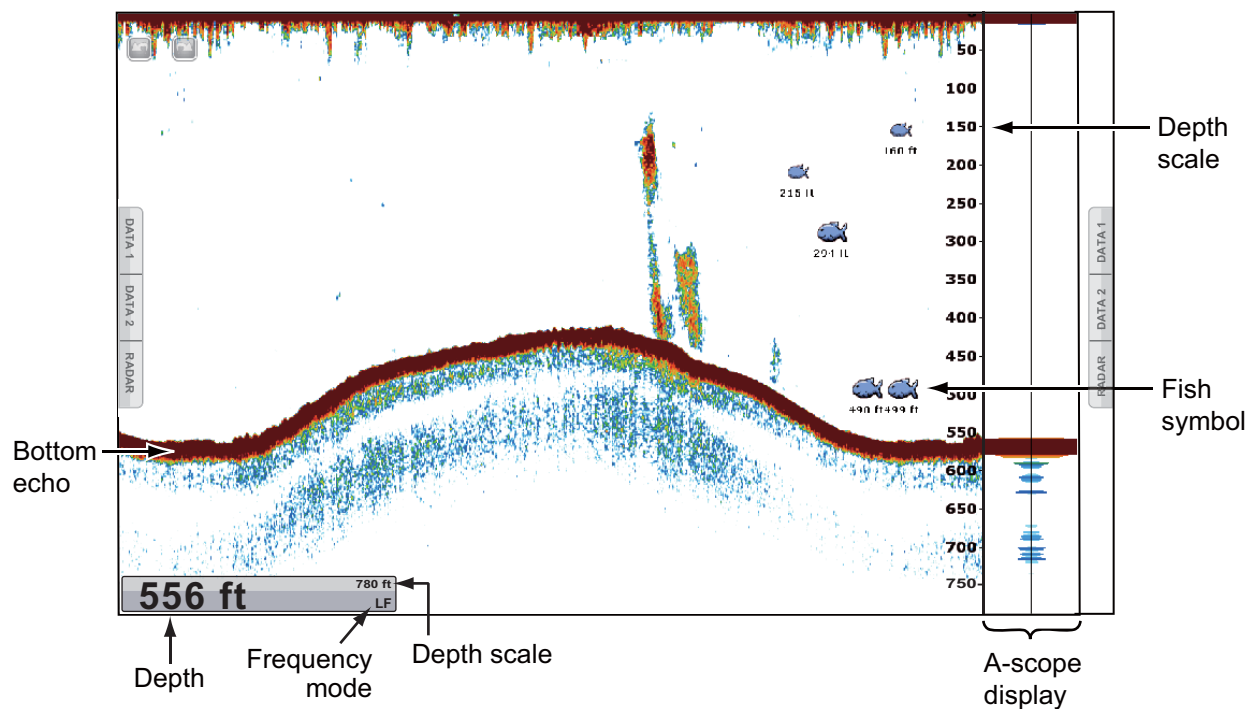
1.8 Sounder (Fish Finder) Introduction

The sounder (fish finder) display provides a picture of the echoes found by the fish finder. Echoes are scrolled across the screen from the right position to the left position.

The echoes at the right position are the current echoes. These echoes can be from separate fish, a school of fish, or the bottom. Depth to the bottom is indicated always, provided the gain is set correctly. You can scroll the echoes backward.

Both low and high TX frequencies are provided. (Frequencies depend on the transducer connected.) The low frequency has a wide detection area, which is for general detection and understanding bottom conditions. The high frequency has a narrow beam that helps you inspect fish.

The range, gain, clutter and TVG can be adjusted automatically according to your purpose (cruising or fishing) to let you do other tasks.



1.9 RotoKey Menus

The main function of the **RotoKey™** is to display the RotoKey menu, a revolving menu of soft controls which change with operating mode. Push the **RotoKey™** to display the RotoKey menu then rotate the **RotoKey™** to select a soft control. You can also select a soft control by dragging with a finger. When you search through the soft control menu, the now-selected soft control is the longest and surrounded in yellow. Push the **RotoKey™** or tap the menu item to do the function shown on the selected soft control. For details, see section 13.1.



The indication at the end of a soft control indicates soft control category:

- The "◀" mark indicates a multi-function soft control. Push the **RotoKey™** (or tap the menu item desired) to go to the next level.
- The "✓" mark indicates ON status (selected) of the item shown on the soft control. The "✓" mark disappears with OFF status (deselected). Push the **RotoKey™** (or tap the menu item desired) to switch ON or OFF.
This manual states these operation procedures as follows:
ON status with the "✓" mark: Select [menu item name].
OFF status: Deselect [menu item name].
- There is no mark on a soft control that does the function labeled on the control, for example, [Hdg Ln Off] in the radar display. Push the **RotoKey™** (or tap the menu item desired) to process the item.



1.10 Pop-up Menu

The pop-up menus let you quickly access the commands according to the selected object, position or active display. Select an object or position to display the pop-up menu. The pop-up menus shown on the screen depend on the RotoKey mode (see section 13.1). The right figure shows the Chart Plotter pop-up menu.



How to operate a pop-up menu

Rotate the **RotoKey**TM to select an item. You can also select an item by dragging with a finger. The operation is same as the RotoKey menu.

- The "◀" mark indicates a multi-function soft control. Push the **RotoKey**TM (or tap the menu item desired) to go to the next level.
- The "✓" mark indicates ON status (selected) of the item shown on the soft control. The "✓" mark disappears with OFF status (deselected). Push the **RotoKey**TM (or tap the menu item desired) to switch ON or OFF.
- There is no mark on a soft control that does the function labeled on the control or displays the window for the function, for example, software keyboard. Push the **RotoKey**TM (or tap the menu item desired) to process the item.

1.11 Data Area (Data Box)

The data area at both sides of the screen shows the navigation data, with data boxes. You can select the data to display in the area, and show or hide the data boxes as necessary. The data that you can show depends on your system configuration.



Note: A data box set is displayed at the left side in a three-way split screen.

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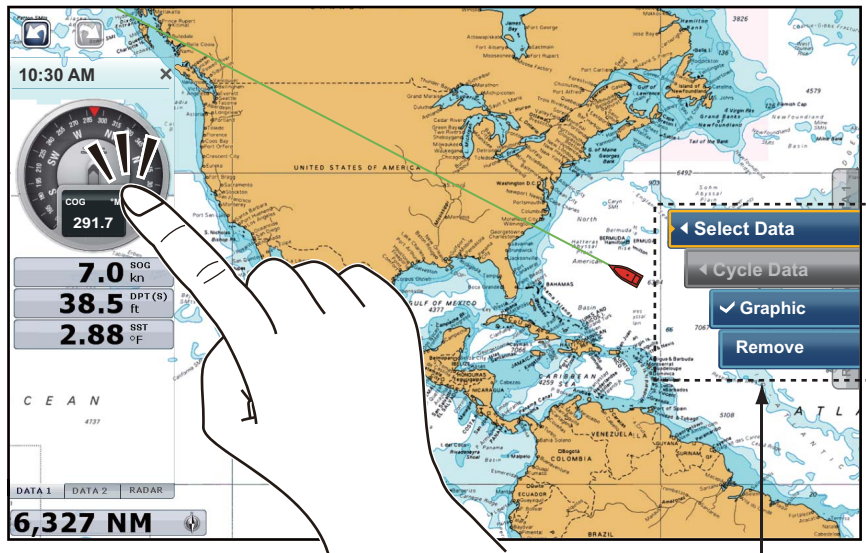
Select [DATA 1], [DATA 2] or [RADAR] of the side menu at the left or right of the screen to show a data box set. To hide a data box set, select [x] at the top right-hand corner of the data area.

You can select the data to display in each data box on the screen.

1.11.1 How to set the data boxes

How to change the contents of a data box

1. Select the data box to change. The pop-up menu appears.



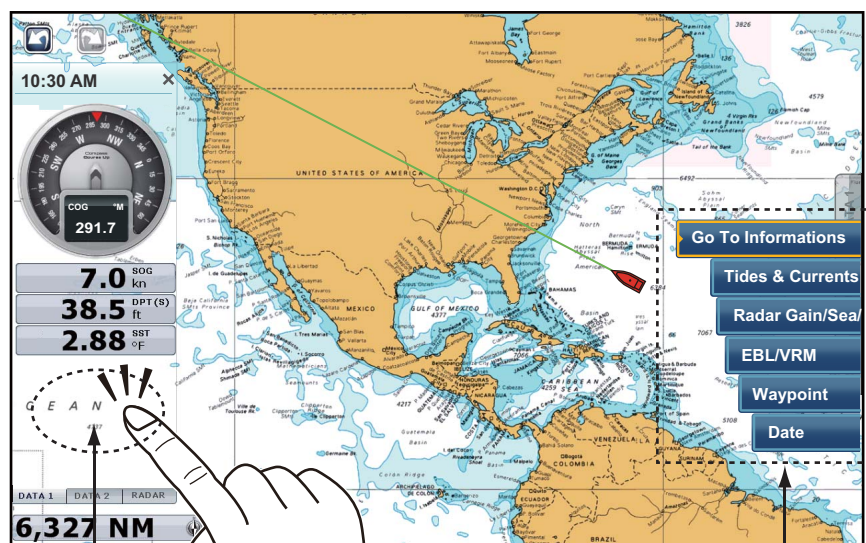
Select the data box to change (in this case, COG).

The pop-up menu appears.

2. Select [Select Data].
3. Select the new data.

How to add a data box to a data area

1. Tap any unoccupied area in the data area to display the pop-up menu.



Tap unoccupied position.

The pop-up menu appears.

1. SYSTEM INTRODUCTION

2. Select the data to add. The added data appears under the bottommost data box. [Date] is added in the following example.

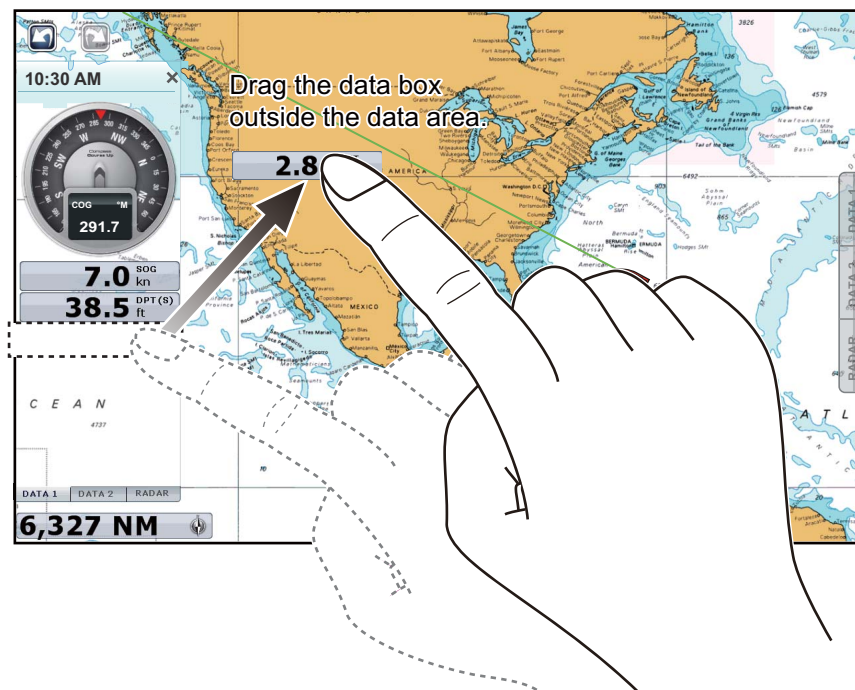


You can sort the data boxes by drag and drop.

How to delete a data box from a data area

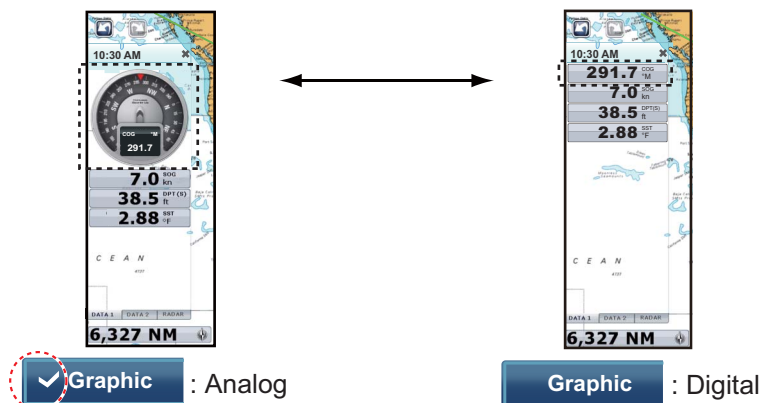
Pop-up menu: Select the data box to delete. The pop-up menu appears. Select [Remove].

Touch control: Drag the data box outside the data area.



How to switch the indication between analog (graphic) and digital

Select the data box for which to switch the indication. The pop-up menu appears. Select [Graphic] to display the analog indication. Deselect [Graphic] to display the digital indication.



1.11.2 Data cycling

A data box may contain more than one data indication. In this case you can cycle the data, at the interval desired.

How to add a data indication to a data box and cycle the data

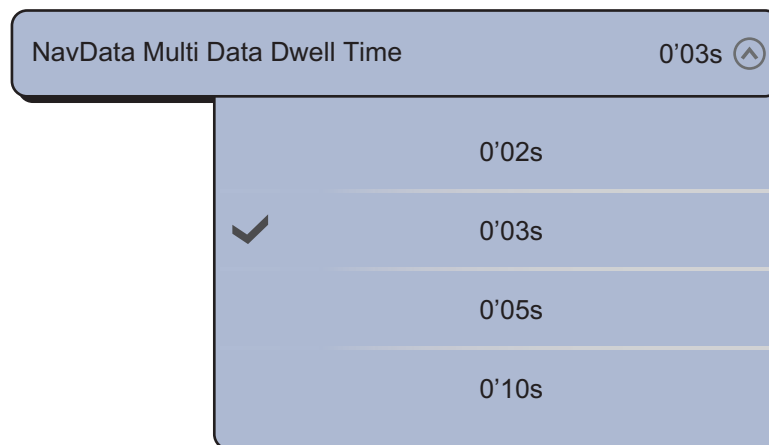
Do the following to add data indication(s) to a data box and cycle the data.

1. Select the data box for which you want to add a data indication. The pop-up menu appears.
Note: You can not cycle the analog data.
2. Select [Cycle Data].
3. Select the data to add.
4. Repeat steps 1 to 3 to continue adding data.

How to set the cycling time

You can set the cycling time interval as follows:

1. Select [General] - [NavData Multi Data Dwell Time] of the main menu.



2. Select [2s], [3s], [5s] or [10s].
3. Select [Close] to exit the menu.

1.11.3 How to adjust transparency of the data box

You can adjust the degree of transparency for the data box with the [NavData Transparency] slider with [General] of the main menu. The available degree of transparency is 0 - 80(%). (Alpha blending technology is used for transparency effects.)



1.12 Menu Introduction

The menu system has main menus and related sub menus. The number of menus depends on equipment connected.

How to use the menu

1. Press the **Home** key to display the menu icon bar.



2. Select (tap) the icon desired on the menu icon bar. The function for each icon is in the following table.

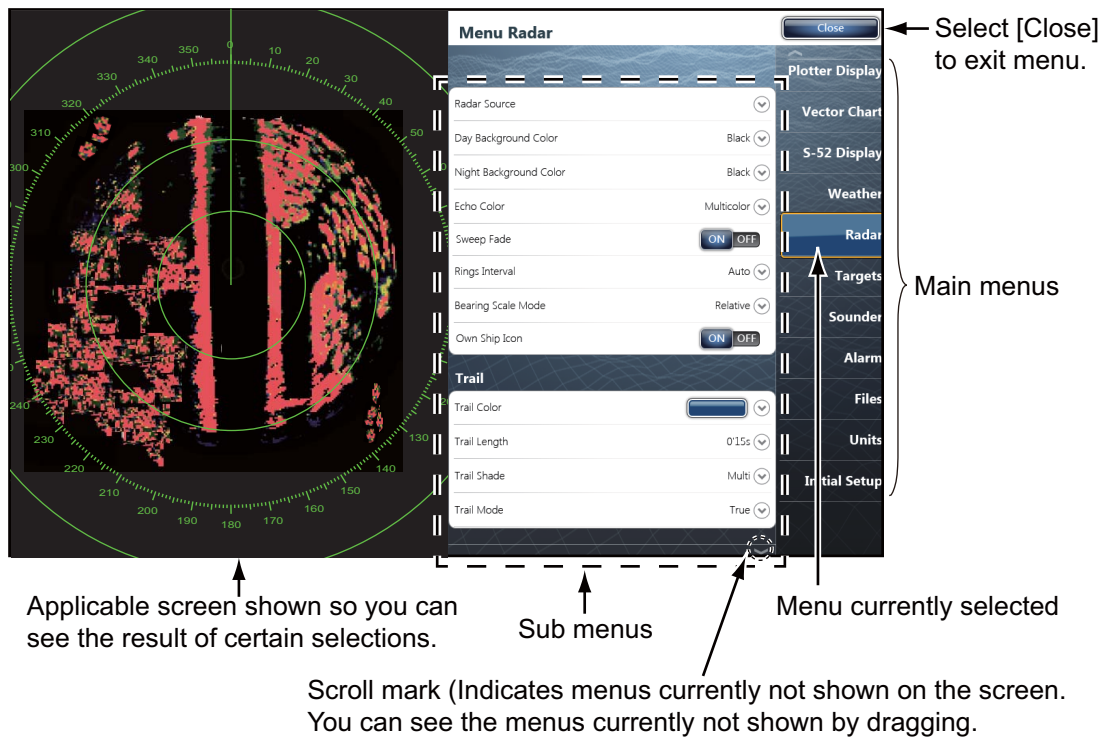
Menu icons

Menu icon	Function	Menu icon	Function
	15 main menus; set the screens for chart plotter, radar, fish finder, and so on.		Mark the MOB position.
	The lists for points, routes, detailed routes, AIS, DSC and ARPA		Open the list for the installed chart data. Enter the unlock codes.
	Open the tide graph.		

For example, select (tap) the [Menu] icon to open the main menu.

1. SYSTEM INTRODUCTION

3. Drag the main menus on the right side of the screen to display a menu desired. The selected menu is indicated with a yellow highlight. The sub menus for the selected menu appear. Below is an example screen for the [Radar] menu.


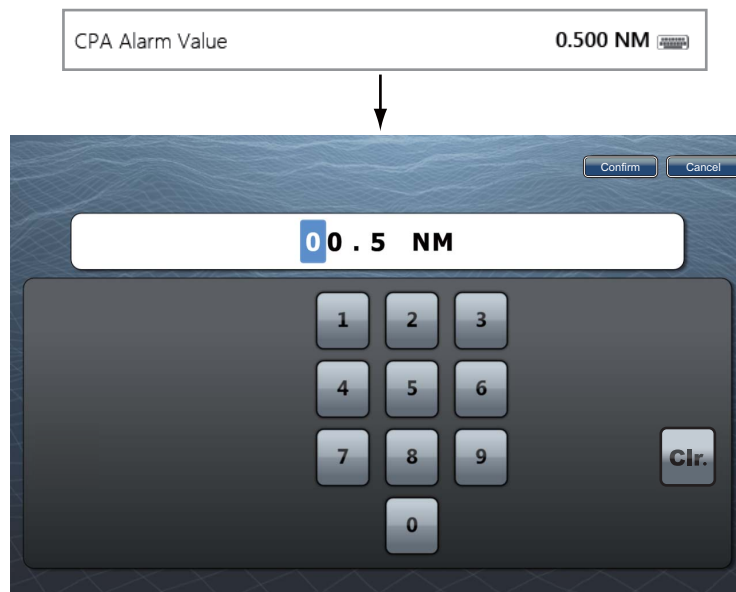


4. Do one of the following according to the menu type:
 - [ON] or [OFF] icon: Select (tap) the [ON] or [OFF] icon as appropriate.



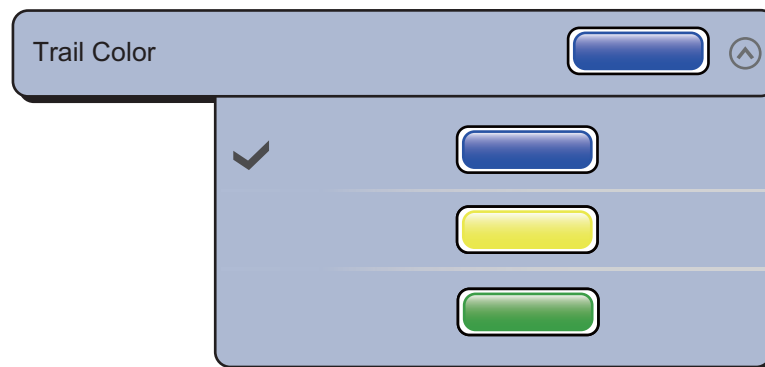
- Slider bar: Drag the circle icon to set the level. Current level is indicated on the icon.



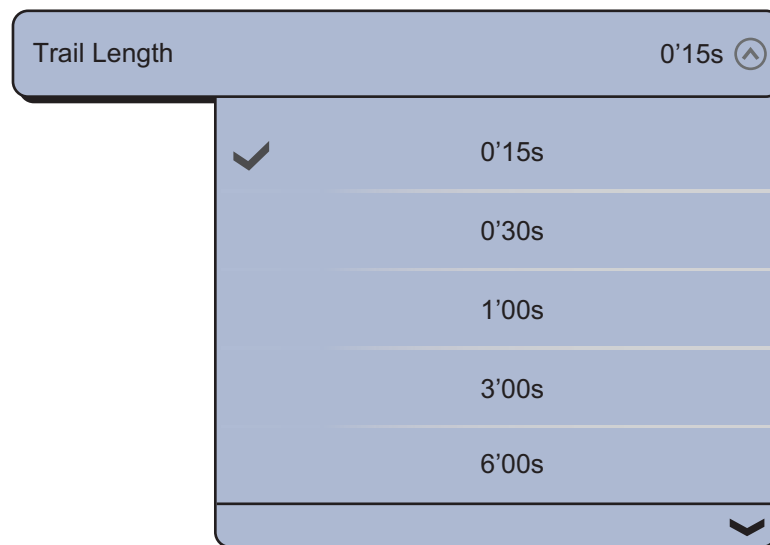
- Numerical value with the software keyboard icon (


The image shows a menu titled "CPA Alarm Value" with a value of "0.500 NM" and a software keyboard icon. An arrow points down to a larger screen showing the same menu with a software keyboard open. The keyboard has buttons for digits 0-9, a "Clr." button, and "Confirm" and "Cancel" buttons at the top right. The current value "00.5 NM" is displayed in the input field.

- Color icon: Select (tap) the menu to open the options. Select (tap) the option desired. Current selection has a checkmark.



- Options: Select (tap) the menu to open the options. Select (tap) the option desired. Current selection has a checkmark.



- Select [Close] to exit the menu.

1.13 [Display] Menu on the RotoKey Menu

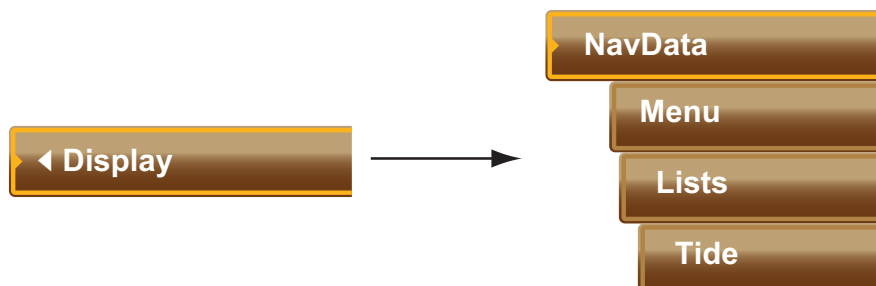
[Display] on the RotoKey menu is common for all displays.

[NavData]: Open the data boxes (see section 1.11).

[Menu]: Open the main menu (see section 1.12).

[Lists]: Open the lists menu (see section 1.12 and section 4.7).

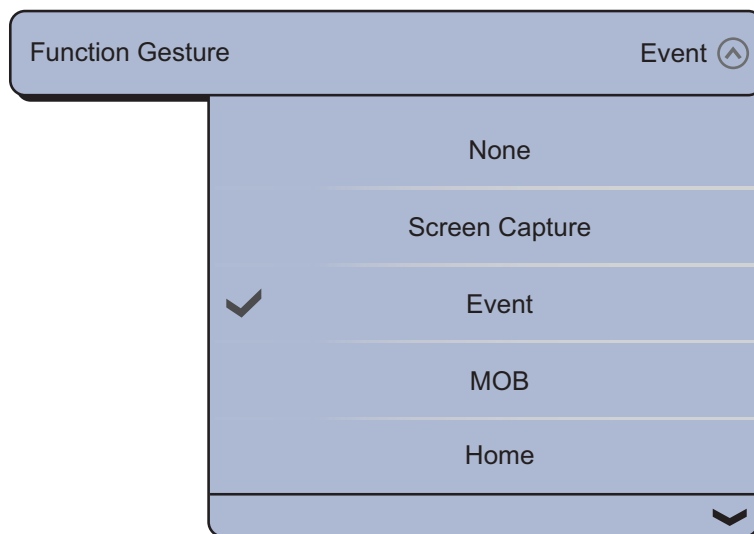
[Tide]: Open the tide graph (see section 1.12 and paragraph 3.2.4).



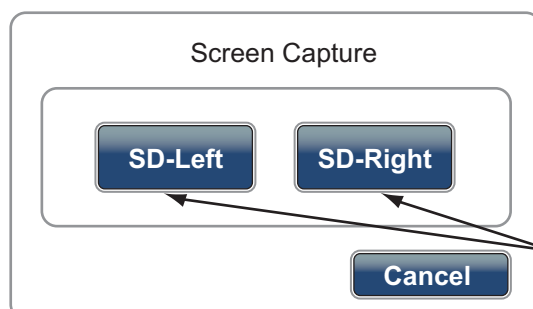
1.14 Function Gesture on the Main Menu

You can easily access a function by tapping the screen with two fingers. Select the function as below.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [General] - [Function Gesture] menu.

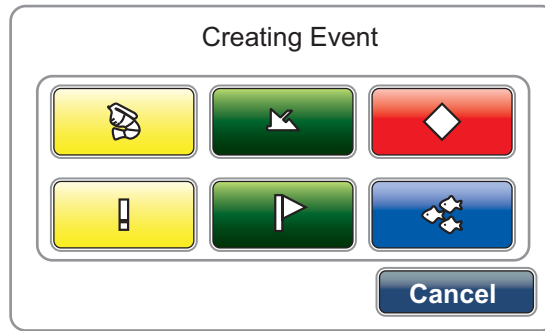


3. Select the function among the following:
 [None]: Nothing happens.
 [Screen Capture]: Capture a screenshot. The following window appears. Select [SD-Left] or [SD-Right] where to save the screenshot.



If either left or right SD card is not inserted, its option is grayed out.

[Event]: Record an event to the logbook. The selected mark is put at the position at the time the screen was tapped to open the [Creating Event] window (see paragraph 4.2.2)



[MOB]: Record MOB position to the logbook (see section 1.17).

[Home]: Open the display selection window (see section 1.4) and display the menu icon bar (see section 1.12).

[Menu]: Open the main menu (see section 1.12).

[Lists]: Open the lists menu (see section 1.12 and section 4.7).

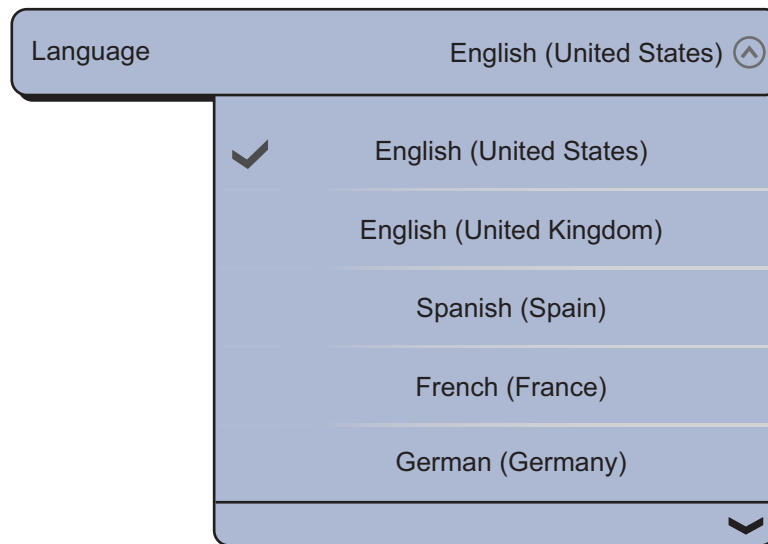
[Tide]: Open the tide graph (see section 1.12 and paragraph 3.2.4).

4. Select [Close] to exit the menu.

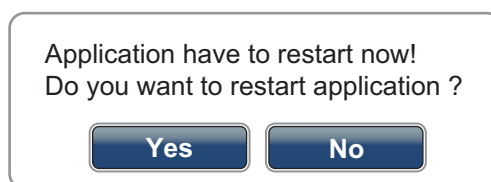
1.15 Language

The default interface language is English (United States). You can select a language to use as follows:

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [General] - [Language] menu.



3. Select the desired language to use. The confirmation message appears.

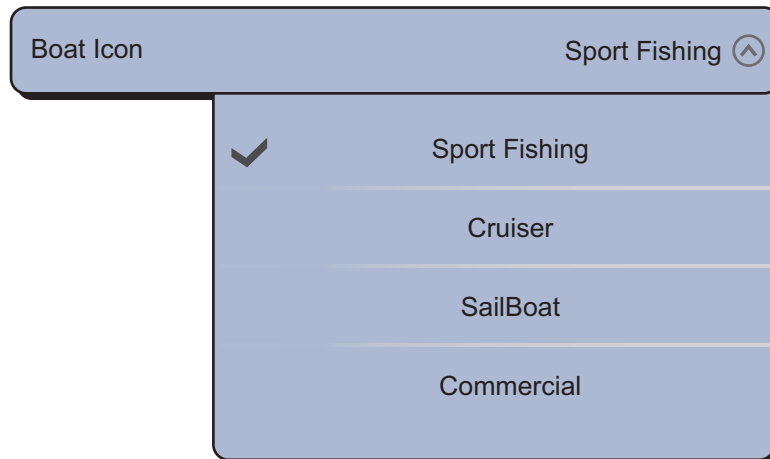


4. Select [Yes] then this equipment restarts.

1.16 Boat Icon

The boat icon marks current position. In the 3D display, you can change the shape of the boat icon to match your ship. In the 2D display, the boat icon can not be changed and is red.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Initial Setup] - [Boat Icon] menu.



3. Select [Sport Fishing], [Cruiser], [SailBoat] or [Commercial] to match your ship.
4. Select [Close] to exit the menu.

1.17 Man Overboard (MOB)

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

How to mark the MOB position

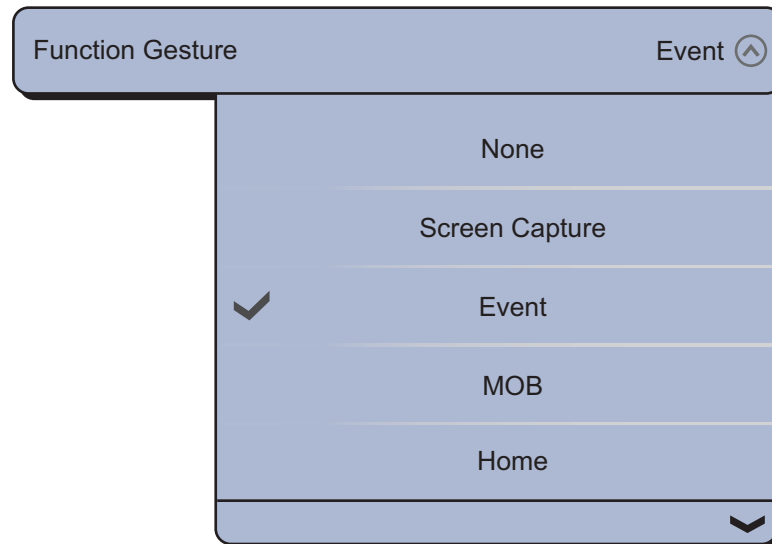
There are two methods by which you can enter the MOB mark: two fingers tap on the screen, or the [MOB] icon on the menu icon bar.

Method 1: Tap two fingers on the screen

Preset the Function Gesture for MOB mark. Once you have done this preset, simply tap the screen with two fingers to enter the MOB mark.

1. Select [Menu] on the menu icon bar to open the main menu.

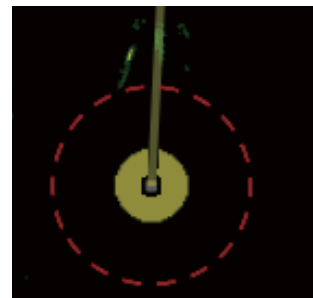
2. Select the [General] - [Function Gesture] menu.



3. Select [MOB].
4. Select [Close] to exit the menu.
5. Tap the screen with two fingers on the chart plotter display or the radar display. The area around the boat icon is zoomed in. (The scale is automatically set to 1.25 nm for the chart plotter and 0.5 nm for the radar.) The MOB mark is entered and flashes. A yellow line runs between the MOB position and your ship. This line is the course to take to go to the MOB position.



MOB mark on the chart plotter display



MOB mark on the radar display

The MOB marks entered are automatically saved to the points lists.

Method 2: [MOB] icon on the menu icon bar

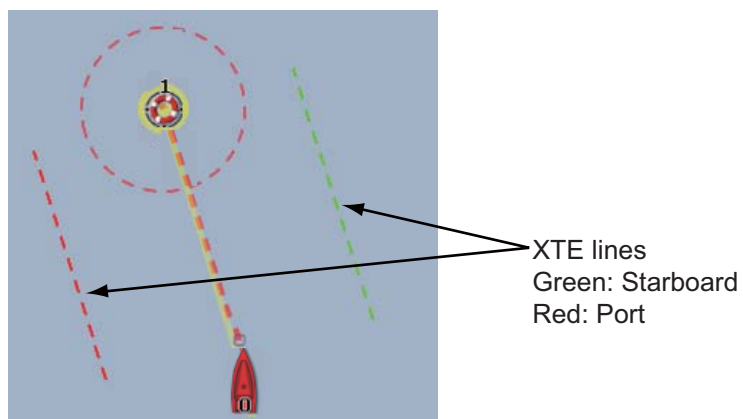
Select the [MOB] icon on the menu icon bar. The chart plotter display opens and the MOB mark position is zoomed in.

MOB information

Select a MOB mark to display the name, comment and depth (only for the chart plotter).

How to go to a MOB mark

Select a MOB mark to go to then select [Go To] from the pop-up menu.



How to delete a MOB mark

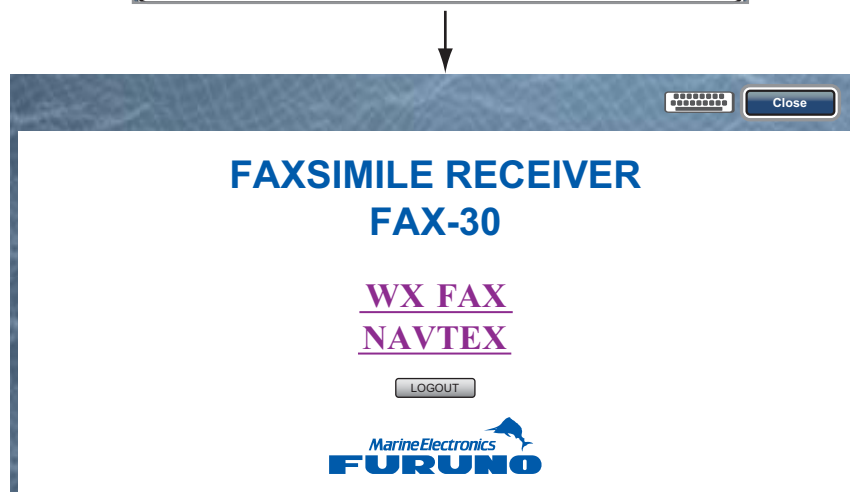
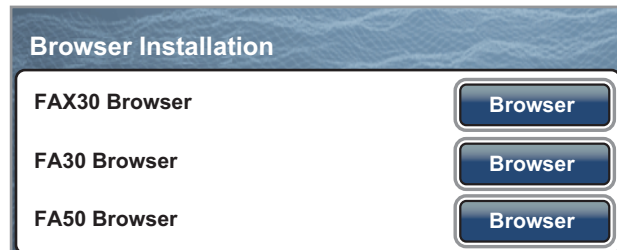
Inactive MOB mark: Select a MOB mark to display the pop-up menu. Select [Delete].

Active MOB mark: Before you erase an active MOB mark, you must cancel the navigation. Select the active MOB mark to display the pop-up menu then select [Stop Nav.]. Select the MOB mark to display the pop-up menu then select [Delete].

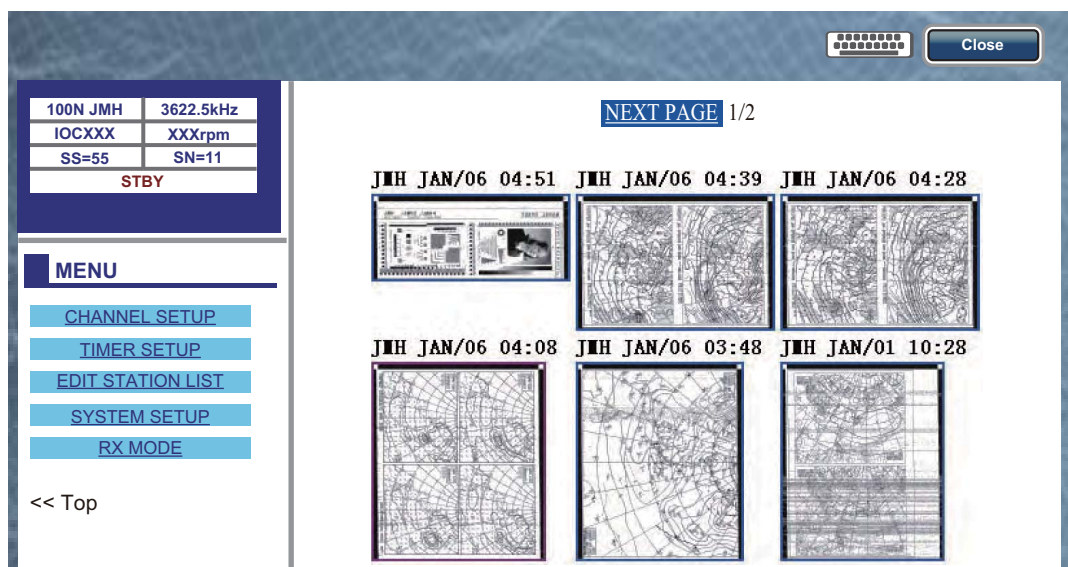
1.18 Facsimile Receiver FAX-30

The FURUNO Facsimile Receiver FAX-30 installs in the TZT network and can be controlled from a TZT display. Below are the steps to start fax operation.

1. At the installation of this equipment, connect the FAX-30 to the TZT.
2. Select [Menu] on the menu icon bar to open the main menu.
3. Select the [Initial Setup] - [FAX30 Browser] menu.



4. Select [WX FAX] or [NAVTEX].



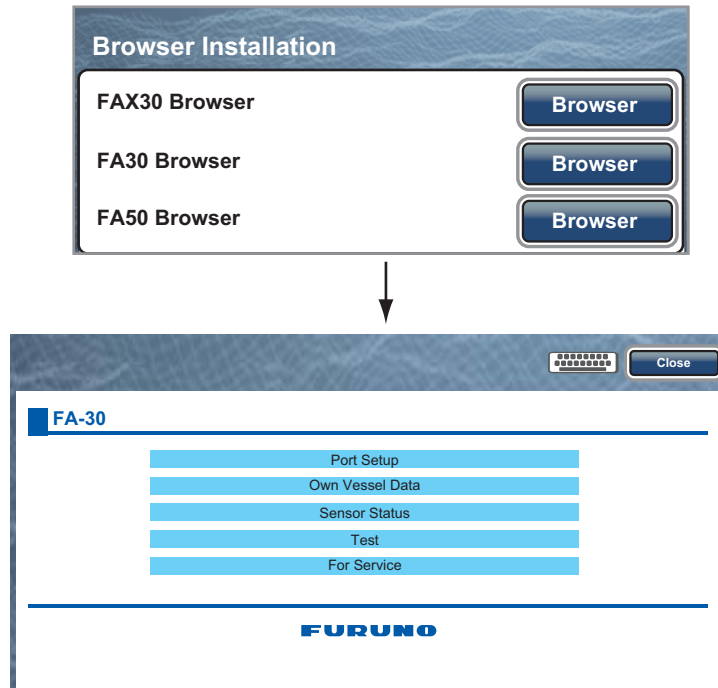
5. Refer to the Operator's Manual of the FAX-30 for operation information.

The FAX-30 display can be accessed only by one TZT display. When another TZT display accesses the FAX-30, control of the FAX-30 is given to that display after the picture is stopped completely. This sequence takes approximately one minute.

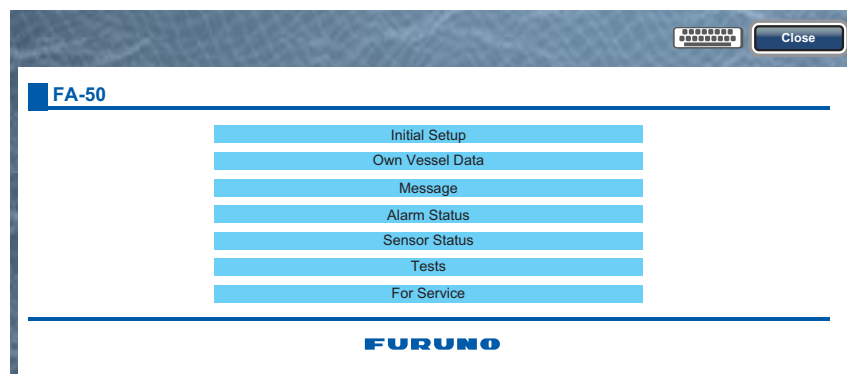
1.19 AIS Transponder FA-30, FA-50

The FURUNO AIS Transponder FA-30 (or FA-50) installs in the TZT network and can be controlled from a TZT display. To access the main menu of the transponder, do the following:

1. At the installation of this equipment, connect the FA-30 (or FA-50) to the TZT.
2. Select [Menu] on the menu icon bar to open the main menu.
3. Select the [Initial Setup] - [FA30 Browser] or [FA50 Browser] menu.



OR



4. Refer to the Operator's Manual for FA-30 or FA-50 for operation information.

1.20 DSC Message Information

The DSC (Digital Selective Calling) message information feature provides, on the chart plotter and radar displays, the MMSI no. and position* of the ships that have transmitted a DSC message to you. A hexagon-shaped marker marks a ship's position. The marker is color-coded according to the type of DSC message sent, red for distress and green for non-distress.

* Position at the time of message transmission. Position information is not updated.



This feature requires connection of a DSC capable radiotelephone that outputs the DSC sentence in NMEA 0183 format.

1.20.1 DSC notification

When a DSC message for position of the ship is received, the message "DSC Position Report Received" appears in yellow on the status bar at the top of the screen (refer to paragraph 2.10.7).

When a DSC message for distress is received, the message "DSC Distress Call Received" appears in red on the status bar at the top of the screen.

1.20.2 How to show or hide the DSC message information

On the chart plotter or radar display, select [Targets] from the RotoKey menu then select [AIS/DSC]. The DSC information appears. To hide the DSC information, deselect [AIS/DSC].

Note: On the chart plotter display, the [AIS/DSC] menu with the **RotoKey**TM is available in the [Full] mode (see section 13.1).

When you receive a DSC message, the appropriate DSC marker and the MMSI no. of the transmitting ship appear on the chart plotter and radar displays.

1.20.3 How to go to a DSC point

Select the DSC marker to go to. The pop-up menu appears. Select [Go To].

1.20.4 How to display the DSC information

Select a DSC marker to display the simple information (position, MMSI no. of the ship that transmitted a DSC message and so on). To get the detailed information, select a DSC marker to display the pop-up menu then select [Info].

Target Info	
Nickname	ABCDEF
MMSI	333336789
COG	263.4°M
SOG	1.5 kn
Range	2.101 NM
Bearing	210.4°
Time	9'34s
Position	N 47°47.692'; W122°29.653'
Nature of Distress	Distress

Detailed information

1.20.5 The DSC list

When you receive a DSC message, it is automatically registered to the DSC list. To help you identify a ship quickly on the chart plotter and radar displays, you can replace the MMSI no. indication with the name of your choice; for example, ship's name.

How to open the DSC list

1. Select [Lists] on the menu icon bar to open the lists menu.
2. Select [DSC List].

Sort by: Name Range Cpa		
Name/Mmsi	Range/Bearing	Cpa/Tcpa
AAAAA 333331111	19.71 NM 25.6 °M	16.16 NM -1h40'
BBBBB 333332222	20.42 NM 20.5 °M	19.42 NM -27'20s

3. Select [Name], [Range] or [Cpa] in the [Sort by] area at the top of the list.
 [Name]: DSC sorted in alphanumeric order
 [Range]: DSC sorted by range in ascending order
 [Cpa]: DSC sorted by CPA in ascending order

To see the detailed information for a DSC, select a DSC then select [Detail].

To center a DSC marker on the screen, select the DSC then select [Find On Chart].

To edit DSC nickname, select the DSC then select [Edit Nickname] (refer to "How to edit an AIS nickname" on page 12-6).

Name/Mmsi	Range/Bearing	Cpa/Tcpa
AAAAA 333331111	19.71 NM 25.6 °M	16.16 NM -1h40'
<div> <div>✓</div> <div>Detail</div> </div>		
<div>Find On Chart</div>		
<div>Edit Nickname</div>		

1.21 Wireless LAN Settings

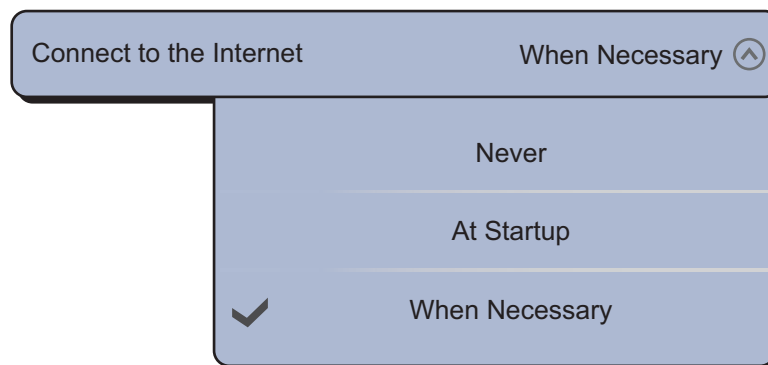
You can connect to the internet with the wireless LAN signal to download weather information (see chapter 11) and to connect to an iPhone, iPod or iPad. To download weather information, connect the existing LAN network. To connect to an iPhone, iPod or iPad, create a local wireless network.

Notes about the wireless LAN

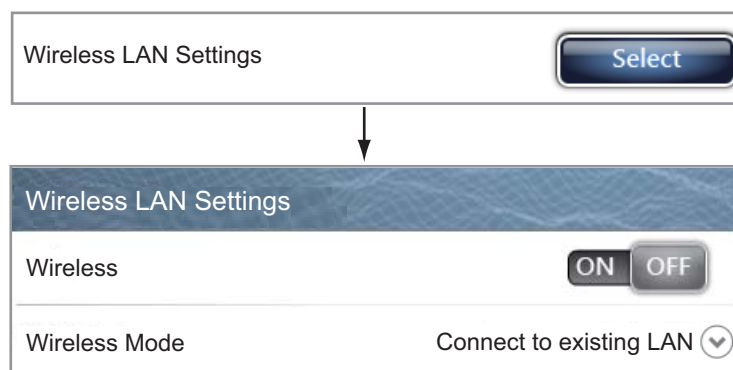
- The wireless LAN function is available only in the countries which have acquired radio wave certification. Turn this function off in countries which do not have radio wave certification. Ocean-going vessels that have radio wave certification can use the wireless LAN function in any country that has acquired radio wave certification. Vessels with radio wave certification that enter a country that does not have radio wave certification may use the wireless LAN function only onboard the vessel. Available countries (as of January, 2012): USA, Canada, EU, New Zealand, Australia, Japan
- The communication rate and effective range for the wireless LAN can be affected by the electromagnetic wave, interfering object, or access point location.
- We strongly recommend using the wireless LAN with encrypted connection. Otherwise unauthorized access by a third party can occur, which can cause loss of data or system crash.
- We recommend changing the initial password when using a local wireless network.

How to connect the existing LAN network

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [General] - [Connect to the Internet] menu.



3. Select [When Necessary].
4. Select [Wireless LAN Settings].

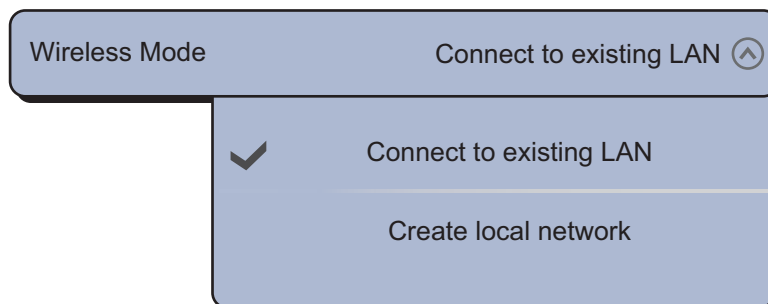


1. SYSTEM INTRODUCTION

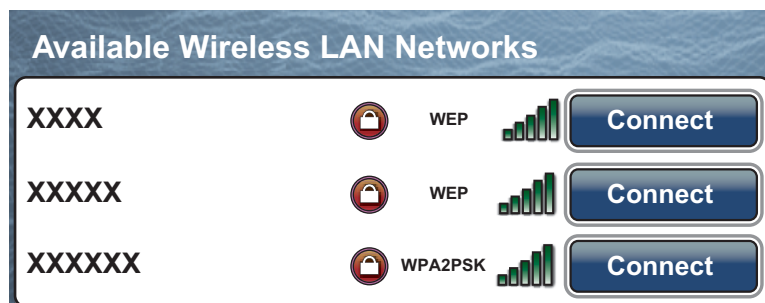
5. Select the [ON] icon in [Wireless].

Note: You can use the wireless LAN function when the internal temperature of the equipment inside is detected with the temperature sensor and is over 0°C. The [ON] icon in [Wireless] is grayed out if the equipment does not meet the above requirement.

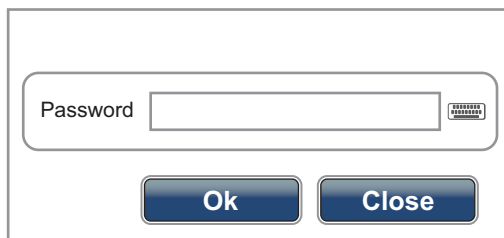
6. Select [Wireless Mode].



7. Select [Connect to existing LAN]. The available wireless networks are listed.

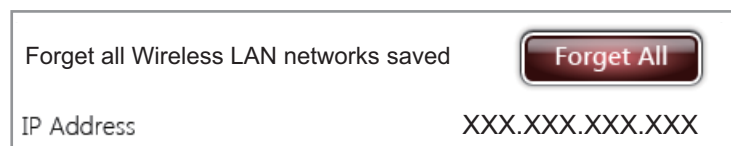


8. Select [Connect] in the desired network.



9. Select the password field to open the software keyboard.

10. Enter the password then select [Ok]. The IP address is displayed.



How to create a local wireless network

When you connect wireless LAN network without access to the existing LAN network, do the following to create a new local network.

Note 1: Do the following steps 1 to 7 with [OFF] in [Network Status].

Note 2: Connection to a local network may not be possible if the network is unstable. In this case, select the [OFF] icon in [Wireless] then select the [ON] icon. Connect via existing LAN network.

Note 3: Confirm if [When Necessary] is selected in [Connect to the Internet] menu.

1. Select [Create local network] in [Wireless Mode].

The screenshot shows the 'Wireless LAN Settings' interface. At the top, there's a 'Wireless' toggle switch set to 'ON'. Below it, 'Wireless Mode' is set to 'Create local network' with a dropdown arrow. The 'Create local Wireless network' section contains fields for 'SSID' (NAVNETTZT), 'Authentication' (WEP), and 'Password' (masked with asterisks). At the bottom, there's a 'Network Status' toggle switch set to 'ON'.

2. Select [SSID] to open the software keyboard.
3. Enter the SSID then select [Confirm].
4. Select [Authentication].

The screenshot shows a dropdown menu for 'Authentication'. The menu is open, displaying three options: 'Open' (marked with a checkmark), 'WEP', and 'WPA2 - PSK'. The 'Open' option is currently selected.

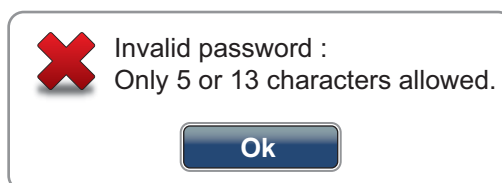
5. Select the security from [Open], [WEP] or [WPA2 - PSK]. For [Open], go to step 8. For others, go to the next step.

Note: Select the security according to the equipment connected to the network. Select [WEP] to connect an iPhone or iPad to the network. ([WPA2-PSK] is not available for iOS.)

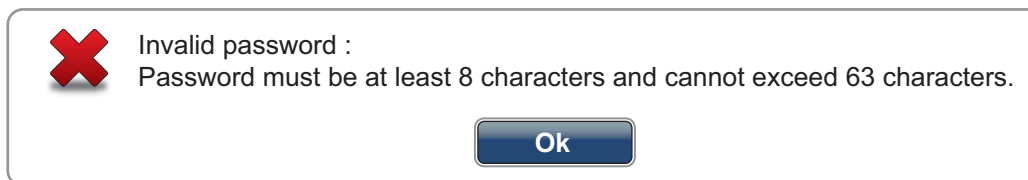
6. Select [Password] to open the software keyboard.
7. Enter the password then select [Confirm].

Note: If you entered the invalid password, the following error message appears.

1. SYSTEM INTRODUCTION



For [WEP]



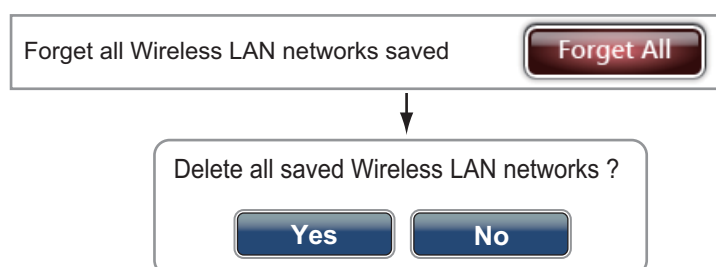
For [WPA2 - PSK]

Select [Ok] then reenter the correct password.

8. Select the [ON] icon in [Network Status] to connect the created network.

How to forget all wireless LAN networks

1. With [Connect to existing LAN] selected in [Wireless Mode], select [Forget all Wireless LAN networks saved]. The confirmation message appears.

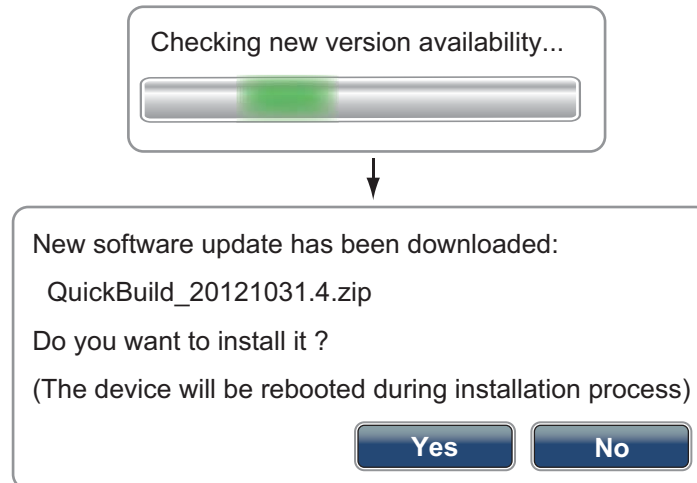


2. Select [Yes].

1.22 Software Update

You can update the software via the internet. See section 1.21 about the internet connection.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [General].
3. Select the [Update] icon in [Check for Software Update]. The following messages appear in order.

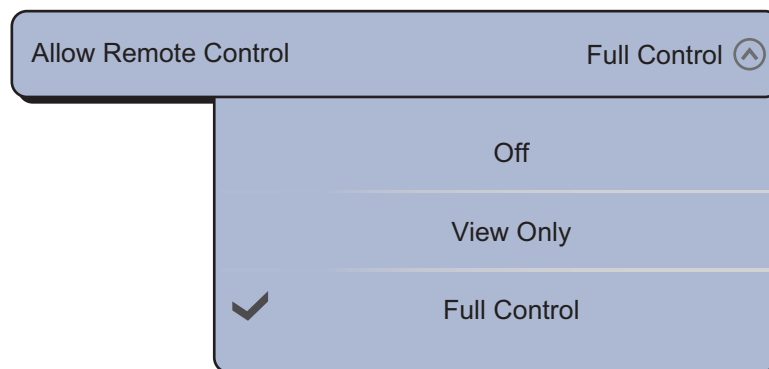


4. Select [Yes] then this equipment restarts.

1.23 Operation by Remote Control

You can turn on or off the operation by a remote control via wireless LAN (iPhone, iPod or iPad).

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [General] - [Allow Remote Control] menu.



[Off]: Cannot operate this equipment by a remote control.

[View Only]: Cannot operate this equipment but can display the data on the screen of the remote control.

[Full Control]: Can fully operate this equipment by a remote control.

3. Select [Close] to exit the menu.

1. SYSTEM INTRODUCTION

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2. CHART PLOTTER

This chapter shows you how to do the following:

- Use and prepare the chart plotter
- Set chart plotter related alarms
- Control the track

2.1 Chart Type

A world map in raster chart format is included in your unit. A vector chart for the US coastline (Alaska and Hawaii included) is provided also. To use this chart plotter as a navigational aid, have electronic charts (stored in the internal memory) for the area you navigate. Contact your dealer about charts for your area.

There are five types of chart format in this equipment: [Raster], [S-57], [Jeppesen], [Navionics] or [Fishing].

[Raster]: Raster charts are digitized scans of NOAA paper charts. Raster charts have information like notes, source diagrams, tidal diamonds, horizontal and vertical datum, etc.

[S-57]: S-57 formats are vector charts (digital files) that contain marine features and information created for marine navigation. These charts are made according to the International Hydrographic Organization (IHO).

[Jeppesen]: Vector chart (data by Jeppesen)

[Navionics]: Vector chart (data by Navionics)

[Fishing]: Fishing charts are vector charts that show only detailed depth contours. These are available for US waters.

How to select a chart type

1. Select the plotter display on the display selection window (see section 1.4).
2. Select [Chart] from the RotoKey menu.
3. Select the chart type from [Raster], [S-57], [Jeppesen], [Navionics], [Fishing] or [Auto]*.

*: [Auto] automatically switches the chart type according to availability and chart priority setting (priority setting: [Plotter Display] - [Chart Priority in Auto Mode] - [Vector] or [Raster]).

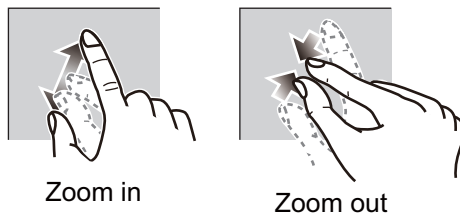
2.2 Chart Scale

You can change the chart scale to change the amount of information shown, or zoom in or out at the location you select. The selected chart scale appears at the bottom left-hand corner of the screen. The value shown is the distance from the left of the screen to the right of the screen.



To zoom in or out the chart scale, rotate the **RotoKey™**.

You can also change the chart scale by pinching the chart screen.

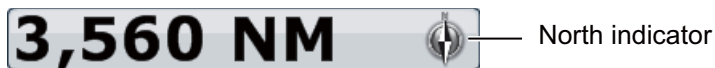


2.3 Orientation Mode

The chart can be shown in head-up or north-up orientation.

1. Select [Orientation] from the RotoKey menu.
2. Select [North Up] or [Head Up].
 - [North Up]: North is at the top of the screen. When your heading changes, the boat icon moves according to heading. This mode is for long-range navigation.
 - [Head Up]: Displays the chart with the current compass heading of your ship at the top of the screen. The heading data from a compass is required. When the heading changes, the boat icon remains fixed, and the chart picture rotates according to heading.

Note: You can change the orientation mode by tapping the chart scale box at the bottom left-hand corner of the screen. Each time you tap the chart scale box, the orientation mode switches between north up and head up. The north indicator rotates accordingly.



2.4 How to Move the Chart

Move the chart in the following conditions.

- Your ship is not in the current area
- Take a look at another area
- Enter a point at another location

Do the following to move the chart:

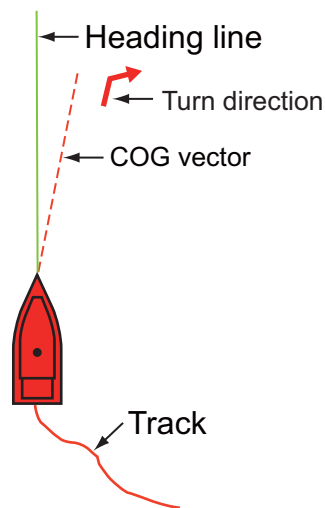
- Change the chart scale with zoom in or zoom out (section 2.2).

- Select [Center Vessel] at the top right-hand corner of the screen to return your ship to the center of the screen.
- Switch to the 3D display by dragging two fingers upward or downward.

2.5 The Boat Icon

The boat icon appears at the current position. You can change the icon shape in the 3D display from the menu (see section 1.16). The boat icon has the functions indicated below also.

- The **Heading line** is a straight line that runs from your position and this line shows the current heading.
- The **COG vector** is a vector line that runs from the boat icon. This vector points in the direction in which your ship is now moving. Also, a red arrow appears as the **turn direction**.
- The **Track** plots the movement of your ship.



Heading line

To display the heading line, do as follows:

1. Select the boat icon to display the pop-up menu.
2. Select [Heading Line].

COG vector

To display the COG vector and the turn direction, do as follows:

1. Select the boat icon to display the pop-up menu.
2. Select [COG Vector].

Track

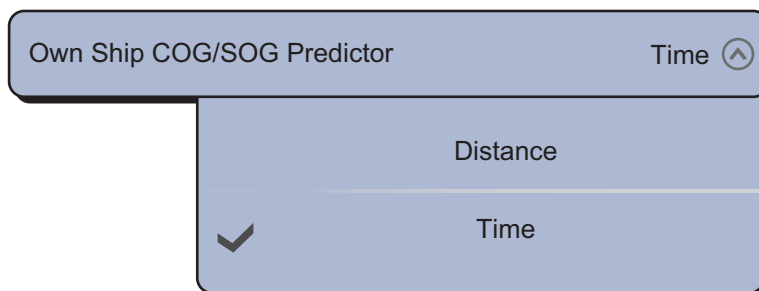
To display the track, do as follows:

1. Select [Overlay] from the RotoKey menu.
2. Select [Tracks].

COG/SOG predictor

The **COG/SOG predictor** shows estimated course and speed of your ship. This predictor is displayed as the COG vector. The top of the predictor is the estimated position of your ship at the end of the selected predictor time or distance (set on the menu). You can increase the length of the predictor to find the estimated position of your ship in the future on the current course and speed. You can set the COG/SOG predictor as follows. The greater the distance or the time, the longer the COG/SOG predictor.

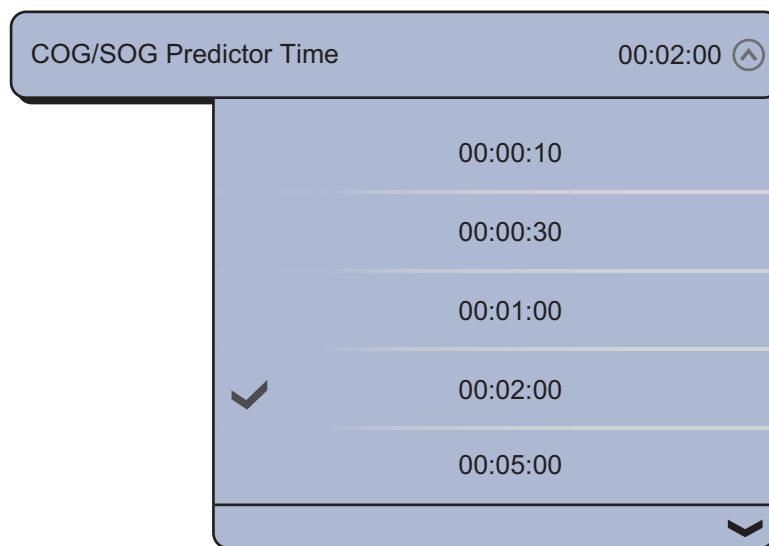
1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Ship & Track] - [Own Ship COG/SOG Predictor] menu.



3. Select [Distance] or [Time]. For [Distance], go to the next step. For [Time], go to step 6.
4. Select [COG/SOG Predictor Length] to display the software keyboard.



5. Set the length for COG/SOG predictor then select [Confirm]. Go to step 7.
6. Select [COG/SOG Predictor Time] then select the time for COG/SOG predictor.



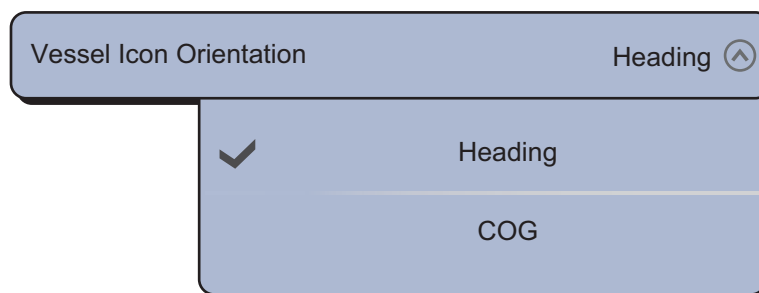
7. Select [Close] to exit the menu.

Orientation

You can select the orientation of the boat icon.

1. Select [Menu] on the menu icon bar to open the main menu.

2. Select the [Ship & Track] - [Vessel Icon Orientation] menu.



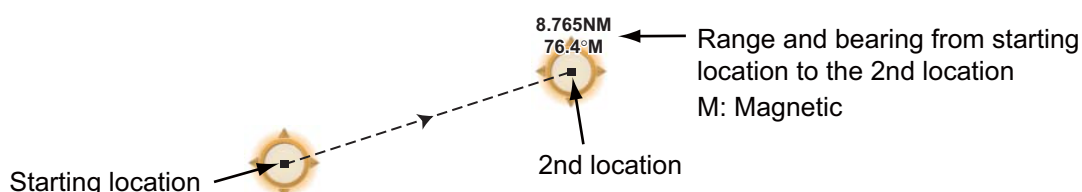
3. Select [Heading] or [COG].

2.6 How to Find the Range and Bearing to a Location

Between any two locations

The [Measure] menu measures the range and bearing between any two locations on your chart. Range and bearing between the two locations are digitally indicated on the screen. This pop-up menu is available in [Full] RotoKey mode (refer to section 13.1).

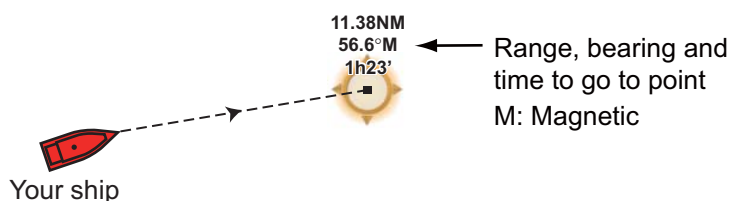
1. Select the starting location then the pop-up menu appears.
2. Select [Measure].
3. Select the 2nd location. A dashed line runs between the start location and the 2nd location. The range and bearing to the 2nd location are shown.



4. Select [Cancel Ruler] at the top right-hand corner of the screen to erase the indication.

From your ship to a location

1. Select the location then the pop-up menu appears.
2. Select [Dist. to Boat]. A dashed line runs between the boat icon and the selected location. The range, bearing and the time to go to the selected location are shown.



3. Select [Cancel Ruler] at the top right-hand corner of the screen to erase the indication.

2.7 Chart Object Information

Vector charts show many objects, like buoys and lighthouses, for which you can find the information. Port, tide and current information are available if the chart contains this information.

Select any chart object to find the information.

S57 Object Info

By, special purpose

Shape	pillar
Category	TSS mark (Traffic Separation Scheme)
Color	yellow
Name	Puget Sound Traffic Lane Separation Lighted Buoy T
Source date	10/10/2012

2.8 Multiple Chart Plotter Displays

A maximum of three chart plotter displays can be shown on one screen. The multiple chart plotter displays let you see the conditions around your ship on both short and long ranges. Also, you can see how your ship moves toward your destination from more than one angle. For example, you can show one display in 2D and another in 3D.

The following features can be adjusted individually.

- AIS
- ARPA
- Chart scale
- Chart orientation
- Chart type
- Scroll the chart
- Overlays (radar, sat photo, depth shading, tide icon, tidal current, ACCU-FISH™ (see section 7.10), points, routes, tracks)
- 2D and 3D (For the 3D displays, the aerial view (pitch and orientation) are adjusted together, but different orientation modes (north up and head up) are possible.)

Chart plotter display 2

Chart type: Raster Chart scale: 1,717 NM
 Orientation: North-up Perspective: 2D
 Overlay: Sat photo

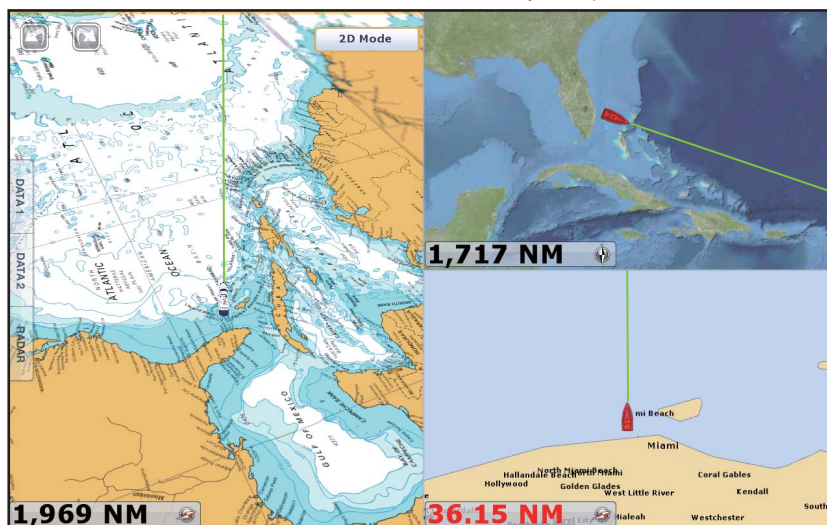


Chart plotter display 1

Chart type: Raster Chart scale: 1,969 NM
 Orientation: Head-up Perspective: 3D

Chart plotter display 3

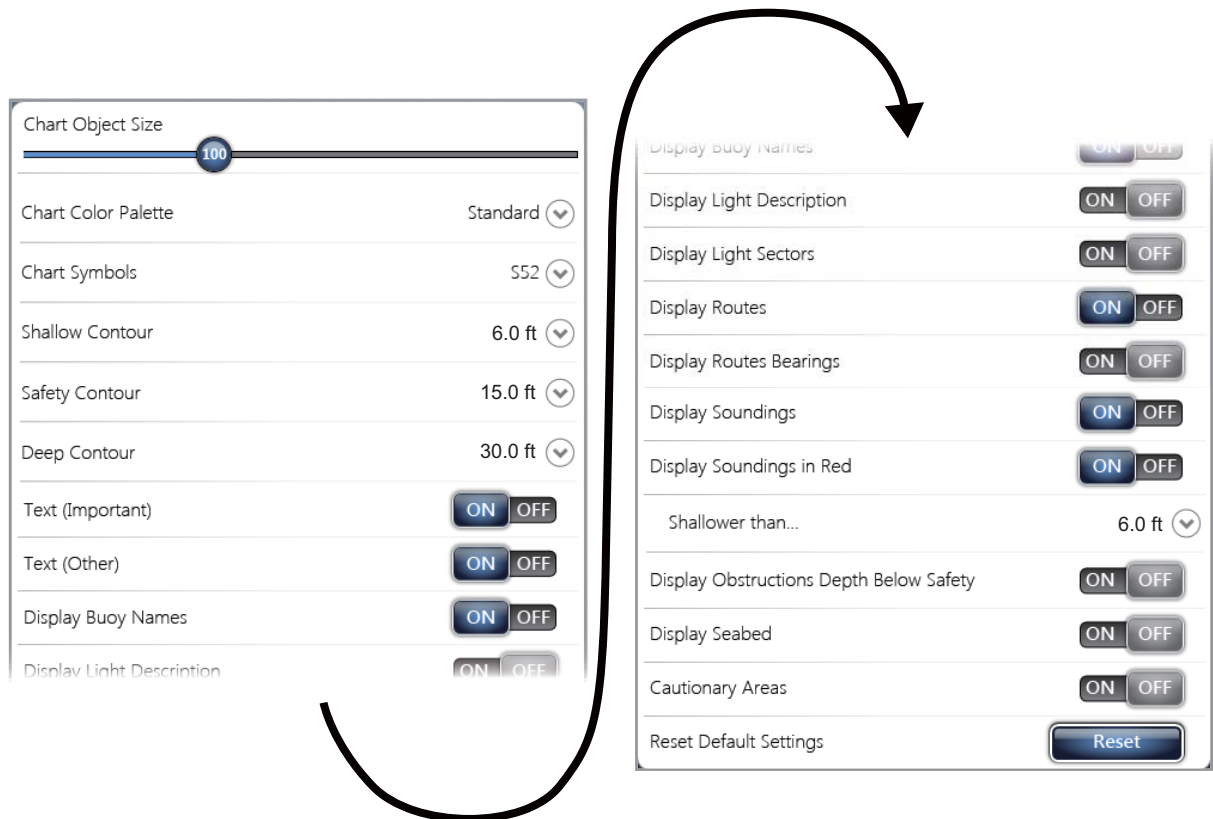
Chart type: S-57 Chart scale: 36.15 NM
 Orientation: Head-up Perspective: 2D

2.9 Cartographic Text and Objects on Vector Charts

This section shows you how to show or hide the cartographic objects and text information that appear on the vector charts.

2.9.1 Control visibility of text and object information

The [Vector Chart] menu controls the visibility of text and object information, for example, buoy names and light description.



[Chart Object Size]: Drag the circle icon to set the chart object size (setting value: 50 to 200%).

[Chart Color Palette]: Set the chart color pattern. [Standard] is the NAVNet TZtouch original color palette, [S-52] complies with the official S-52 charts, and [Sunlight] provides a high contrast palette.

[Chart Symbols]: Select the chart symbol type. [S-52] are the official IMO symbols (also referred to as simplified symbols) library for ECDIS. [International] symbols are the copy of paper chart symbols of IALA symbols library (US symbols library).

[Shallow Contour]: Set the shallow depth (setting range: 0.0, 3.0, 6.0, 9.0, 12.0, 15.0, 18.0, 21.0, 24.0, 27.0, 30.0 ft). Show shallow depth contours in dark blue.

[Safety Contour]: Set the safety depth (setting range: 0.0, 3.0, 6.0, 9.0, 12.0, 15.0, 18.0, 21.0, 24.0, 27.0, 30.0, 50.0, 70.0, 100, 200 ft). Show safety depth contours in medium blue.

[Deep Contour]: Set the deep depth (setting range: 0.0, 3.0, 6.0, 9.0, 12.0, 15.0, 18.0, 21.0, 24.0, 27.0, 30.0, 50.0, 70.0, 100, 200, 300, 500, 1,000, 2,000 ft). Show deep-depth contours in light blue. Depths greater than set here are shown in white.

[Text (Important)]: Show or hide the important text information.

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[Text (Other)]: Show or hide the other text information.

[Display Buoy Names]: Show or hide the buoy names.

[Display Light Description]: Show or hide the light descriptions.

[Display Light Sectors]: Show or hide light sectors for fixed beacons.

[Display Routes]: Show or hide routes.

[Display Routes Bearings]: Show or hide route bearings.

[Display Soundings]: Show or hide depth soundings.

[Display Soundings in Red]: Spot soundings whose depths are lower than the value selected on the [Shallower than...] menu are shown in red.

[Shallower than ...]: Select the value for the [Display Soundings in Red] menu (setting range: 0.0, 3.0, 6.0, 9.0, 12.0, 15.0, 18.0, 21.0, 24.0, 27.0, 30.0, 50.0, 70.0, 100 ft).

[Display Obstructions Depth Below Safety]: Show or hide obstruction depths under the safety depths.

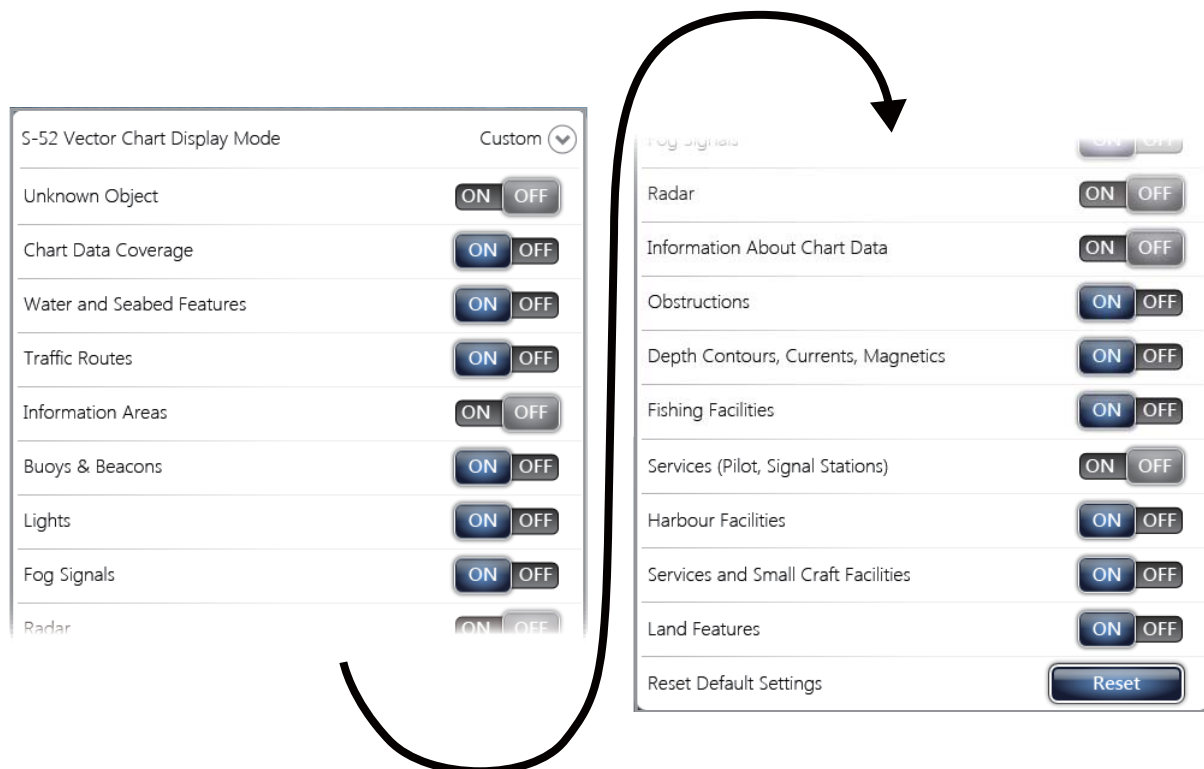
[Display Seabed]: Show or hide seabed composition indication, for example, mud, sand, rock.

[Cautionary Areas]: Show or hide the cautionary areas that appear on the chart.

[Reset Default Settings]: Select this menu item to restore default settings for the [Vector Chart] menu.

2.9.2 Control visibility of cartographic objects

The [S-52 Display] menu controls the visibility of cartographic objects, for example, lights, fog signals, etc.



[S-52 Vector Chart Display Mode]: Set the level of information to show on the chart. The selections are [Custom], [Base], [Standard], [Other], and [Fishing]. The chart features are turned on or off according to setting.

Note: The following menu items except [Reset Default Settings] are unavailable when you select the mode other than [Custom].

[Unknown Object]: Show or hide unknown objects that appear on the chart.

[Chart Data Coverage]: Show or hide the geographic names and geographic objects.

[Water and Seabed Features]: Show or hide the water and seabed presentation.

[Traffic Routes]: Show or hide the marine traffic routes.

[Information Areas]: Show or hide the information areas that appear on the chart.

[Buoys & Beacons]: Show or hide the buoys and beacons.

[Lights]: Show or hide the sector of light that a fixed beacon shines.

[Fog Signals]: Show or hide the structure that sends a fog signal.

[Radar]: Show or hide the radar buoy.

[Information About Chart Data]: Show or hide the chart data information.

[Obstructions]: Show or hide obstructions (wrecks, etc.)

[Depth Contours, Currents, Magnetics]: Show or hide the depth contours, tidal currents and magnetics.

[Fishing Facilities]: Show or hide the location of fishing facilities.

[Services (Pilot, Signal Stations)]: Show or hide the location of pilots and signal stations.

[Harbour Facilities]: Show or hide the location of harbour facilities.

[Services and Small Craft Facilities]: Show or hide the services for ship and small craft.

[Land Features]: Show or hide the cartographic features that are shown on land.

[Reset Default Settings]: Select this menu item to restore default settings for the [S-52 Display] menu.

2.10 Alarms

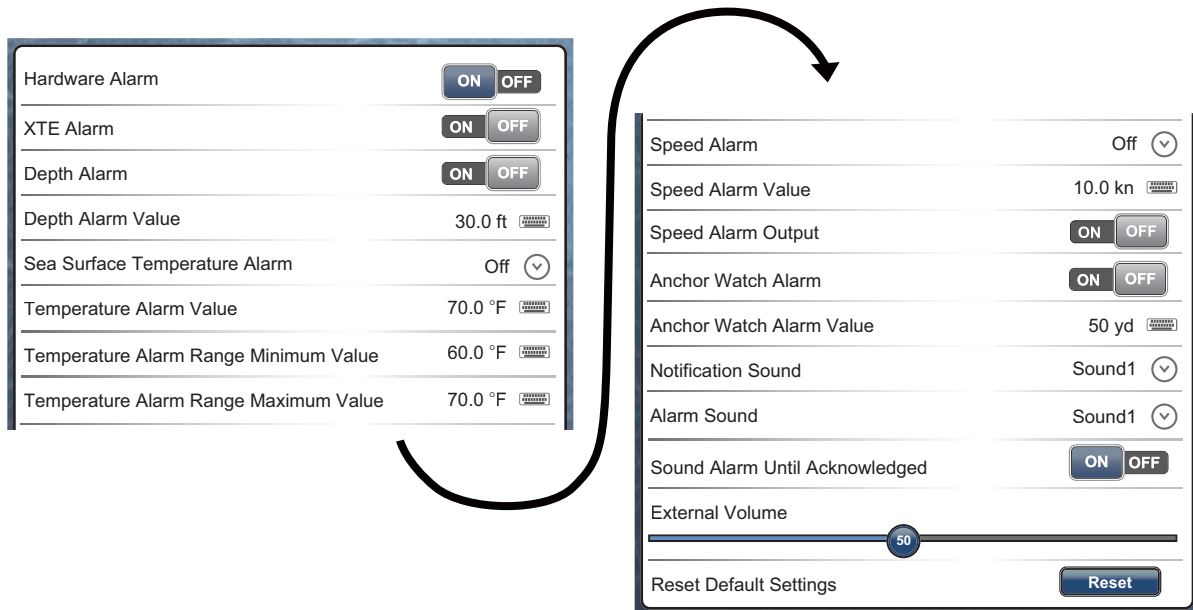
The various plotter alarms alert you (with audiovisual alarms) when the conditions specified are met. These alarms are:

- XTE alarm
- Depth alarm
- Sea surface temperature alarm
- Speed alarm
- Anchor watch alarm

2. CHART PLOTTER

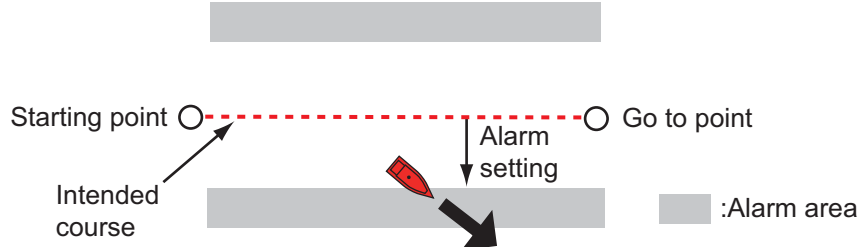
How to open the [Alarm] menu

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Alarm].



2.10.1 XTE alarm

The XTE alarm tells you when your ship goes off course by more than the limit set (XTE alarm boundaries).



1. Select the [ON] icon in [XTE Alarm] of the [Alarm] menu.
2. Select [XTE Value] from the [Route] menu to display the software keyboard.
3. Set the value then select [Confirm].
4. Select [Close].

2.10.2 Depth alarm

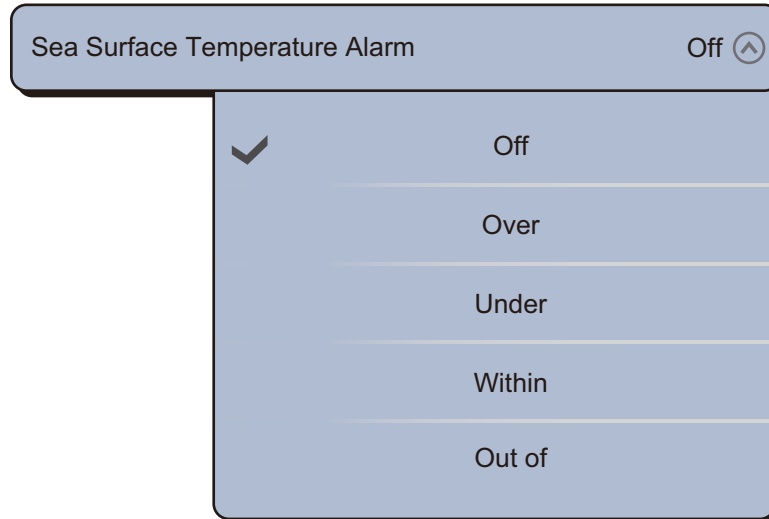
The depth alarm tells you when the depth to the bottom is shallower than the value you set. Requires depth data.

1. Select the [ON] icon in [Depth Alarm] of the [Alarm] menu.
2. Select [Depth Alarm Value] to display the software keyboard.
3. Set the value then select [Confirm].
4. Select [Close].

2.10.3 SST alarm

The sea surface temperature alarms tells you when the sea surface temperature is over, under, within, or out of range of the temperature you set. Requires a temperature sensor.

1. Select [Sea Surface Temperature Alarm] from the [Alarm] menu.

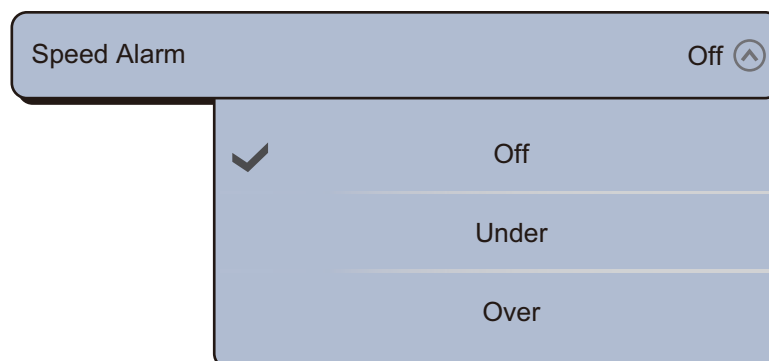


2. Select [Over], [Under], [Within] or [Out of]. For [Over] or [Under], go to the next step. For [Within] or [Out of], go to step 5.
3. Select [Temperature Alarm Value] to display the software keyboard.
4. Set the value for [Over] or [Under] then select [Confirm]. Go to step 9.
5. Select [Temperature Alarm Range Minimum Value] to display the software keyboard.
6. Set the minimum value for [Within] or [Out of] then select [Confirm].
7. Select [Temperature Alarm Range Maximum Value] to display the software keyboard.
8. Set the maximum value for [Within] or [Out of] then select [Confirm].
9. Select [Close].

2.10.4 Speed alarm

The speed alarm tells you when the speed of your ship is over or under the limit set. Set the value at [Speed Alarm Value]. Requires a GPS navigator or speed sensor.

1. Select [Speed Alarm] from the [Alarm] menu.



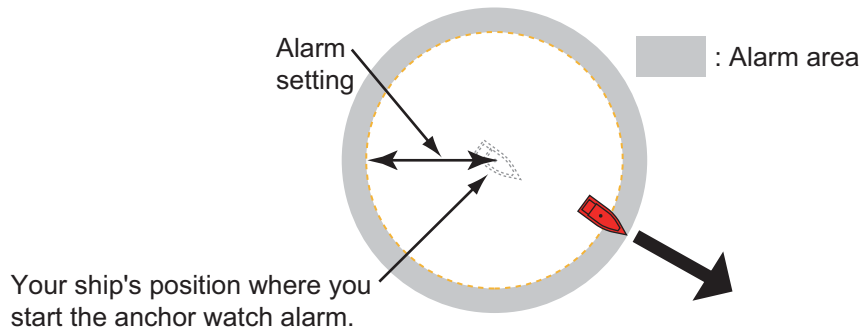
2. Select [Under] or [Over].

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3. Select [Speed Alarm Value] to display the software keyboard.
4. Set the value for [Under] or [Over] then select [Confirm].
5. If you output the speed alarm from this equipment, select the [ON] icon in [Speed Alarm Output].
6. Select [Close].

2.10.5 Anchor watch alarm

The anchor watch alarm tells you that your ship has moved a distance greater than the set value when the ship must not be moving.



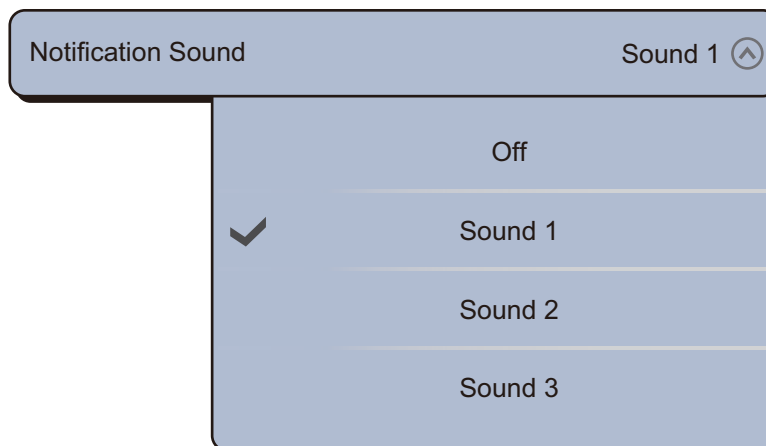
1. Select the [ON] icon in [Anchor Watch Alarm] of the [Alarm] menu.
2. Select [Anchor Watch Alarm Value] to display the software keyboard.
3. Set the value then select [Confirm].
4. Select [Close].

2.10.6 Alarm menus

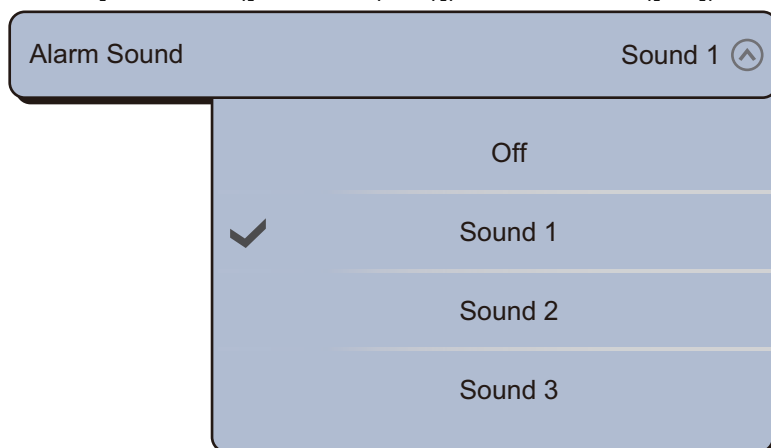
The followings are the alarm menus not previously mentioned.

[Hardware Alarm]: This alarm alerts you when something is wrong with the hardware.

[Notification Sound]: Activate ([Sound 1 (2, 3)]) or deactivate ([Off]) the notification sound (for "Waypoint Crossing" (see section 5.8), "End of Route" (section 4.10) or fish finder alarms (section 7.9)).



[Alarm Sound]: Activate ([Sound 1 (2, 3)]) or deactivate ([Off]) the alarm buzzer.



[Sound Alarm Until Acknowledged]: Turn this item on to sound the aural alarm until an alarm is acknowledged (see paragraph 2.10.7).

[External Volume]: Set the level for the external volume output.

[Reset Default Settings]: Select this menu item to restore default settings for the [Alarm] menu.

2.10.7 How to stop the alarm sound

When an alarm is generated, the name of the offending alarm appears on the status bar at the top of the screen and flashes. If [Alarm Sound] is active, the unit beeps. To stop the flashing and silence the alarm, tap the status bar.



Note: If [Sound Alarm Until Acknowledged] is set for [OFF], the unit continues to beep until the cause of the alarm is removed.

2.11 Track

The track (or movement) of your ship is plotted on the screen with position data. Your track lets you see how your ship has moved.

The track is saved to the internal memory if the track is active. A line runs between each track point. The internal memory stores a maximum of 30,000 track points. When the memory for track points becomes full, the oldest track points are deleted to get space for new track points.

Your track remains on the screen when the power is turned off. You can delete the track that you do not need from the menu.

The saved track can be shown on the screen, and you can make a route with the saved track.

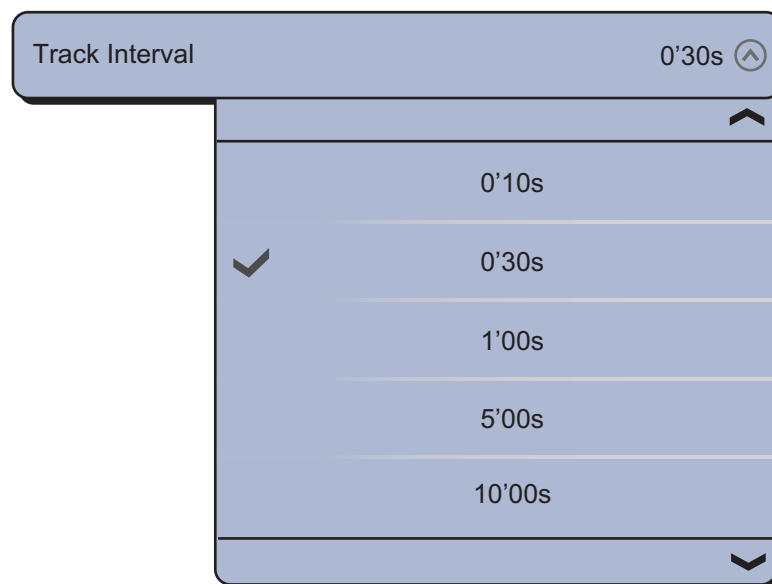
2.11.1 How to show or hide the track display

1. Select [Overlay] from the RotoKey menu.
2. To show the track, select [Tracks]. To hide the track, deselect [Tracks].

2.11.2 Track interval

In drawing the track, the position of your ship is stored into the memory of this unit at an interval of time. A shorter interval provides better reconstruction of the track, but the storage time of the track is reduced. When the track memory becomes full, the oldest track is erased to make room for the latest.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Ship & Track].
3. Select [Track Interval].



4. Select a time interval.
5. Select [Close] to exit the menu.

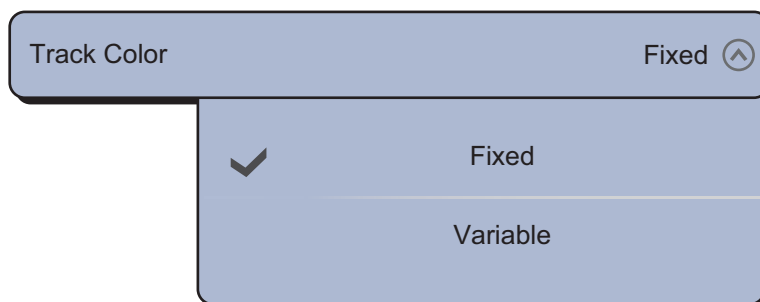
2.11.3 Track color

Track can be displayed in a single color or multiple colors. For multiple colors, you can display the track according to the conditions shown below.

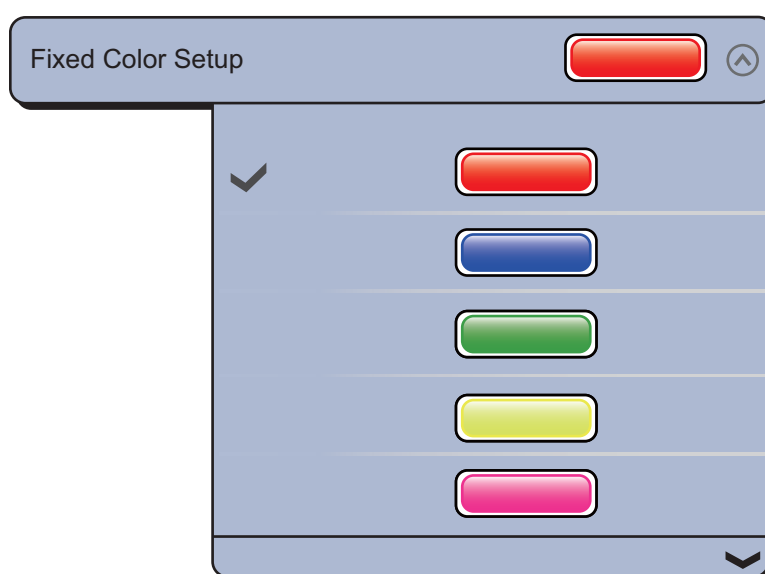
- SST (Sea Surface Temperature)
- Speed
- Depth
- Bottom sediment

From the main menu

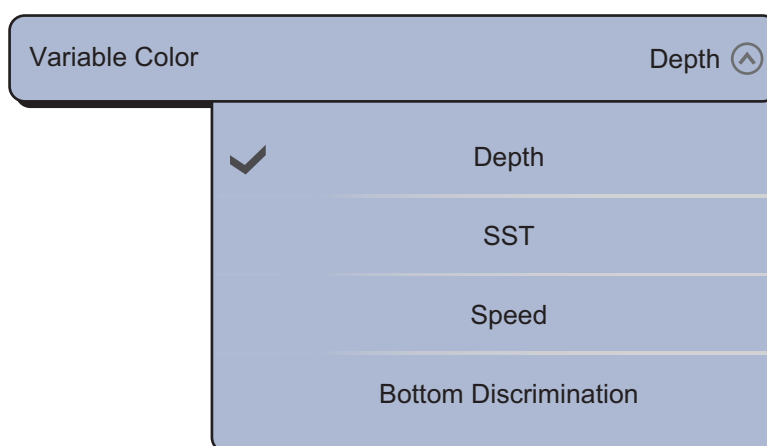
1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Ship & Track] - [Track Color] menu.



3. Select [Fixed] or [Variable]. For [Fixed], go to the next step. For [Variable], go to step 5.
4. Select [Fixed Color Setup] then select a color. Go to step 10.



5. Select [Variable Color] then select an option.



[Depth]: Change the color of the track with depth.

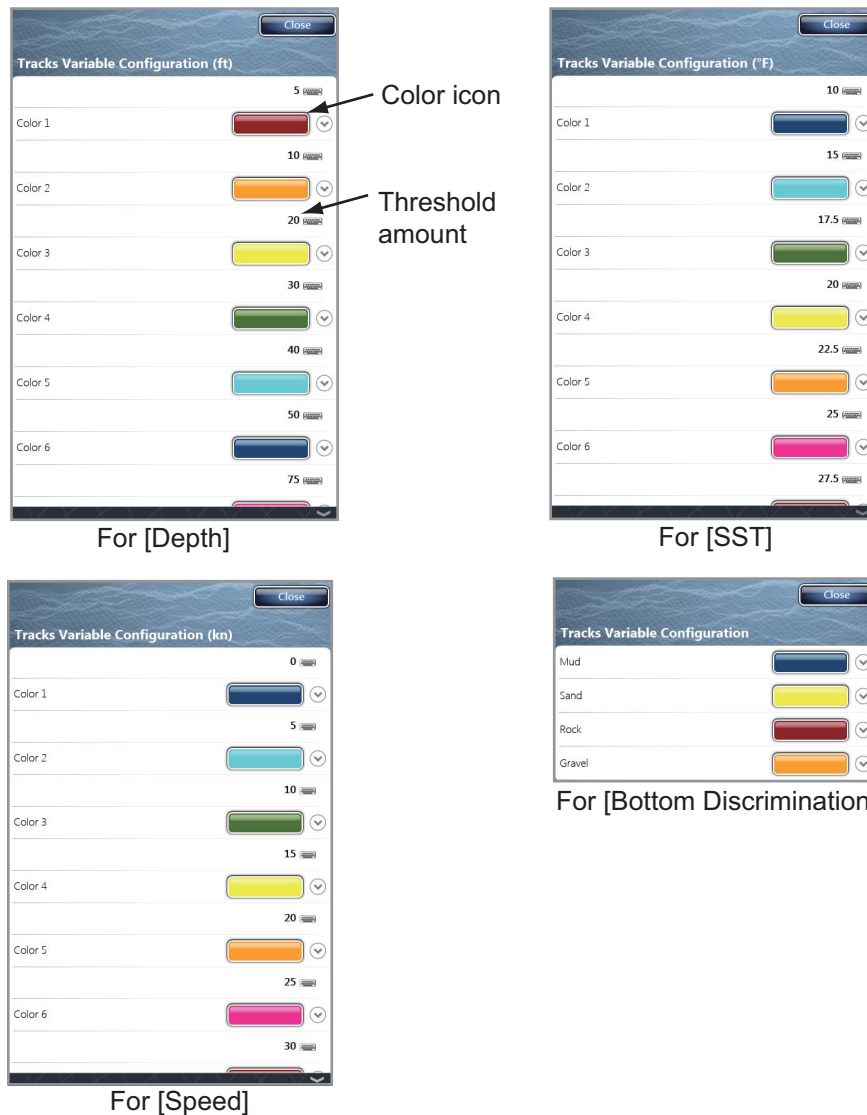
[SST]: Change the color of the track with change in sea surface temperature.

[Speed]: Change the color of the track with speed.

[Bottom Discrimination]: Change the color of the track with bottom sediment.

2. CHART PLOTTER

6. Select [Variable Color Setup].



7. For [Bottom Discrimination], select [Mud], [Sand], [Rock] or [Gravel]. For others, select [Color 1 (2, 3, 4, 5, 6, 7)].
8. Select a color for each menu item.
[Depth]: Set the color for each depth range. For example, when the red icon is selected in [Color 1], the track is red for depths from 5 to 10 ft.
[SST]: Set the color for each range of sea surface temperature. For example, when the blue icon is selected in [Color 1] (temperature range: 10 to 15°F), the track is blue for temperatures from 10 to 15°F.
[Speed]: Set the color for each speed range. For example, when the blue icon is selected in [Color 1], the track is blue for speed from 0 to 5 kn.
[Bottom Discrimination]: Set the color for each bottom sediment. For example, when the blue icon is selected in [Mud], the track where mud is found is blue.
For [Depth], [SST] and [Speed], you can change the threshold amount for each color. Select a threshold amount to display the software keyboard. Set the value then select [Confirm].
9. Select [Close].
10. Select [Close] to exit the menu.

On the screen

1. Select a track to display the pop-up menu.
2. Select [Color].
3. Select a color.

2.11.4 Track thickness

You can set the thickness of the track. If you are following the same track many times, you can show the track in the thinnest width to prevent overlapping of track.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Ship & Track].
3. Drag the circle icon in [Track Thickness] to set the level.



4. Select [Close] to exit the menu.

2.11.5 How to delete tracks

If the screen becomes full of track, you can not know which is the newer track. Delete the track you do not need.

How to delete the selected history track

You can delete the selected history track. You can not delete the track currently recorded.

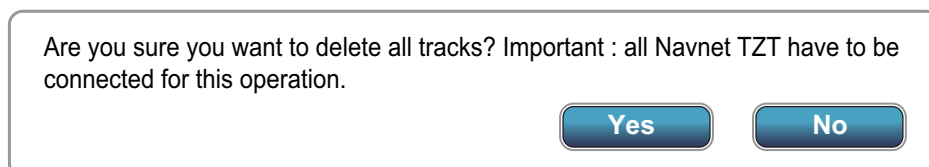
1. Select the track to delete. The pop-up menu appears.
2. Select [Delete].

How to delete all tracks

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Ship & Track].
3. Select [Delete] in [Delete All Tracks].



The confirmation message appears.



4. Select [Yes].
5. Select [Close] to exit the menu.

2.11.6 How to turn on the automatic deleting of tracks

The internal memory stores a maximum of 30,000 track points. When the memory for track points becomes full, the equipment automatically deletes the oldest track points to get space for new track points.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Ship & Track].
3. Select the [ON] icon in [Automatic Track Deleting].

2.11.7 How to record tracks

You can record tracks as follows:

1. Select [Track Rec.] from the RotoKey menu. The track is plotted on the screen.
2. To stop plotting the track, select the track then select [Stop Track Rec.].

2.11.8 How to replay a saved track

You can replay a saved track on the screen to use the track to create a route.

1. Select the track to replay. The pop-up menu appears.
2. Select [Follow Track]. The route (blue) is created on the track (red).

2.11.9 How to remove a replayed track

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

1. Select the replayed track to display the pop-up menu.
2. Select [Delete]. The red line is removed and the track remains as the route (blue line).

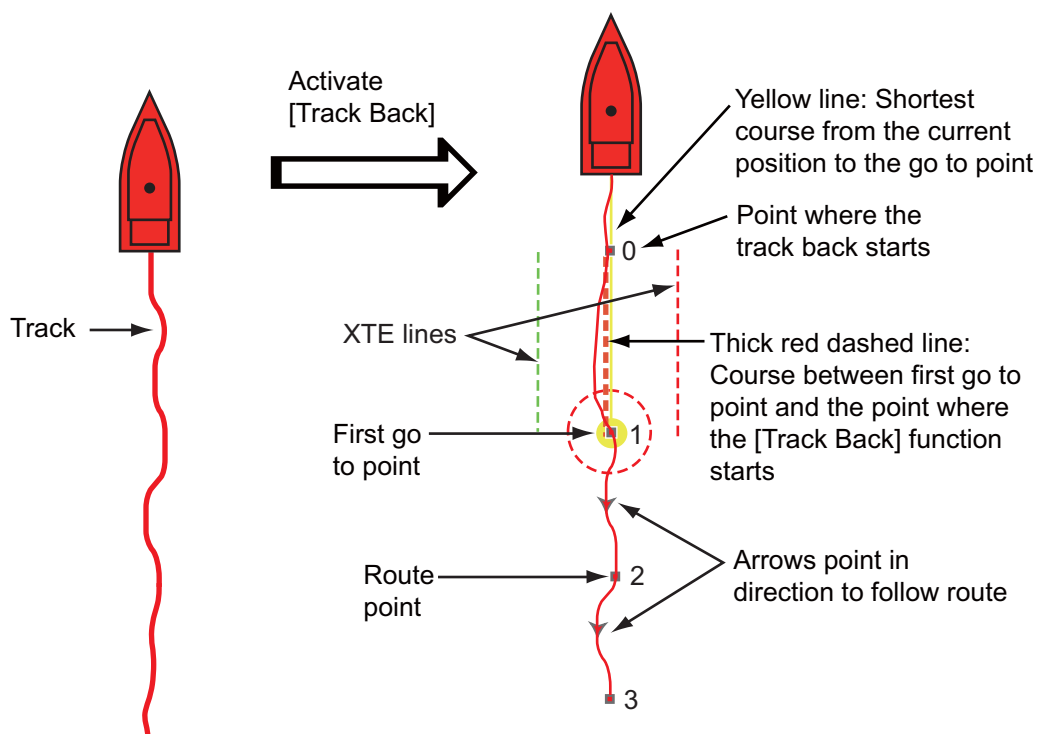
2.11.10 Trackback

The trackback feature creates a route with your current track. This feature helps you return along a previous track to get lobster pots, crab pots, and the like.

To use the trackback feature, select the active track to display the pop-up menu. Select [Track Back] to start operation as shown below.

- A yellow line runs between your ship and the destination (the shortest course).
- A thick red dashed line runs between first destination and point where the track back starts.
- Route points are automatically created.
- Arrows on the track point in the direction to follow the route.

- The XTE lines appear when you turn on these lines.



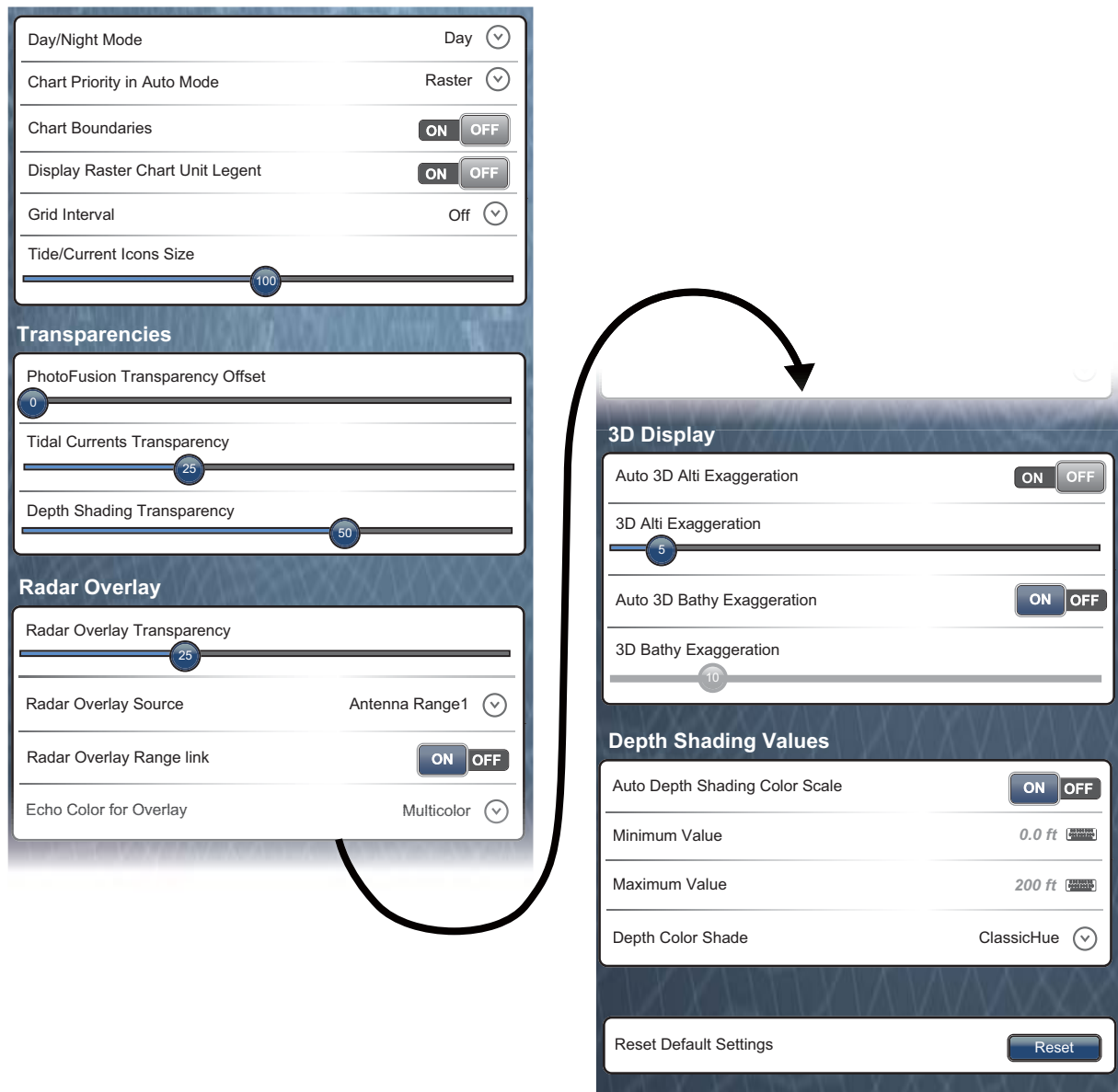
When you are following a route, you can do the following from the pop-up menu. Select the yellow line to display the pop-up menu.

- [Stop Nav.]: Stop following the route.
- [Restart Nav.]: Restart following the route.
- [Skip Wpt]: Skip a waypoint.
- [Rte Detail]: Open the [Route Detail] list.
- [Edit]: Open the [Editing Route] window.
- [Lists]: Open the lists.
- [Reverse]: Reverse the following direction.
- [Extend]: Extend a route from the last point on the route.
- [Split]: Divide a route in two to make two routes.

For additional information, see the chapter 5.

2.12 Plotter Display Menu

This section describes the chart plotter menus. To open the following menus, select [Menu] on the menu icon bar then select [Plotter Display].



[Day/Night Mode]: Select the color mode for best viewing in the current environment. The options are [Automatic], [Day], [Dusk] and [Night].

[Chart Priority in Auto Mode]: Select the chart priority in auto mode from [Vector] and [Raster].

[Chart Boundaries]: Show or hide the chart boundaries.

[Display Raster Chart Unit Legend]: Show or hide the [Raster chart unit] box at the bottom left-hand corner of the screen. The unit for the depth values on the raster chart is displayed in the [Raster chart unit] box.

[Grid Interval]: Select the grid interval on the plotter display. The options are [Off], [Very Low], [Low], [Medium], [High] and [Very High].

[Tide/Current Icons Size]: Set the size of the icon for tide and current.

[Transparencies]

[PhotoFusion Transparency Offset]: Set the degree of transparency for the satellite photo overlay. See paragraph 3.2.2.

[Tidal Currents Transparency]: Set the degree of transparency for the tidal currents.

[Depth Shading Transparency]: Set the degree of transparency for the depth shading on the water. See paragraph 3.2.1.

[Radar Overlay]

[Radar Overlay Transparency]: Set the degree of transparency for the radar echo.

[Radar Overlay Source]: Select the source for the radar echo from [Antenna Range1] or [Antenna Range2].

[Radar Overlay Range link]: Activate or deactivate matching the overlay with radar ranges.

[Echo Color for Overlay]: Select the color for the radar echo.

For the following menu items in the table, see chapter 3.

Menu item	Reference
<u>[3D Display]</u> <ul style="list-style-type: none"> • [Auto 3D Alti Exaggeration] • [3D Alti Exaggeration] • [Auto 3D Bathy Exaggeration] • [3D Bathy Exaggeration] 	See paragraph 3.1.3.
<u>[Depth Shading Values]</u> <ul style="list-style-type: none"> • [Auto Depth Shading Color Scale] • [Minimum Value] • [Maximum Value] • [Depth Color Shade] 	See paragraph 3.2.1.

[Reset Default Settings]: Select this menu item to restore default settings for the [Plotter Display] menu.

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3. 3D DISPLAY, OVERLAYS

3.1 3D Display

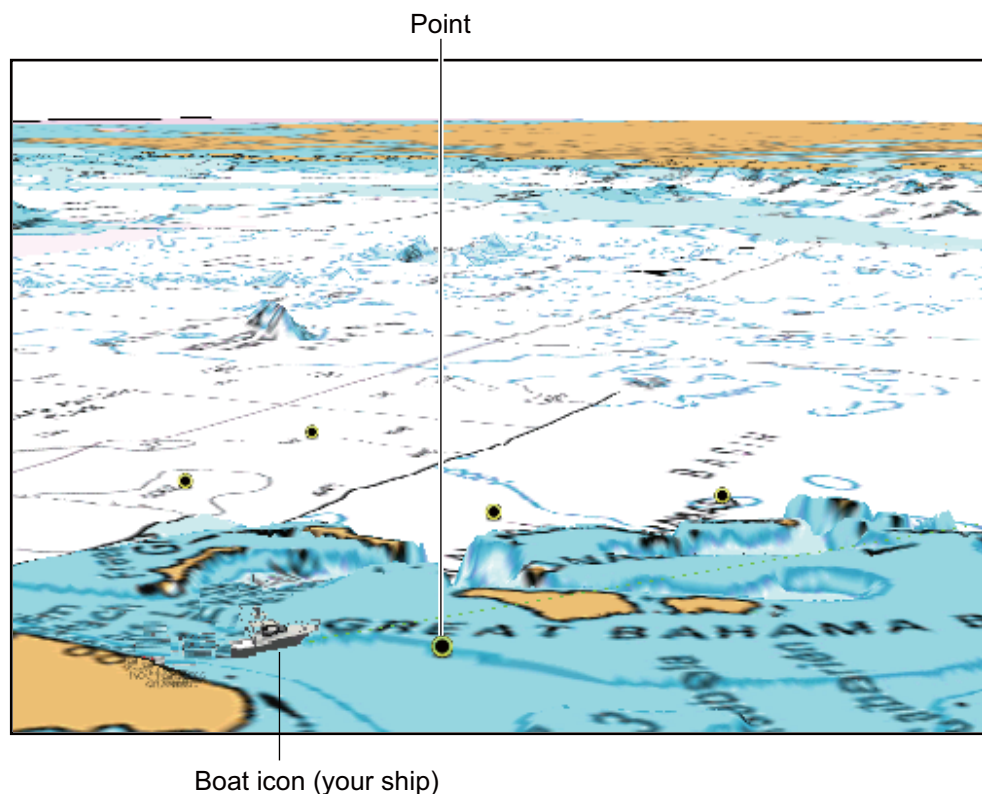
The 3D display has native 3D chart design that allows full time 3D presentation. This true 3D environment gives you all of the information you require with no restrictions on the information you can see. You can plan your routes, enter points, etc. like on the 2D chart.

The 3D display provides a 3D view of land and sea around your ship. The 3D display has most of the same information as the 2D display. With both presentations available you can see the conditions around your ship from different angles. The 3D display helps you navigate when you are in waters that you do not know. Also, most functions of the 2D display, for example, destination setting, are available in the 3D display.

For best results make sure you have accurate position and heading data.

3.1.1 Aerial view

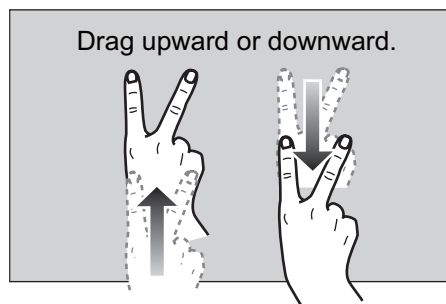
The aerial view is the view you get when you activate the 3D display. Your position is above and behind your ship, and your view is in the forward direction. The illustration shown below provides an example of how you can change the orientation of the aerial view display. This illustration shows the view from starboard side of the ship.



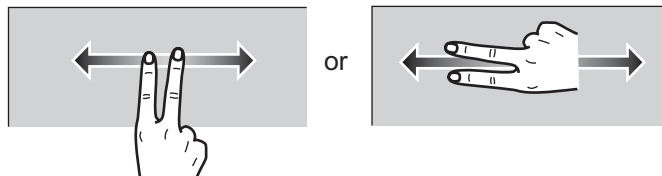
3D display, aerial view

3.1.2 How to activate the 3D display

1. Select [3D] from the RotoKey menu. You can also switch 2D to 3D by dragging two fingers upward or downward.



2. Orientate the 3D display by dragging sideways with two fingers.



To switch to 2D, select [2D Mode] at the top right-hand corner of the screen.

3.1.3 How to make the 3D view clearer

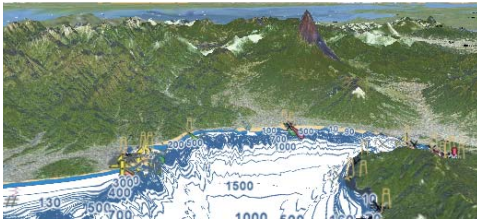
In the 3D display, some topographical features are easier to see if you use the 3D exaggeration feature. This feature expands both objects on the chart and the underwater vertically so that you can easily see the shape of the objects and position. There are two methods for 3D exaggeration: automatic and manual.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Plotter Display].

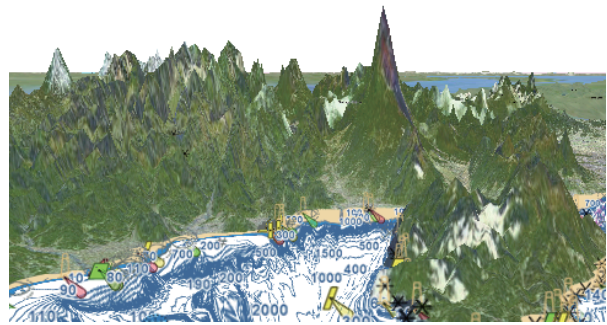


3. Automatic method:
Select the [ON] icon in [Auto 3D Alti Exaggeration] or [Auto 3D Bathy Exaggeration].
Manual method:
Select [3D Alti Exaggeration] or [3D Bathy Exaggeration].
[3D Alti Exaggeration]: Drag the circle icon to set the level for altitude.
[3D Bathy Exaggeration]: Drag the circle icon to set the level for bathymetry.

High gives the highest level of exaggeration. The example below compares the same picture in low and high exaggerations.



Low exaggeration



High exaggeration

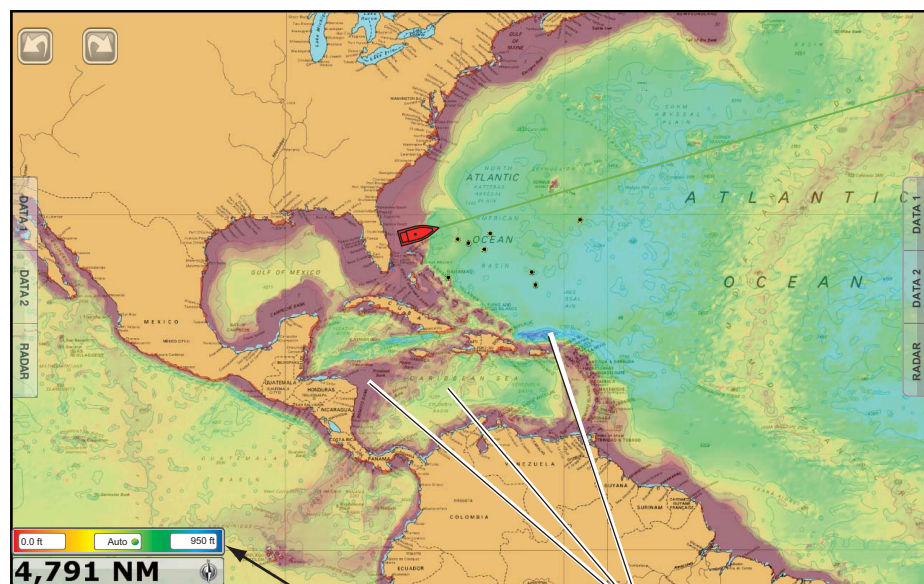
4. Select [Close] to exit the menu.

3.2 Overlays

Radar, satellite photo, depth shading, tide icons, tidal currents, etc. overlays are available on the chart plotter display.

3.2.1 Depth shading overlay

The depth shading overlay shows the depths in different color (the default settings are red (shallow), yellow (medium) and blue (deep)). This overlay is available in both 2D and 3D presentations. Use this overlay to find depths. To show the depth shading overlay, select [Overlay] from the RotoKey menu then select [Dpth Shade]. To hide the depth shading overlay, deselect [Dpth Shade].



Depth shading color scale

Depth shading

Depth shading settings

The depth shading settings are on the [Plotter Display] menu of the main menu. Set these menus by following the description shown below.

Auto Depth Shading Color Scale	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF
Minimum Value	0.0 ft
Maximum Value	200 ft
Depth Color Shade	ClassicHue

[Auto Depth Shading Color Scale]: Turn automatic depth shading color scale selection on or off.

On the screen, you can turn on or off the automatic depth shading color scale with tapping here.



ON

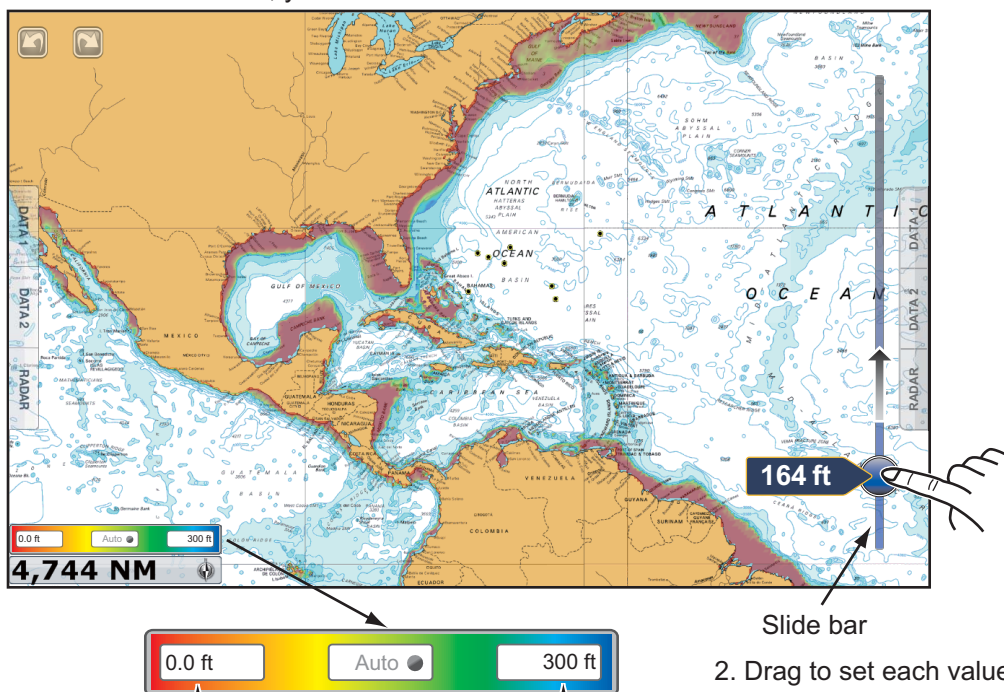


OFF: [Auto] is grayed out.

[Minimum Value]: Set the minimum depth range for which to show depth shading, with the software keyboard. This is available when [Auto Depth Shading Color Scale] is set to [OFF].

[Maximum Value]: Set the maximum depth range for which to show depth shading, with the software keyboard. This is available when [Auto Depth Shading Color Scale] is set to [OFF].

On the screen, you can set the minimum and maximum value.



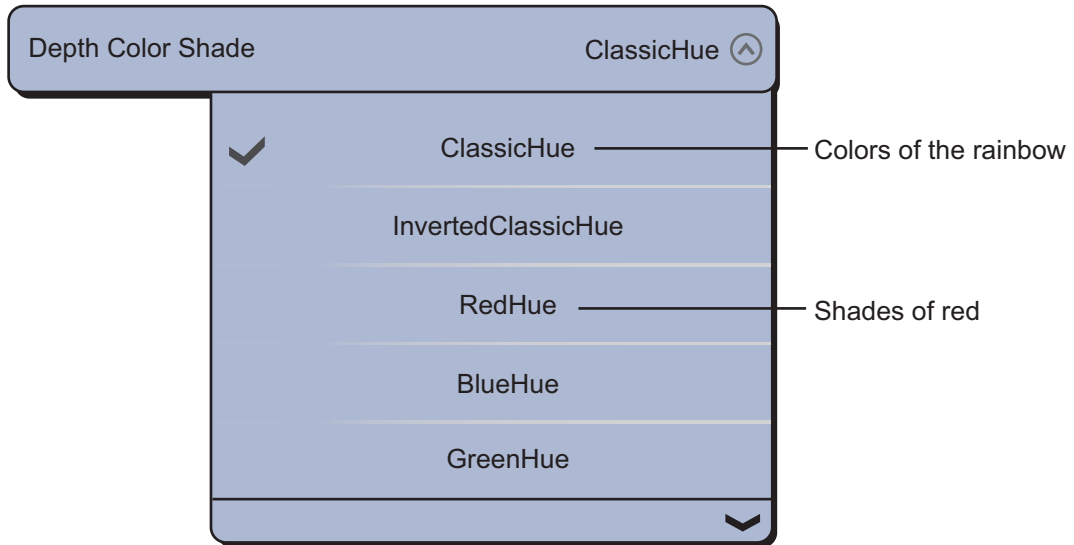
For minimum value

For maximum value

1. Tap the desired position to display the slide bar.

Slide bar
2. Drag to set each value.

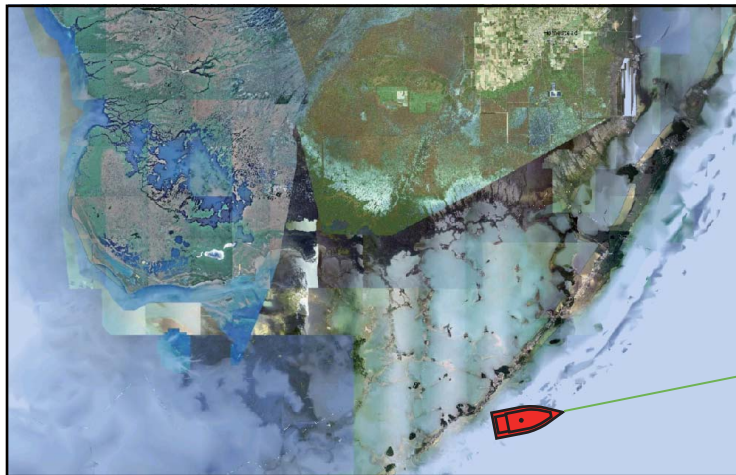
[Depth Color Shade]: Select how to display the depth colors among [ClassicHue], [InvertedClassicHue], [RedHue], [BlueHue], [GreenHue] and [YellowHue].



3.2.2 Satellite photo overlay

You can put the satellite photo for your area on the 2D and 3D displays. Select [Overlay] from the RotoKey menu then select [Sat Photo].

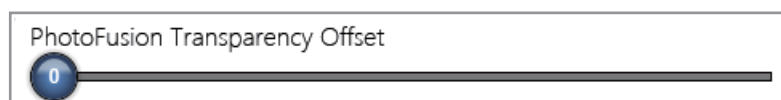
High resolution satellite images for the USA coastline are not provided standard, but are available at no cost (except shipping and handling). Users can install multiple satellite photos on the hard drive of the NavNet TZtouch. The illustration below shows the vector chart with the satellite photo overlay.



How to set satellite photo transparency on water

You can set the degree of transparency for the satellite photo on the water.

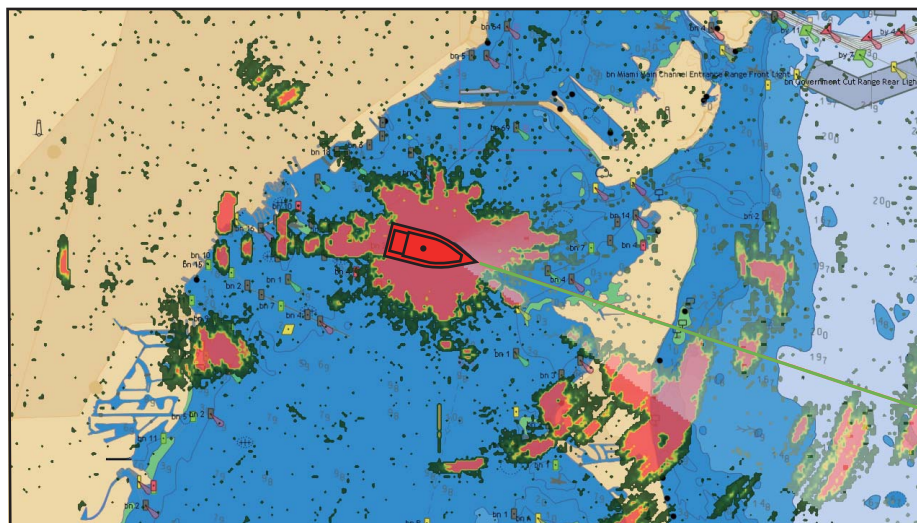
1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Plotter Display].
3. Drag the circle icon in [PhotoFusion Transparency Offset] to set the level (setting range: 0 to 80%).



4. Select [Close] to exit the menu.

3.2.3 Radar overlay

The radar overlay display puts the radar picture on the top of the navigation chart. To display the radar overlay, select [Overlay] from the RotoKey menu then select [Radar].



How to switch between stand-by and TX

To transmit, select [Radar] from the RotoKey menu then select [Tx Radar]. To get stand-by, deselect [Tx Radar].

How to set the level of the radar echo transparency

RotoKey menu: Select the [Radar] - [Transparency] menu. Drag the circle icon to set the level.

Main menu: Select [Plotter Display]. Drag the circle icon to set the level in [Radar Overlay Transparency].

How to match the overlay and radar ranges

Select [Plotter Display] of the main menu. Select the [ON] icon in [Radar Overlay Range link].

How to adjust radar gain, sea, rain

The gain and sea and rain clutters can be adjusted from the radar overlay. Select [Radar] from the RotoKey menu. For automatic adjustment, select [Auto Gain], [Auto Sea] or [Auto Rain]. For manual adjustment, select [Manual Gain], [Manual Sea] or [Manual Rain] then drag the circle icon to set each level. See section 6.2, section 6.3 or section 6.4.

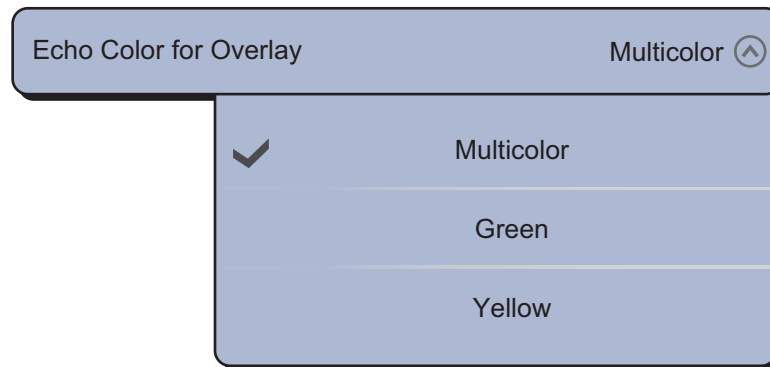
How to display the echo trail

Select [Radar] from the RotoKey menu then select [Echo Trail] to display the echo trail. To hide the echo trail, deselect [Echo Trail].

To clear the echo trail, select [Radar] from the RotoKey menu then select [Clear Trail].

How to select the echo color

Select the [Plotter Display] - [Echo Color for Overlay] menu of the main menu. Select [Multicolor], [Green] or [Yellow].

**How to acquire a target for ARPA**

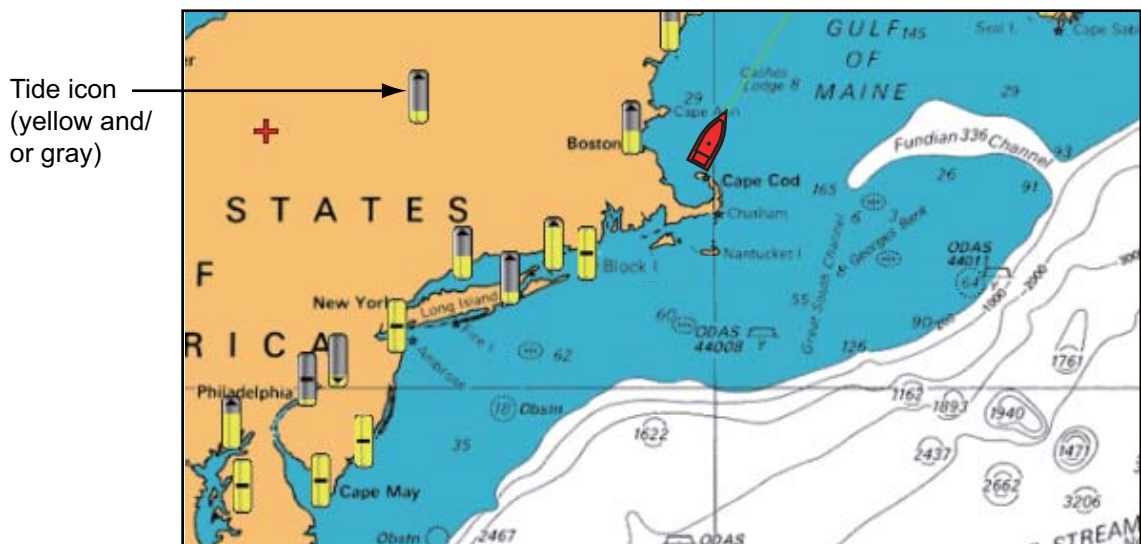
A target can be acquired for ARPA. See paragraph 6.25.2.

3.2.4 Tide icon overlay

The NavNet TZtouch has worldwide tidal and tidal current information. You can overlay this information on the chart plotter display. The tide icon (📏) appears at the locations of tidal recording stations.

How to display the tide icon overlay

1. Select [Overlay] from the RotoKey menu.
2. Select [Tide Icons].



📏 : Up arrow indicates the tide is going high.

📏 : Down arrow indicates the tide is going low.

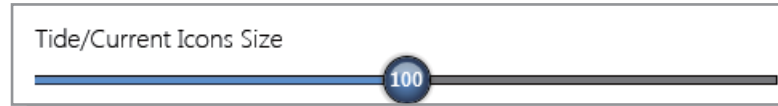
📏 : No arrow indicates no change in tide.

The arrow on the tide icon is up when the tide is high, or is down when the tide is low. The tide icon is gray and yellow according to the tide state. The tide icon is all yellow when the tide is high completely and all gray when the tide is low completely.

3. 3D DISPLAY, OVERLAYS

How to change the size of the tide icon

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Plotter Display].
3. Drag the circle icon in [Tide/Current Icons Size] to set size (setting range: 50 to 150%).



4. Select [Close] to exit the menu.

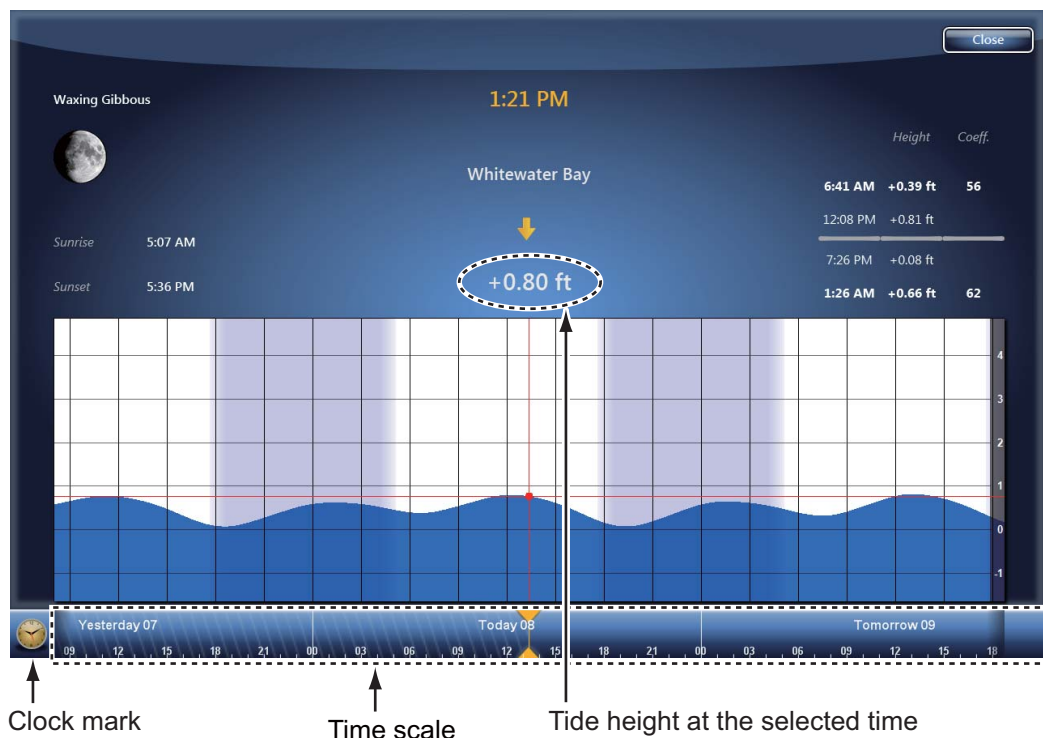
How to show the tide information

Select a tide icon to display the information (name, date, tide height and tide status) about a tide.



How to display the tide graph

- On the screen: Select a tide icon then select [Info] from the pop-up menu. You can display the tide graph to select the call-out for the tide information instead of the [Info] pop-up menu.
- From the [Tides] menu: Select [Tides] on the menu icon bar. The tide graph for the closest tidal station to the current position opens.



How to understand the tide graph

- Vertical axis: Height, Horizontal axis: Time
- The information is mostly accurate under moderate weather conditions. However, storms and weather fronts can influence forecasted tide times and heights.
- Drag the time scale at the bottom of the screen sideways then read the tide height at the selected time (drag to the left to display the future information, right for the past information).
- To set the time scale to the current time, select the clock mark at the bottom left-hand corner of the screen. The color of the clock mark turns gold.



Clock mark for the current time



Clock mark except the current time

- To return to the chart plotter display, select [Close] at the top right-hand corner of the screen.

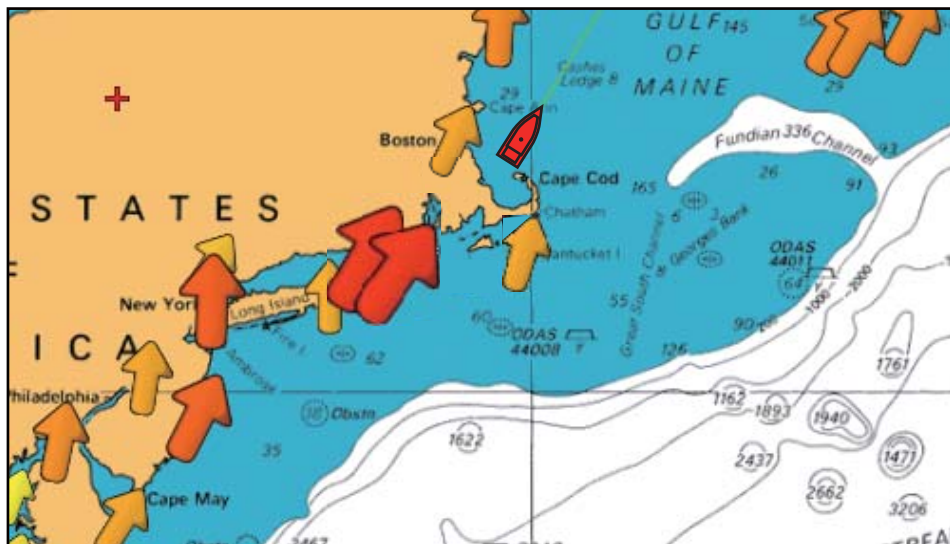
3.2.5 Tidal current overlay

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

How to display the tidal current overlay

1. Select [Overlay] from the RotoKey menu.
2. Select [Currents].

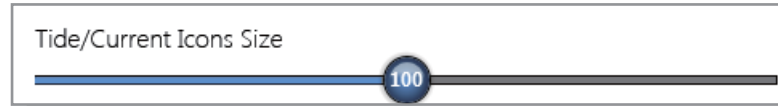
Arrows of more than one color and size appear on the screen and are pointing in different directions.



The arrow indicates the movement of the tidal current. The size and color of the arrow indicate the tidal current speed (yellow: slow, orange: medium, red: fast).

How to change the tidal current icon size

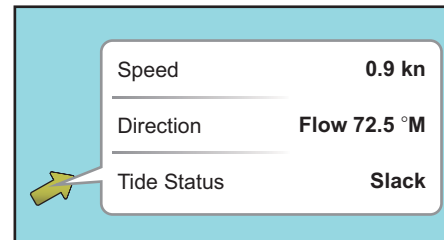
1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Plotter Display].
3. Drag the circle icon in [Tide/Current Icons Size] to set size (setting range: 50 to 150%).



4. Select [Close] to exit the menu.

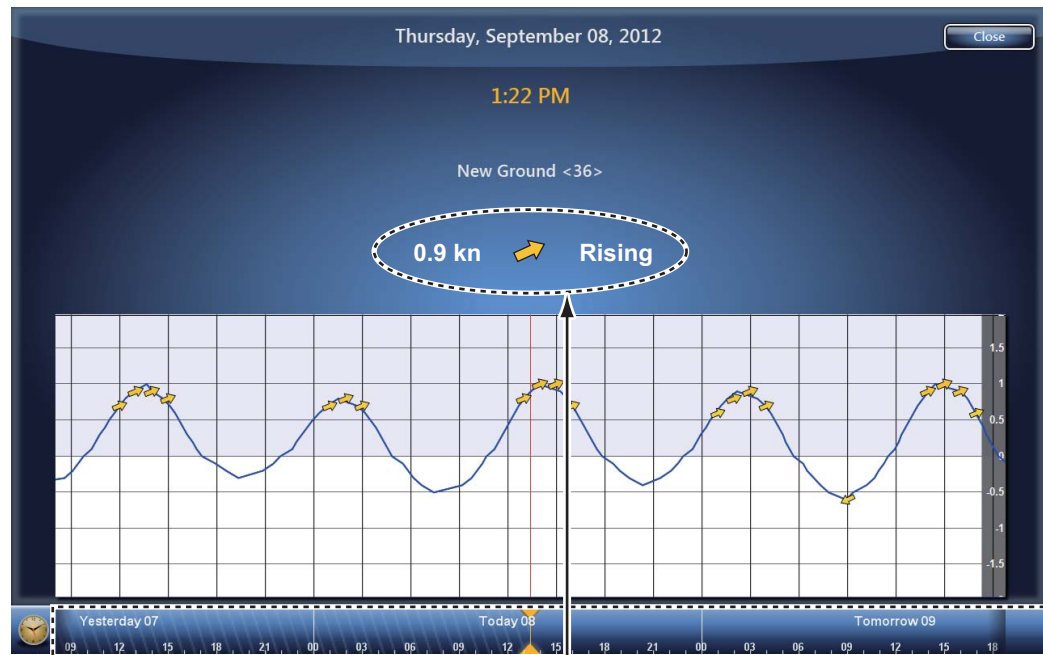
How to show the tidal current information

Select a tidal current icon to display the information (speed, direction and tide status) about a tidal current.



How to display the tidal current graph

Select a tidal current icon then select [Info] from the pop-up menu. You can display the tidal current graph to select the call-out for the tidal current information instead of the [Info] pop-up menu.



Clock mark

Time scale

Tidal current speed at the selected time

How to understand the tidal current graph

- Vertical axis: Speed, Horizontal axis: Time
- The information is mostly accurate under moderate weather conditions. However, storms and weather fronts can influence forecasted tidal current directions and speeds.
- Drag the time scale at the bottom of the screen sideways then read the tidal current speed at the selected time (drag to the left to display the future information, right for the past information).
- To set the time scale to the current time, select the clock mark at the bottom left-hand corner of the screen. The color of the clock mark turns gold.



Clock mark for the current time



Clock mark except the current time

- To return to the chart plotter display, select [Close] at the top right-hand corner of the screen.

3. 3D DISPLAY, OVERLAYS

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4. POINTS

4.1 About Points

In navigation terminology, a point is any location you put on the chart plotter display. A point can be a fishing spot, reference point and other important locations. You can use a point you have entered to set a destination.

This unit has 30,000 points into which you can enter position information.

When you enter a point, the point is put on the screen with the point symbol selected as the default point symbol. The position of the point, symbol and color information are saved to the points list. You can show or hide the points, and the default setting shows all points.

Default point symbol —————→ 
(black circle in yellow circle)

You can edit a point on the screen or the points list.

4.2 How to Put a Point or an Event Mark

4.2.1 How to put a point

1. Select the position to display the pop-up menu.
2. Select [New Point] or [Lat/Lon]. To set the position accurately, select [Lat/Lon] then go to the next step.
3. Set the position referring to steps 2 and 3 in paragraph 4.7.1.
4. Select [Confirm]. The [Editing Point] window appears.



5. Select [Save].

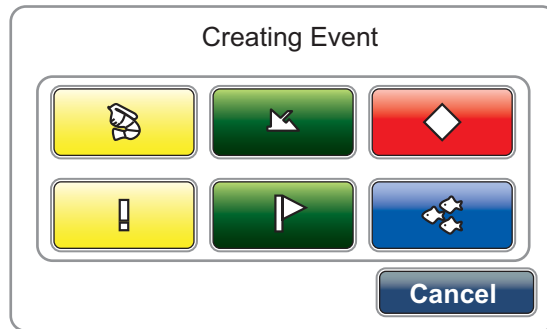
The following occurs.

- The default point symbol is put at the selected position.
- The point is saved to the points list.

4.2.2 How to put an event mark

This function is available by touch control when you select [Event] in [General] - [Function Gesture] of the main menu (see section 1.14).

1. Tap the screen with two fingers.



You can open the above window from the [Event] RotoKey menu.

2. Select a desired mark.

The following occurs.

- The selected mark is put at the position, at the time the **RotoKey™** was pushed or the screen was tapped to open the [Creating Event] window.
- The event mark is saved to the points list.

Most of the operations are common in points and event marks.

4.3 How to Display the Point Information

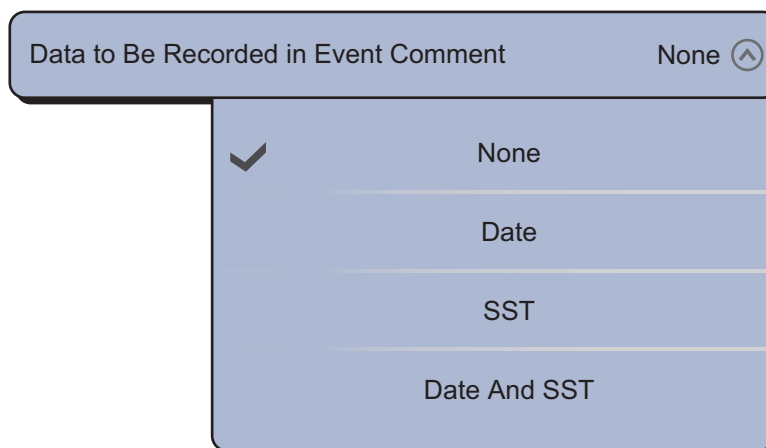
Select a point to display the information (name, depth, comment, bearing and range) about a point.

For an event mark, the comment is automatically entered according to the setting in the [Points] menu.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Points] - [Data to Be Recorded in Event Comment] menu.

A small map showing a coastal area with a point marked. A white box is overlaid on the map, displaying point information.

Name	POINT1
Depth	443 ft
Comment	
Bearing	17.9 °M
Range	0.822 NM

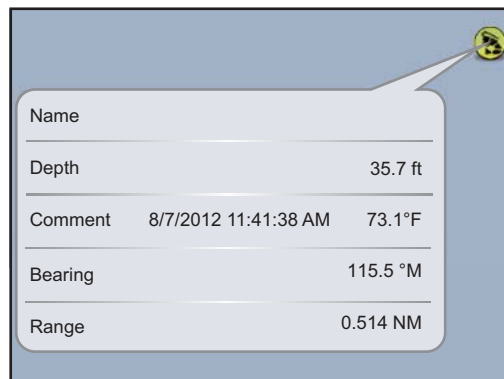


3. Select an option.
[None]: No comment
[Date]: Date

[SST]: Sea surface temperature

[Date And SST]: Date and sea surface temperature

4. Select [Close] to exit the menu.



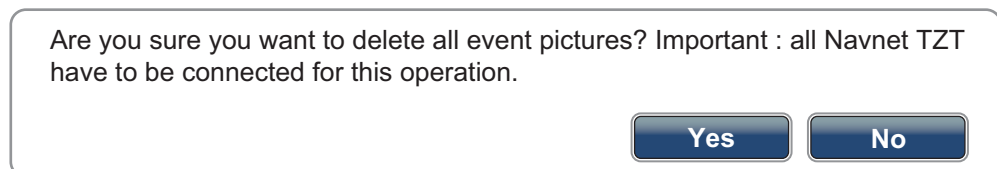
Example: [Date And SST]

Screenshot in the information area

You can display a screenshot, at the time when tapping the screen with two fingers to put an event mark, in the information area. Select [Points] of the main menu. Select the [ON] icon in [Add Screen Capture to Event].

To delete all screenshots for event marks in the information area, do the following:

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Points] - [Delete All Event Pictures] menu. The confirmation message appears



3. Select [Yes].
4. Select [Close] to exit the menu.

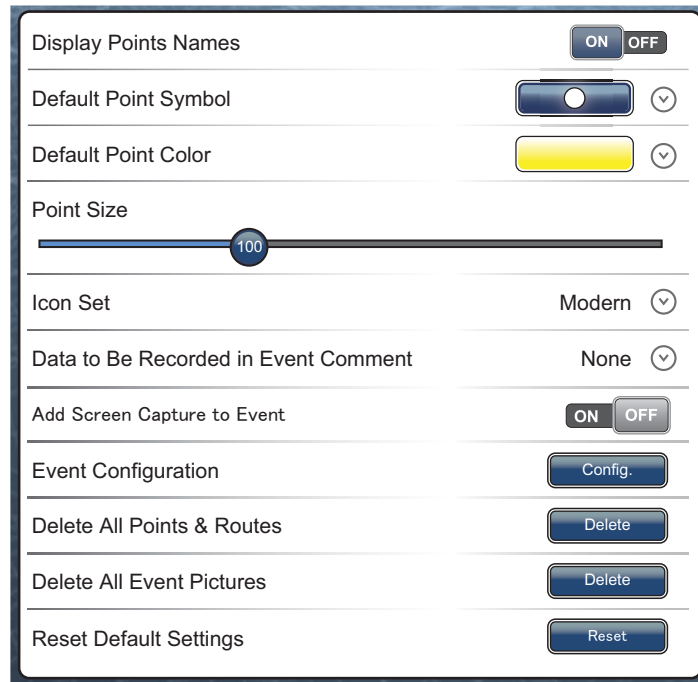
4.4 Default Point Settings

When you save a point, the equipment saves the point according to the shape, color, size and type set on [Points] of the main menu. If those settings do not meet your requirements, you can change the settings as shown below.

1. Select [Menu] on the menu icon bar to open the main menu.

4. POINTS

2. Select [Points].



Display Points Names

Default Point Symbol ▼

Default Point Color ▼

Point Size

Icon Set Modern ▼

Data to Be Recorded in Event Comment None ▼

Add Screen Capture to Event

Event Configuration

Delete All Points & Routes

Delete All Event Pictures

Reset Default Settings

3. Select [Default Point Symbol], [Default Point Color], [Point Size] or [Icons Set]. Below are the options for [Default Point Symbol], [Default Point Color] and [Icons Set].

[Default Point Symbol]

Default Point Symbol ▲

▼

▼

[Default Point Color]

Default Point Color ▲

▼

Scroll marks (Indicate options currently not shown in the window. You can see the options currently not shown by dragging.)

[Icons Set]

Icons Set Modern ▲

Classic

▼ Modern

4. Select an option or set the level.
5. Select [Close] to exit the menu.

4.5 How to Move a Point

You can move a point by two methods, on the screen and from the points list.

4.5.1 How to move a point on the screen

1. Select the point to move. The pop-up menu appears.
2. Select [Move]. The selected point is highlighted.



3. Move the point to the new position by dragging the point or tapping the new position.
4. Select [End Move] at the top right-hand corner of the screen.

4.5.2 How to move a point from the points list

1. Select [Lists] on the menu icon bar to open the lists menu.
You can also open the lists menu from the [Display] - [Lists] of the RotoKey menu.
2. Select [Points List] to open the points list.
3. Select [Name], [Color], [Icon] or [Range] in the [Sort by] area at the top of the list.
[Name]: Points sorted in alphanumeric order
[Color]: Points sorted by color in order of red, green, blue, cyan, magenta, black & white, yellow, orange
[Icon]: Points sorted by symbol shape order
[Range]: Points sorted by range in ascending order
4. Select the point to move then select [Edit] to display the [Editing Point] window.
You can also open the [Editing Point] window on the screen. Select the point to move then select [Edit] from the pop-up menu.
5. Select [Position] to display the software keyboard.
6. Enter the position then select [Confirm].
7. Select [Save]. If you opened the [Editing Point] window on the screen, you do not need to do step 8.
8. Select [Close] to exit the menu.

You can also open the points list from the RotoKey menu instead of steps 1 and 2. See section 1.13.

4.6 How to Delete a Point

You can delete points by two methods, on the screen and from the points list. The point currently set as a go to point cannot be deleted.

4.6.1 How to delete a point on the screen

1. Select the point to delete. The pop-up menu appears.
2. Select [Delete].

4.6.2 How to delete a point from the points list

1. Select [Lists] on the menu icon bar to open the lists menu.
2. Select [Points List] to open the points list.
3. Select [Name], [Color], [Icon] or [Range] in the [Sort by] area at the top of the list.
[Name]: Points sorted in alphanumeric order
[Color]: Points sorted by color in order of red, green, blue, cyan, magenta, black & white, yellow, orange
[Icon]: Points sorted by symbol shape order
[Range]: Points sorted by range in ascending order
4. Select the point to delete then select [Delete]. The point disappears from both the screen and the points list.
5. Select [Close].

4.6.3 How to delete all points

You can delete all points from the [Points] menu. When there is an active route, this function is not available.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Points] - [Delete All Points & Routes] menu. The confirmation message appears.

Are you sure you want to delete all points and routes? Important : all Navnet TZT have to be connected for this operation.

Yes

No

3. Select [Yes].
4. Select [Close] to exit the menu.

4.7 How to Edit a Point

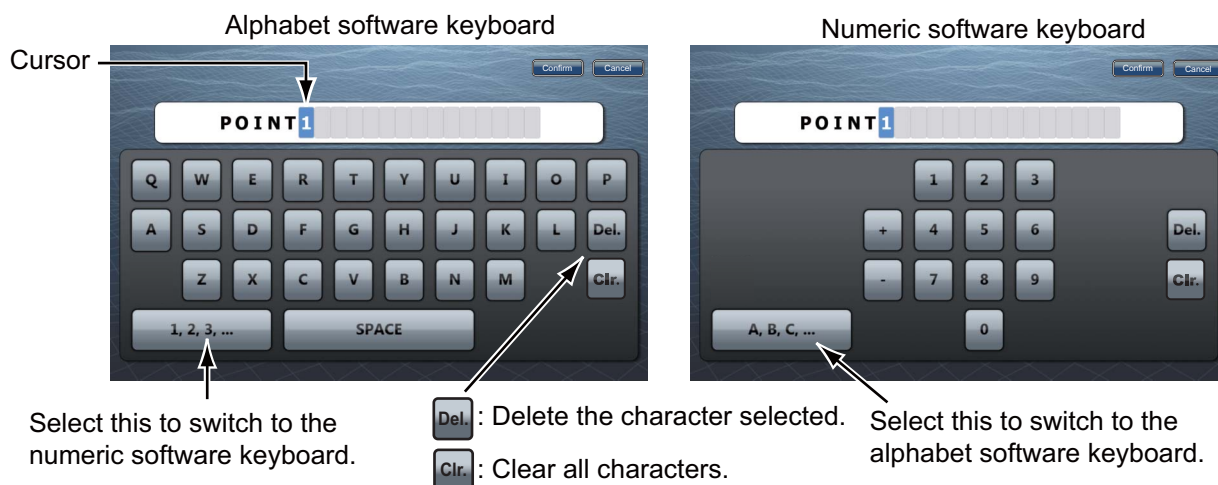
You can edit the points which you have entered by two methods, on the screen and from the points list.

4.7.1 How to edit a point on the screen

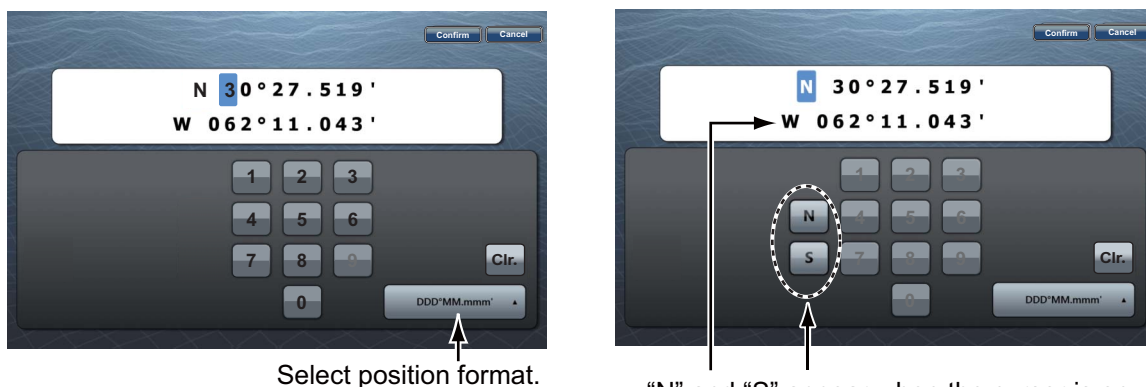
1. Select the point to edit then select [Edit] from the pop-up menu. You can display the [Editing Point] window to select the call-out for the point information instead of the [Edit] pop-up menu.

2. To change the name of the point, select [Name] to display the software keyboard. Change the name as follows:

- 1) Select the character to edit. For example, "1" is selected in the following figure.



- 2) Select an alphanumeric character from the software keyboard.
 - 3) Repeat steps 1) and 2) to complete the name. The maximum length of the name is 20 alphanumeric characters.
 - 4) Select [Confirm].
3. To change the position, select [Position] to display the software keyboard. Set the position referring to step 2.



4. Select [Color] to change the color of the point symbol.
5. Select a color.
6. Select [Icon] to change the point symbol.
7. Select a symbol.
8. Select [Comment] to display the software keyboard.
9. Enter the comment for the point.
10. Select [Confirm].
11. Select [Save].

4.7.2 How to edit a point from the points list

1. Select [Lists] on the menu icon bar to open the lists menu.

2. Select [Points List] to open the points list.

3. Select [Name], [Color], [Icon] or [Range] in the [Sort by] area at the top of the list.

[Name]: Points sorted in alphanumeric order

[Color]: Points sorted by color in order of red, green, blue, cyan, magenta, black & white, yellow, orange

[Icon]: Points sorted by symbol shape order

[Range]: Points sorted by range in ascending order

Sort by : Name Color Icon Range		
P		
POINT1	N 43°04.617'; W 65°42.642'	Range 1,893 NM
POINT10	N 36°43.818'; W 56°56.134'	Range 0,705 NM
POINT11	N 24°04.569'; W 59°10.240'	Range 1,835 NM
POINT12	N 33°05.248'; W 60°19.448'	Range 0,562 NM
POINT13	N 17°51.474'; W 53°30.375'	Range 2,867 NM
POINT2	N 55°43.549'; W 47°01.101'	Range 3,464 NM
POINT3	N 57°37.416'; W 41°17.782'	Range 3,205 NM
POINT4	N 30°13.197'; W 71°19.945'	Range 1,285 NM
POINT5	N 24°52.941'; W 66°37.620'	Range 1,962 NM
POINT6	N 59°11.051'; W 52°43.328'	Range 3,234 NM
POINT7		

4. Select the point to edit then select [Edit].



POINT1
N 43°04.617'; W 65°42.642'

Range 1,893 NM

Edit

Add to route

Goto

Goto

Save

Cancel

Editing Point

Name
POINT1

Position
N 43°04.617'; W 65°42.642'

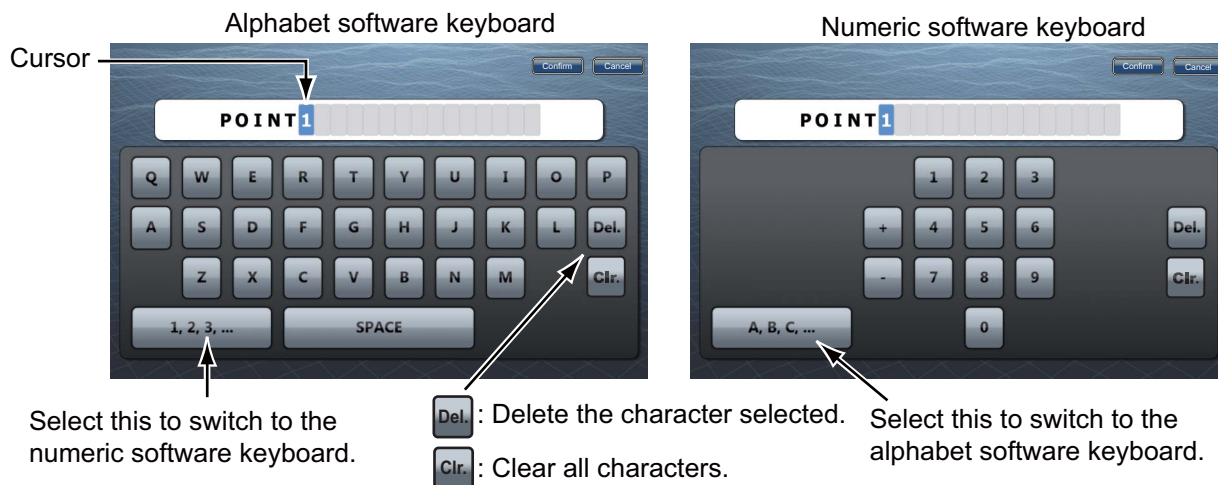
Color


Icon

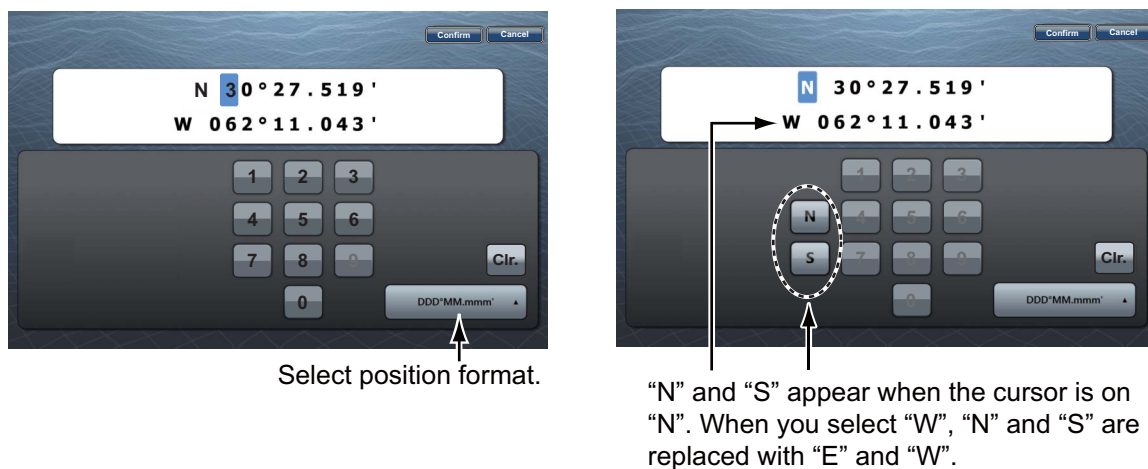

Comment

5. To change the name of the point, select [Name] to display the software keyboard. Change the name as follows:

1) Select the character to edit. For example, "1" is selected in the following figure.



- 2) Select an alphanumeric character from the software keyboard.
- 3) Repeat steps 1) and 2) to complete the name. A name can have a maximum of 20 alphanumeric characters.
- 4) Select [Confirm].
6. To change the position, select [Position] to display the software keyboard. Set the position referring to step 5.



7. Select [Color] to change the color of the point symbol.
8. Select a color.
9. Select [Icon] to change the point symbol.
10. Select a symbol.
11. Select [Comment] to display the software keyboard.
12. Enter the comment for the point.
13. Select [Confirm].
14. Select [Save].
15. Select [Close] to exit the menu.

4.8 How to Find a Point

You can easily move a point to the center of the screen from the points list.

1. Select [Lists] on the menu icon bar to open the lists menu.
2. Select [Points List] to open the points list.
3. Select [Name], [Color], [Icon] or [Range] in the [Sort by] area at the top of the list.
4. Select the point to find then select [Find On Chart].

The menu closes and the selected point is put at the center of the screen on the active chart plotter display.

Note: When you use this function in the split-screen display, the split-screen display is replaced with the full-screen display.

4.9 How to Show or Hide All Points or Points Names

Points

You can show or hide all points.

1. Select [Overlay] from the RotoKey menu.
2. To show all points, select [Points]. To hide all points, deselect [Points].

Points Names

You can show or hide all points names.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Points].
3. To show all points names, select the [ON] icon in [Display Points Names]. To hide all points names, select the [OFF] icon.

4.10 How to Go to a Point

Select the point to go to among the three methods shown below.

- Select the point on the screen
- Select a position on the screen
- Select the point from the points list

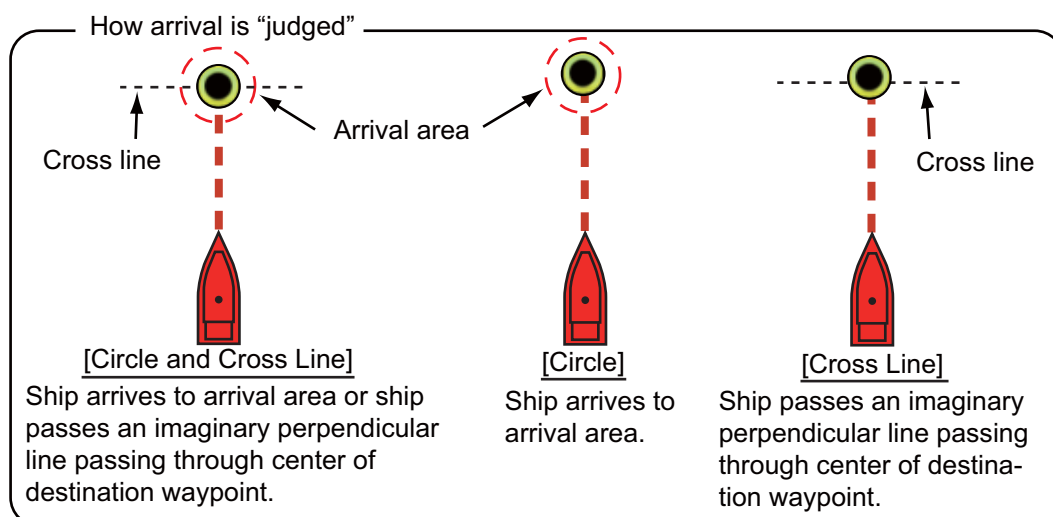
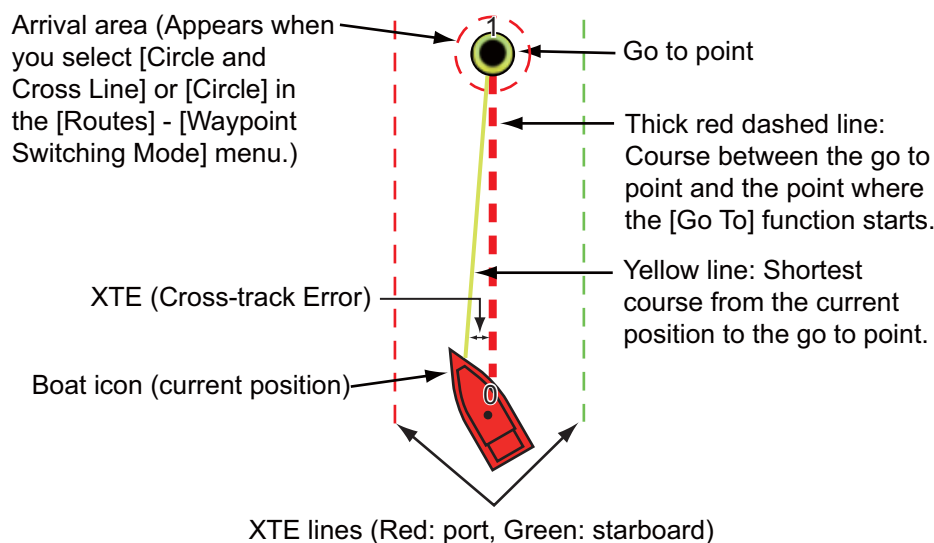
After you have selected a point, you can do the following.

- Restart the cross-track error (XTE) indication.
- Stop and restart Go To. (Select the boat icon to display the pop-up menu. Select [Stop Nav.] and [Restart Nav.] respectively.)

Note: Before you try to go to a point, make sure that the path to the point is clear. Make sure to zoom your chart to check for hazards which appear on a smaller scale.

4.10.1 How to go to an on-screen point

1. Select the point to display the pop-up menu.
2. Select [Go To].



The following occurs:

- The go to point is highlighted.
- A thick red dashed line and a yellow line appear. The thick red dashed line is the course to follow to get to the point. The yellow line is the shortest course from the current position to the go to point.
- The go to point is numbered "1" and the position where the [Go To] function starts is numbered "0".
- The arrival area marker appears if activated on the menu (see paragraph 5.9.5).
- The XTE lines, red for port side, green for starboard side, appear. You can show or hide these lines with [Display XTE Lines] on [Routes] of the main menu.

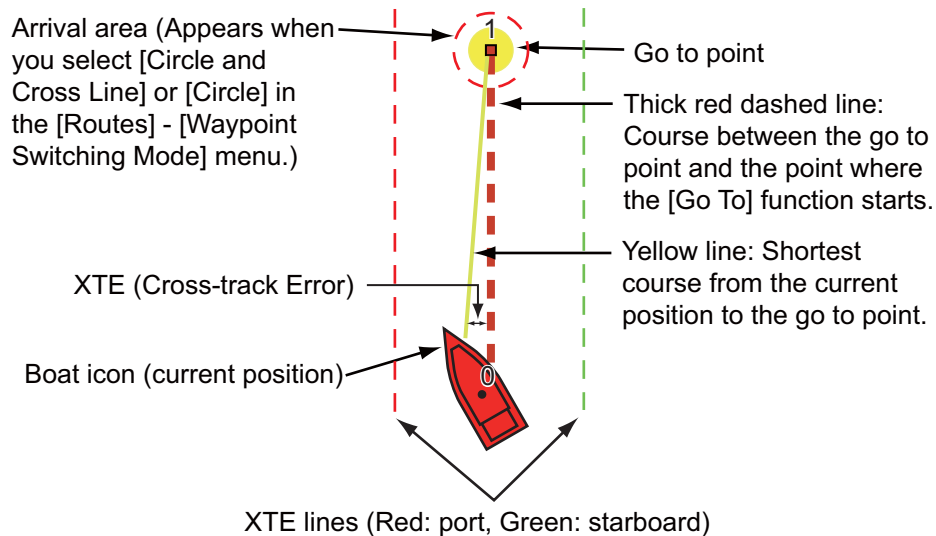
Note: If you want to be notified when you reach the go to point (the end of a route), turn on [End of Route Notification] on [Routes] of the main menu (see paragraph 5.9.9). Then the message "End of Route" appears when you reach the end of a route. For the arrival timing, see paragraph 5.9.5.

The route is saved to the routes list.

4.10.2 How to go to a position selected on screen

You can set a position as a point to go to without saving the point. The point is erased when the navigation is cancelled or the power is turned off.

1. Select the position to set as a point to go to. The pop-up menu appears.
2. Select [Go To].



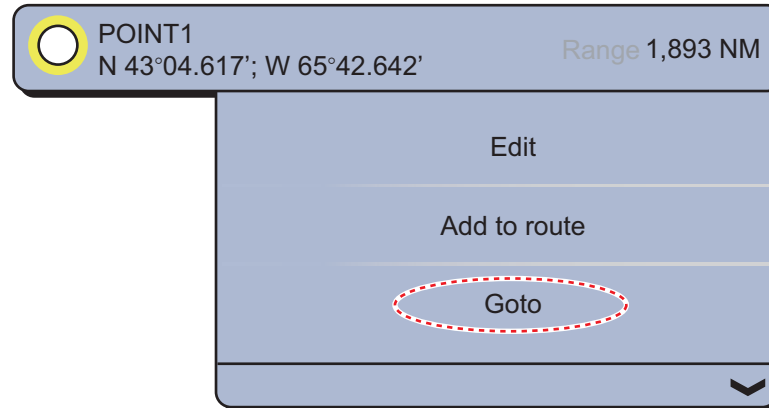
The following occurs:

- The go to point is highlighted.
- A thick red dashed line and a yellow line appear. The thick red dashed line is the course to follow to get to the point. The yellow line is the shortest course from the current position to the go to point.
- The go to point is numbered "1" and the position where the [Go To] function starts is numbered "0".
- The arrival area marker appears if activated on the menu (see paragraph 5.9.5).
- The XTE lines, red for port side, green for starboard side, appear. You can show or hide these lines with [Display XTE Lines] on [Routes] of the main menu.

Note: If you want to be notified when you reach the go to point (the end of a route), turn on [End of Route Notification] on [Routes] of the main menu (see paragraph 5.9.9). Then the message "End of Route" appears when you reach the end of a route. For the arrival timing, see paragraph 5.9.5.

4.10.3 How to go to a point selected from the points list

1. Select [Lists] on the menu icon bar to open the lists menu.
2. Select [Points List] to open the points list.
3. Select [Name], [Color], [Icon] or [Range] in the [Sort by] area.
4. Select the point to go to then select [Goto].



5. Select [Close] to close the points list.

The following occurs:

- The go to point is highlighted.
- A thick red dashed line and a yellow line appear. The thick red dashed line is the course to follow to get to the point. The yellow line is the shortest course from the current position to the go to point.
- The go to point is numbered "1" and the position where the [Go To] function starts is numbered "0".
- The arrival area marker appears if activated on the menu (see paragraph 5.9.5).
- The XTE lines, red for port side, green for starboard side, appear. You can show or hide these lines with [Display XTE Lines] on [Routes] of the main menu.

Note: If you want to be notified when you reach the go to point (the end of a route), turn on [End of Route Notification] on [Routes] of the main menu (see paragraph 5.9.9). Then the message "End of Route" appears when you reach the end of a route. For the arrival timing, see paragraph 5.9.5.

4.10.4 How to display the point information for the active route

1. Select the yellow line to display the pop-up menu.
2. Select [Rte Detail]. The [Route Detail] window appears.

Route Detail					Close	
	ID	CTS/Speed	Dist/Total	TTG/Total		
	0	--- °M 6.8 kn	0 yd 0 yd	0'00s 0'00s		
	ID	CTS/Speed	Dist/Total	TTG/Total		
	1	61.1 °M 6.8 kn	4.622 NM 4.622 NM	38'55s 38'55s		

Points List
Routes List
Route Detail

CTS: Course To Steer, TTG: Time To Go

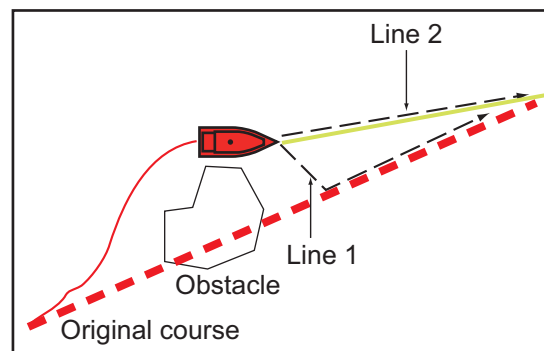
3. Select [Close] to close the route detail list.

4.11 How to Restart and Cancel Navigation to a Point

4.11.1 How to restart navigation to a point

When you go to a point, you can restart the navigation to the point from the current location.

When you steer to keep away from an obstruction or the ship drifts, you go off course as shown in Line 1 in the figure. If you do not need to return to the original course, you can go to the point from the current position as shown in Line 2 in the figure.



1. Select the red dashed line or the yellow line of the route to display the pop-up menu.
2. Select [Restart Nav.]. The route start position for the route moves to the current position.

4.11.2 How to cancel navigation to a point

1. Select the go to point, red dashed line or the yellow line of the route, to display the pop-up menu.
2. Select [Stop Nav.].

The red dashed line, yellow line, XTE lines and arrival area circle are erased from the screen.

5. ROUTES

5.1 What is a Route?

A route is a series of route points entered in the order to use for navigation. A route can contain up to a maximum of 500 route points, and this equipment stores 200 routes.

Note: When connecting NavNet 3D units on the LAN network, a route can contain up to a maximum of 100 route points.

You create a route by selecting geographical positions on the screen. These positions are marked with blue squares.

You can follow a route that you have created, with the [Go To] feature. When you follow a route, the current leg is shown as a red dashed line and the previous leg is shown as a light gray line.

The routes on the screen can be edited from the pop-up menu. With this pop-up menu, you can

- Insert route points in a route
- Move route points in a route
- Delete route points from a route
- Extend a route
- Split routes
- Find information about a route
- Delete a route
- Set a route as destination
- Follow a route in the reverse direction
- Ignore a route point when following a route

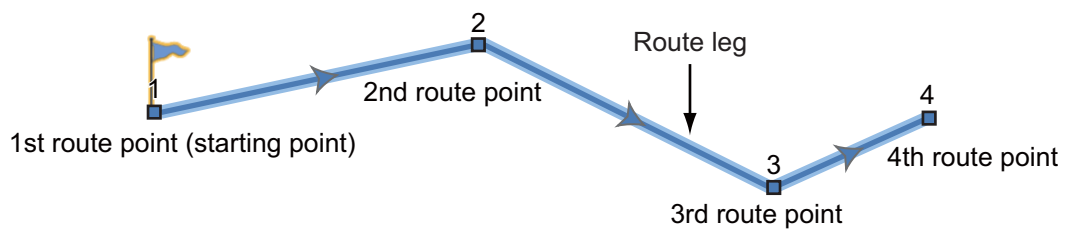
5.2 How to Create a Route

5.2.1 How to create a new route

1. Select the 1st route point for the route to display the pop-up menu.
2. Select [New Route]. The flag mark appears on the selected position.
3. Select the next route point in the route. A blue line with arrow runs between the previous route point and the next route point. The arrow points in the direction of route flow.

5. ROUTES

4. Select the next route point in the route.
Repeat this step to enter all route points. Each route point is numbered.



5. At the last route point, select [End Route] at the top right-hand corner of the screen to complete the route. The flag mark disappears and the following window appears.



The route is automatically named. The default route name is "RTE" plus the date (e.g. RTE 2012-03-01). Select [Save]. If necessary, select [Rename] to change the route name. The route is saved to the routes list.

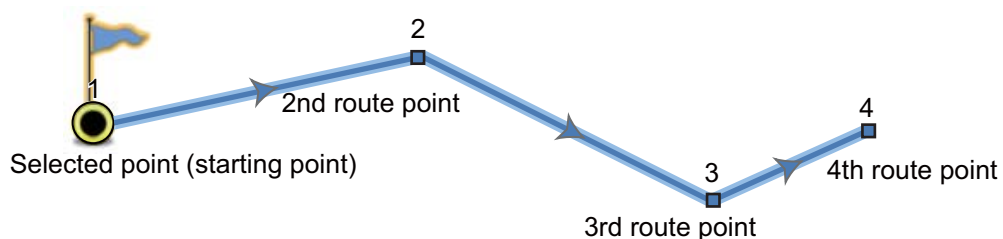
5.2.2 How to create a new route from a point

You can create a route from a point.

1. Select a point to display the pop-up menu.
2. Select [New Route]. The flag mark as below appears on the point.



3. Select the next route point in the route. A blue line with arrow runs between the previous point and the next route point. The arrow points in the direction of route flow.
4. Select the next route point in the route.
Repeat this step to enter all route points. Each route point is numbered.



- At the last route point, select [End Route] at the top right-hand corner of the screen to complete the route. The flag mark disappears and the following window appears.

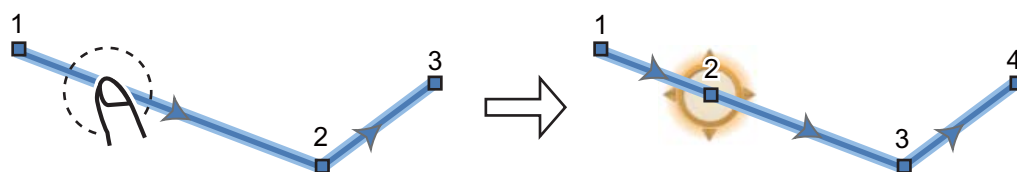


The route is automatically named. The default route name is “RTE” plus the date (e.g. RTE 2012-03-01). Select [Save]. If necessary, select [Rename] to change the route name. The route is saved to the routes list.

5.2.3 How to insert a route point on a route

You can insert a new route point on a route leg.

- Select a position on a route leg to insert a route point.
- Select [Insert] from the pop-up menu. The blue square marks the position selected and is highlighted. The route point is numbered according to its position in the route, and the succeeding route points are renumbered.

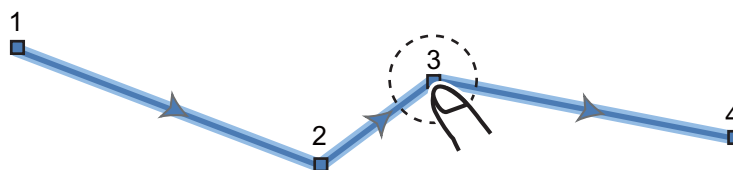


- Select [End Move] at the top right-hand corner of the screen.

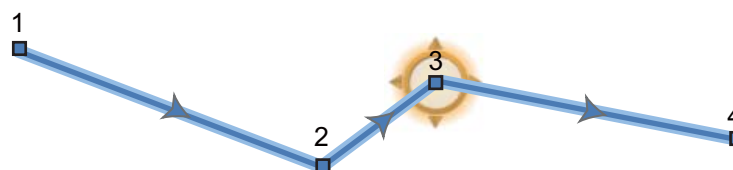
5.2.4 How to move a route point on a route

You can move a route point on a route.

- Select a route point on a route to display the pop-up menu.

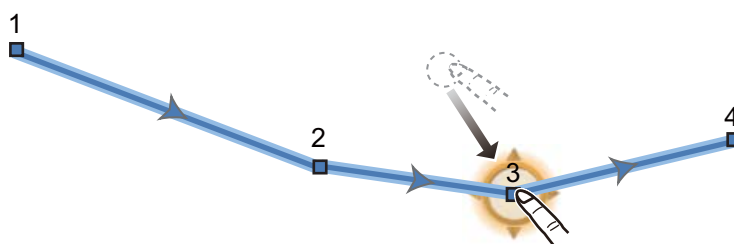


- Select [Move]. The selected route point is highlighted.



5. ROUTES

3. Move the route point to the new position by dragging the route point or tapping the new position.



4. Select [End Move] at the top right-hand corner of the screen.

5.2.5 How to delete a point or route point on a route

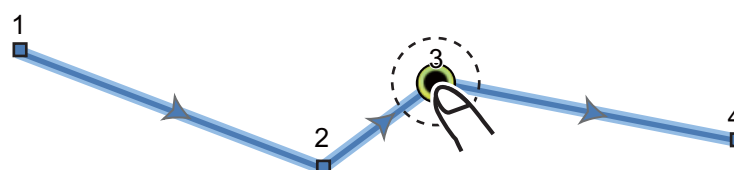
You can delete a point or route point on a route.

1. Select the point or route point to delete. The pop-up menu appears.
2. Select [Delete]. The selected point or route point is deleted, and the succeeding route points are renumbered.

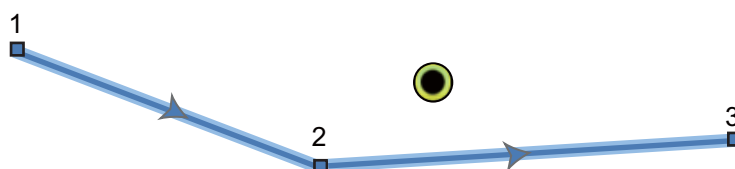
5.2.6 How to remove a point from a route

You can remove a point from a route.

1. Select the point to remove. The pop-up menu appears.



2. Select [Remove]. The selected point is removed from the route, and the succeeding route points are renumbered.



5.2.7 How to extend a route

You can extend a route from the last route point on the route.

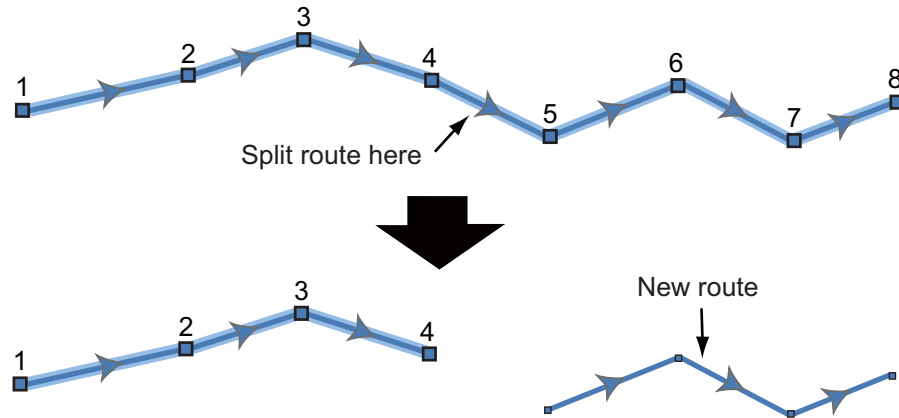
1. Select a route leg to display the pop-up menu.
2. Select [Extend].
3. Select a position. A blue line with arrow runs from the last route point to the selected position.
4. Repeat step 3 to enter more route points, if necessary.
5. At the last route point, select [End Route] at the top right-hand corner of the screen to complete the route and save the route to the routes list.

5.2.8 How to split a route

You can divide a route in two to make two routes.

1. Select the route leg where to divide the route. The pop-up menu appears.
2. Select [Split].

The selected route leg is deleted and the route is divided. The new route is given the new route name and saved to the routes list.



5.3 Routes List

The created routes are stored in the routes list, where you can edit or see the route data. The list stores the following route data for each route (the number for each item below has links to the number in the figure at step 3):

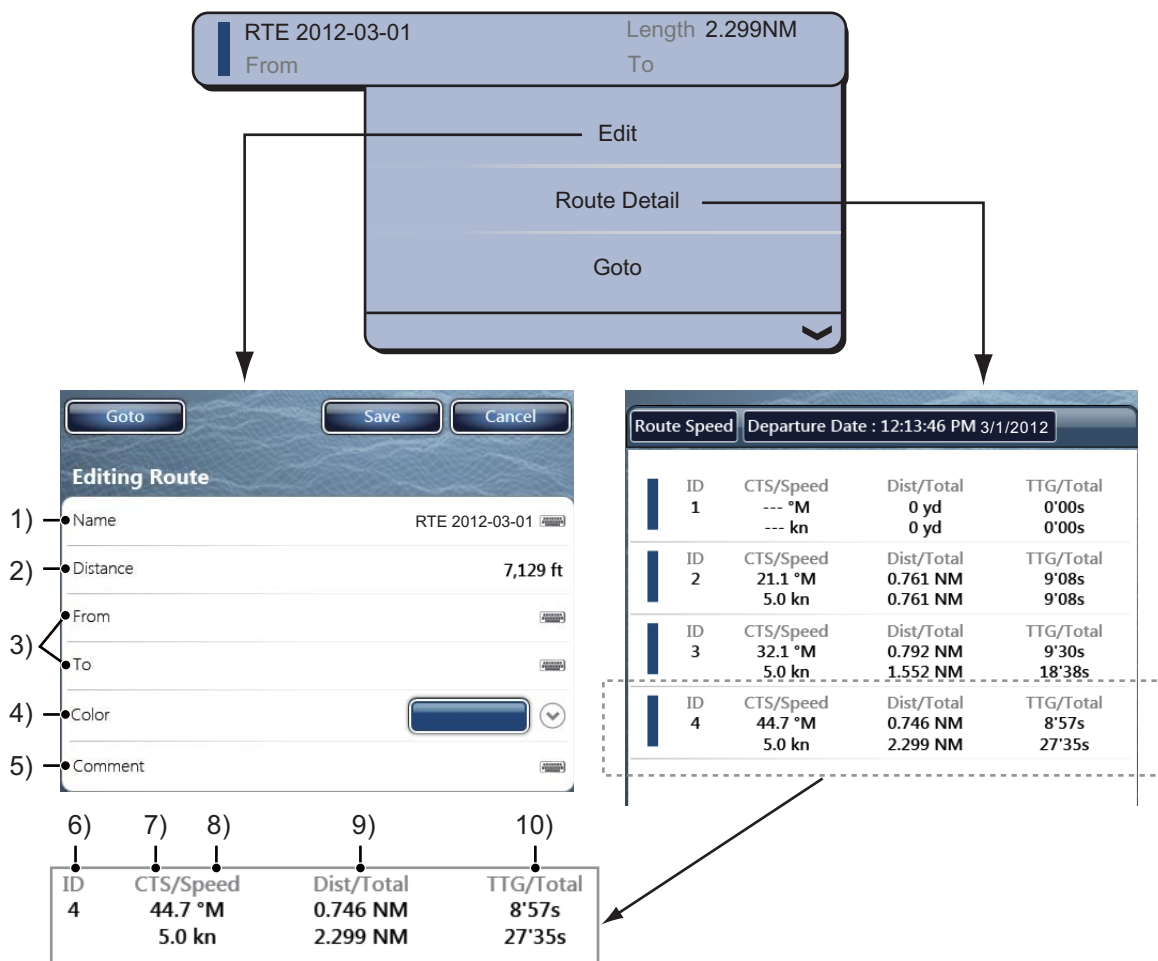
- 1) Name of a route
- 2) Length of a route
- 3) Names of starting route point and last route point (Enter them with the software keyboard.)
- 4) Color of a route
- 5) Comment for a route
- 6) Each number of each route point
- 7) Bearing to steer
- 8) Planning route speed (see section 5.11)
- 9) Distance between legs and total distance
- 10) TTG between legs and total TTG

To open the routes list:

1. Select [Lists] on the menu icon bar to open the lists menu.
2. Select [Routes List] to open the routes list.

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3. Select the route to view then select [Edit] or [Route Detail]. The route data appears.



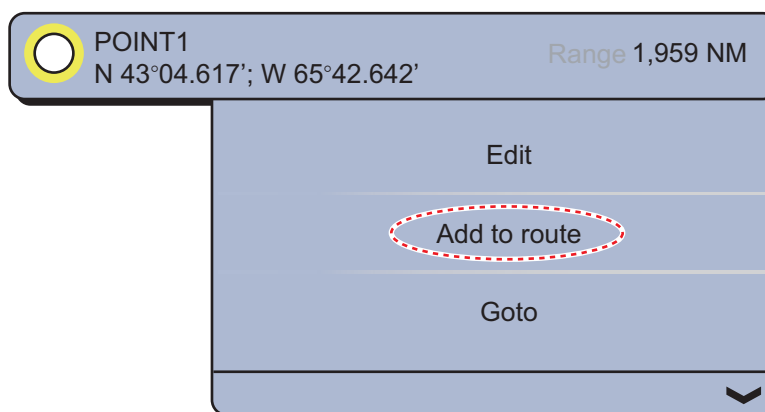
You can edit the route data in the [Editing Route] window. For detailed information of the editing procedures, refer to section 4.7.

You can open the routes list from the screen. Select a route to get route information. The pop-up menu appears. To open the routes list, select [Lists] then select [Routes List]. To open the [Route Detail] window, select [Rte Detail]. To open the [Editing Route] window, select [Edit].

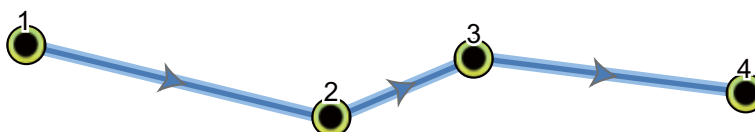
5.4 How to Join Points to Create a Route

You can join points which you have entered to create a route from the points list.

1. Select [Lists] on the menu icon bar to open the lists menu.
2. Select [Points List] to open the points list.
3. Select a point to add a route.



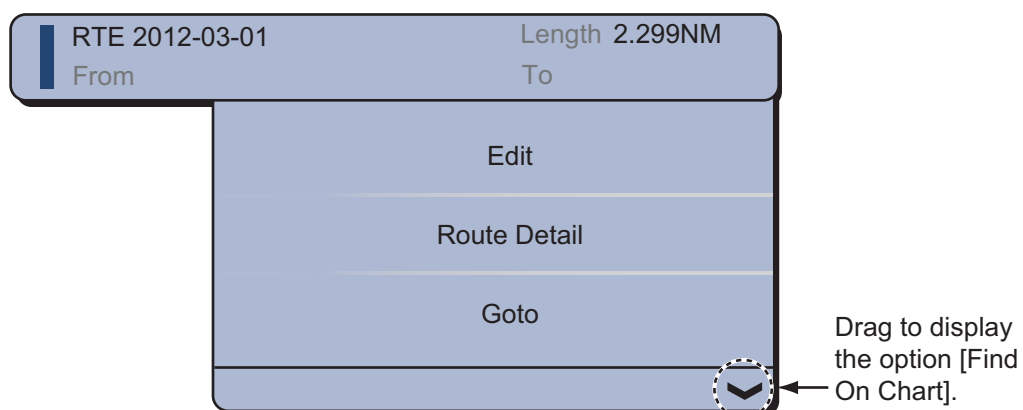
4. Select [Add to route].
5. Select the next point to add a route.
6. Select [Add to route].
7. Repeat these steps to add all points then select [Close]. The route is created and automatically named. Each point is numbered and the route is saved to the routes list.



5.5 How to Find a Route on the Chart

You can easily find the location of a route from [Routes List]. The selected route is put at the center of the active chart plotter display.

1. Select [Lists] on the menu icon bar to open the lists menu.
2. Select [Routes List] to open the routes list.
3. Select a route then select [Find On Chart] from the options. The menu closes then the selected route is displayed at the center of the chart plotter display.



5.6 How to Delete a Route

You can delete routes separately or together. An active route cannot be deleted.

5.6.1 How to delete a route on the screen

1. Select a route leg of a route to delete. The pop-up menu appears.
2. Select [Delete].

5.6.2 How to delete a route from the routes list

1. Select [Lists] on the menu icon bar to open the lists menu.
2. Select [Routes List] to open the routes list.
3. Select the route to delete then select [Delete] from the options. The route disappears from both the screen and the routes list.
4. Select [Close].

5.6.3 How to delete all routes

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Routes] - [Delete All Points & Routes] menu. The confirmation message appears.

Are you sure you want to delete all points and routes? Important : all Navnet TZT have to be connected for this operation.

Yes

No

3. Select [Yes].
4. Select [Close] to exit the menu.

5.7 How to Show or Hide All Routes

All routes can be shown or hidden. An active route cannot be hidden from the screen unless route following is stopped.

1. Select [Overlay] from the RotoKey menu.
2. To show all routes, select [Routes]. To hide all routes, deselect [Routes].

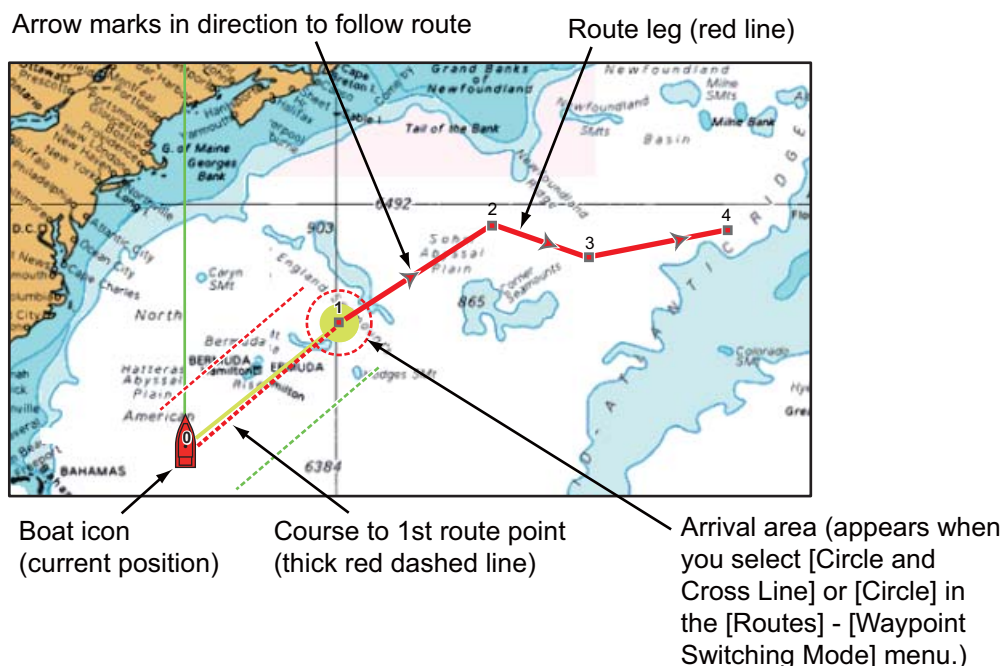
5.8 How to Follow a Route

Before you follow a route, make sure that the path to the route is clear. Make sure to zoom your chart to check for hazards that do not appear on a smaller scale.

5.8.1 How to follow an on-screen route

1. Select a route leg of the route to follow. The pop-up menu appears.

2. Select [Activate].



The following occurs:

- The line for the selected route turns red.
- The go to point (1st route point) is highlighted.
- A thick red dashed line and a yellow line run between the current position and the 1st route point of the selected route. The thick red dashed line is the course to follow to get to the 1st route point. The yellow line is the shortest course from the current position to the go to point.
- The go to point is numbered "1" and the position where the [Go To] function starts is numbered "0".
- The arrival area marker appears if activated on the menu (see paragraph 5.9.5).
- The XTE lines, red for port side, green for starboard side, appear. You can show or hide these lines with [Display XTE Lines] on [Routes] of the main menu.

Note: If you want to be notified when you reach a go to point, turn on [Waypoint Crossing Notification] on [Routes] of the main menu (see paragraph 5.9.8). Then the message "Waypoint Crossing" appears when you reach a go to point. For the arrival timing, see paragraph 5.9.5.

5.8.2 How to follow a route selected from the routes list

1. Select [Lists] on the menu icon bar to open the lists menu.
2. Select [Routes List] to open the routes list.
3. Select the route to follow then select [Goto] from the options.
4. Select [Close] to exit the menu.

The following occurs:

- The line for the selected route turns red.
- The go to point (1st route point) is highlighted.
- A thick red dashed line and a yellow line run between the current position and the 1st route point of the selected route. The thick red dashed line is the course to follow

5. ROUTES

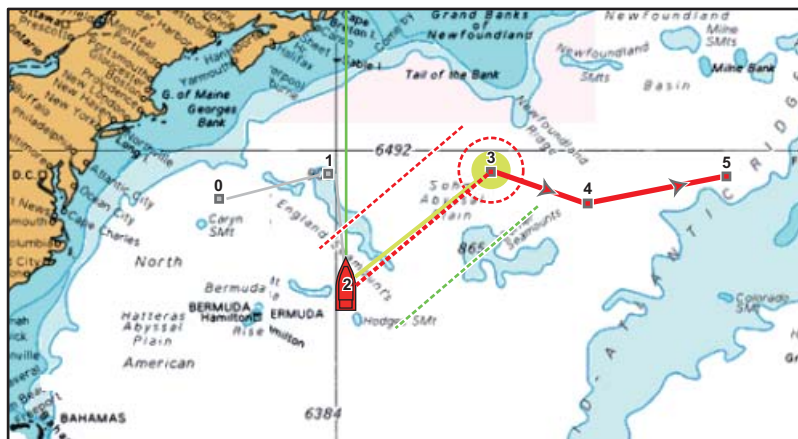
to get to the 1st route point. The yellow line is the shortest course from the current position to the go to point.

- The go to point is numbered "1" and the position where the [Go To] function starts is numbered "0".
- The arrival area marker appears if activated on the menu (see paragraph 5.9.5).
- The XTE lines, red for port side, green for starboard side, appear. You can show or hide these lines with [Display XTE Lines] on [Routes] of the main menu.

Note: If you want to be notified when you reach a go to point, turn on [Waypoint Crossing Notification] on [Routes] of the main menu (see paragraph 5.9.8). Then the message "Waypoint Crossing" appears when you reach a go to point. For the arrival timing, see paragraph 5.9.5.

5.8.3 How to start navigation from a route point

1. Select the route point of the route from where to start navigation. The pop-up menu appears.
2. Select [Activate From].



In the above example, the following occurs:

- The route point "3" is selected to start navigation from, and is highlighted.
- The current position is numbered "2" and the numbers of the previous route points decrease one by one.
- The line from "3" to the route point "5" for the selected route turns red and the legs for "0" and "1" turn gray.
- A thick red dashed line and a yellow line run between the current position "2" and the "3" route point. The thick red dashed line is the course to follow to get to the route point "3". The yellow line is the shortest course from the current position to the route point "3".
- The arrival area marker appears if activated on the menu (see paragraph 5.9.5).
- The XTE lines, red for port side, green for starboard side, appear. You can show or hide these lines with [Display XTE Lines] on [Routes] of the main menu.

Note: If you want to be notified when you reach a go to point, turn on [Waypoint Crossing Notification] on [Routes] of the main menu (see paragraph 5.9.8). Then the message "Waypoint Crossing" appears when you reach a go to point. For the arrival timing, see paragraph 5.9.5.

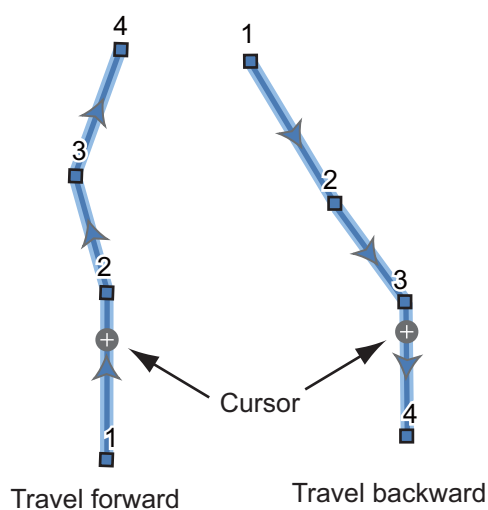
5.8.4 How to show the detailed information about a route

1. Select a route leg of the route to get the detailed information. The pop-up menu appears.
2. Select [Rte Detail]. The [Route Detail] window for the selected route opens (see section 5.3).

5.8.5 Flyover

The flyover feature lets you view an entire route from overhead, with the display automatically scrolled as the flyover progresses.

1. Select a route leg to display the pop-up menu.
2. Select [Fly Over]. The cursor travels back and forth between the first route point and the last route point on the selected route.



The picture rotates with the cursor movement and the cursor moves upward on the screen.

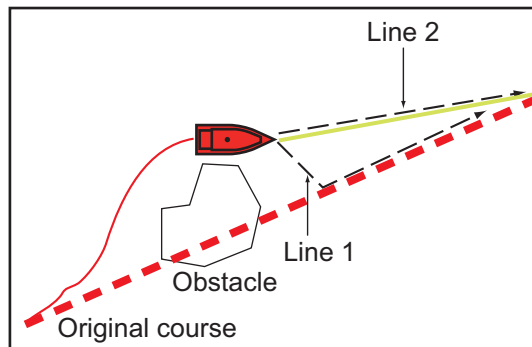
3. To stop the flyover feature, select [End Fly Over] at the top right-hand corner of the screen.

5.9 Operations When You Follow a Route

5.9.1 How to restart navigation

When you follow a route, you can restart the navigation to the next route point on the route from current location.

When you steer to keep away from an obstruction or the ship drifts, you go off course as shown in Line 1 in the figure. If you do not need to return to the original course, you can go to the route point from the current position as shown in Line 2 in the figure.



1. Select a route leg, the red dashed line or the yellow line of the route to display the pop-up menu.
2. Select [Restart Nav.]. The route start position for the route moves to the current position.

5.9.2 How to follow a route in the reverse direction

You can follow a route in reverse order. This helps you return along the same path.


Note: This function is not available for an active route.

1. Select a route leg to display the pop-up menu.
2. Select [Reverse]. The arrows on the route legs are in reverse direction and the numbers of the route points are in reverse order.

5.9.3 How to stop following a route

1. Select a route leg, a route point or a thick red dashed line on an active route to display the pop-up menu.
2. Select [Stop Nav.]. The arrival area, XTE lines, set course (thick red dashed line) and yellow line are erased from the screen. The red line for the route turns the default color you set.

5.9.4 How to skip a go to point on a route

There are times when you do not need to follow all legs in an active route. You can skip a go to point  (highlighted) as shown in the procedure below. After you select the go to point to skip, the skipped route leg turns from red to gray.

- **When you select the go to point of the active route**, select [Skip] from the pop-up menu. The selected go to point is skipped then the next route point is marked as the go to point.
- **When you select a route leg of the active route**, select [Skip Wpt] from the pop-up menu. The go to point on the route is skipped then the next route point is marked as the go to point.

5.9.5 Waypoint switching mode

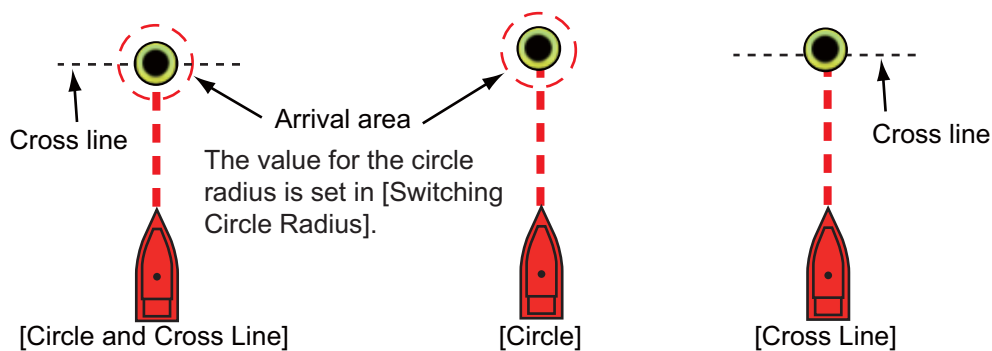
When you arrive to a route point, your unit automatically changes to the next route point according to the waypoint switching mode selected on the menu.

[Cross Line]: Change the waypoint when the ship moves through an imaginary cross line (vertical line) that passes through the center of the destination point.

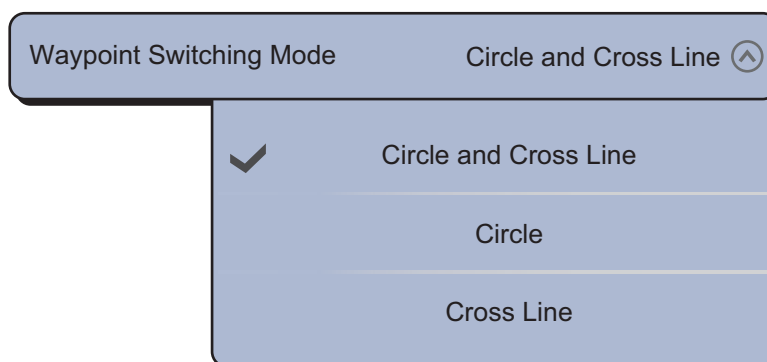
[Circle]: Change the waypoint when the ship comes within the circle.

[Circle and Cross Line]: Change the waypoint when one of the above two conditions is met.

A red dashed circle appears when you select [Circle and Cross Line] or [Circle].



1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Routes] - [Waypoint Switching Mode] menu.



3. Select [Circle and Cross Line], [Circle] or [Cross Line]. For [Circle and Cross Line] or [Circle], go to the next step. For [Cross Line], go to step 6.
4. Select [Switching Circle Radius] to display the software keyboard.
5. Set the arrival area (circle radius) then [Confirm].
6. Select [Close] to exit the menu.

5.9.6 Route auto zoom

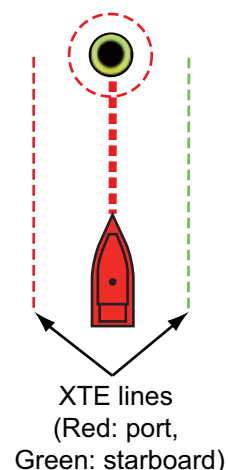
You can get automatic range change after you have moved past the go to point. Use this feature to find the next go to point in the route when the next go to point is not within the current display range.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Routes].
3. Select the [ON] icon in [Route Auto Zoom] to activate the route auto zoom, or the [OFF] icon to deactivate the route auto zoom.
4. Select [Close] to exit the menu.

5.9.7 XTE lines

The XTE line for port side is red, for starboard side it is green. You can show or hide these lines.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Routes].
3. Select the [ON] icon in [Display XTE Lines] to show the XTE lines, the [OFF] icon to hide the XTE lines. For [ON], go to the next step.
4. Select [XTE Value] to display the software keyboard.
5. Set the length of the XTE lines (the distance from your ship) to display then select [Confirm].
6. Select [Close] to exit the menu.



5.9.8 Waypoint arrival notification

The waypoint arrival notification feature releases audio and visual notifications when your ship reaches a go to point. For the arrival timing, see paragraph 5.9.5. The notification message "Waypoint Crossing" appears. Activate or deactivate this feature as follows.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Routes].
3. Select the [ON] icon in [Waypoint Crossing Notification] to activate this feature, the [OFF] icon to deactivate this feature.
4. Select [Close] to exit the menu.

5.9.9 End of route notification

The end of route notification feature releases audio and visual notifications when your ship reaches the end of a route. For the arrival timing, see paragraph 5.9.5. The notification message "End of Route" appears. Activate or deactivate this feature as follows.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Routes].
3. Select the [ON] icon in [End of Route Notification] to activate this feature, the [OFF] icon to deactivate this feature.
4. Select [Close] to exit the menu.

5.10 Fuel Level

You can display the fuel level on the screen. The fuel flow or fuel level data is required.

Fuel Max Range

You can display a pump icon on the route where it is predicted that the fuel supply will be exhausted. Select [Routes] of the main menu. Select the [ON] icon in [Fuel Max Range].

Fuel range ring

You can display a circle, within which you can navigate with the remaining fuel, around your ship. Select [Ship & Track] of the main menu. Select the [ON] icon in [Fuel Range Ring].

5.11 Routes Menu

This section provides descriptions for the menu items in [Routes] of the main menu not previously mentioned.

Default Route Color	<input type="button" value="Blue"/> <input type="button" value="v"/>
Route Thickness	2 <input type="button" value="v"/>
Ask to Enter Route Name	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>
Great Circle Navigation	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>
Fuel Max Range	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>
Maximum Dist. Between Waypoints	200.0 NM <input type="button" value="v"/>
Route Auto Zoom	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>
Waypoint Switching Mode	Circle and Cross Line <input type="button" value="v"/>
Switching Circle Radius	70 yd <input type="button" value="v"/>
Waypoint Crossing Notification	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>
End of Route Notification	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>
Intelligent Route Waypoint Centering	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>
Display XTE Lines	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>
XTE Value	100 yd <input type="button" value="v"/>
Default Planning Route Speed	5.0 kn <input type="button" value="v"/>
Delete All Point & Routes	<input type="button" value="Delete"/>
Reset Default Settings	<input type="button" value="Reset"/>

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[Default Route Color]: Select the color of the routes. The options are red, blue, green, yellow, magenta, orange, cyan, or black & white.

[Route Thickness]: Select the thickness of the routes.

[Ask to Enter Route Name]: Show or hide the window for the route name (see the illustration at step 5 in paragraph 5.2.1) when you create a new route.

[Great Circle Navigation]: Great circle is the shortest line that joins two points on the surface of the earth. Select the [ON] icon to automatically enter the waypoint with great circle line when you create the route.

[Maximum Dist. Between Waypoints]: Set the maximum distance between route points when [Great Circle Navigation] is [ON].

[Intelligent Route Waypoint Centering]: When you create a route, center a route point each time it is selected on the screen.

[Default Planning Route Speed]: Set the planning route speed (see section 5.3).

[Reset Default Settings]: Select this menu item to restore default settings for the [Routes] menu.

6. RADAR

This chapter provides the information necessary for radar operation.

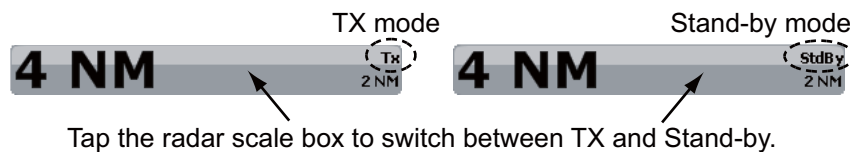
6.1 How to Transmit, Set the Radar in Stand-by, Tune

Transmission, stand-by

Press the **Home** key to show the display selection window then select the radar display. Push the **RotoKey**TM to show the RotoKey menu then select [Tx Radar] to transmit.

If you do not require the radar for some time, set the radar in stand-by to save the magnetron from unnecessary use. Push the **RotoKey**TM to show the RotoKey menu then deselect [Tx Radar] to set the radar in stand-by.

You can switch the radar between transmit and stand-by by tapping the radar scale box at the bottom left-hand corner of the screen.



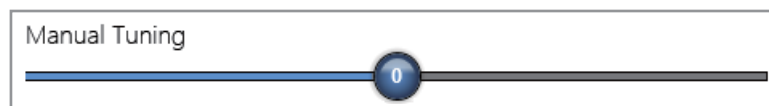
Tuning

In default, the radar receiver is tuned automatically after turning the radar to TX. If you require fine tuning, do the following to tune manually:

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Radar].
3. In default, the automatic tuning turns on. First turn off the automatic tuning. Select the [OFF] icon in [Auto Tuning].



4. Drag the circle icon in [Manual Tuning] to set the value.



5. Select [Close] to exit the menu.

6.2 How to Adjust the Gain

You can adjust the gain (sensitivity) of the radar receiver. The correct setting shows some background noise on the screen. If you do not use enough gain, weak echoes are erased. If you use more gain than necessary, the background noise hides both weak and strong targets.

Automatic gain adjustment

1. Select [Radar Adjust] from the RotoKey menu.
2. Select [Auto Gain].

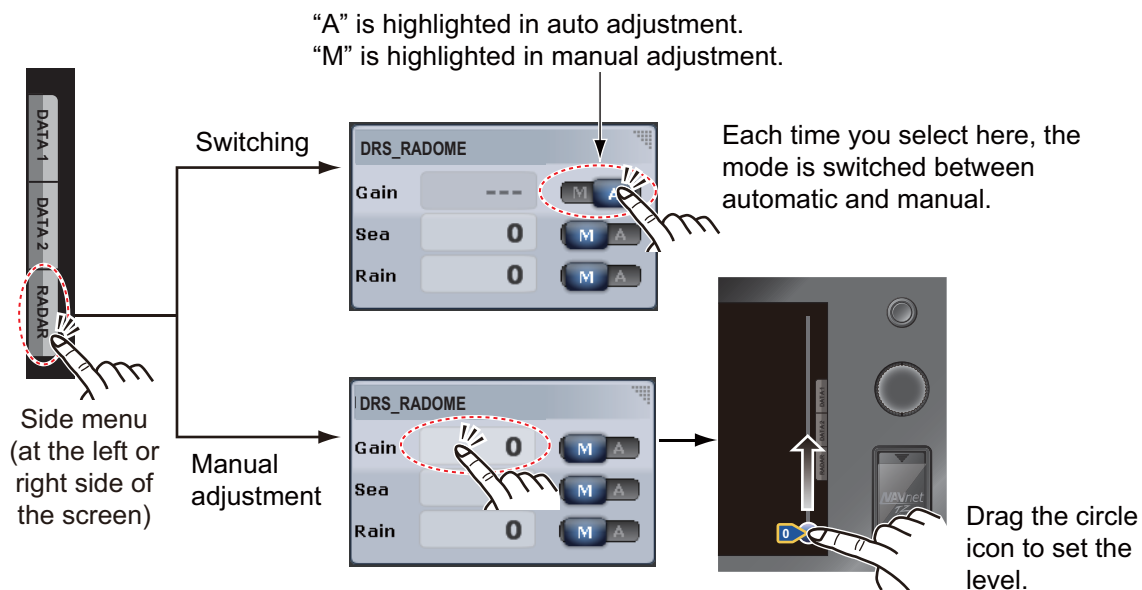
Manual gain adjustment

1. Select [Radar Adjust] from the RotoKey menu.
2. Select [Manual Gain].

Note: If [Auto Gain] is checked, first deselect [Auto Gain].
3. Drag the circle icon to set the level (see the figure below).

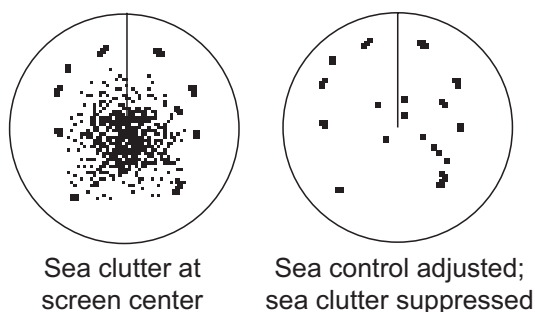
[RADAR] side menu

You can switch the method of the gain adjustment between automatic and manual with the [RADAR] side menu at the left or right side of the screen. You can also manually adjust the gain from this side menu.



6.3 How to Reduce the Sea Clutter

The reflected echoes from waves appear at the central part of the screen and have the name "sea clutter". The sea clutter increases in width as the height of waves and the height of the antenna above the water increase. If the sea clutter is strong, targets can be hidden inside the clutter, like in the left-hand figure shown below.



When the sea clutter hides targets, adjust the sea control (automatically or manually) to reduce the clutter. After the sea clutter is gone, turn off the sea control to prevent the loss of targets.

Automatic sea clutter adjustment

1. Select [Radar Adjust] from the RotoKey menu.
2. Select [Auto Sea].

For automatic sea clutter suppression, there are two methods: [Advanced] and [Coastal]. [Advanced] provides for standard suppression of sea clutter and is intended for normal use. [Coastal] suppresses sea clutter further than does [Advanced] and paints land and target echoes thicker. Use [Coastal] when you are cruising along a coastline. To select an automatic sea clutter suppression method, select [Auto Sea Mode] from the RotoKey menu followed by [Advanced] or [Coastal].

Manual sea clutter adjustment

1. Select [Radar Adjust] from the RotoKey menu.
2. Select [Manual Sea].

Note: If [Auto Sea] is checked, first deselect [Auto Sea].
3. Drag the circle icon to set the level.

You can switch the method of the sea clutter adjustment between automatic and manual with the [RADAR] side menu at the left side of the screen. You can also adjust the sea clutter from this side menu (see "[RADAR] side menu" in section 6.2).

6.4 How to Reduce the Rain Clutter

When your ship is in or near rain or snow, the reflections from the rain or snow appear on the screen. These reflections have the name “rain clutter”. When the rain clutter is strong, targets in or near the rain clutter are hidden in the clutter. Reflections from the rain clutter are easily identified from true targets by their wool-like appearance.

The rain control breaks the continuous display of rain or snow reflections into a random pattern. The rain control also helps to reduce the target clutter in good weather in busy harbors.

When the rain clutter hides targets, adjust the rain control (automatic or manual) to reduce the clutter. After the rain clutter is gone, turn off the rain control to prevent the loss of targets.

Automatic rain clutter adjustment

1. Select [Radar Adjust] from the RotoKey menu.
2. Select [Auto Rain].

Manual rain clutter adjustment

1. Select [Radar Adjust] from the RotoKey menu.
2. Select [Manual Rain].

Note: If [Auto Rain] is checked, first deselect [Auto Rain].

3. Drag the circle icon to set the level.

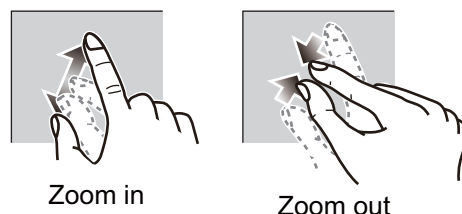
You can switch the method of the rain clutter adjustment between automatic and manual with the [RADAR] side menu at the left side of the screen. You can also adjust the rain clutter from this side menu (see “[RADAR] side menu” in section 6.2).

6.5 Range Scale

The range setting controls the size of the area (in nautical miles, kilometers or statute miles) that appears on your screen. The range and range ring interval appear at the bottom left-hand corner of the screen.



Zoom in to decrease the range, or zoom out to increase the range.



You can also change the range by rotating the **RotoKey™**.

6.6 Orientation Mode

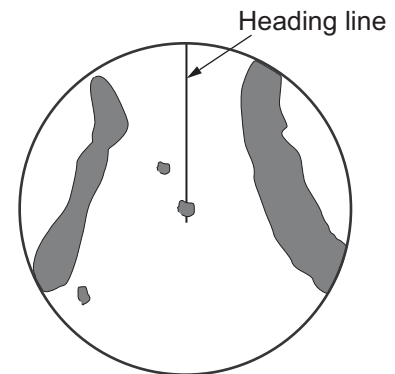
The orientation mode controls the relationship between your ship and all the other targets.

The heading data is required in the north-up mode. When the heading data is lost, the orientation mode automatically goes to head-up. Restore the compass signal to show the heading indication. Select the orientation mode again if necessary.

To select an orientation mode, select [Orientation] from the RotoKey menu then select [Head Up] or [North Up]. (You can also select an orientation mode with the Radar pop-up menu.)

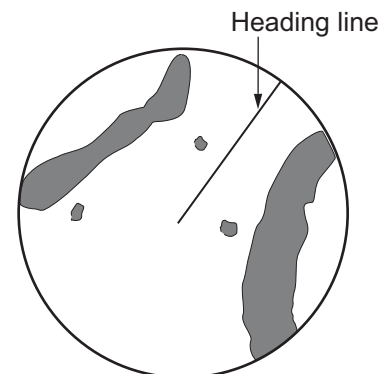
Head-up

A display without azimuth stabilization in which the line that connects the center with the top of the screen indicates your heading. Targets are shown at their measured distances and in their directions relative to your heading.



North-up

Targets are shown at their measured distances and their true (compass) directions from your ship. North is at the top of the screen. The heading line changes its direction according to your heading.



6.7 How to Measure the Range and Bearing from Your Ship to a Target

You can measure the range or bearing to a target by the following four methods.

	Range measurement	Bearing measurement
Fixed range rings	Yes	No
Ruler	Yes	Yes
VRM (Variable Range Marker)	Yes	No
EBL (Electronic Bearing Line)	No	Yes

6.7.1 How to display the range rings

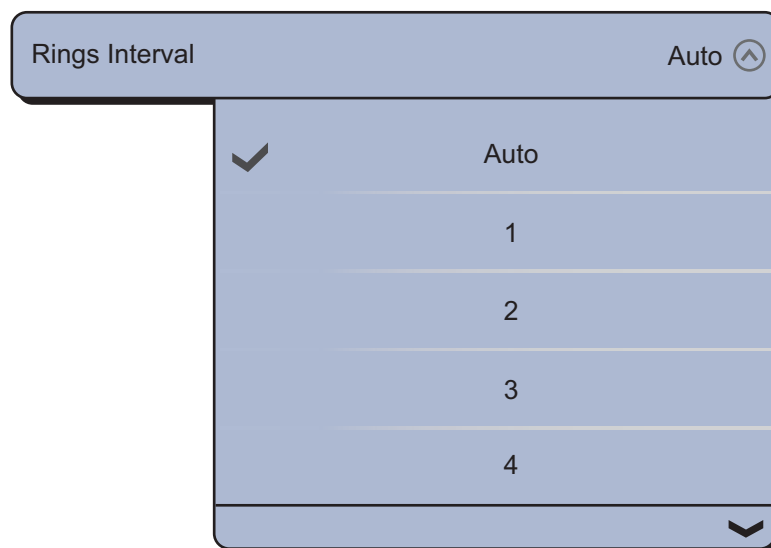
Use the fixed range rings to get a rough estimate of the range to a target. These rings are the concentric solid circles about your ship.

To display the range rings, select [Rings] from the RotoKey menu. To hide the range rings, deselect [Rings].

The interval is displayed at the bottom left-hand corner of the screen. To measure the range with the range rings, count the number of rings between the center of the screen and the target. Check the range ring interval and estimate the distance of the echo from the inner edge of the nearest ring.

6.7.2 How to set the number of the range rings

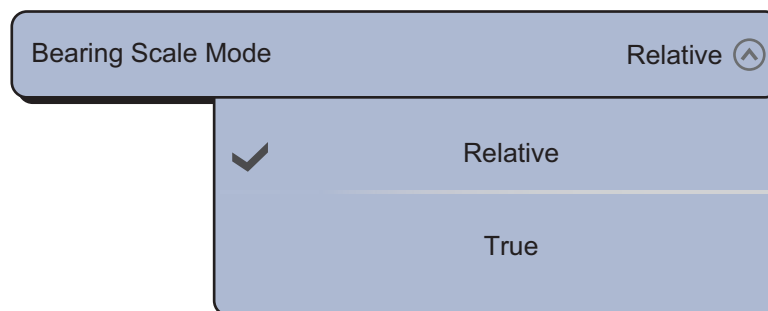
1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Radar] - [Rings Interval] menu.

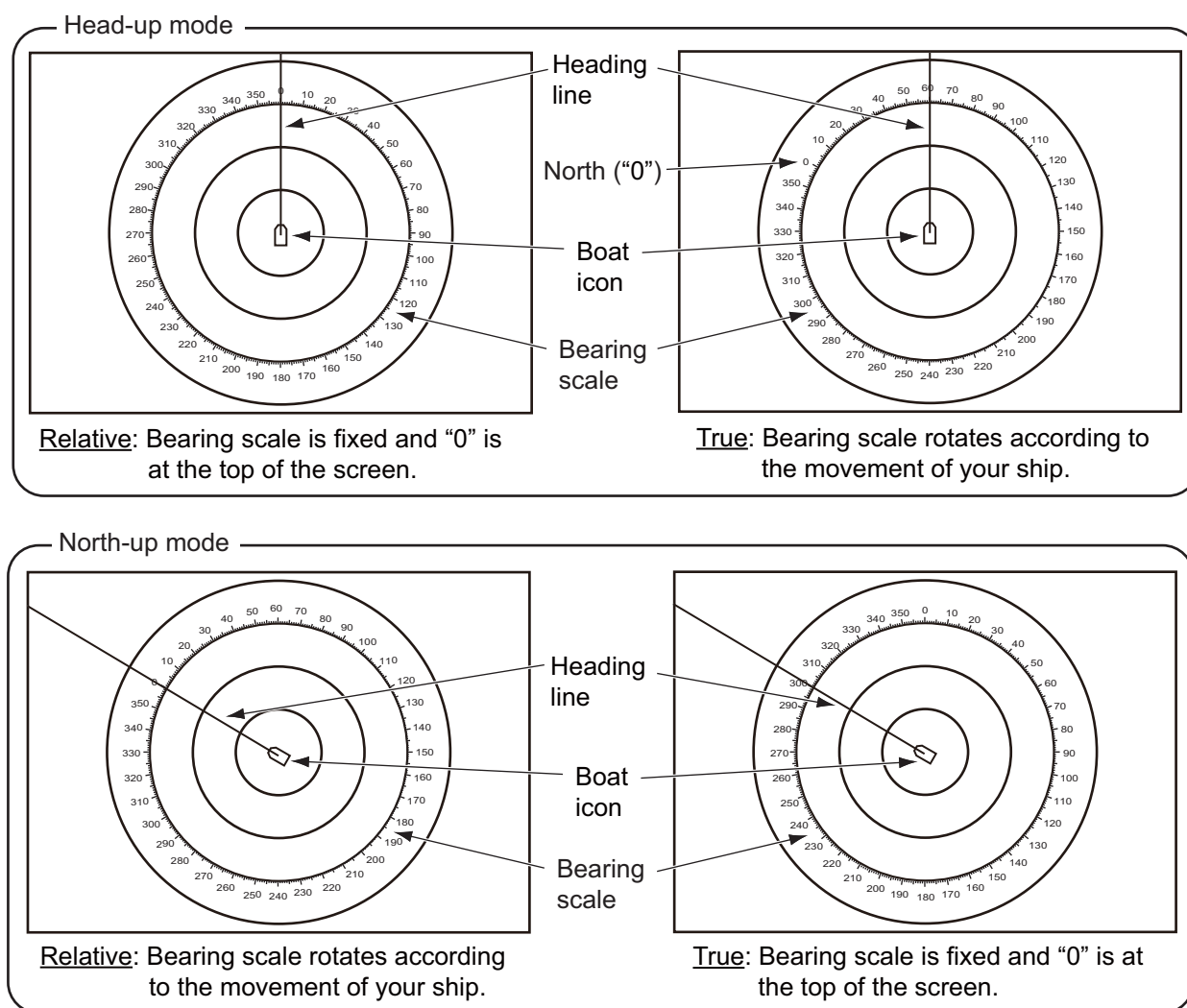


3. Select the number. [Auto] automatically selects the number of rings according to the range scale.
4. Select [Close] to exit the menu.

6.7.3 How to select the range rings mode

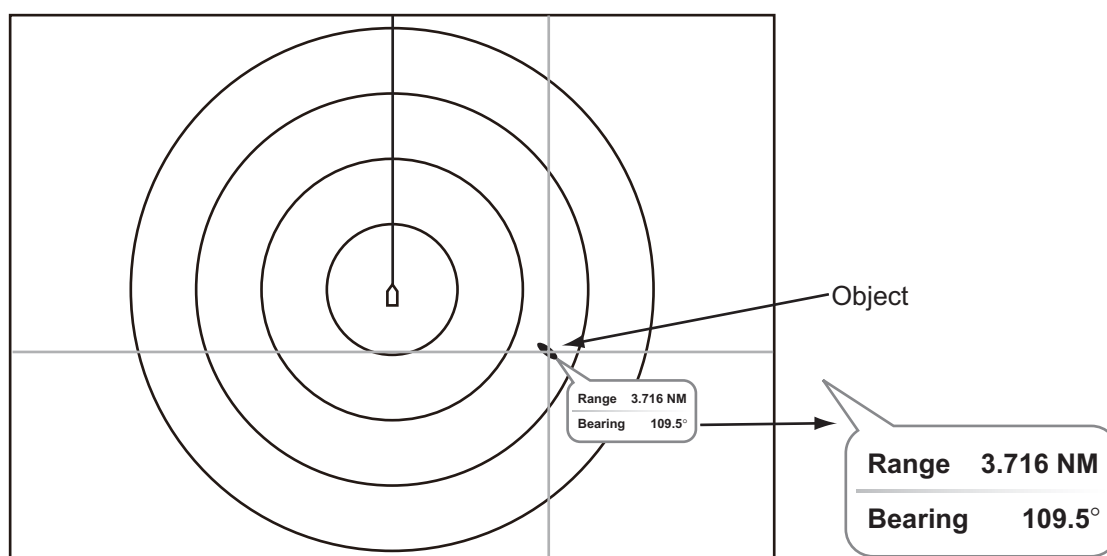
To select the range rings mode, select the [Radar] - [Bearing Scale Mode] menu of the main menu then select [Relative] or [True].





6.7.4 How to measure the range and bearing with the ruler

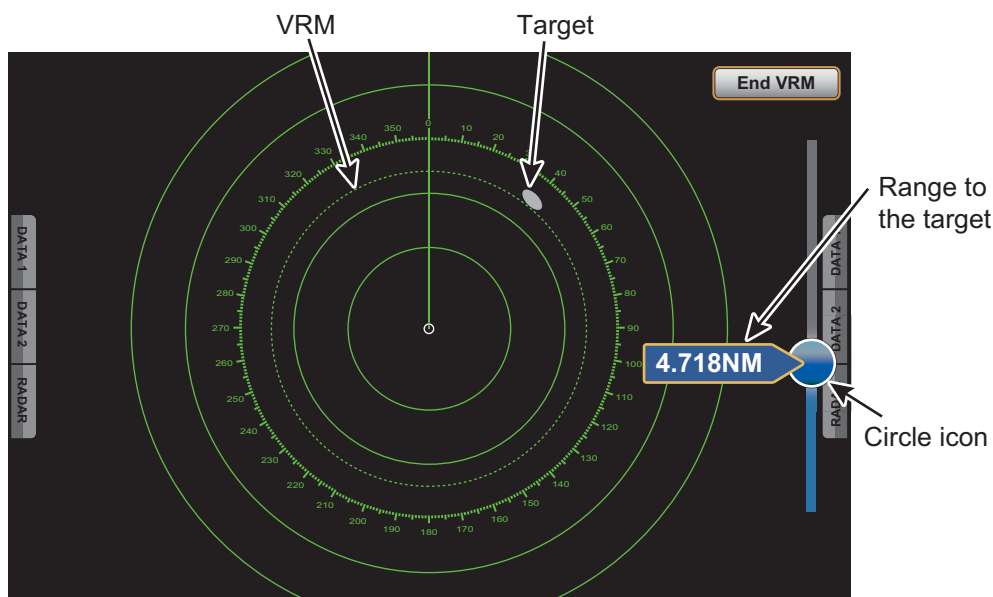
Select an object to get the range and bearing. Read the range and bearing in the box.



6.7.5 How to measure the range with the VRM

The VRM is a dashed ring so that you can identify the ring from the fixed range rings.

1. Select [VRM] from the RotoKey menu.
2. Select [Adjust].



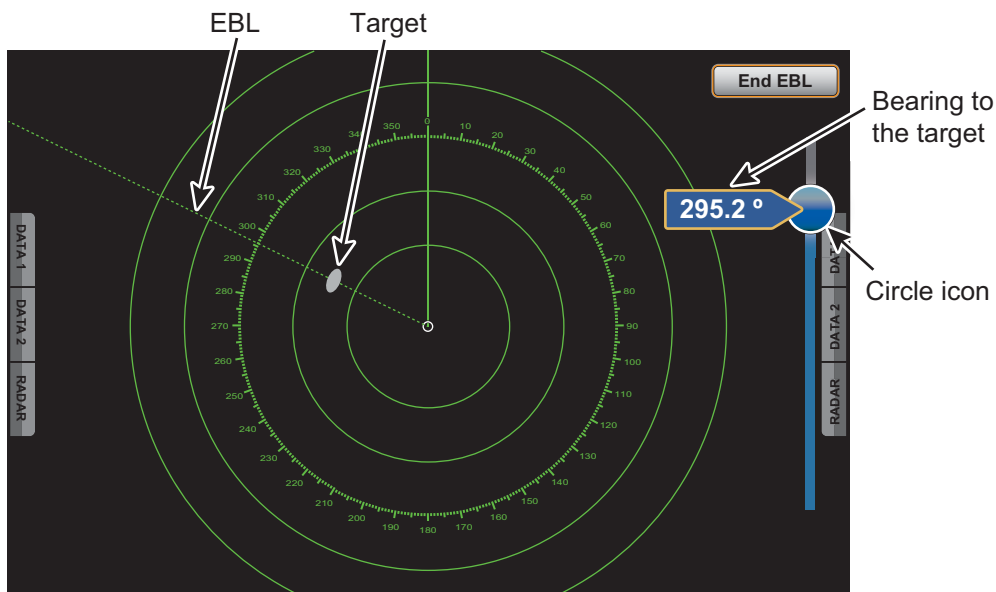
3. Drag the circle icon to put the VRM on the inner edge of the target. Read the range to the target at the left side of the circle icon.
4. Select [End VRM] at the top right-hand corner of the screen to erase the slider bar. To delete the VRM, select [VRM] - [Clear] from the RotoKey menu.

You can operate the VRM from a pop-up menu.

6.7.6 How to measure the bearing with the EBL

The EBL is a straight dashed line from the center of the screen to the edge.

1. Select [EBL] from the RotoKey menu.
2. Select [Adjust].



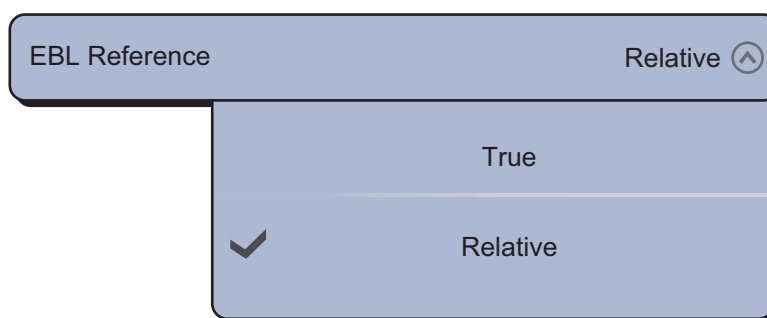
3. Drag the circle icon to put the EBL on the center of the target. Read the bearing to the target at the left side of the circle icon.
4. Select [End EBL] at the top right-hand corner of the screen to erase the slider bar. To delete the EBL, select [EBL] - [Clear] from the RotoKey menu.

You can operate the EBL from a pop-up menu.

6.7.7 How to select the EBL reference

You can select the EBL reference from [True] or [Relative]. [True] means the bearing is in reference to the north. [Relative] means the bearing is relative to the heading of your ship. True bearing requires a heading sensor.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Radar] - [EBL Reference] menu.

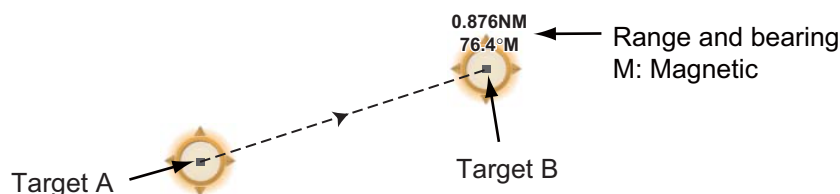


3. Select [True] or [Relative].
4. Select [Close] to exit the menu.

6.8 How to Measure the Range and Bearing Between Two Targets

You can measure the range and bearing between any two targets with the [Measure] menu.

1. Select the center of the target A to display the pop-up menu.
2. Select [Measure].
3. Select the center of the target B. A dashed line runs between the target A and the target B. The range and bearing between the targets A and B are shown.

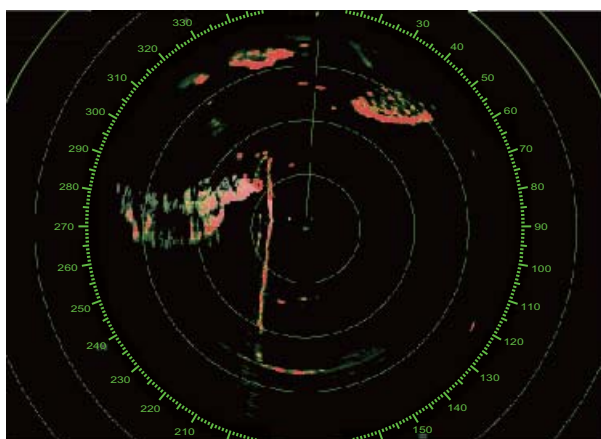


4. Select [Cancel Ruler] at the top right-hand corner of the screen to erase the indication.

6.9 How to Off-center the Picture

You can off-center your position to expand the view field without selecting a larger range scale. The position can be off-centered in the bow, stern, port or starboard direction, but not more than 75% of the range in use.

Pan the radar display by dragging with a finger. To return your ship to the center of the screen, select [Center Radar] at the top right-hand corner of the screen.



Normal picture



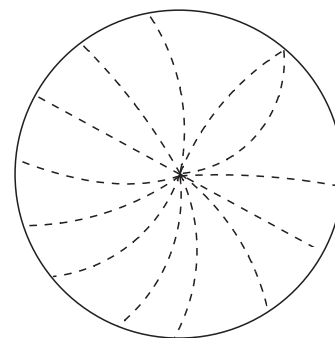
Picture off-centered in stern direction

6.10 Heading Line

The heading line indicates your heading in all orientation modes. This line connects between your position to the outer edge of the radar display. The line is at zero degrees on the bearing scale in the head-up mode. The orientation of the line changes in the north-up mode with the movement of your ship. If it is hard to identify the echoes on the heading line, you can hide the heading line and range rings for a few seconds. Select [Hdg Ln Off] from the RotoKey menu to activate this function.

6.11 How to Reduce Radar Interference

Radar interference can occur when your ship is near the radar of another ship that operates on the same frequency band with your radar. The interference shows on the screen in many bright dots. The dots can be random or in the shape of dotted lines that run from the center to the edge of the screen. You can identify the interference from the normal echoes, because the interference does not appear in the same location at the next rotation of the antenna.



Turn off the interference rejector when there is no interference to prevent the loss of weak targets.

1. Select [Radar Filters] from the RotoKey menu.
2. Select [Int Reject].

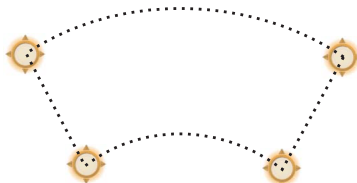
To deactivate the interference rejector, deselect [Int Reject] at step 2.

6.12 Guard Zone

The purpose of the guard zone is to provide audio and visual warnings against targets (ships, islands, landmasses, etc.) that enter the area you set.

6.12.1 How to set the guard zone

1. Select [Guard Zone] from the RotoKey menu.
2. Select [Visible]. The guard zone with dotted lines appears on the screen.
3. Select [Guard Zone] from the RotoKey menu.
4. Select [Resize]. Four circles appear at the four corners of the guard zone.



5. Move the circles to set the guard zone.
Note: To set a 360-degree guard zone, set the same bearing for all four circles.
6. Select [End Resize] at the top right-hand corner of the screen. Four circles disappear.

6.12.2 How to activate or deactivate the guard zone

1. Select [Guard Zone] from the RotoKey menu.
2. Select [Alarm]. The dotted lines for the guard zone turn to solid lines.

If a target enters the zone, the alarm sounds. The audio alarm continues until the target leaves the guard zone or the guard alarm is deactivated. To deactivate the guard zone, deselect [Alarm] at step 2.

You can mute the audio alarm by selecting [Off] in the [Alarm] - [Alarm Sound] menu of the main menu (paragraph 2.10.6).

6.12.3 How to hide the guard zone

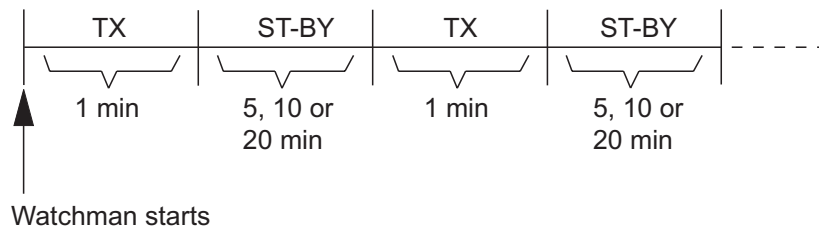
1. Select [Guard Zone] from the RotoKey menu.
2. Deselect [Visible]. The guard zone disappears from the screen.
Note: This operation is available when the guard zone is deactivated.

6.12.4 Guard zone menus

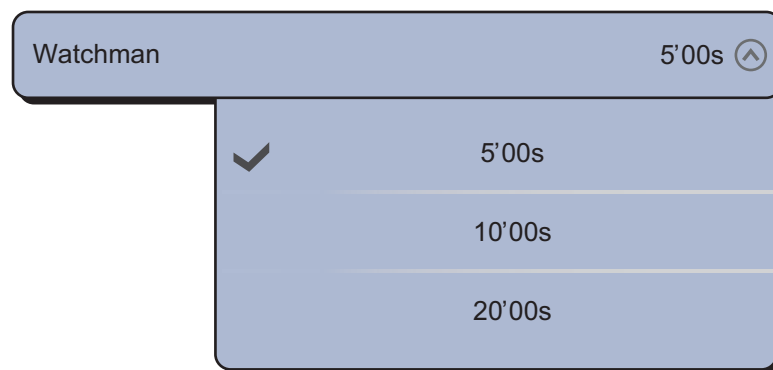
There are four sub menus in [Guard Zone]; [Visible], [Alarm], [Auto Acquire] (see paragraph 6.25.3) and [Resize]. When the guard zone is visible, you can select these sub menus from both the RotoKey menu and pop-up menu. To display the pop-up menu, select anywhere on the lines of the guard zone.

6.13 Watchman

The watchman feature transmits the radar for one minute at a specified time interval (5, 10 or 20 minutes) to monitor the guard zone. If a target is found in the guard zone, the watchman is cancelled and the radar continues to transmit. This feature helps you watch for targets in the area you set when you do not continuously require the radar.



1. Set a guard zone. See section 6.12. (Watchman does not operate unless a guard zone is active. You can set Watchman when the radar is in transmit state.)
2. Select [Menu] on the menu icon bar to open the main menu.
3. Select the [Radar] - [Watchman] menu.



4. Select a watchman rest interval.
5. Select [Close] to exit the menu.
6. Select [Watchman] from the RotoKey menu to activate the watchman function.

6.14 Echo Trails

Echo trails show the movements of radar targets relative or true to your ship in imitation afterglow. This function helps alert you to possible collision conditions.

6.14.1 How to show or hide echo trails

To show the echo trails, select [Echo Trail] from the RotoKey menu. To hide the echo trails, deselect [Echo Trail].

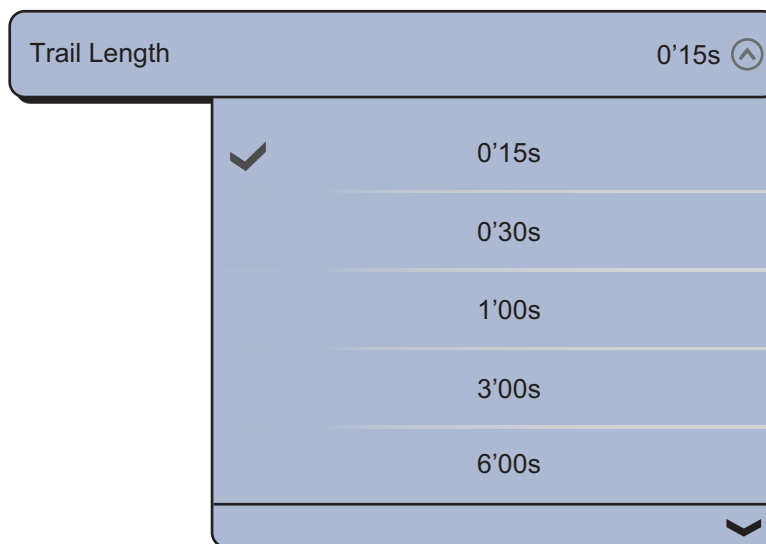
6.14.2 How to clear echo trails to restart new echo trails

Select [Clear Trail] from the RotoKey menu to clear echo trails and restart with new echo trails.

6.14.3 Echo trail time

You can set the trail time. Trails are shown on the screen until the end of the selected trail time then the trails are erased and restarted.

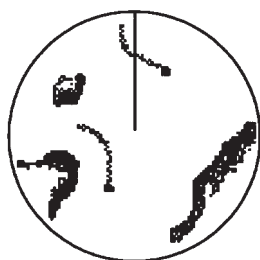
1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Radar] - [Trail Length] menu.



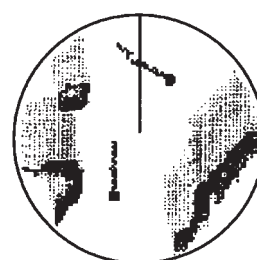
3. Select a time interval.
4. Select [Close] to exit the menu.

6.14.4 Echo trail mode (reference)

Trail movement can be set for relative or true. The relative trails show the relative movements between targets and your ship. True motion trails show the movements of targets according to the targets over-the-ground speeds and courses. True trails require position and heading information.

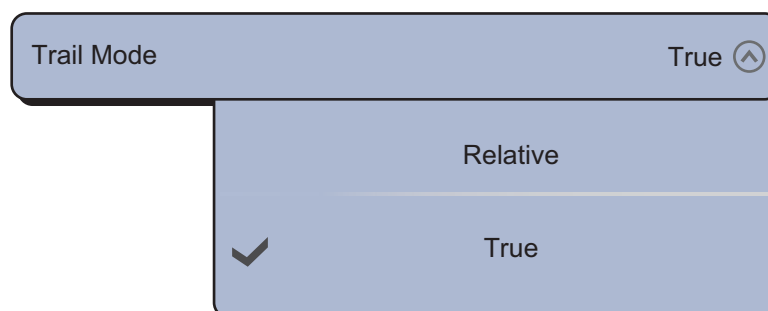


(a) True target trials
(No smearing of stationary targets)



(b) Relative target trials
(Targets moving relative to your ship)

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Radar] - [Trail Mode] menu.



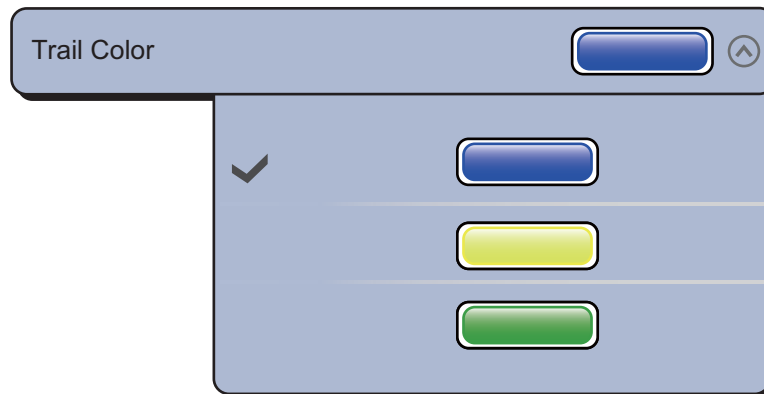
6. RADAR

3. Select [Relative] or [True].
4. Select [Close] to exit the menu.

6.14.5 Echo trail color

Trail color can be selected to blue, yellow or green.

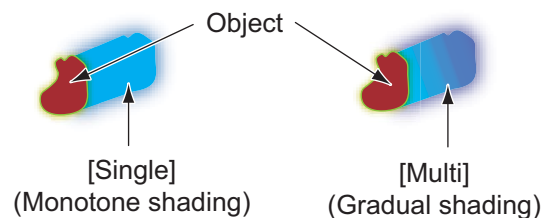
1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Radar] - [Trail Color] menu.



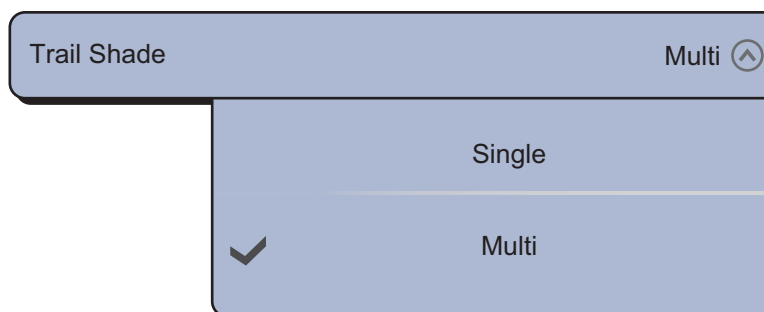
3. Select a color desired.
4. Select [Close] to exit the menu.

6.14.6 Echo trail shading

The echo trail can be shown in gradual shading or monotone (single shade). The figure below is an example when you select blue in the [Radar] - [Trail Color] menu.



1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Radar] - [Trail Shade] menu.



3. Select [Single] or [Multi].
4. Select [Close] to exit the menu.

6.15 Echo Stretch

The radar adjusts the reflected echoes from long-range targets, but the echoes are normally displayed weak and small. If you have a weak, long-range target that requires closer inspection, use the echo stretch to magnify the target.

This function magnifies the targets and sea clutter and radar interference. For this reason, correctly adjust the sea clutter and radar interference before you activate the echo stretch.

1. Select [Radar Filters] from the RotoKey menu.
2. Select [Stretch].

To deactivate the echo stretch, deselect [Stretch] at step 2.

6.16 Echo Average

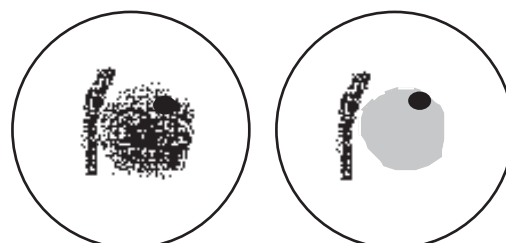
The echo average feature effectively suppresses sea clutter. Echoes received from stable targets such as ships appear on the screen at almost the same position during every rotation of the antenna. On the other hand, unstable echoes such as sea clutter appear at random positions.

To distinguish real target echoes from sea clutter, echo average performs scan-to-scan correlation. Correlation is made by storing and averaging echo signals over successive picture frames. If an echo is solid and stable, it is presented in its normal intensity. The sea clutter is averaged over successive scans resulting in the reduced brilliance, making it easier to discriminate real targets from the sea clutter.

To properly use the echo average function, first suppress the sea clutter.

1. Select [Radar Filters] from the RotoKey menu.
2. Select [Average].

To deactivate the echo average, deselect [Average] at step 2.



a) Echo average OFF

b) Echo average ON

6.17 Sweep Fade

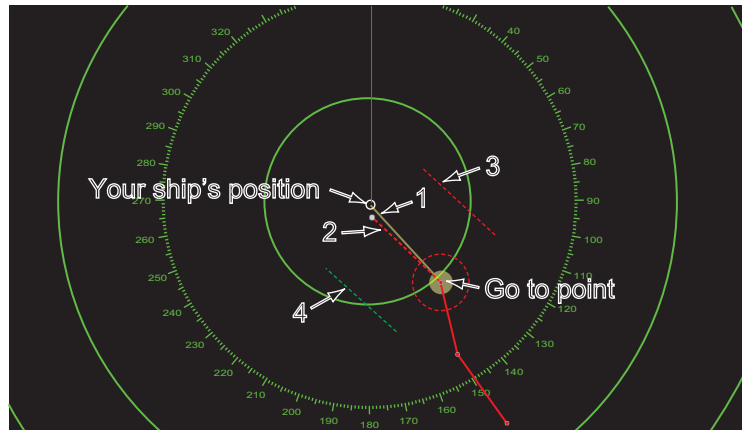
The sweep fade feature automatically reduces the brilliance of weak signals (noise, sea clutter, rain clutter, etc.) and unnecessary echoes like radar interference to clear the picture. Use the sweep fade when unnecessary echoes cannot be reduced by other methods.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Radar].
3. Select the [ON] icon to activate the sweep fade, the [OFF] icon to deactivate the sweep fade in [Sweep Fade].
4. Select [Close] to exit the menu.

6.18 How to Show, Hide or Cancel an Active Route

You can show or hide the active route from the radar display. To show the active route, select [Active Rte] from the RotoKey menu. To hide the active route, deselect [Active Rte].

To cancel route navigation, select the go to point, boat icon or any of the lines (no. 1 to 4 in the figure below) which appear when [Active Rte] turns on, then select [Stop Nav.] from the pop-up menu.



6.19 How to Show or Hide the Boat Icon

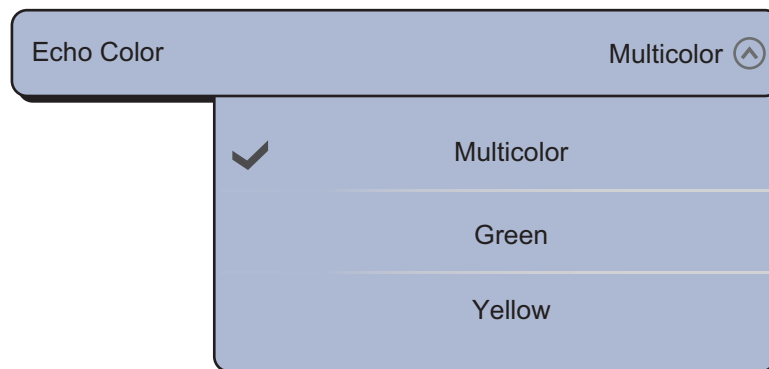
You can show or hide the boat icon on the radar display.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Radar].
3. Select the [ON] icon to show the boat icon, the [OFF] icon to hide the boat icon in [Own Ship Icon].
4. Select [Close] to exit the menu.

6.20 Echo Color

Echo color is available in colors of green, yellow or multicolor.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Radar] - [Echo Color] menu.

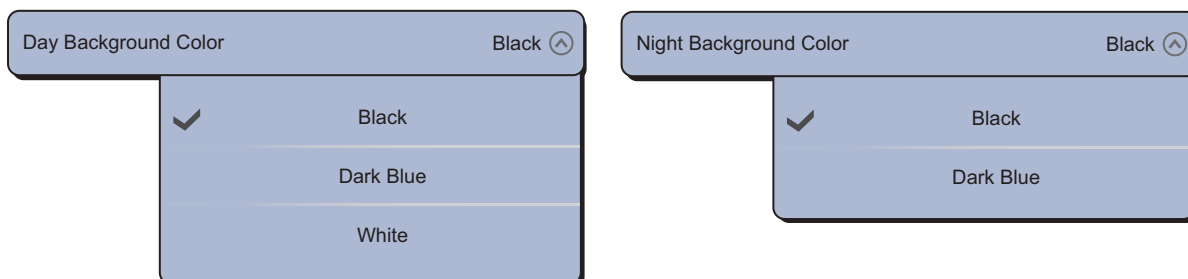


3. Select a color.
4. Select [Close] to exit the menu.

6.21 Background Color

You can select the background color for daytime and nighttime operations.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Radar] - [Day Background Color] or [Night Background Color] menu.



3. Select [Black], [Dark Blue] or [White] (only for daytime).
4. Select [Close] to exit the menu.

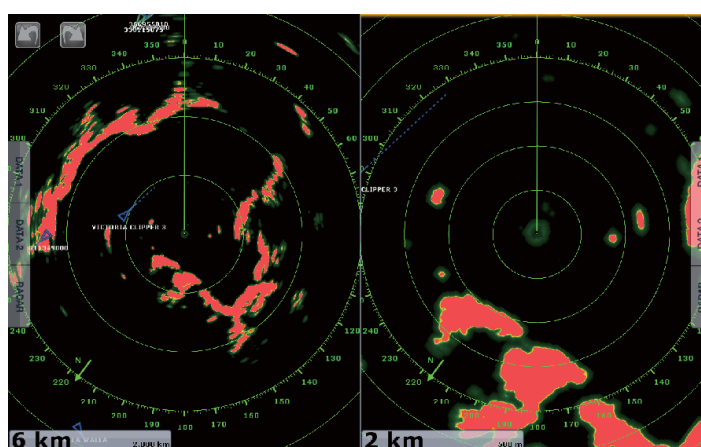
6.22 Radar Overlay Range Link

The radar overlay range link automatically keeps the chart scale and radar range in sync. This feature helps you understand the relation between the radar and the chart. You can activate or deactivate this feature from [Plotter Display]. See paragraph 3.2.3.

Note: The radar picture can look “out of focus” on long ranges when the range link is active. This out of focus appearance does not indicate a problem, because it is a characteristic of the digital zoom.

6.23 Dual-Range Display

The dual-range display scans and displays two different radar ranges at the same time, with a single antenna. There is no time delay between the two pictures and you have separate control of each picture. This feature lets you keep a close watch on close-range targets and far targets.



Long range display

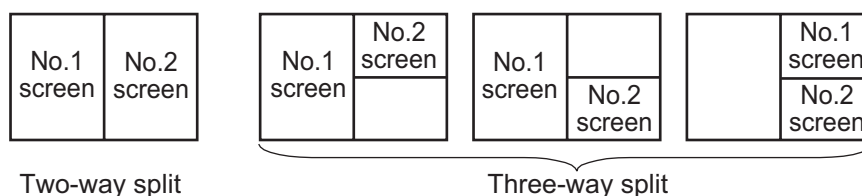
Short range display

To get the dual-range display, set dual-range displays in the display selection window. See section 13.2 for the procedure. You can put the dual-range displays in the two-way and three-way split screens.

The radar functions that are adjusted separately are as follows:

- Active route (show or hide)
- Rain (rain clutter)
- Heading line and rings (hide temporarily)
- Range
- Orientation mode (head-up or north-up)
- Auto sea mode ([Advanced] or [Coastal])
- Transmission* (Can not set stand-by mode separately)
- Gain
- Sea (sea clutter)
- AIS/DSC (show or hide)
- Range rings (show or hide)
- Trail (clear to restart)
- Interference rejector

*: The no.1 screen is independent of the no.2 screen when the no.2 screen is in stand-by. However, when the no.2 screen goes to transmit state, so does the no.1 screen.



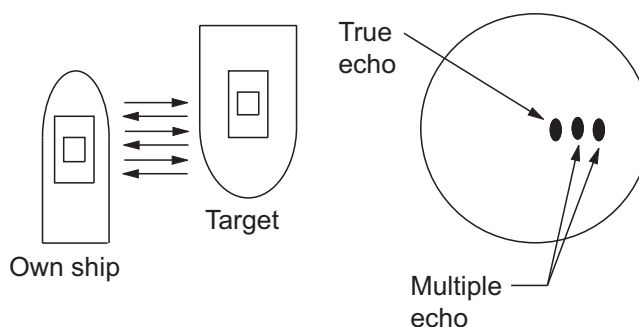
6.24 How to Understand the Radar Display

6.24.1 False echoes

Echo signals can appear on the screen at positions where there is no target or disappear where there are targets. You can identify false targets when you understand why the false echoes appear. A description of false echoes follows.

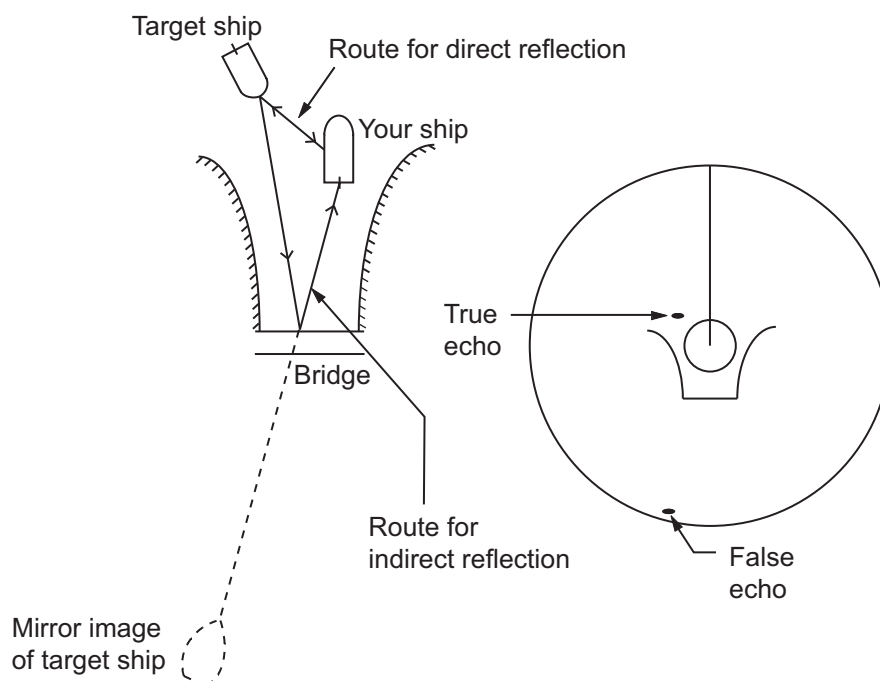
Multiple echoes

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 can be seen on the screen at two, three or more times the true range of the target as shown below. You can reduce and sometimes remove these multiple echoes if you decrease the gain, or correctly adjust the sea clutter.



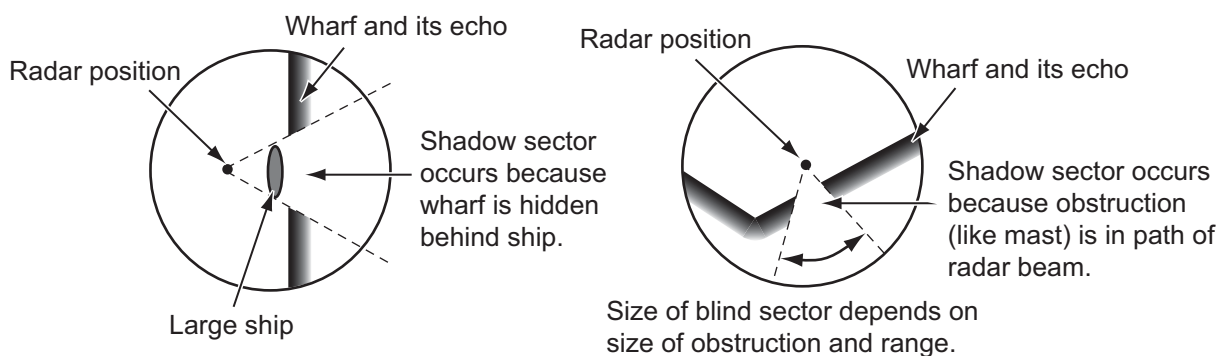
Virtual image

A large target near your ship can show at two positions on the screen. One of the positions is the true echo reflected by the target. The other position is a false echo which is caused by the “mirror effect” of a large object on or near your ship. See the figure shown below for an example of this type of false echo. If your ship gets near a large metal bridge, for example, a false echo appears on the screen. The echo disappears after move some distance from the bridge.



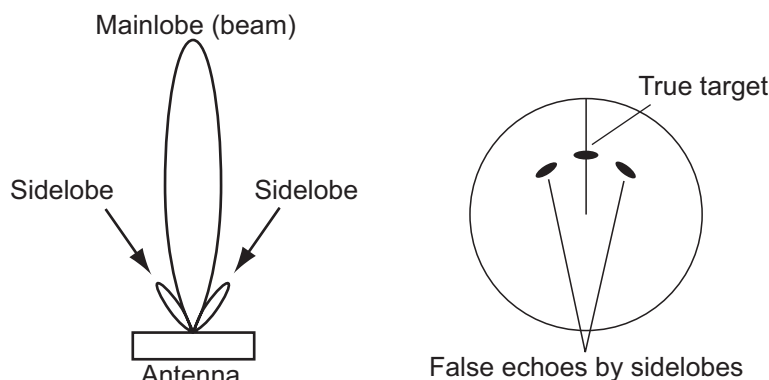
Shadow sector

Funnels, stacks, masts, or derricks in the path of the antenna stop the radar beam. If the angle opposite the antenna is more than one or two degrees, a sector or shadow sector appears on the screen. Targets are not displayed within the sector.

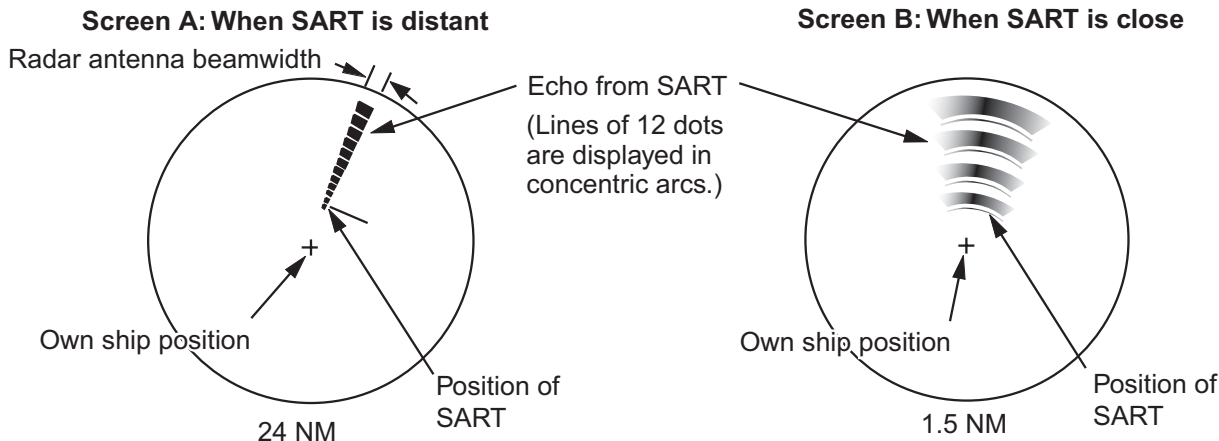


Sidelobe echoes

Each time the radar transmits, some radiation leaves on each side of the beam. This lost energy has the name "sidelobes." If a target is detected by both the sidelobes and the mainlobe, the sidelobe echoes can appear at both sides of the true echo at the same range. Sidelobes normally show only on short ranges and from strong targets. You can reduce sidelobes if you reduce the gain, or correctly adjust the sea clutter.

**6.24.2 Search and rescue transponder (SART)**

A ship in distress uses a radar-SART to show a series of dots on the radar display of nearby ships to indicate distress. A SART transmits when it receives a radar pulse from any X-Band (3 cm) radar within a range of approximately 8 nm. When a SART receives a radar pulse, the SART transmits a response across all the radar frequency band.

**How to detect the SART response**

- Use the range scale of 6 or 12 NM. The distance between the SART responses is approximately 0.6 NM (1125 m) to identify the SART.
- Turn off all the automatic clutter filters.
- Turn off the interference rejector.

Racon (Radar Beacon)

A racon is a radar transponder that sends a characteristic signal when the racon receives a radar pulse (normally only the three-centimeter band). If the racon signal is sent on the same frequency as that of the radar, the signal appears on the radar display. The racon signal appears on the radar in one of two methods:

- A line that starts just after the position of the Racon
- A Morse code signal displayed with a line just after the position of the Racon



6.25 ARPA Operation

The ARPA (Automatic Radar Plotting Aid) shows the movement of a maximum of 30 radar targets. The targets can be acquired manually or automatically. All 30 targets can be acquired manually when the ARPA acquisition area is not active. If the ARPA acquisition area is active, that total is equally divided between manual and auto acquisition.

ARPA requires speed and heading data.

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 landmass, 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 (your ship or target)

6.25.1 How to show or hide the ARPA display

1. Select [Targets] from the RotoKey menu on the chart plotter or radar display.
2. Select [ARPA] to show the ARPA display.




To hide the ARPA display, deselect [ARPA] at step 2.

6.25.2 How to manually acquire a target

You can manually acquire a target from both the radar display and the radar display overlay.

1. Select an object to acquire. The pop-up menu appears.
2. Select [Acquire].

After you acquire a target, the radar marks the target with a broken square and a vector appears within 30 s. The vector indicates the direction of the target. Within 90 s after you acquire the target, the first tracking step is finished and the target is tracked continuously. At this point, the broken square changes to a solid circle.

ARPA Symbol	Meaning
	At acquisition of the target.
	30 s after the acquisition, the plotting symbol changes to a small circle, which indicates steady-state tracking. A vector appears to show the direction of the target.
	A lost target is indicated by a diamond symbol, created from two equal triangles.

Note 1: For successful acquisition, the target must be within 0.05 to 16 NM from your ship and not hidden in sea or rain clutter.

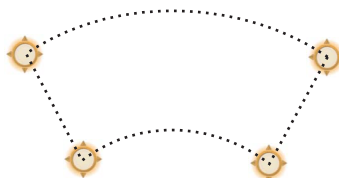
Note 2: When the capacity for manual acquisition is reached, you cannot acquire more targets. Cancel tracking of non-threatening targets to acquire additional targets manually.

6.25.3 How to automatically acquire a target

Any target that enters the ARPA acquisition area is acquired and tracked automatically. When a target enters the area, the buzzer sounds.

1. Select [Guard Zone] from the RotoKey menu.
2. Select [Visible]. The guard zone with dotted lines appears on the screen.
3. Select [Guard Zone] from the RotoKey menu.

4. Select [Resize]. Four circles appear at the four corners of the guard zone.



5. Move the circles to set the guard zone.
Note: To set a 360-degree guard zone, set the same bearing for all four circles.
6. Select [End Resize] at the top right-hand corner of the screen.
7. Select [Guard Zone] from the RotoKey menu.
8. Select [Auto Acquire]. The dotted lines for the guard zone turn the solid lines.
9. Select [Guard Zone] from the RotoKey menu.
10. Select [Alarm].

To erase the guard zone, deselect [Alarm], [Auto Acquire], [Visible] in the [Guard Zone] menu in order.

6.25.4 How to display target data

You can find the bearing, range, etc. of an ARPA target. Select the ARPA target to get its information. For detailed information, select the ARPA target to display the pop-up menu then select [Info]. The detailed information display can also be shown by selecting the simple information display.

ID	4
Bearing	148.2 °
Range	10.13 NM
CPA	2.885 NM
TCPA	9'54 S

Simple information

Target Info	
ID	04
COG	211.3 °M
SOG	11.4 kn
CPA	2.885 NM
TCPA	9'54 S
Range	10.13 NM
Bearing	148.2 °
Position	N 35°37.519'; E 139°47.863'

Detailed information

6.25.5 How to stop tracking targets

You can stop tracking ARPA targets separately or all together.

Individual target

1. Select the ARPA target to display the pop-up menu.
2. Select [Cancel] to delete the target from the screen.

All targets

1. Select [Targets] from the RotoKey menu.
2. Select [Cancel All] to delete all targets from the screen.

6.25.6 How to clear a lost target

An ARPA target not detected in five scans becomes a lost target. You can clear lost targets separately or all together.

Individual lost target

1. Select the lost target to display the pop-up menu.
2. Select [Clear] to delete the lost target from the screen.

All lost targets

1. Select [Targets] from the RotoKey menu.
2. Select [Clear Lost] to delete all lost targets from the screen.

6.25.7 CPA/TCPA alarm

This alarm helps you keep your ship away from collision by warning of targets on a collision course. The ARPA continuously monitors the predicted range at the Closest Point of Approach (CPA) and predicted time to CPA (TCPA) of each tracked target. When the predicted CPA or TCPA is less than their set values, the alarm sounds and the message "CPA/TCPA Alarm" appears and flashes at the top of the screen.

Make sure that the gain, sea and rain controls are correctly adjusted before you use this alarm.

CPA/TCPA alarm ranges must be set correctly according to the size, tonnage, speed, turning performance and other characteristics of your ship.

How to set the CPA/TCPA alarm

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Targets].
3. Select the [ON] icon in [CPA/TCPA Alarm].
4. Select [CPA Alarm Value] or [TCPA Alarm Value] to display the software keyboard.
5. Set the value then select [Confirm].
6. Select [Close] to exit the menu.

How to acknowledge the CPA/TCPA alarm

The CPA/TCPA alarm sounds when the CPA and TCPA of an ARPA target are within the CPA/TCPA alarm range. The alarm indication "CPA/TCPA Alarm" appears and flashes at the top of the screen. To acknowledge the alarm and stop the audio alarm and flashing of the indication, select (tap) the indication "CPA/TCPA Alarm" (see paragraph 2.10.7). (The ARPA vector must be displayed at least 30 seconds to calculate CPA and TCPA.)

How to deactivate the CPA/TCPA alarm

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Targets].
3. Select the [OFF] icon in [CPA/TCPA Alarm].
4. Select [Close] to exit the menu.

7. FISH FINDER

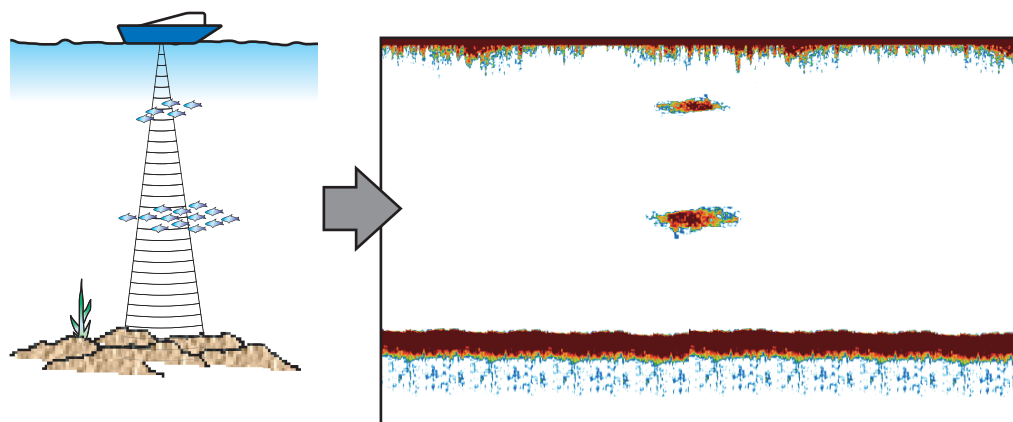
This chapter describes the functions of the fish finder, which requires the Bottom Discrimination Sounder BBDS1 or Network Sounder DFF1 or DFF3.

7.1 How the Fish Finder Operates

The fish finder calculates the distance between its transducer and underwater objects like fish, lake bottom or seabed. The results are shown in different colors or shades of gray according to echo strength.

The ultrasonic waves transmitted through water move at a constant speed of approximately 4800 feet (1500 meters) per second. When a sound wave "hits" an underwater object like fish or sea bottom, part of the sound wave is reflected toward the source. To find the depth to an object, the fish finder calculates the time difference between the transmission of a sound wave and the time the reflected sound wave is received.

The picture displayed by the fish finder contains a series of vertical scan lines. Each line is a "picture" of the objects under the boat. The series of pictures are put side-by-side across the screen to show the contours of the bottom and echoes from fish. The amount of history of objects that have moved under the boat can be less than a minute to more than one minute depending on the picture advance speed.



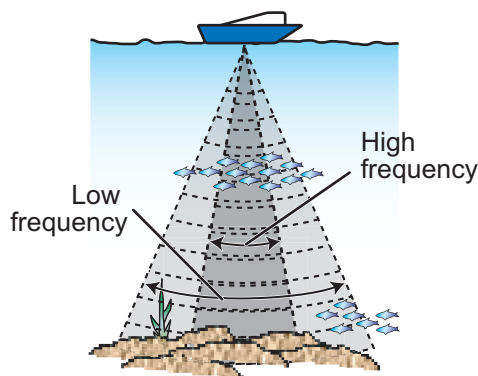
7.2 How to Select a Display

Your fish finder has six display modes. These modes are single frequency, dual frequency, bottom zoom, bottom lock, A-scope, and bottom discrimination (requires Bottom Discrimination Sounder BBDS1 and specified transducer).

7.2.1 Single frequency display

The single frequency display shows either the low-frequency or high-frequency picture on all the screen. Select a frequency according to your purpose.

- A low frequency gives a wide detection area. Use the low frequency for general search and to find bottom conditions.
- A high frequency gives better resolution. Use the high frequency to inspect a school of fish.



Detection area

How to select a single frequency display

1. Select [Mode] from the RotoKey menu.
2. Select [Single Freq.].
3. Select [Frequency] from the RotoKey menu.
4. Select [HF] (high frequency) or [LF] (low frequency).

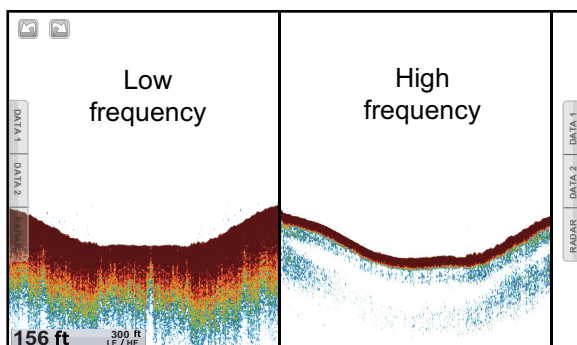
You can switch the frequency between high and low by tapping the sounder scale box at the bottom left-hand corner of the screen.

Tap the sounder scale box to switch between high and low frequencies.



7.2.2 Dual frequency display

The dual frequency display provides both low and high frequency pictures. Use the dual frequency display to compare the same picture with two different sounding frequencies.



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

How to select the dual frequency display

Select [Mode] from the RotoKey menu then select [Dual Freq.].

How to reverse the display pictures between low and high frequencies

In the default setting, the low frequency picture is on the left, and the high frequency picture is on the right. To reverse the pictures between low and high frequencies, select [Frequency] from the RotoKey menu then select [LF]. The picture for the frequency option ([HF] or [LF]) selected here is displayed on the right.

7.2.3 Zoom displays

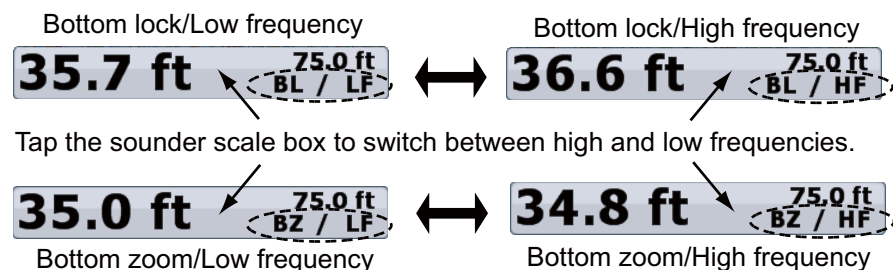
Zoom mode expands selected area of the single frequency picture. Two modes are available: bottom lock and bottom zoom.

How to activate a zoom display

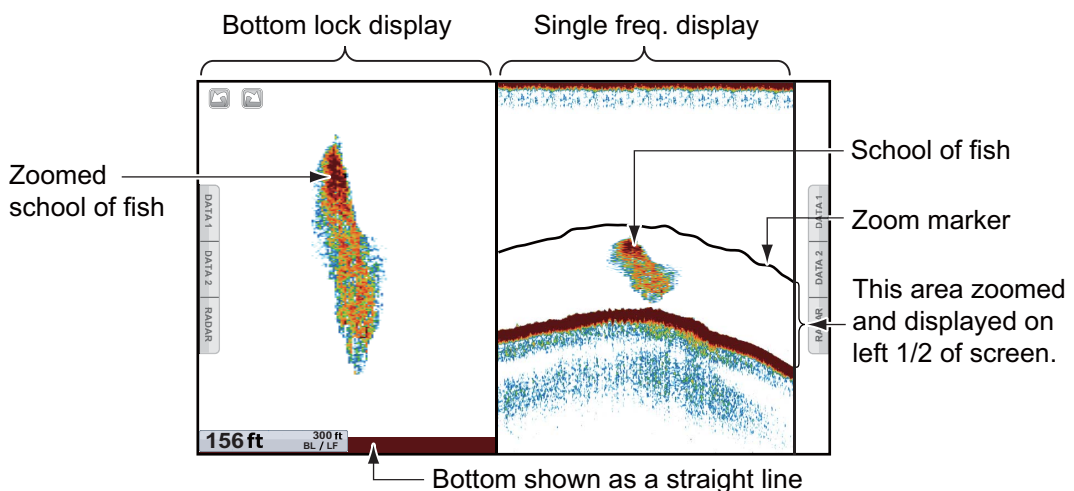
1. Select [Mode] from the RotoKey menu.
2. Select [Btm Lock] or [Btm Zoom].

To quit the zoom display and go to the single frequency display, select [Mode] from the RotoKey menu then select [Single Freq.].

You can switch the frequency for the zoom displays by tapping the sounder scale box at the bottom left-hand corner of the screen.

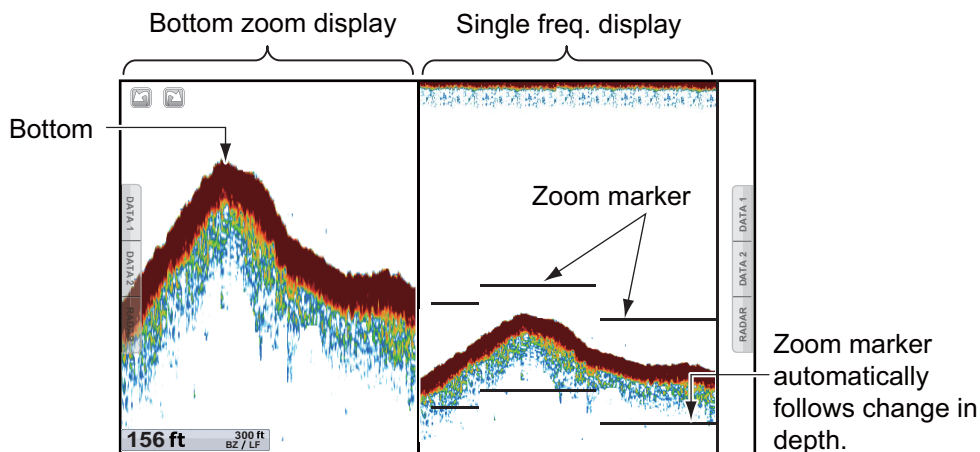
**Bottom lock display**

The bottom lock display provides a compressed normal picture on the right half and a 7 to 400 feet (2 to 120 meter) wide layer in contact with the bottom is expanded on the left half. This display helps you separate the fish near the bottom from the bottom echo. You can select the bottom lock range with [Bottom Lock Range Span] in [Sounder] of the main menu.

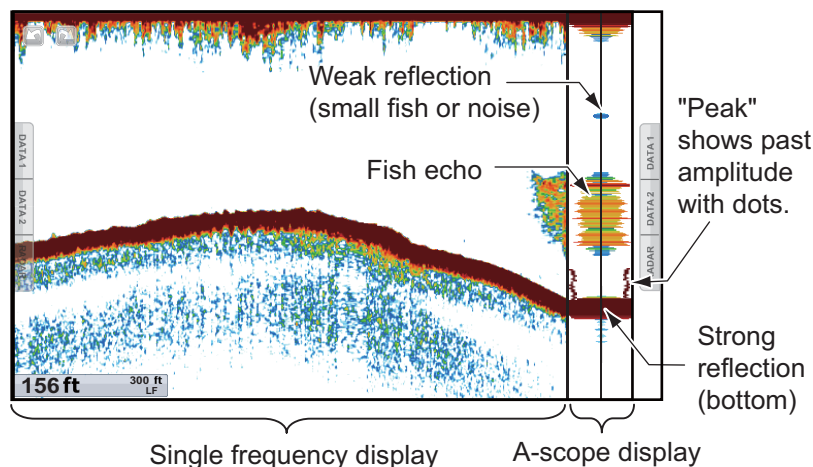


Bottom zoom display

The bottom zoom display expands the bottom and the fish near the bottom according to the zoom range selected on [Zoom Range Span] in [Sounder] of the main menu. This display helps you find the density of the bottom. A short echo tail normally indicates a soft bottom (sand bottom, etc.). A long echo tail indicates a hard bottom.

**7.2.4 A-scope display (display only)**

The A-scope display appears at the right of the screen and is available in any fish finder mode. This display shows the echoes at each transmission with the amplitudes and tone in balance with their intensities. This display helps you identify possible fish species and bottom structure.

**How to show or hide the A-scope display**

To show the A-scope display, select [A-scope] from the RotoKey menu. To hide the A-scope display, deselect [A-scope].

A-scope peak hold

You can show the "normal" A-scope display plus the peak-hold amplitude picture for the last five seconds in dots.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Sounder].

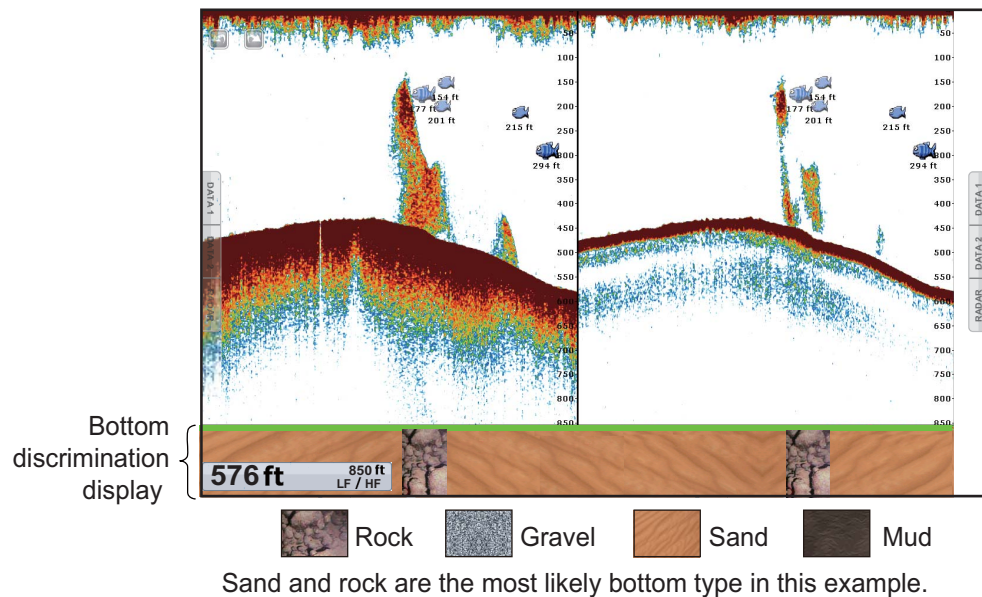
3. Select the [ON] icon in [A-Scope Peak Hold].



4. Select [Close] to exit the menu.

7.2.5 Bottom discrimination display

The bottom discrimination display, available with the Bottom Discrimination Sounder BBDS1 and appropriate transducer, identifies probable bottom composition. The display is available in all screen divisions, single or dual frequency mode and occupies the bottom 1/6 of the screen in the full screen display.



How to active or deactivate the bottom discrimination display

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Sounder] - [Fish Finder Source] menu.
3. Select [BBDS1].
4. Select [Close] to exit the menu.
5. To activate the bottom discrimination display, select [Bottom Type] from the Ro-toKey menu on the sounder display.

To deactivate the bottom discrimination display, deselect [Bottom Type].

7.3 Automatic Fish Finder Operation

Your fish finder can be adjusted automatically to let you do other tasks.

7.3.1 How the automatic fish finder operates

The automatic fish finder function automatically adjusts the gain, clutter, TVG, echo offset and range. The main features of the automatic mode are as shown below.

- Gain adjusts the sensitivity of the receiver to show the bottom echo in reddish-brown (default color arrangement).

- Clutter automatically reduces low-level noise like plankton.
- The TVG function is automatically adjusted.
- The echo offset balances the gain on high and low frequencies.
- Range is adjusted automatically to show the bottom echo.

7.3.2 How to select an automatic fish finder mode

There are two types of automatic fish finder modes: [Auto Fishing] and [Auto Cruising]. [Auto Fishing] searches for schools of fish, and [Auto Cruising] tracks the bottom. [Auto Cruising] uses a higher clutter removal setting than [Auto Fishing]. Do not use [Auto Cruising] when your purpose is to find fish, because the clutter removal circuit can erase weak echoes.

To select an automatic fish finder mode:

1. Select [Adjust] from the RotoKey menu.
2. Select [Auto Fishing] or [Auto Cruising].

7.4 Manual Fish Finder Operation

Use the manual operation to see schools of fish and the bottom echo with a fixed gain setting. The gain, range and range shift functions let you select the depth you can see on the screen.

7.4.1 How to select the manual mode

1. Select [Adjust] from the RotoKey menu.
2. Select [Manual].

7.4.2 How to select the display range

Manual range setting

Rotate the **RotoKey**TM to select the range. The range can not be changed in the auto mode or the bottom discrimination display.

How to turn on or off the auto range

The range can be selected automatically or manually. Select [Auto Range] from the RotoKey menu for auto range. To turn off the auto range, deselect [Auto Range].

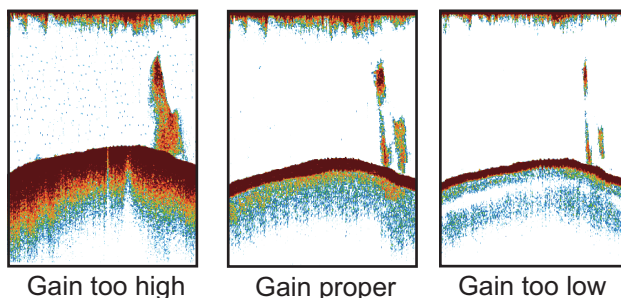
7.4.3 How to Shift the Range

The basic range and range shift functions let you select the depth you can see on the screen. This function is not available when [Auto Range] is active.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Sounder].
3. Select [Range Shift] to open the software keyboard.
4. Set the range then select [Confirm].
5. Select [Close] to exit the menu.

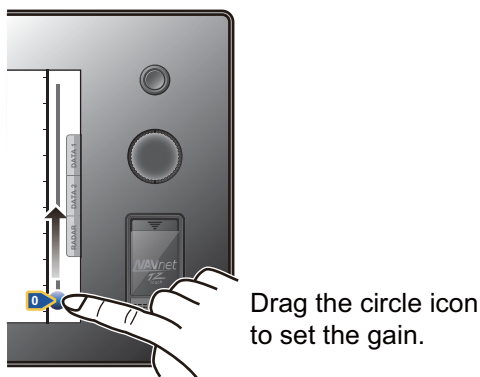
7.4.4 How to adjust the gain

The gain controls how echoes of different strengths are displayed. Set the gain to show a slight amount of noise on the screen. Increase the gain for greater depths and lower the gain for shallow waters.



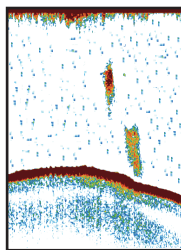
Note: This function is not available in the auto mode.

1. Select [Adjust] from the RotoKey menu.
2. Select [HF Gain] or [LF Gain].
3. Drag the circle icon to set the gain (see the figure below).



7.4.5 How to reduce the clutter

Low intensity “spots” of noise appear over most of the screen like in the illustration shown below. These spots are caused by sediment in the water or noise. You can reduce this type of noise.

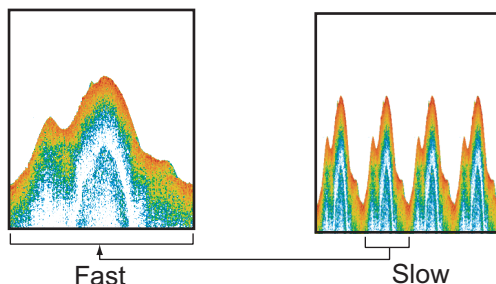


Note: This function is not available in the auto mode.


1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Sounder].
3. Drag the circle icon in [Clutter] to set the level. The larger the setting value, the greater the degree of reduction.
4. Select [Close] to exit the menu.

7.5 Picture Advance Speed

The picture advance speed controls how quickly the vertical scan lines move across the screen. A fast advance speed expands the size of a school of fish horizontally on the screen. A slow advance speed shortens the school of fish. Use a fast advance speed to see the hard bottom. Use a slow advance speed to see the smooth bottom.

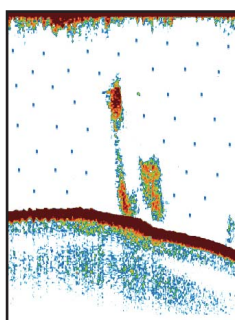


1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Sounder].
3. Select [Picture Advance] menu.
4. Select a picture advance speed. The options in the window indicate the number of scan lines made per transmission. For example, [1/2] creates one scan line per two transmissions. [1/16] is the slowest advance speed and [4/1] is the fastest speed. [Stop] stops picture advance, and is useful for taking a photo or screenshot of the screen.
5. Select [Close] to exit the menu.

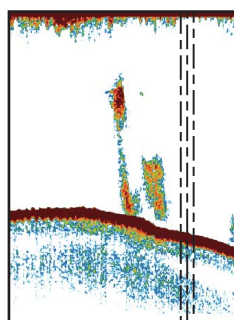
 CAUTION
<p>The picture is not refreshed when picture advancement is stopped.</p> <p>Maneuvering the vessel in this condition may result in a dangerous situation.</p>

7.6 How to Reduce Interference

Interference from other fish finders and electrical equipment appears on the screen as shown in the illustration. When these types of interference appear on the screen, use the interference rejector to reduce the interference. Turn off the interference rejector when there is no interference, so that you do not erase weak echoes.



Interference from other sounder



Interference from electrical equipment

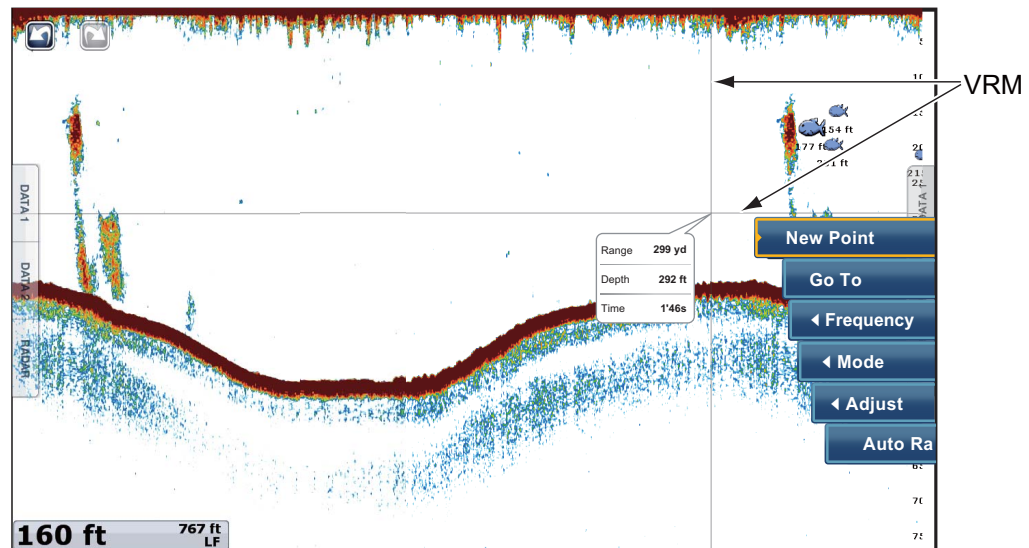
1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Sounder].
3. Select [Interference Rejection].
4. Select [Low], [Medium], [High] or [Auto]. [High] is the greatest interference rejection. [Auto] automatically selects suitable interference setting.
5. Select [Close] to exit the menu.

To deactivate the interference rejection, select [Off] at step 5.

7.7 How to Measure Range, Depth or Time to an Object

You can measure the depth to an object with the VRM. Also, you can measure the range and time from the right edge to a location. For example, you can measure how many minutes ago an echo appeared.

To measure the range, the depth or the time to an object, select an object to display the VRM. Read the range, the depth and the time in the box.

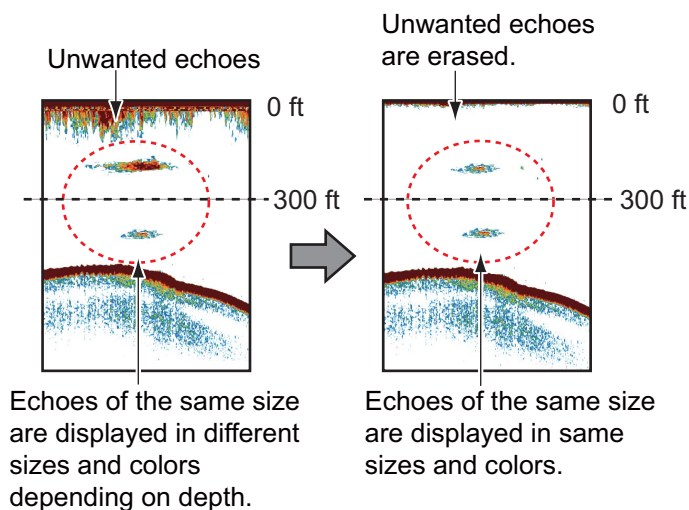


When you want to see the past echoes which are off the screen, drag the screen to right. To show the current display, select [Cancel Hist.] at the top right-hand corner of the screen.

7.8 How to Balance Echo Strength

A school of fish at a depth deeper than a school of equal strength in shallow water appears in weaker colors. This condition is caused by the attenuation of the ultrasonic wave. To display the schools of fish in the same colors, use the TVG. The TVG automatically increases the gain with depth so that echoes of the same strength and different depths are shown in the same colors. In the illustration shown below, for example, the TVG is set for 300 ft and the TVG level is adjusted. Unnecessary echoes at a distance less than 300 ft are deleted and echoes at depths greater than 300 ft are not adjusted.

Note: This function is not available in the auto mode.



1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Sounder].
3. Drag the circle icon in [TVG HF] (high frequency) or [TVG LF] (low frequency) to set the level. Raise the TVG to increase the gain difference between near and far distances.
4. Select [Close] to exit the menu.

7.9 Fish Finder Alarms

Two types of fish alarms release audio and visual alarms to tell you that echoes from fish are in the area you selected. These alarms are [Fish Alarm] and [Fish Alarm for Bottom Lock].

The [Fish Alarm] function tells you when an echo above some strength (selectable) is within the alarm range you specify.

The [Fish Alarm for Bottom Lock] function tells you when fish are within some distance from the bottom. The bottom lock display must be active to use this alarm.

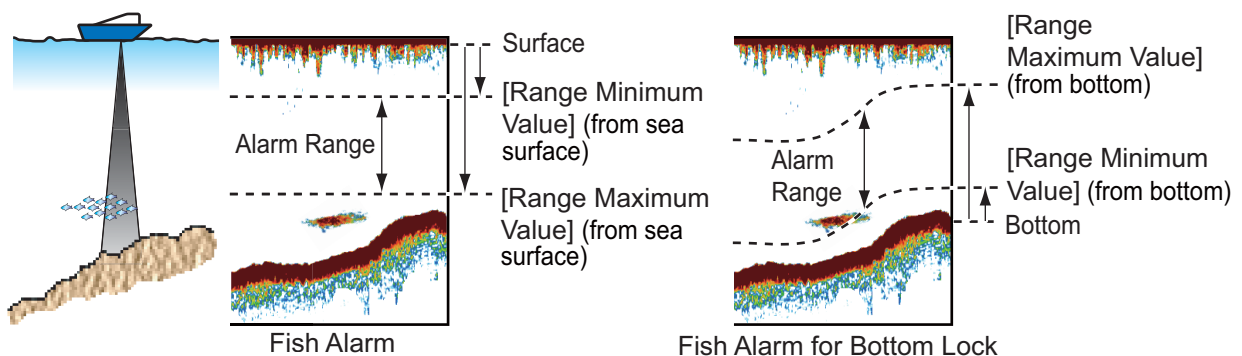
7.9.1 How to set an alarm

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Sounder].

- For **fish alarm**, select [Range Minimum Value] or [Range Maximum Value] below [Fish Alarm] to display the software keyboard.
For **bottom lock fish alarm**, select [Range Minimum Value] or [Range Maximum Value] below [Fish Alarm for Bottom Lock] to display the software keyboard.

Fish Finder Alarms	
Fish Alarm	ON OFF
Range Minimum Value	0.0 ft
Range Maximum Value	3.3 ft
Fish Alarm for Bottom Lock	ON OFF
Range Minimum Value	0.0 ft
Range Maximum Value	3.3 ft
Fish Alarm Level	Medium

- Set the start depth in [Range Minimum Value], the end depth in [Range Maximum Value].



- Select [Close] to exit the menu.

7.9.2 How to activate or deactivate an alarm

Fish alarm

- Select [Menu] on the menu icon bar to open the main menu.
- Select [Sounder].
- To activate the fish alarm, select the [ON] icon in [Fish Alarm].
To deactivate the fish alarm, select the [OFF] icon in [Fish Alarm].

You can activate or deactivate [Fish Alarm] from the RotoKey menu.

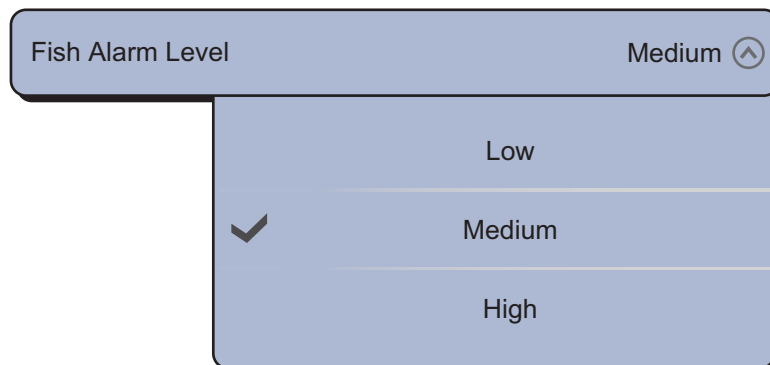
Bottom lock fish alarm

- Select [Menu] on the menu icon bar to open the main menu.
- Select [Sounder].
- To activate the bottom lock fish alarm, select the [ON] icon in [Fish Alarm for Bottom Lock].
To deactivate the fish alarm, select the [OFF] icon in [Fish Alarm for Bottom Lock].

7.9.3 Alarm sensitivity

You can select which strength of echoes release the fish alarms.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Sounder] - [Fish Alarm Level].



3. Select which echo strength releases the fish and bottom lock alarms.
 [Low]: Light-blue or stronger echoes
 [Medium]: Yellow or stronger echoes
 [High]: Red and reddish-brown echoes
4. Select [Close] to exit the menu.

7.10 ACCU-FISH™

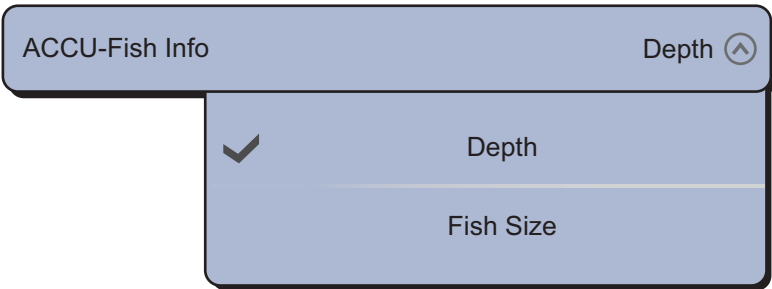
The ACCU-FISH™ feature estimates the length of each fish and shows a fish symbol and depth value or fish length. This feature requires appropriate transducer and either Network Sounder BBDS1, DFF1 or DFF3.

Application consideration

- The information given by this feature is intended for reference only.
- ACCU-FISH™ uses both low and high frequency echoes for the measurements regardless of the frequency mode in use.
- The intensity of an echo depends on fish species. If the indicated length is different from the true length, you can apply an offset in the [Sounder] - [ACCU-Fish Size Correction] menu of the main menu.
- 50 kHz and 200 kHz beams are transmitted alternately without reference to the current display mode.
- To reduce the error, the detection area must be 2 to 100 meters from the surface.
- The signal attenuation on the inside-hull transducer is different between 50 kHz and 200 kHz. This attenuation causes some fish to get ignored and the fish length indicated can be shorter than the true length.
- Echoes from a school of fish can be in more than one layer, which can cause wrong length indication.
- The fish symbol indication is not shown when the bottom echo does not appear on the screen.

7.10.1 How to set ACCU-FISH™

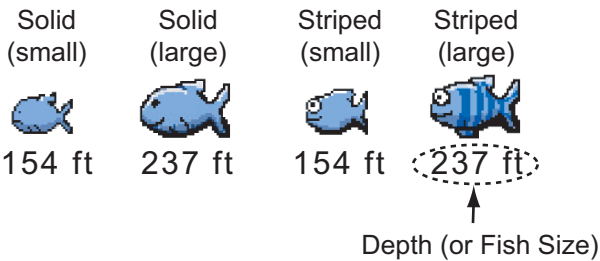
- 1. Select [Menu] on the menu icon bar to open the main menu.
- 2. Select [Sounder].
- 3. Select [ACCU-Fish Info].







- 4. Select [Depth] or [Fish Size].
- 5. Select [ACCU-Fish Symbols].



- 6. Select [Solid], [Striped] or [Off] (turn off fish symbol).



Fish size	Solid	Striped
Large fish symbol (more than 51 cm (20.08 inch))		
Small fish symbol (10 to 50 cm (3.9. to 19.69 inch))		

- 7. Select [Close] to exit the menu.

7.10.2 Fish size correction

The fish size shown on the screen can be different from the true size. If the size is wrong, add an offset to the measured value to get a more accurate indication on the screen.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Sounder].
3. Drag the circle icon in [ACCU-Fish Size Correction] to set correction percentage (setting range: -80% to 100%).



Setting	Revised size
+100	Two times
+50	1.5 times
-50	1/2
-65	1/3
-75	1/4
-80	1/5

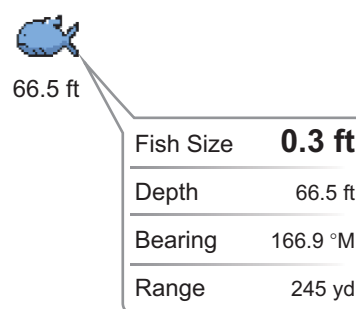
4. Select [Close] to exit the menu.

7.10.3 How to turn the fish symbol indication on

Select [Accu Fish] from the RotoKey menu. Fish symbols and their depth values or fish lengths appear on the screen. If you selected [Off] at step 7 in paragraph 7.10.1, the fish symbols are hidden and only the depth values or fish lengths appear.

7.10.4 How to display the fish information

Select a fish symbol (only in ACCU-FISH™ mode) to display the information (size, depth, bearing and range) about a fish.



7.11 How to Put a Point, Go To a Point or a Position

You can put a point on the sounder display. The point also appears on the chart plotter display. You can set a point or a position as a go to point.

How to put a point

1. Select a fish symbol (only in ACCU-FISH™ mode), a position, etc. to put a point.
2. Select [New Point] from the pop-up menu. The [Creating Point] window appears (see paragraph 4.2.2).

3. Select a mark. In the example below, a shrimp mark is put on the fish symbol.

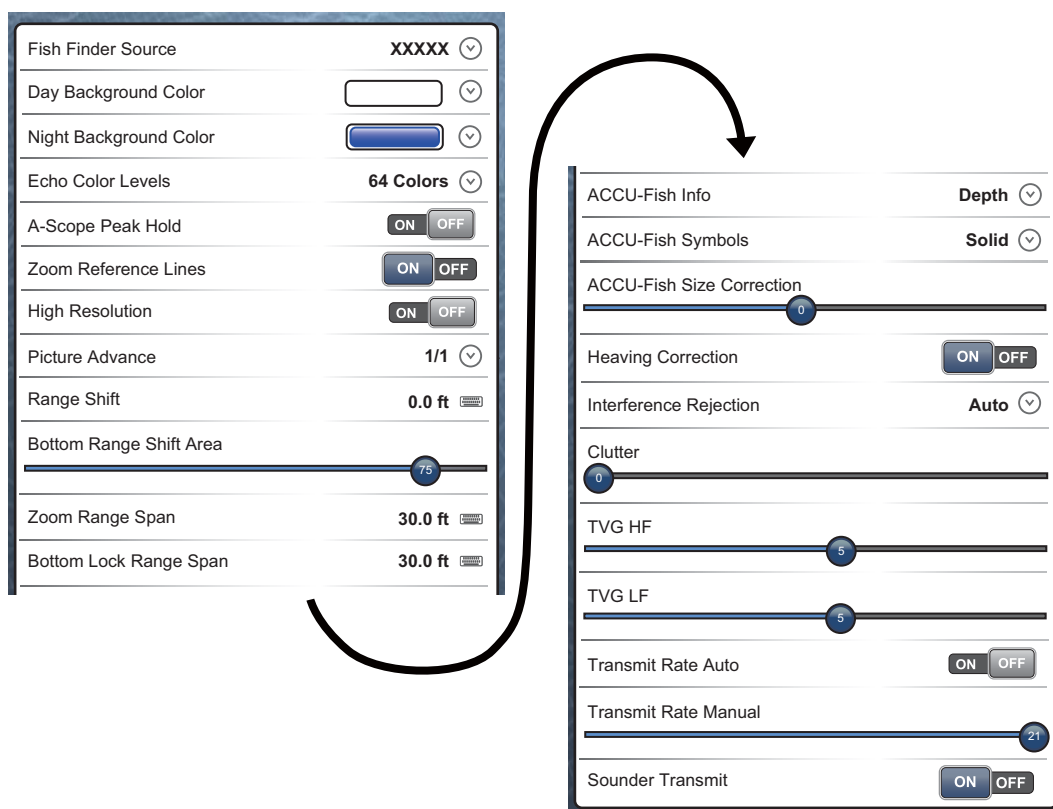


How to go to a point or a position

1. Select a fish symbol (only in ACCU-FISH™ mode), a point or a position to display the pop-up menu.
2. Select [Go To]. The selected symbol*, point* or position is highlighted on the chart plotter display. For details, see section 4.10.
*: When [Accu Fish] or [Points] is turned on in the [Overlay] RotoKey menu.

7.12 Fish Finder Menu Operation

This section describes the fish finder functions not described in previous sections. To open the following menus, select [Menu] on the menu icon bar then select [Sounder].



[Day Background Color]: Select the background color for use during daylight hours. The options are [White], [Light Blue], [Black] and [Dark Blue].

[Night Background Color]: Select the background color for use at nighttime. The options are [Black] and [Dark Blue].

[Echo Color Levels]: Select the number of colors shown on the screen. The selections are [8 Colors], [16 Colors] and [64 Colors].

[Zoom Reference Lines]: Show or hide the zoom marker, which appears in the bottom lock and bottom zoom modes.

7. FISH FINDER

[High Resolution]: When you select [OFF], smoothed echoes are displayed, however, the screen resolution is lower. To get higher screen resolution and greater detail, select [ON].

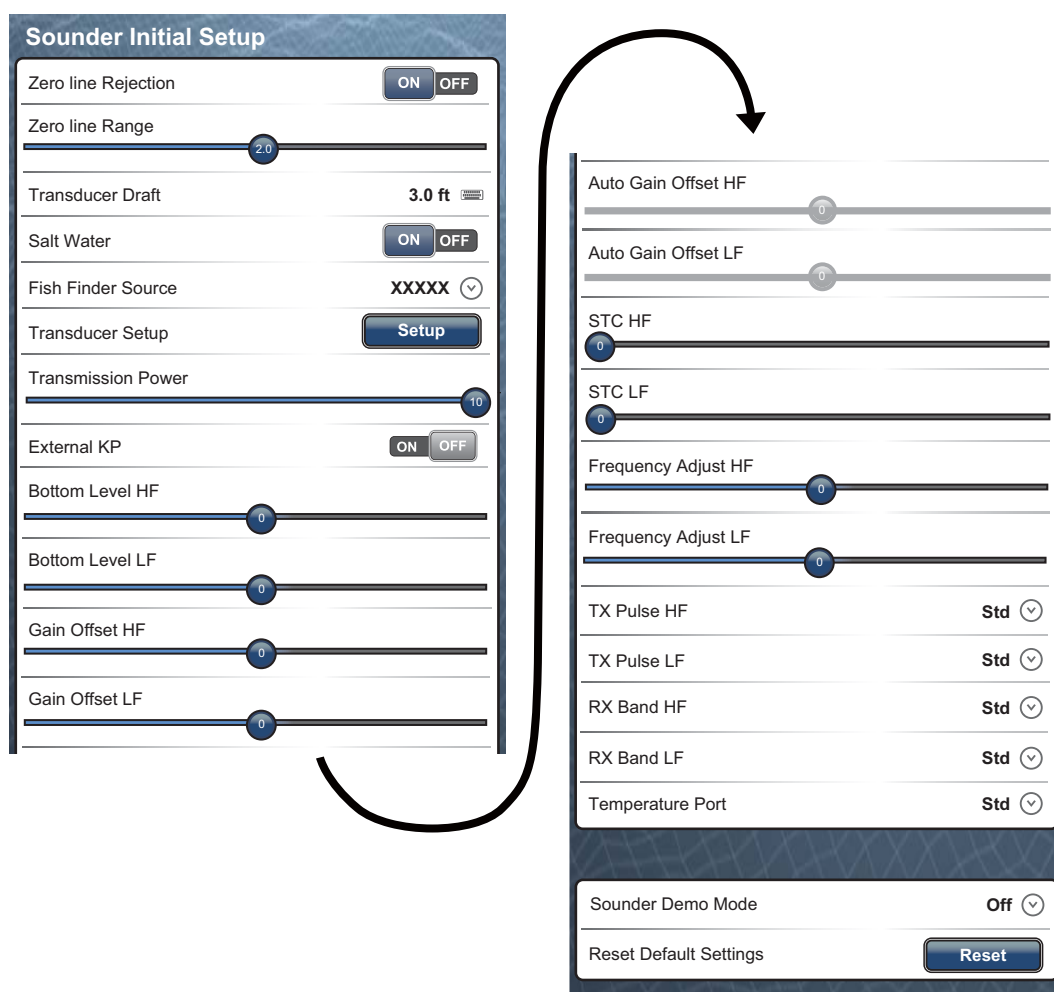
[Bottom Range Shift Area]: Select the area where to show the bottom echo, when [Auto Range] is active. For example, setting 75% would place the bottom echo at a position equivalent to 75% from the top of the screen.

[Heaving Correction]: When the ship is in rough seas, the bottom echo and the echoes from fish are not stable, because the distance to the bottom changes. To remove this problem, the satellite compass sends pitch and roll data to the fish finder to adjust the TX and RX beams. This function requires a FURUNO Satellite Compass.

[Transmit Rate Auto]: Automatically set the transmit rate according to ship's speed, and is inoperative when there is no speed data.

[Transmit Rate Manual]: Change the TX pulse repetition rate in 21 levels. Use 21 (highest power) in normal use. Lower the TX rate in shallow waters to prevent the second reflection echo.

[Sounder Transmit]: Turn on or off the sounder transmission.



[Zero Line Rejection]: Turn the zero line (transmission line) on or off. When turned on, the transmission line disappears, which allows you to better watch fish echoes near the surface. The length of the transmission line changes with transducer used and installation characteristics. If the width of the transmission line is 2.0 or more, set the transmission line width with [Zero Line Range], as shown on the next page.

[Zero Line Range]: This feature adjusts the transmission line so that the line disappears when [Zero Line Rejection] is turned on. The effective range is 1.4 to 2.5. For a long tail, increase the value. If the transmission line does not disappear, lower the TX power (only for DFF3).

[Transducer Draft]: Set the distance between the transducer and the draft line to show the distance from the sea surface (Setting range: 0.0 to 99.9 ft).

[Salt Water]: Select [ON] to use this equipment in salt water.

[Fish Finder Source]: Select the sounder used, among DFF1, BBDS1 and DFF3.

[Transducer Setup]: Select the method to setup the transducer, manually or by selecting the model number.

[Manual]: Enter high/low frequencies and TX power.

[Model Number]: Select the type of the transducer connected.

[Transmission Power]: Interference can appear on the screen when the fish finder on your ship and another ship have the same TX frequency. To prevent this interference, lower your TX power and ask the other ship to lower their TX power. The setting range is 0 to 10. 0 is off and 10 provides the highest TX power.

[External KP]: Turn on to sync with external keying pulse.

[Bottom Level HF (LF)]: The default bottom level setting (0) determines that two strong echoes received in sequence are bottom echoes. If the depth indication is not stable in the default setting, adjust the bottom level here. If vertical lines appear from the bottom echo in the bottom lock display, lower the bottom level to erase the vertical lines. If you can not identify the fish near the bottom from the bottom echo, increase the bottom level.

[Gain Offset HF (LF)]: If the gain setting is wrong, or there is a difference in the gain between the low and high frequencies, you can balance the gain for the two frequencies here.

[Auto Gain Offset HF (LF)]: If the auto gain offset is wrong, or there is a difference in the gain between the low and high frequencies, set an offset here to balance auto gain for the two frequencies.

[STC HF (LF)]: Delete unnecessary echoes (plankton, air bubbles, etc.) near the surface that hide the fish near the surface. The setting range is 0 to 10, and 0 is off. 10 deletes unnecessary echoes from the surface to approximately 16 ft. Make sure you do not use more STC than necessary, because you can erase the small echoes near the surface (only for DFF3).

[Frequency Adjust HF (LF)]: You can adjust the TX frequency of both the low- and high-frequency transducers. Use this feature when your fish finder and another fish finder operate on the same frequency, causing interference. Change the frequency of your transducer by enough percentage points to remove the interference (only for DFF3).

[TX Pulse HF (LF)]: The pulse length is automatically set according to range and shift. Use a short pulse for better resolution and a long pulse when detection range is important. To improve resolution on zoom displays, use [Short 1] or [Short 2]. [Short 1] improves the detection resolution, but the detection range is shorter than with [Std] (pulse length is 1/4 of [Std]). [Short 2] raises the detection resolution, however detection range is shorter (pulse length is about 1/2 of [Std]) than [Std]. [Std] is the standard

pulse length, and is suitable for general use. [Long] increases the detection range but lowers the resolution (about 1/2 compared to the [Std] pulse length) (only for DFF3).

[RX Band HF (LF)]: The RX bandwidth is automatically set according to pulse length. To decrease noise, select [Narrow]. For better resolution, select [Wide] (only for DFF3).

[Temperature Port]: Select the data source for water temperature (only for DFF3).

[MJ]: The water temperature data from the water temperature/speed sensor

[Low Frequency]: The low frequency measured water temperature

[High Frequency]: The high frequency measured water temperature

[Sounder Demo Mode]: The demonstration mode provides, with connection of the transducer, simulated operation of the equipment, using internally generated echoes (only for DFF3).

[Off]: Turn demo mode off.

[Shallow]: Shallow depth demonstration

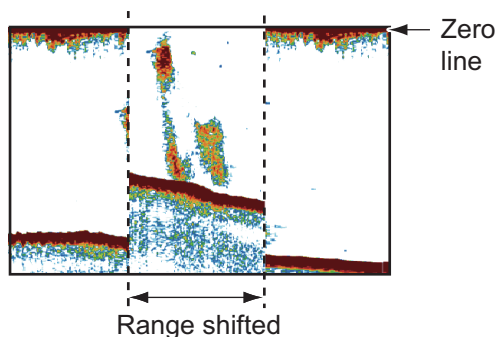
[Deep]: Deep depth demonstration

[Reset Default Settings]: Select this menu item to restore default settings for the [Sounder] menu.

7.13 Interpreting the Display

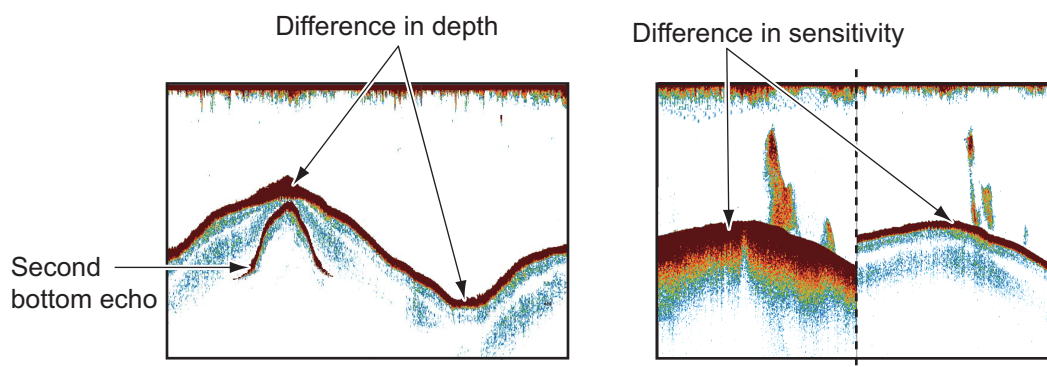
Zero line

The zero line (transmission line) shows the position of the transducer. The line disappears from the screen when the range is shifted.



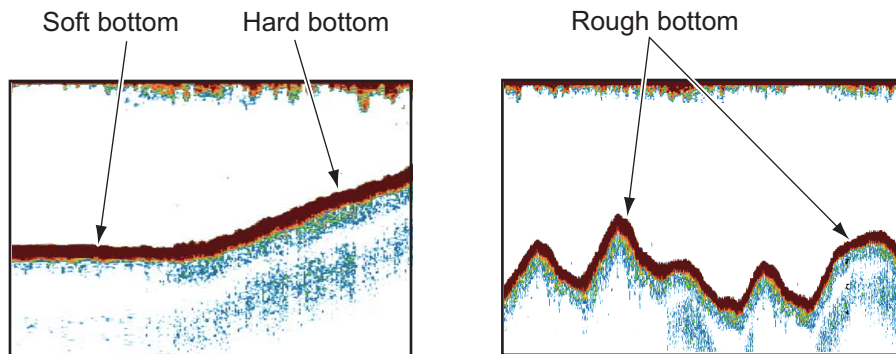
Bottom echoes

The strongest echoes are from the bottom, and are normally shown in reddish-brown or red. The colors and the width change with bottom material, depth, sea condition, installation, frequency, pulse length and sensitivity.



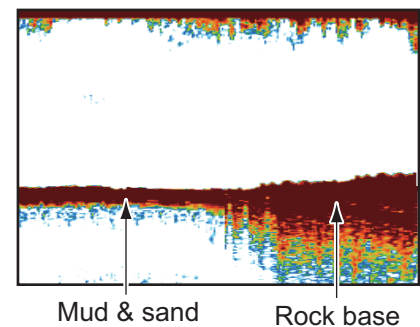
Bottom contour

The tail from a hard bottom is longer than the tail from a soft bottom, because the hard bottom reflects more of the ultrasonic pulse. An echo from shallow water gives a stronger reflection than the echo received from deep water. A longer bottom tail appears on slopes, because of the difference in travel time at both edges of the beam angle. For the rough bottom, echoes are reflected on many different planes, which displays echoes in many layers, giving a 3D effect.



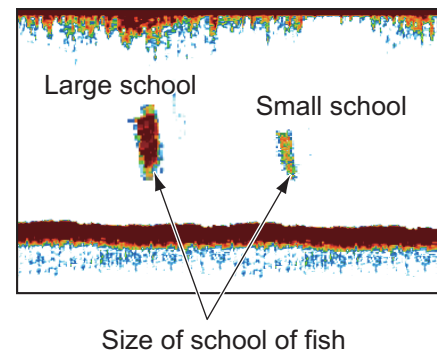
Nature of a bottom

The nature of a bottom is known from the intensity and length of the bottom tail. To find the nature of a bottom, use a long pulse length and normal gain. For the hard and rough bottom, the bottom echo is reddish-brown with a long tail. For the mud or sand bottom, the bottom echo has less red and with a short tail. A bottom with a lot of small particles can give a long tail on the low frequency picture.



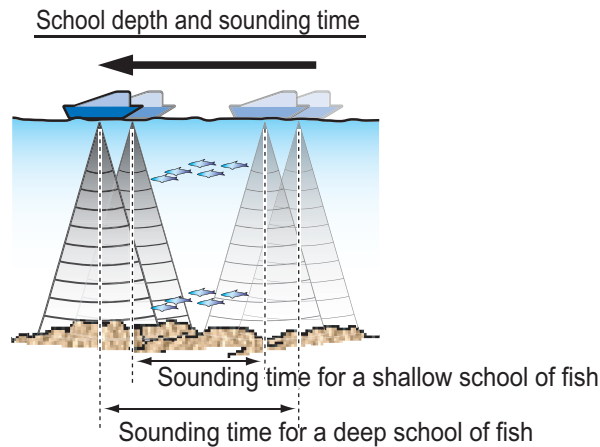
Fish quantity

The size and density of a school of fish are indicators of the quantity of fish.



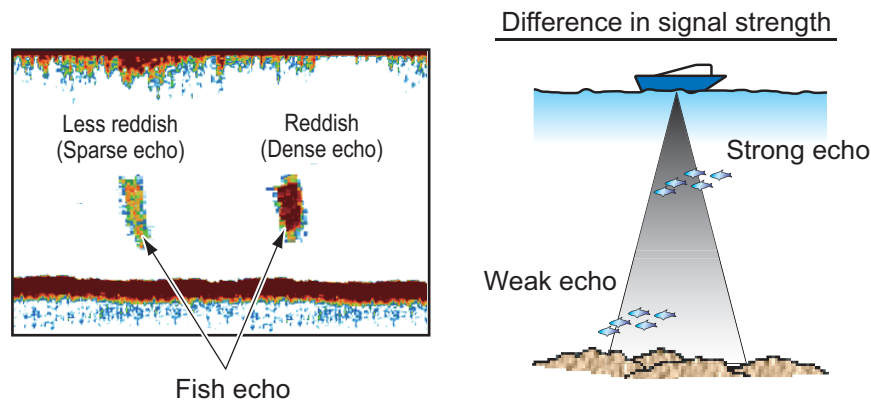
Size of a school of fish

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



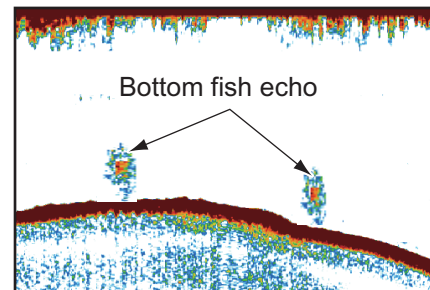
Density of a school of fish

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



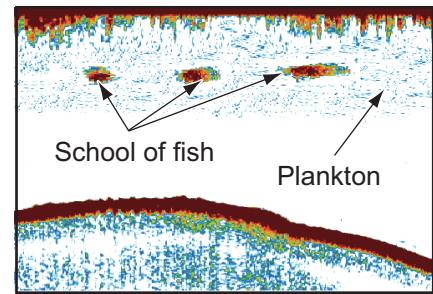
Bottom fish

The echoes from the bottom are stronger than the bottom fish echoes so that you can distinguish between them by colors. The bottom echoes are normally shown in reddish-brown or red, the bottom fish echoes in weaker color.

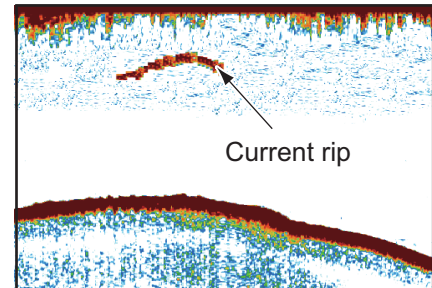


Plankton

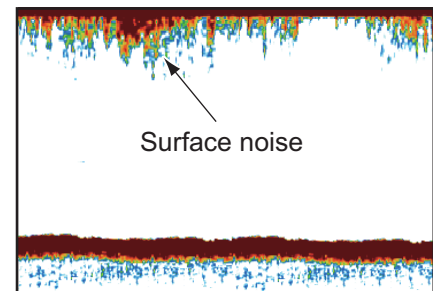
A plankton layer appears as a large amount of green or blue dots, and is a possible location for fish. A plankton layer moves down in the day and up at night.

**Current rip**

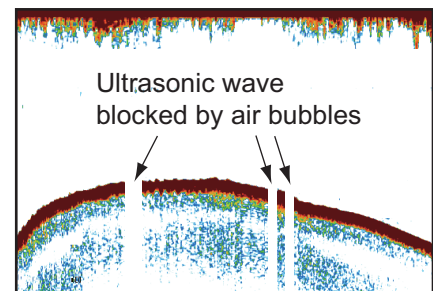
When two ocean currents of different speeds and directions meet, a current rip occurs. A current rip appears on the screen as shown in the right illustration.

**Surface noise**

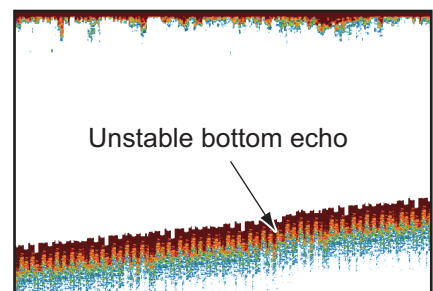
When the sea is rough or the ship moves over a wake, surface noise can appear at the top of the screen.

**Air bubbles in the water**

When the sea is rough or the ship makes a quick turn, there can be blank spots in the bottom echo (see the right illustration). These blank spots are caused by air bubbles which stop the movement of the sound wave. These air bubbles can occur with the low frequency ultrasonic waves.

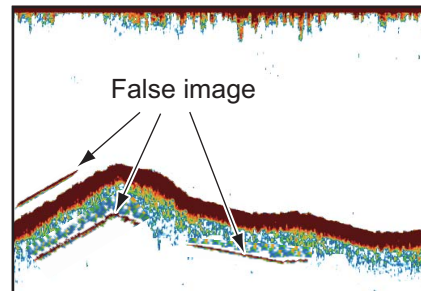
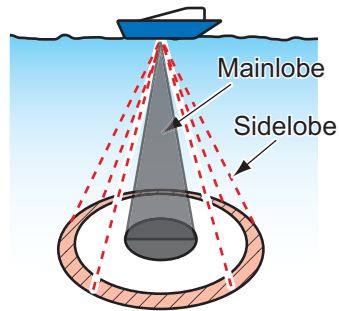
**Unstable bottom echo**

The bottom echoes can have a saw-tooth appearance. This occurs in heavy weather because pitching and rolling changes the direction of the ultrasonic pulses and the vertical motion of the ship causes the distance to the bottom to change.



False echo

When an ultrasonic pulse is transmitted, some energy leaves from each side of the beam. This energy has the name “sidelobe”. Echoes from sidelobes show on the screen as false images like in the illustration shown below.



8. FILE OPERATIONS

This chapter covers the file operations shown below, using SD cards.

- How to export points, routes and tracks
- How to import points, routes and tracks

Note 1: DO NOT remove the card while the SD drive is being accessed, to prevent loss of data or damage to the card.

Note 2: User setup items cannot be imported or exported between TZT9 and TZT14.

8.1 How to Format SD Cards

You do not need to format SD cards for use with the system. However, if you need to format a card to delete all data from the card, see section 1.5 "SD Cards".

8.2 Files Menu Operation

The [Files] menu of the main menu is where you import and export data.

The screenshot displays a software interface for file operations. At the top, there is a dropdown menu labeled 'Export File Format' with 'TZD' selected. Below this is a section titled 'Import/Export' containing four rows: 'Import Points & Routes' with an 'Import' button, 'Export All Points & Routes' with an 'Export' button, 'Import Tracks' with an 'Import' button, and 'Export Tracks' with an 'Export' button. The next section is 'Backup/Restore Settings', which includes 'BackUp Settings' with a 'Backup' button and 'Restore Settings' with a 'Restore' button. Below these is a 'Clone SD-Card' option with a 'Clone' button. The final section at the bottom is 'Clean Points, Routes & Tracks' with a 'Clean all' button. The interface has a dark blue background with a subtle pattern.

[Export File Format]: Select the file format to use to export data, among [TZD], [CSV], [GPX] or [KML].

[Import Points & Routes]: Import points and routes from an SD card. When you import points and routes from an SD card, all points and routes currently stored in the TZT unit are replaced with those on the SD card.

[Export All Points & Routes]: This unit holds 30,000 points and 200 routes in its internal memory. When the capacity for points or routes is reached, a new point or route cannot be entered unless an unnecessary point or route is erased. For those reasons, you may want to export all points and routes to an SD card.

[Import Tracks]: Import tracks from an SD card. When you import tracks from an SD card, all tracks currently stored in the TZT unit are replaced with those on the SD card.

[Export Tracks]: This unit holds 30,000 tracks in its internal memory. When the capacity for tracks is reached, a new track cannot be entered unless an unnecessary track is erased. For those reasons, you may want to export all tracks to an SD card.

[BackUp Settings]: Backup the settings to an SD card. This feature helps you set another multi-function display with the same settings on the SD card.

[Restore Settings]: Load the saved settings from an SD card to this unit.

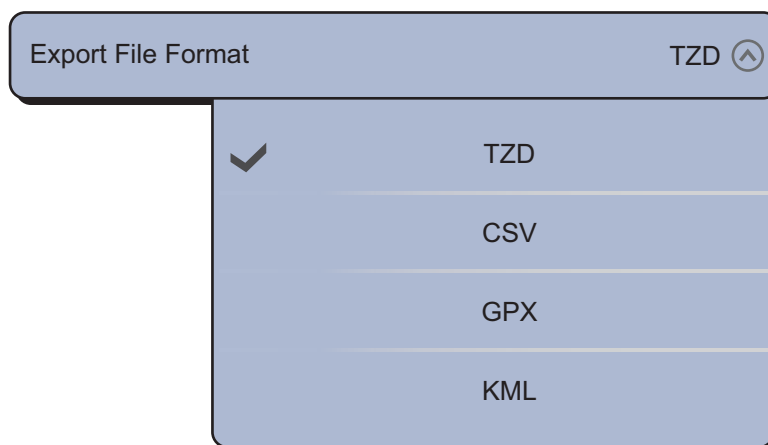
[Clone SD-Card]: Copy the data between SD cards.

[Clean Points, Routes & Tracks]: Delete all points, routes and tracks currently stored in the TZT unit.

8.3 File Format

You can select the file format to use to export data.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Files] - [Export File Format] menu.

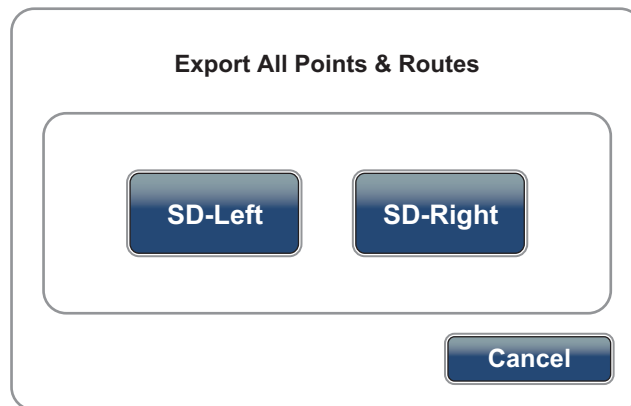


3. Select [TZD], [CSV], [GPX] or [KML].
[TZD]: For TZT series
[CSV]: For use with NavNet 3D series
[GPX]: For use with PC plotter
[KML]: For use with PC plotter
4. Select [Close] to exit the menu.

8.4 How to Export Points and Routes

When the capacity for point is reached, the oldest point is erased to clear space for new point. A new route cannot be entered when the memory for routes is full. If you need to save points and routes permanently, save them to an SD card.

1. Put a blank formatted SD card in the right card drive.
2. Select [Menu] on the menu icon bar to open the main menu.
3. Select [Files].
4. Select [Export All Points & Routes].

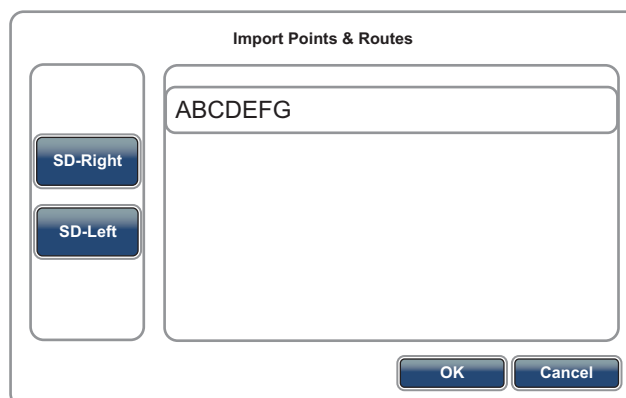


5. Select [SD-Right].
6. After the equipment has exported the data, select [Close] to exit the menu.

8.5 How to Import Points and Routes

You can import points and routes to the internal memory of a TZT unit. Use this feature to use the same data across the TZT network.

1. Put the correct SD card in either card drive.
2. Select [Menu] on the menu icon bar to open the main menu.
3. Select [Files].
4. Select [Import Points & Routes].
5. Select [SD-Right] or [SD-Left].



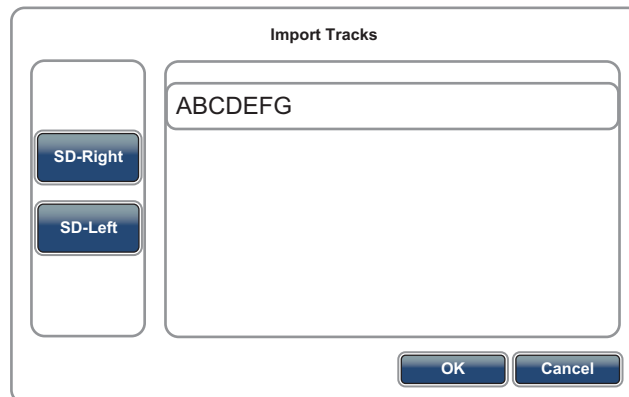
6. Select the data to import then select [OK].
7. After the equipment has imported the selected data, select [Close] to exit the menu.

8.6 How to Import or Export Tracks

How to import tracks

You can import tracks to the internal memory of a TZT unit.

1. Put the correct SD card in either card drive.
2. Select [Menu] on the menu icon bar to open the main menu.
3. Select [Files].
4. Select [Import Tracks].
5. Select [SD-Right] or [SD-Left].

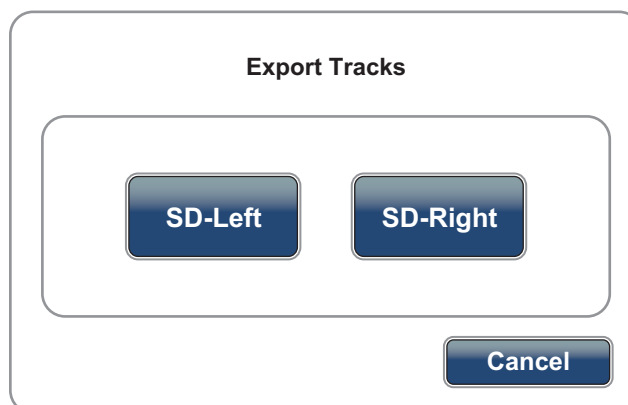


6. Select the data to import then select [OK].
7. After the equipment has imported the selected data, select [Close] to exit the menu.

How to export tracks

You can export tracks to an SD card.

1. Put a blank formatted SD card in the right card drive.
2. Select [Menu] on the menu icon bar to open the main menu.
3. Select [Files].
4. Select [Export Tracks].

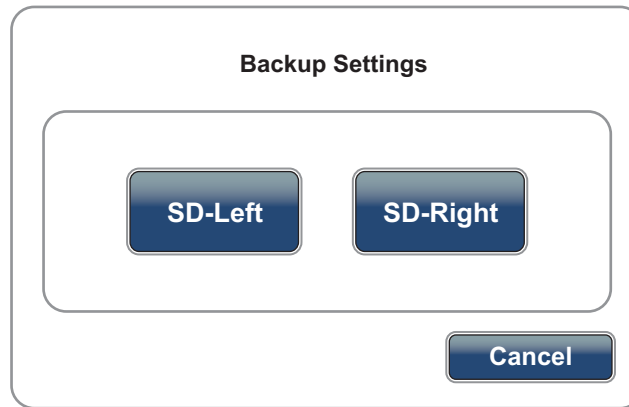


5. Select [SD-Right].
6. After the equipment has exported the data, select [Close] to exit the menu.

8.7 How to Backup the Equipment Settings

You can save the settings to an SD card to use the settings on other TZT units.

1. Put a blank formatted SD card in the right card drive.
2. Select [Menu] on the menu icon bar to open the main menu.
3. Select [Files].
4. Select [BackUp Settings].

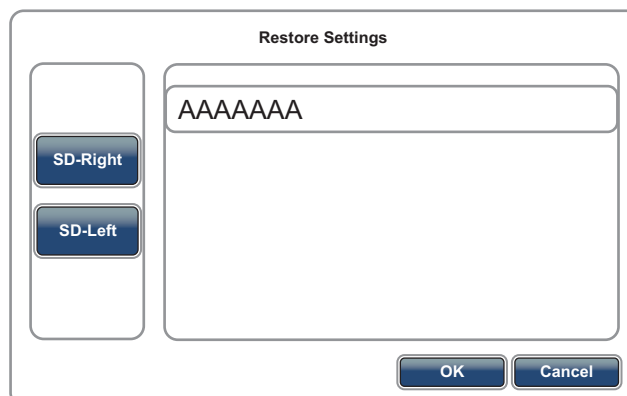


5. Select [SD-Right].
6. After the equipment has exported the settings, select [Close] to exit the menu.

8.8 How to Load the Equipment Settings

You can load the saved settings in an SD card to this unit.

1. Put the correct SD card in either card drive.
2. Select [Menu] on the menu icon bar to open the main menu.
3. Select [Files].
4. Select [Restore Settings].
5. Select [SD-Right] or [SD-Left].

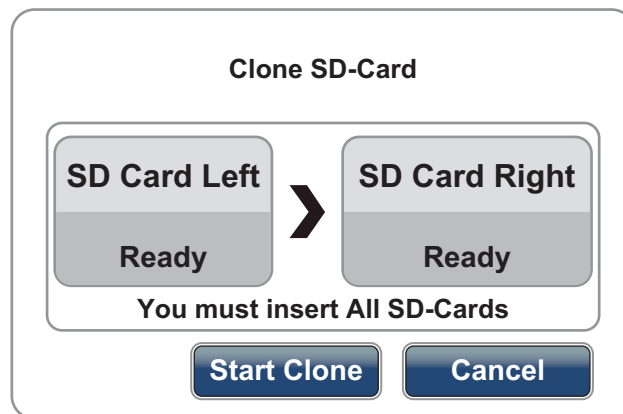


6. Select the settings to load then select [OK].
7. After the equipment has loaded the settings, select [Close] to exit the menu.

8.9 How to Copy the Equipment Settings

You can copy the data between SD cards.

1. Put the source SD card in the left card drive and the copy destination SD card in the right card drive.
2. Select [Menu] on the menu icon bar to open the main menu.
3. Select [Files].
4. Select [Clone SD-Card].

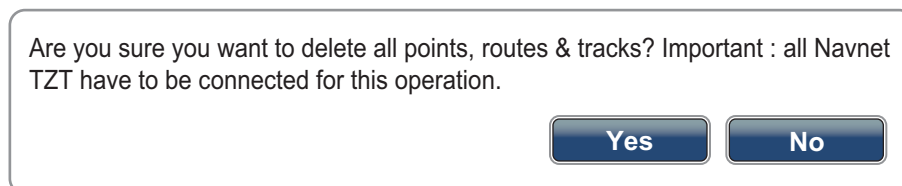


5. Select [Start Clone].
6. After the equipment has copied the data, select [Close] to exit the menu.

8.10 How to Delete Points, Routes and Tracks

You can delete all points, routes and tracks currently stored in a TZT unit.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Files].
3. Select [Clean Points, Routes & Tracks].



4. Select [Yes].
5. After the equipment has deleted the data, select [Close] to exit the menu.

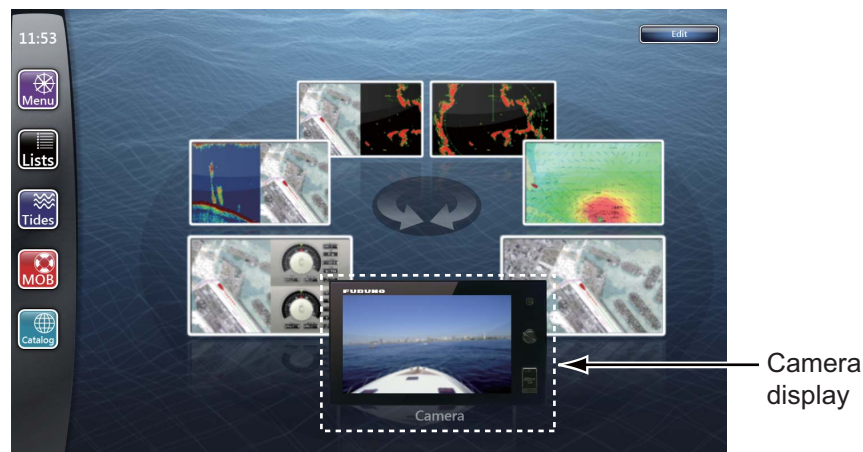
9. CAMERA/VIDEO

The camera/video function allows you to use your unit to play back images from a video player, on-board camera, network camera or DVD player. Network camera images can be seen across the TZT network. A video signal can be seen only on the TZT that receives the video signal.

You can also set the video application to show the display of each video in turns. Further, you can also adjust the brightness, contrast and color of each image.

9.1 How to Display a Video Image

The camera application is included in the default display selection window. Press the **Home** key to show the display selection window. Select the camera display to validate your selection.



9.2 Video Signal Type

There are four types of video signals connected to this equipment.

- Analog: Images from a video player, on-board camera or DVD player
- Digital (IP): Images from a network camera
- Axis Server 241Q: Images from an axis server 241Q. Available quad mode (Four images are displayed simultaneously).
- FLIR: Images from an infrared camera

9.3 How to Set the Video Display

9.3.1 How to select the input source

Select the input source from the RotoKey menu.

[Analog 1 (2)]: An analog signal

[IP 1 (2, 3, 4)]: A digital signal

[Quad]: All digital signals (maximum of four) from an axis server 241Q

[Input 1 (2, 3, 4)]: A digital signal from an axis server 241Q

[Quad 2]: All digital signals (maximum of four) from second axis server 241Q

[Input 1 (2, 3, 4)]: A digital signal from second axis server 241Q

Note: The default menu names are replaced with the nicknames set in the [Camera] menu. See paragraph 9.3.2.

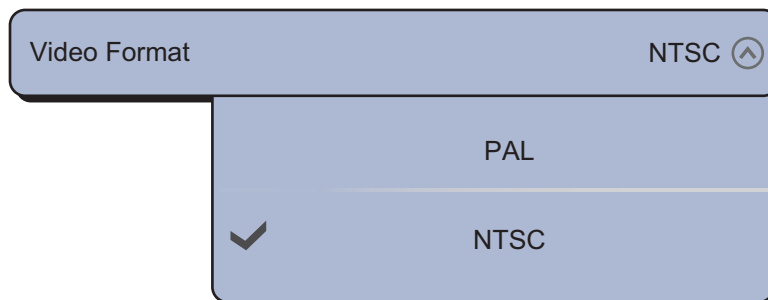
9.3.2 How to set each video signal

Analog camera

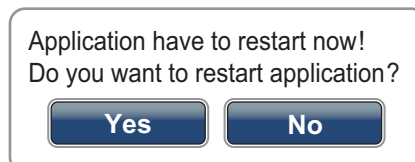
You can select video format for an analog camera and change its nickname. Select [Camera] - [Analog Camera 1] (or 2) of the main menu.



[Video Format]: Select the video format from [PAL] or [NTSC].



Note: The power must be reset to apply the setting. After you change the setting, the following message appears.



Select [Yes] to reset the power and apply the setting immediately, or select [No] to apply the setting at the next power on. The menu shows the new setting ([PAL] or [NTSC]) but change is not effected until the power is reset.

[NickName]: Enter (or change) the nickname (a maximum of 13 alphanumeric characters) with the software keyboard then select [Confirm].

IP camera

You can change the nickname and IP address for an IP camera. Also, you can turn on or off the PTZ (pan, tilt, zoom) function. Select [Camera] - [IP Camera 1] (or 2, 3, 4) of the main menu.

The screenshot shows a configuration window titled "IP Camera 1". It contains three rows of settings:

- NickName:** The value is "IP Camera 1" with a confirmation icon on the right.
- IP Camera:** The value is "172.31.200.3" with a confirmation icon on the right. There is a red "X" icon to the left of the label.
- PTZ Control:** Two buttons labeled "ON" and "OFF". The "ON" button is currently selected.

[NickName]: Enter (or change) the nickname (a maximum of 13 alphanumeric characters) with the software keyboard then select [Confirm].

[IP Camera]: Enter the IP address with the software keyboard then select [Confirm].

[PTZ Control]: Select the [ON] icon to turn on the PTZ function.

Axis Server 241Q

The axis server digitizes four analog video sources (IP cameras) and makes them available on the network. Two axis servers are available: [Axis Server 241Q] and [Second Axis Server 241Q]. Select [Camera] - [Axis Server 241Q] of the main menu.

The screenshot shows a configuration window titled "Axis Server 241Q". It contains several rows of settings:

- Server 241Q:** Two buttons labeled "ON" and "OFF". The "ON" button is currently selected.
- IP Server:** The value is "172.31.200.7" with a confirmation icon on the right. There is a red "X" icon to the left of the label.
- Quad Mode:** Two buttons labeled "ON" and "OFF". The "ON" button is currently selected.
- Input 1:** Two buttons labeled "ON" and "OFF". The "ON" button is currently selected.
- NickName Input 1:** The value is "Video 1" with a confirmation icon on the right.
- Input 2:** Two buttons labeled "ON" and "OFF". The "ON" button is currently selected.
- Input 3:** Two buttons labeled "ON" and "OFF". The "ON" button is currently selected.
- Input 4:** Two buttons labeled "ON" and "OFF". The "ON" button is currently selected.

← When selecting the [ON] icon in [Input 1], this menu item appears.

[Server 241Q]: Select the [ON] icon to receive the signal from an axis server 241Q.

[IP Server]: Enter the IP address with the software keyboard then select [Confirm].

[Quad Mode]: Select the [ON] icon to display the four images from an axis server 241Q simultaneously.

[Input 1] (or 2, 3, 4): Select the [ON] icon to receive each signal from an axis server 241Q.

[NickName Input 1] (or 2, 3, 4): Enter (or change) the nickname (a maximum of 13 alphanumeric characters) with the software keyboard then select [Confirm].

FLIR camera

Images from an infrared camera allow you to navigate easily at night or in bad weather. Select [Camera] - [FLIR Installation] of the main menu.

FLIR Installation	
Scan IP	<input type="button" value="Scan"/>
✓ FLIR IP	255.255.255.255 <input type="button" value="Keyboard"/>
Video Source	NickName Camera 1
Camera Offset (Right-left)	+0.0 ° <input type="button" value="Keyboard"/>
Camera Offset (Up-Down)	+0.0 ° <input type="button" value="Keyboard"/>
Automatic Zoom	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>
Zoom Distance	300 ft <input type="button" value="Keyboard"/>
Camera Altitude	300 ft <input type="button" value="Keyboard"/>
Automatic Lock On Active Waypoint	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>
Automatic Lock On MOB	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>

[Scan IP]: Select the [Scan] icon to scan the IP address automatically when connecting an FLIR camera.

[FLIR IP]: Enter the IP address manually with the software keyboard then select [Confirm].

[Video Source]: Select the input source for an FLIR.

[Camera Offset (Right-left)]: Adjust the side position of an FLIR camera.

[Camera Offset (Up-Down)]: Adjust the up-and down position of an FLIR camera.

[Automatic Zoom]: Select the [ON] icon to turn on the automatic zoom.

[Zoom Distance]: Set the distance to zoom automatically.

[Camera Altitude]: Set the altitude for an FLIR camera.

[Automatic Lock On Active Waypoint]: Select the [ON] icon to automatically track the point currently set as a go to point.

[Automatic Lock ON MOB]: Select the [ON] icon to automatically track the MOB position.

9.3.3 How to cycle your video inputs

You can browse all the images that you receive. Use this feature to monitor the area around your ship, engine room, etc. with an on-board camera.

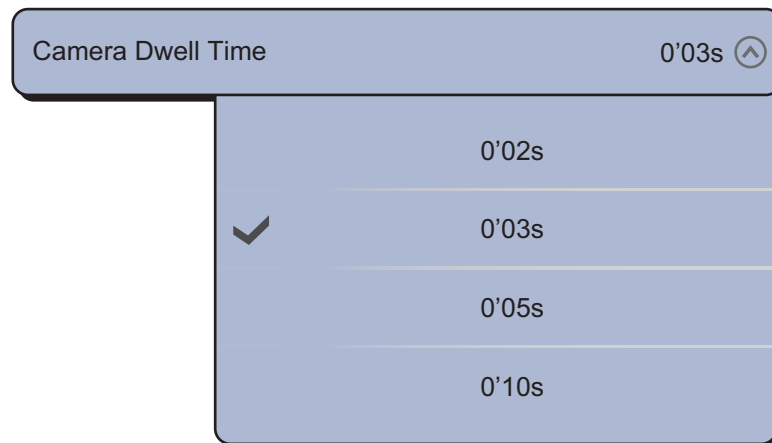
1. Select [Cycle Config.] from the RotoKey menu.
2. Select a menu item of an image which you want to display.

3. Repeat steps 1 and 2 to select all menu items which you want to display.
4. Select [Cycle] from the RotoKey menu.

9.3.4 How to set the dwell time

You can set the amount of time to show each video input before switching to the next.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [General] - [Camera Dwell Time] menu.



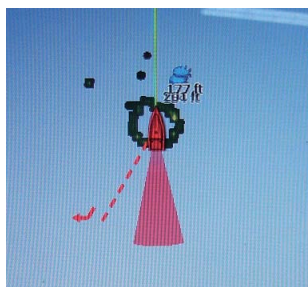
3. Select a dwell time.
4. Select [Close] to exit the menu.

9.4 Pop-up Menus by a FLIR Camera

[Camera FoV] menu

You can display the field of view by a FLIR camera on the plotter display.

1. Select the boat icon to display the pop-up menu.
2. Select [Camera FoV]. The circular sector in translucent red appears on the screen.

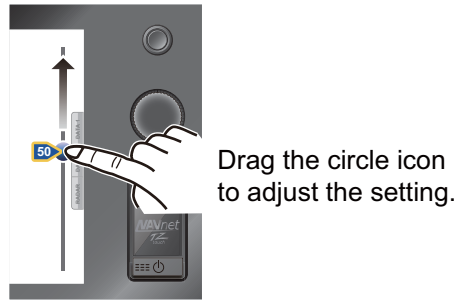


[Move Camera] and [Lock Camera] menus

You can rotate a FLIR camera about the position you select (touch) on the plotter or radar display. Select [Lock Camera] from the RotoKey menu. To track the position, select [Move Camera] from the RotoKey menu.





9.5 How to Adjust the Video Image

- 1. Select [Contrast] or [Brightness] from the RotoKey menu.
- 2. Drag the circle icon to adjust the setting (see the figure below).

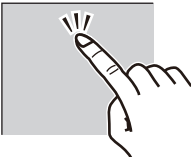


9.6 Touch Control on the Camera Display

Analog and Axis Server 241Q

Operation		Function
Tap		During zoom mode, center the position tapped.
Drag		Scroll the camera image to the dragged direction.
Pinch	<div> Zoom in</div> <div> Zoom out</div>	Zoom in or out the camera image.

FLIR

Operation		Function
Tap		During zoom mode, center the position tapped.

10. INSTRUMENT DISPLAY

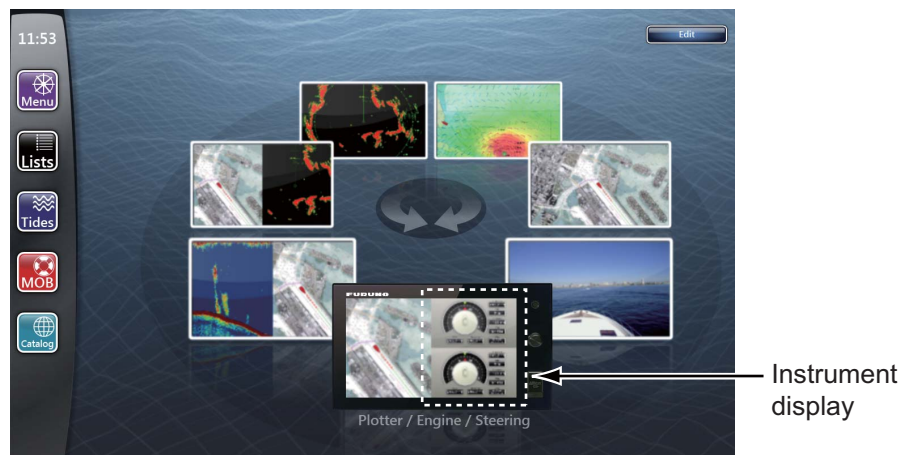
The instrument display gives you the following navigation and environment displays:

- Steering
- Engine
- Tank level (fuel)
- Weather
- Wind

The instrument display can be programmed to a full screen or three-way split screen. In the full screen, four displays are shown at the same time. The size of any instrument display is fixed to the 1/4 screen.

10.1 How to Show the Instrument Display

Set the instrument display referring to section 13.2 then display the (combination) screen which contains the instrument display.



10.2 How to Select an Instrument Display

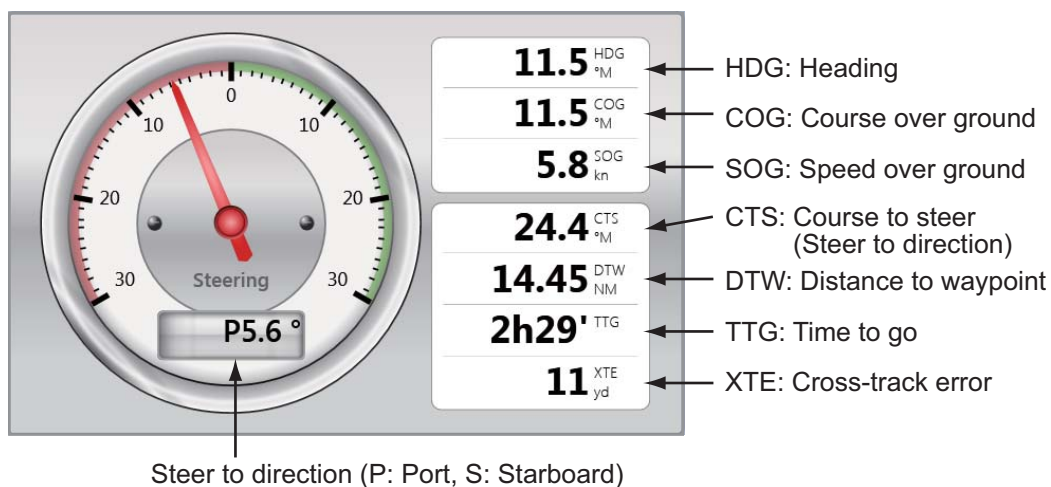
You can show steering, engine, tank level, weather or wind data in the instrument display if you have the related sensors. Select the data to display as follows:

1. Select the instrument display to activate. A orange line is displayed on the top of the selected instrument display.
2. Select a menu item from the RotoKey menu or the pop-up menu. (The options are the same in both the RotoKey and pop-up menus.) The data for the selected menu item is displayed. (See page 13-7 for the menu items.)

10.3 Instrument Displays

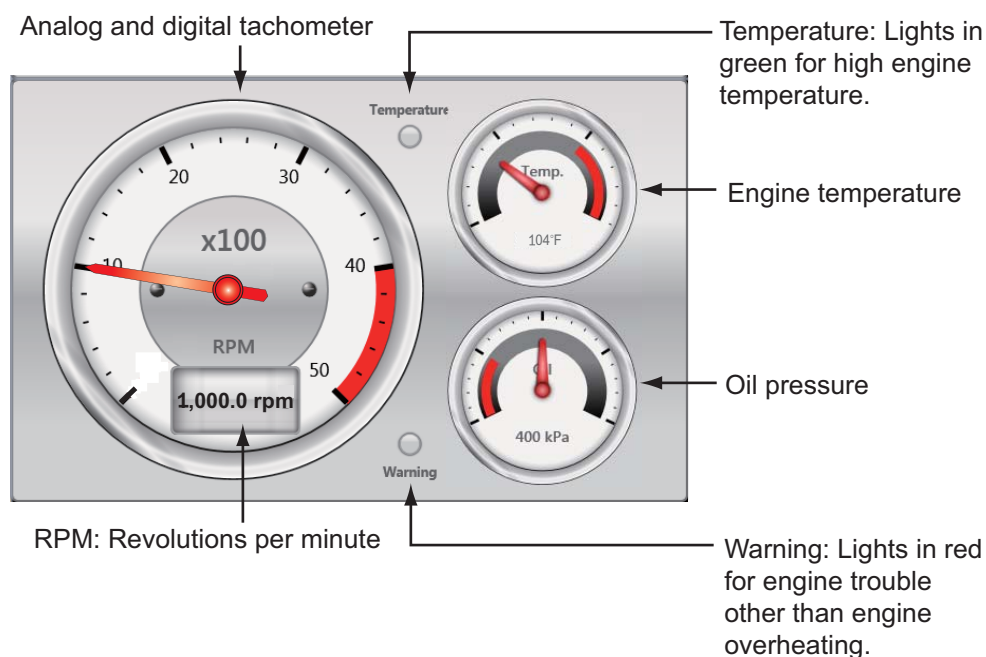
10.3.1 Steering Display

The steering display provides the analog and digital indications shown below.



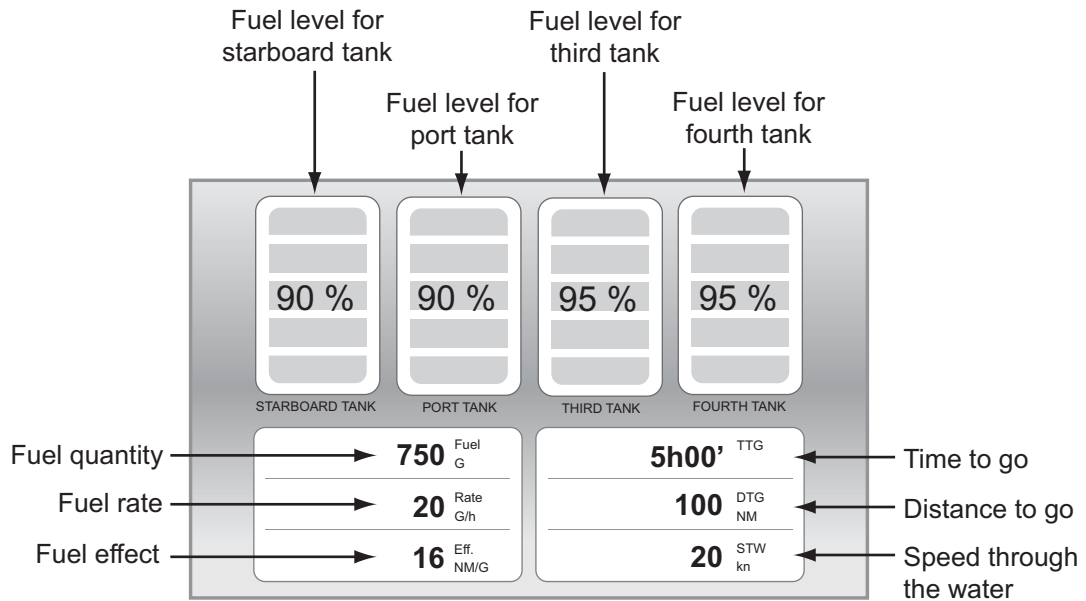
10.3.2 Engine display

The engine must output engine data in NMEA 2000 format to show the engine data. The data for a maximum of four engines can be displayed.



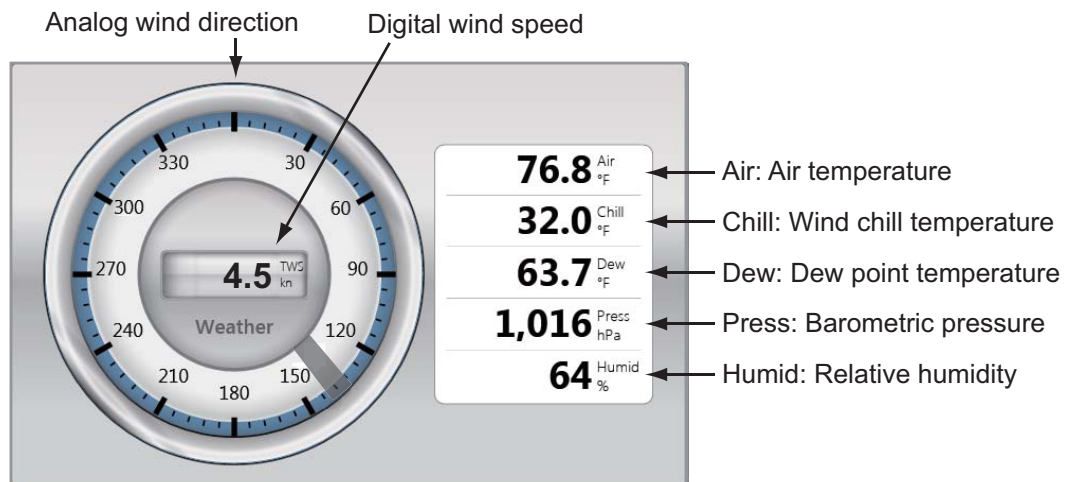
10.3.3 Tank level display

The tank level display provides the digital indications shown below. The data for a maximum of four tank levels can be displayed.



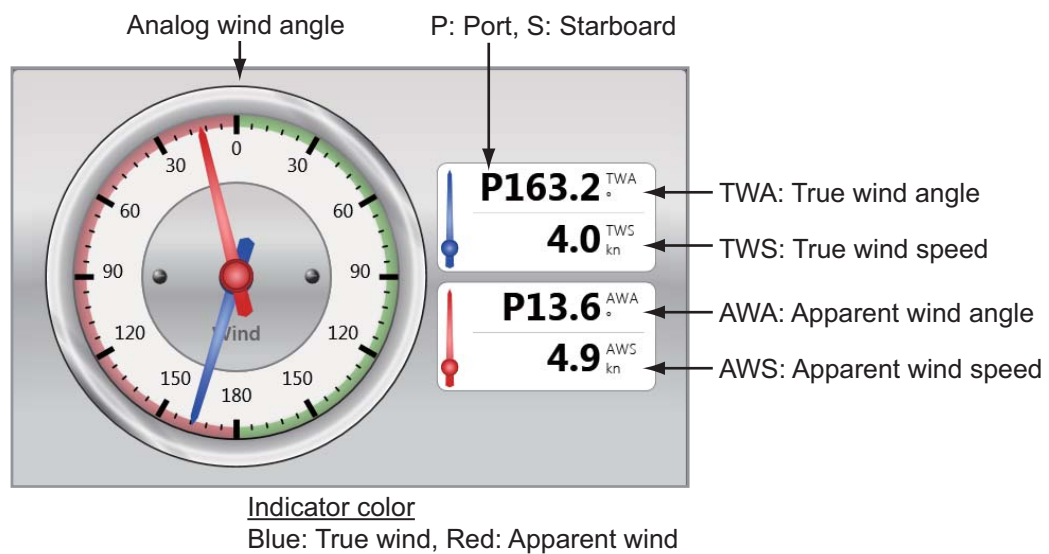
10.3.4 Weather display

The weather display provides the analog and digital indications shown below.



10.3.5 Wind display

The wind display provides digital and analog indications of wind speed and angle.



11. WEATHER

This TZT provides the weather informations (Sirius (only U.S.) and NavCenter (world-wide)). When connected to the Sirius Weather Receiver BBWX2, the weather radar information can be displayed.

Sirius weather receiver

- Purchase the Sirius Weather Receiver BBWX2.
- Purchase a Sirius weather service subscription. Contact Sirius Satellite Radio INC., for additional information.
- Connect the BBWX2 and the TZT displays then turn on both of those units. Your TZT then receives WX data from the BBWX2, which takes approximately 30 minutes.
- During the installation of the equipment, the Installation Wizard checks if the BBWX2 is connected to the TZT. If the TZT cannot find the BBWX2, check the connections between the two units.

11.1 Weather Display Introduction

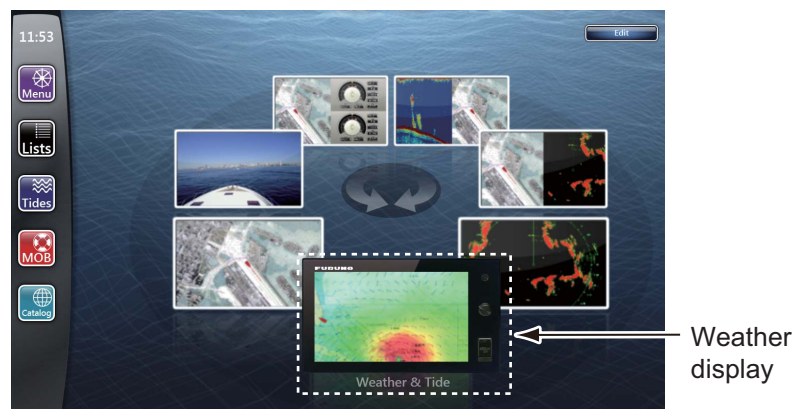
This TZT displays the current and forecasted weather information for your area. The weather information is updated in real time so that you have current weather information for your area and any area in the U.S.

Information provided by the Sirius Marine Weather service is advisory in nature. You, the customer, agree to release FURUNO ELECTRIC CO., LTD., Sirius Satellite Radio Inc., Navcast Inc. and WSI Corporation from any problems that occur from this service. And you acknowledge that you have read the conditions of your subscription agreement and agree to all the conditions of the subscription. If you do not have the subscription agreement, got to www.sirius.com/marineweatheragreement or call 1-800-869-5480 to have a copy sent to you.

You can put a point from the RotoKey menu ([New Point]) on the weather display.

How to select the weather display

The weather display is overlaid on the 2D display. Select the weather display on the display selection window.

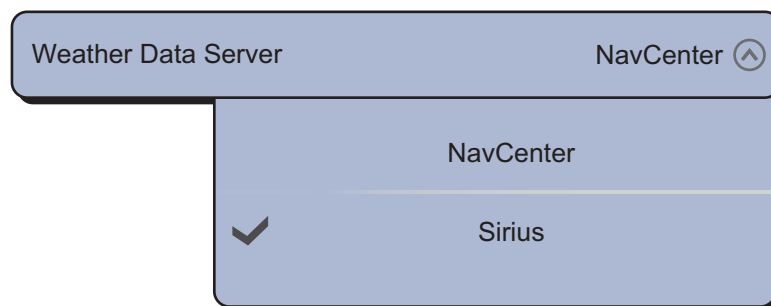


11.2 NavCenter Weather

You can download the NavCenter data from the internet via Wireless LAN. See section 1.21 for how to connect to the internet.

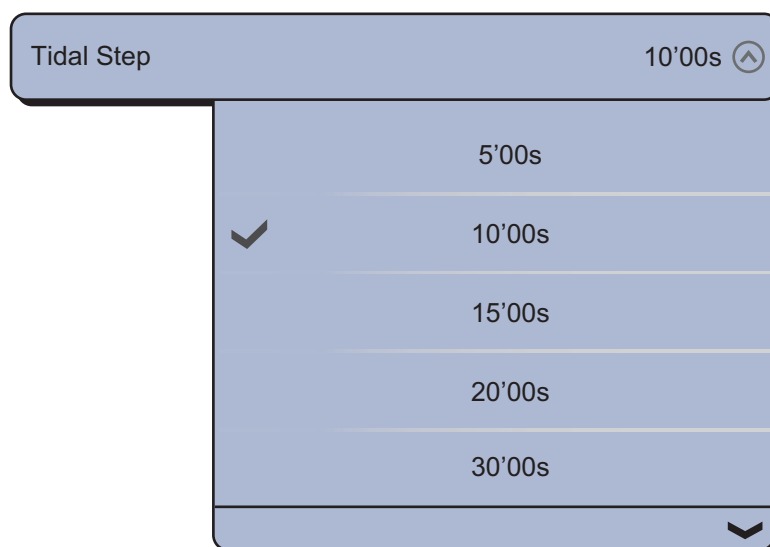
11.2.1 Pre-settings

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Weather].
3. Select [Weather Data Server].



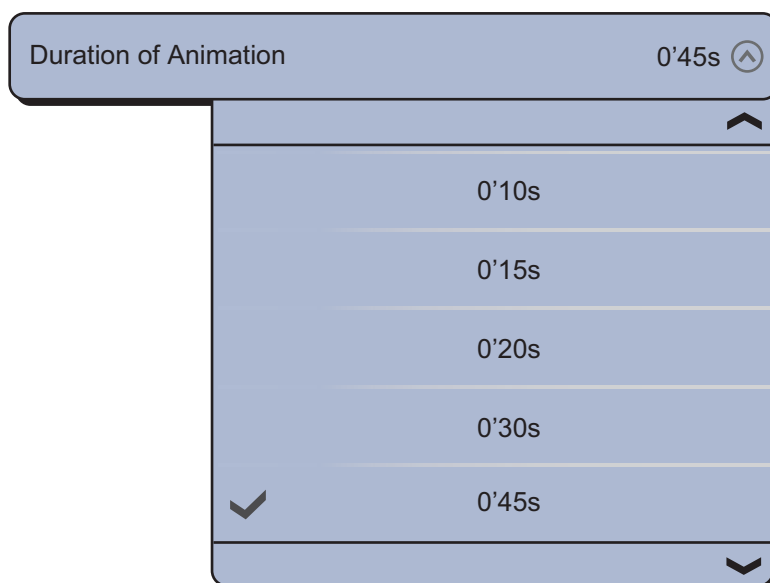
Note: The option [Sirius] appears when connecting BBWX2.

4. Select [NavCenter].
5. Select [Tidal Step].



6. Select the update interval (which determines how often tidal data are captured) for the tide icon.

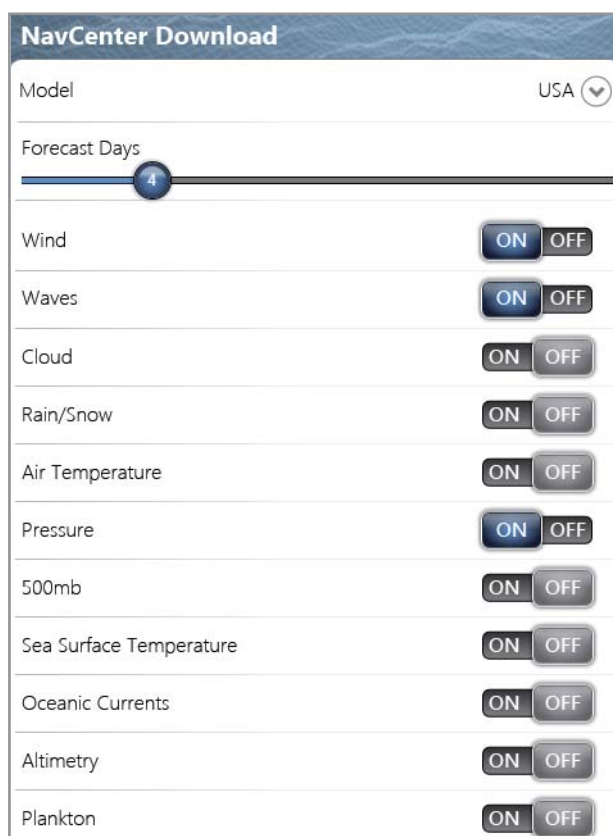
7. Select [Duration of Animation].



8. Select the update interval for the animation. The larger the time, the slower the animation moves.

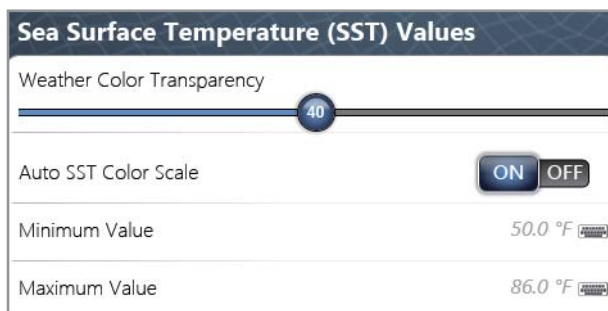
11.2.2 How to download the NavCenter data

1. Select [General] of the main menu.
2. Select [Wireless LAN Settings].
3. Select the [ON] icon in [Wireless].
4. After the internet connection is established, select [Close] to close the [Wireless LAN settings] window.
5. Select [Weather] of the main menu to set how many days' data and which data to download in [NavCenter Download].
6. Select the data model from [Model]. (The options are [USA] and [Worldwide].)
7. Drag the circle icon in [Forecast Days] to select how many days' data to download.
8. Select the [ON] or [OFF] icon for each weather item as appropriate.



11. WEATHER

9. If you selected [ON] for [Sea Surface Temperature], set the following menu items.



[Weather Color Transparency]: Adjust the degree of transparency for the weather overlay. Use a large figure to increase the degree of transparency.

[Auto SST Color Scale]: Activate this feature to adjust the SST color scale automatically according to the sea surface temperature.

[Minimum Value]: Set the minimum value for the SST color when [Auto SST Color Scale] is deactivated.

[Maximum Value]: Set the maximum value for the SST color when [Auto SST Color Scale] is deactivated.

10. Select [Close] to exit the menu.

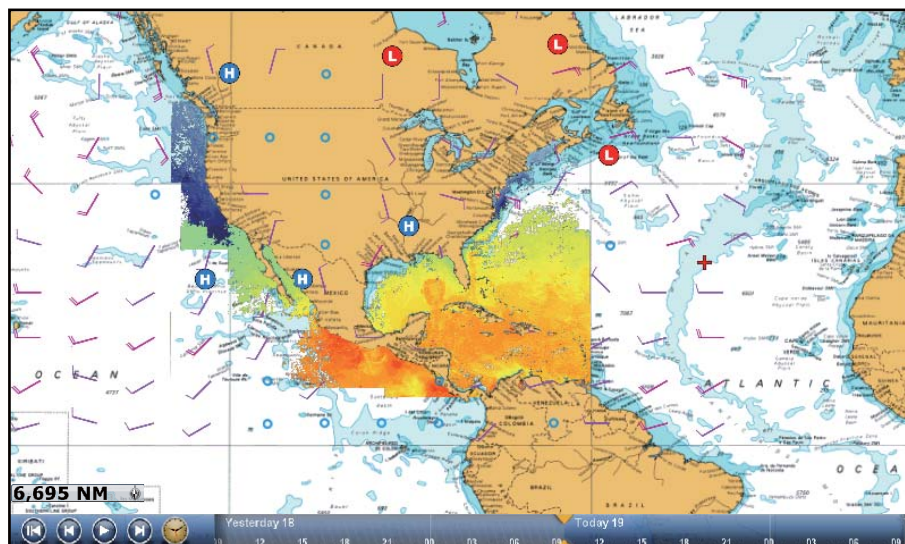
11. Select [Get Latest Wx] from the RotoKey menu on the weather display. The following dialogue boxes appear in order.



When the download is finished, the above dialogue box disappears and the unit beeps.

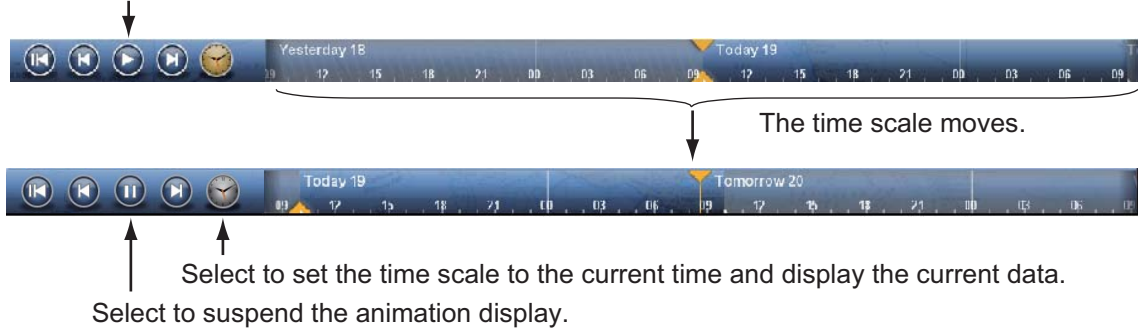
11.2.3 How to display the NavCenter data

The NavCenter data display provides forecast data that includes [Wind], [Waves], [SST] (sea surface temperature), [Cloud], [Rain], [Pressure], [500mb], [Air Temp], [Currents], [Altimetry], [Plankton].



1. Select [Wx Data] from the RotoKey menu on the weather display.
2. Select a menu item to display its data.
3. Repeat steps 1 and 2 to select all menu items desired.
4. Select [Anim Forecast] from the RotoKey menu. The animation forecast is displayed for a specified-day period. To stop the animation display, select [End Anim] at the top right-hand corner of the screen.
You can operate the animation display with the animation bar at the bottom of the screen.

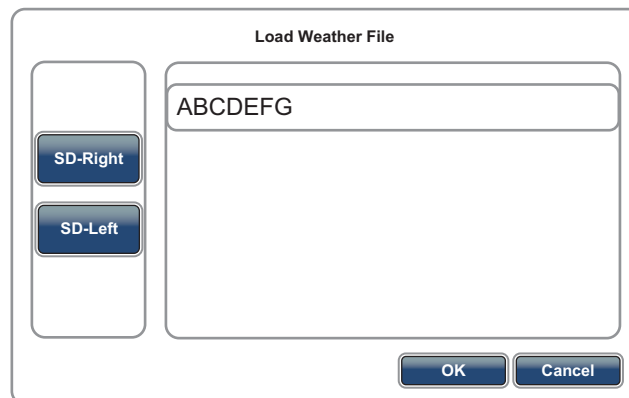
Select to start or restart the animation display.



11.2.4 How to load a weather file

You can load a weather file saved on an SD card.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Weather].
3. Select [Load Weather File].
4. Select [SD-Right] or [SD-Left].



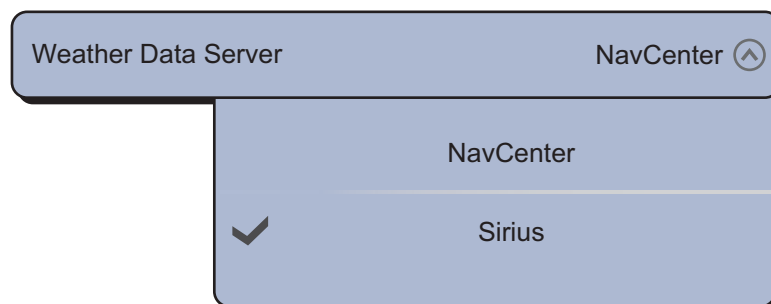
5. Select the data to load then select [OK].
6. After the equipment has loaded the selected data, select [Close] to exit the menu.

11.3 Sirius Weather

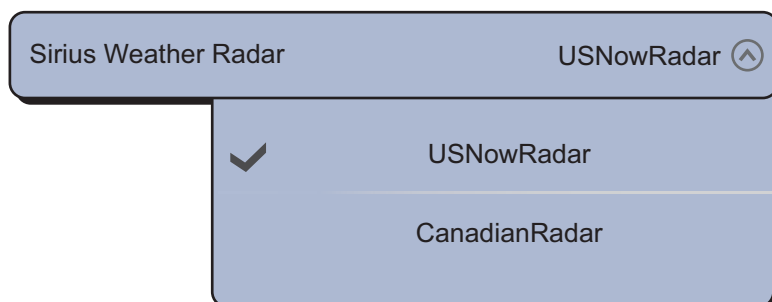
Sirius weather radar information and advanced weather information are available in North America with connection of the Sirius Weather Receiver BBWX2.

11.3.1 Pre-settings

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Weather].
3. Select [Weather Data Server].



4. Select [Sirius].
5. Select [Sirius Weather Radar].



6. Select the sirius weather radar to use, [USNowRadar] (USA) or [CanadianRadar] (Canada). [USNowRadar] shows the type and level of precipitation. The amount of precipitation increases with level.

Precipitation indication on USNowRadar.

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 CanadianRadar

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

7. Select [Close] to exit the menu.

11.3.2 How to display the Sirius data

[Wx Radar] (Weather radar)

NOWRAD and Canadian weather radar information are put on your chart (see paragraph 11.3.1). This display lets you see possible storm fronts to help you identify the clouds from possible sea clutter. To display the weather radar, select [Wx Radar] from the RotoKey menu.



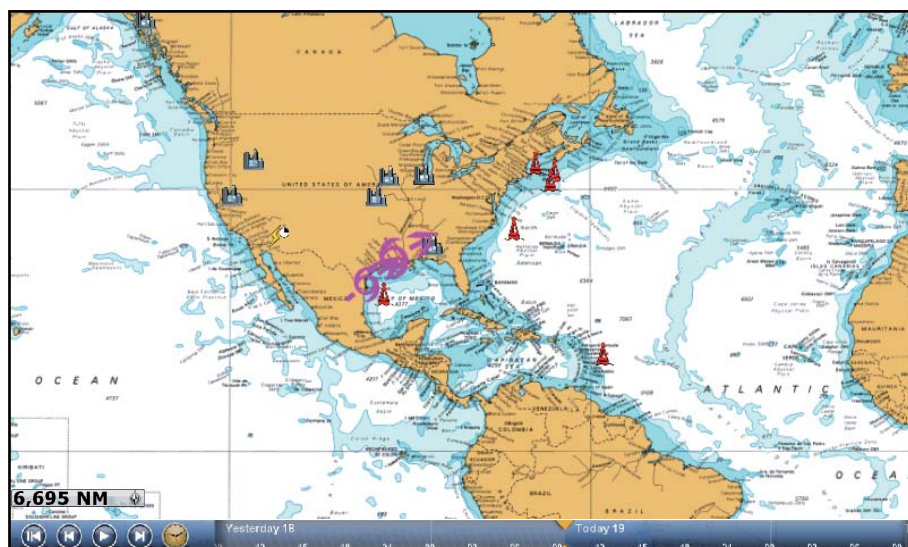
[Adv Wx Data] (Advanced weather)

The advanced weather display provides the weather data; [Buoys], [City], [Storm], [Lighting] or [Storm Tracks]. For the icons of these data, see section 11.4.

1. Select [Adv Wx Data] from the RotoKey menu.
2. Select a menu item to display its data.

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3. Repeat steps 1 and 2 to select all menu items desired.



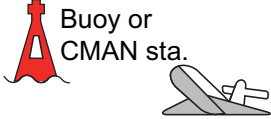






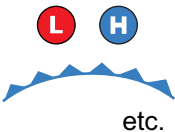
[Anim Radar] (Animation radar)

The animation radar display provides the past weather radar information. To show the animation radar display, select [Anim Radar] from the RotoKey menu. To stop the animation display, select [End Anim] at the top right-hand corner of the screen.

11.4 Weather Icons (Sirius Weather)

The table below shows the weather icons that appear on the Sirius weather display. You can show or hide these icons from the RotoKey menu.

Icon	Meaning
	Storm cast
	Lightning
	Surface observation stations
	Wind
	City
	Currents

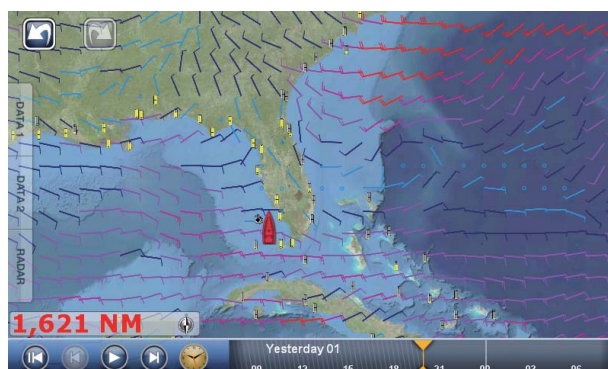
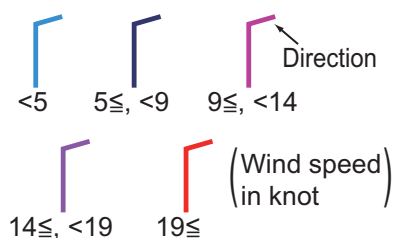
Icon	Meaning
	Storm tracks
	Surface pressure

11.5 Weather Data (NavCenter or Sirius)

The table below shows the weather data available for displaying according to weather data server (NavCenter or Sirius).

Items	NavCenter	Sirius	Item	NavCenter	Sirius
Wind	Yes	Yes	Currents	Yes	No
Waves	Yes	Yes	Altimetry	Yes	No
SST	Yes	Yes	Plankton	Yes	No
Cloud	Yes	No	Buoys	No	Yes
Rain	Yes	No	City	No	Yes
Pressure	Yes	Yes	Storm	No	Yes
500mb	Yes	No	Lightning	No	Yes
Air Temp	Yes	No	Storm Tracks	No	Yes

[Wind]: The wind forecast displays the wind speed by color. The bar at the top points in the wind direction.



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[Waves]: The waves forecast displays wave height with color. 0 foot (minimum) is displayed in light blue, 35 feet (maximum) in red.



[SST] (Sea surface temperature): This data layer shows the temperature of the sea surface in shades. Lower temperatures are in dark blue, higher in red.



[Cloud]: The cloud forecast displays cloud images. 8% of cloud amount (minimum) is displayed in white, 100% (maximum) in black. The cloud amount under 8% is transparent.













[Rain]: The rain forecast displays rain images. 0.1 mm/hour of rain-fall (minimum) is displayed in green, 5 mm/hour (maximum) in dark violet.

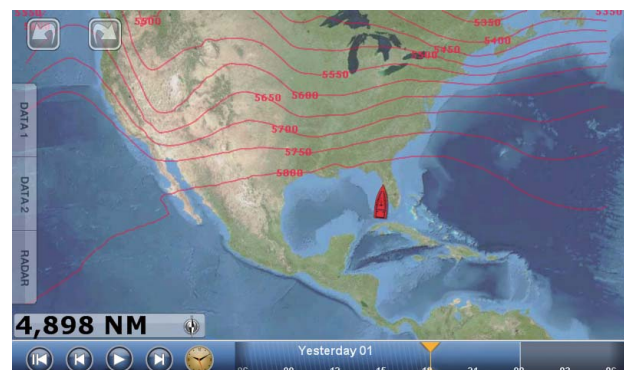


[Pressure]: The pressure forecast displays surface pressure.



Pressure icon	Meaning
	High pressure
	Low pressure
	Warm front
	Cold front
	Occluded front
	Stationary front
	Trough
	Squall line
	Dry line
	Isobars

[500mb]: The 500mb forecast displays the contour lines over 500 mb.

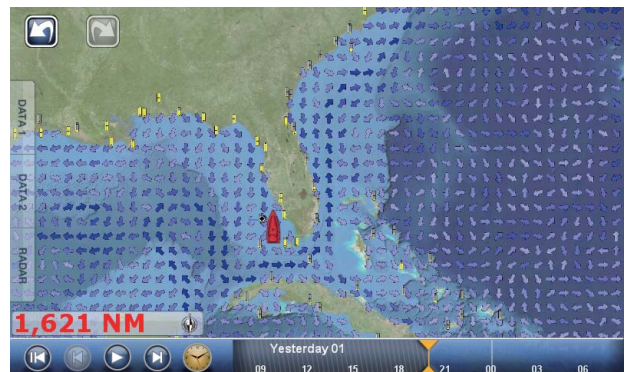


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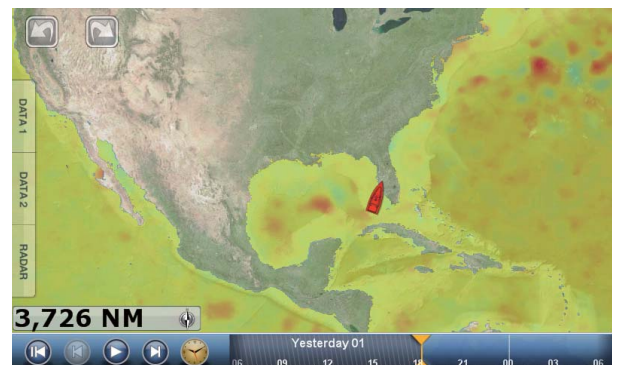
[Air Temp]: The air temp forecast displays the air temperature by color. -45°C (-49°F) (minimum) is displayed in dark violet, 45°C (113°F) (maximum) is displayed in red.



[Currents]: The current forecast displays the tidal current speed and direction by blue arrow. The darker the blue, the faster the current speed (0 to 2 kn).



[Altimetry]: The altimetry forecast displays the sea height anomalies by color. The large anomalies are displayed in red, smaller ones in light green.




[Plankton]: The plankton forecast displays the plankton growth in tones of green. The darker the green, the greater the density of plankton.


[Buoys]: You can check the marine observations and the information of buoys.

Select a buoy icon () to display the buoy information.



[City]: The city weather forecasts are available where city icons are shown. Select a city icon () to display the city information.






[Storm]: The storm cast icon () shows the direction and speed of a storm when the icon is selected.






[Lightning]: The lightning icons show where lightning has hit, within the last 5, 10 and 15 minutes. The fill color of the icon indicates when the lightning hit occurred. The number of lightning bolt markers indicates the number of times lightning has hit. To find lightning information, select a lightning icon.



Lightning icons	Meaning
	Last 0-5 min. (orange)
	Last 5-10 min. (medium yellow)
	Last 10-15 min. (Light yellow)

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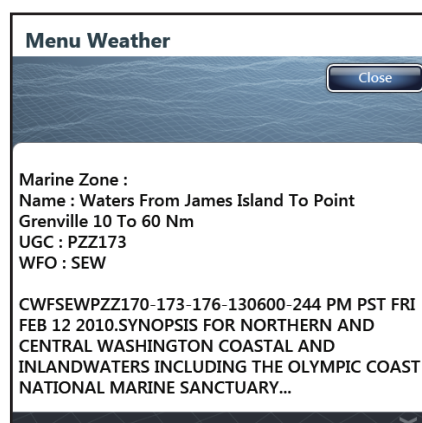
[Storm Tracks]: The storm track icons show major storms in your area. These storms include tropical disturbances, depressions, storms and cyclones, hurricanes, typhoons and super typhoons. These symbols are displayed in three different colors: gray (historical), red (current), and orange (forecast).

Storm track icons	Meaning
	Hurricane (Category 1-5)
	Tropical storm
	Tropical disturbance, Tropical depression

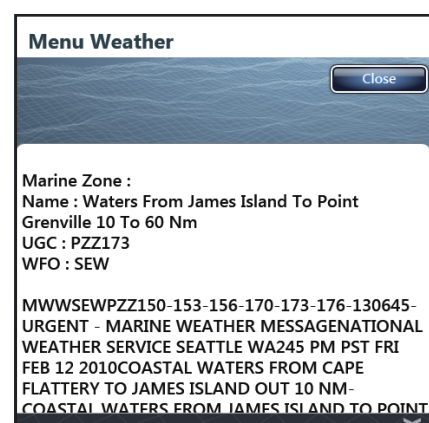
11.6 Weather Reports

Marine zone forecasts, marine warnings, tropical information and sirius diagnostic are sent to your TZT.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Weather].
3. Select [Zone Forecast], [Marine Warnings], [Tropical Infos] or [Sirius Diagnostic].



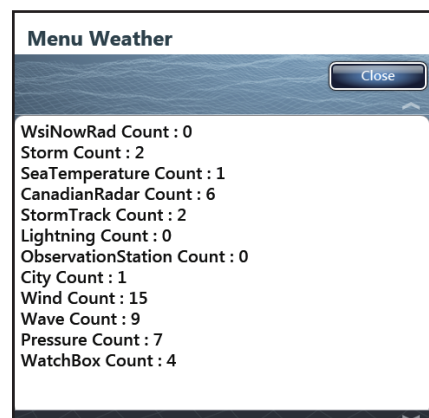
Zone forecast



Marine Warnings



Tropical Infos



Sirius Diagnostic

4. Select [Close] to exit the menu.

12. AUTOMATIC IDENTIFICATION SYSTEM (AIS)

12.1 AIS Introduction

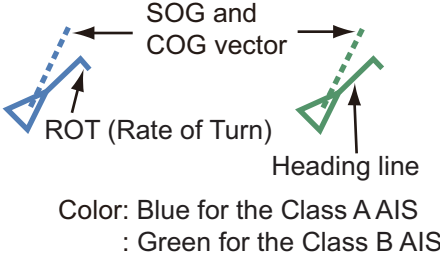

AIS is a system that continuously transmits the identification and position of your ship to other nearby ships. All such ships also receive data from other AIS equipped ships and display their positions and other relevant information. The AIS broadcasts this information over a VHF transceiver. Data include:

- Position
- Name of ship
- Course over ground
- Position of position-fixing equipment
- Heading
- Call sign
- Speed over ground
- Name of position-fixing equipment
- Rate of turn


12.2 How to Show or Hide the AIS Symbols

1. On the radar display or chart plotter display, select [Targets] from the RotoKey menu.
2. To show the AIS symbols, select [AIS/DSC]. To hide the AIS symbols, deselect [AIS/DSC].





12.3 AIS Target Symbols

Target type	Symbol	Description
Activated AIS target	 Color: Blue for the Class A AIS : Green for the Class B AIS	COG is marked on the symbol with a dotted line.
Dangerous AIS target	 Color: Red	The target whose values for both CPA and TCPA are smaller than [CPA Alarm Value] and [TCPA Alarm Value], which are set in [Targets] of the main menu, is indicated as a dangerous target.

12. AUTOMATIC IDENTIFICATION SYSTEM (AIS)

Target type	Symbol	Description
Lost AIS target	 Color - AIS target: Blue for the Class A AIS : Green for the Class B AIS - Cross: Red	An AIS target becomes a lost target if a signal is not received from the AIS target for x* minutes. The lost target symbol is erased if a signal is not received for an additional x* minutes. *: The time depends on the AIS transponder. Check the operator's manual for your AIS transponder for information about lost targets.

Other AIS symbols that may appear are shown in the table below.

Symbol	Meaning
	AtoN
	Base Station
	Aircraft
	SART

12.4 Proximity AIS Target Alarm

When an AIS target is within the distance set, the alarm indication "Proximity AIS Alarm" appears in the status bar and flashes and the audio alarm sounds. (See paragraph 2.10.7).

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Targets].
3. To activate the alarm, select the [ON] icon in [Proximity AIS Target Alarm]. To deactivate the alarm, select the [OFF] icon.



4. Select [Proximity AIS Target Alarm Value] to open the software keyboard.

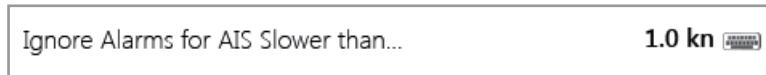


5. Set the alarm value then select [Confirm].
6. Select [Close] to exit the menu.

12.5 How to Ignore the AIS Targets

In the default setting, all AIS targets within 12 NM* from your ship are shown on the display. Slow-moving targets within the AIS proximity alarm range cause frequent violation of the alarm. You can prevent this frequent violation if you ignore targets within the alarm range that are slower than the value you set.

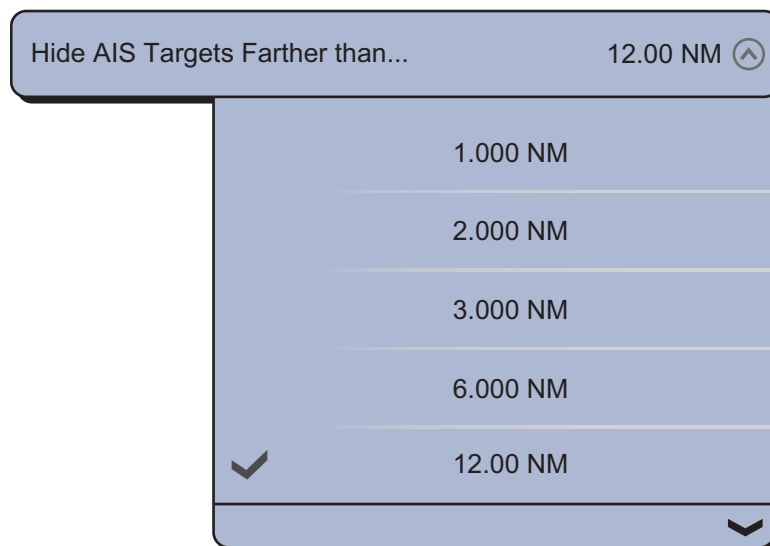
1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Targets] - [Ignore Alarms for AIS Slower than...] menu to open the software keyboard. This menu item prevents frequent violation of the AIS proximity alarm against AIS targets that are slower than the value set here.



3. Set a speed then select [Confirm]. The setting range is 0.0 - 9.9 (knots).
4. Select [Close] to exit the menu.

*: You can change this value. You can hide the AIS symbols that are beyond the distance you set here.

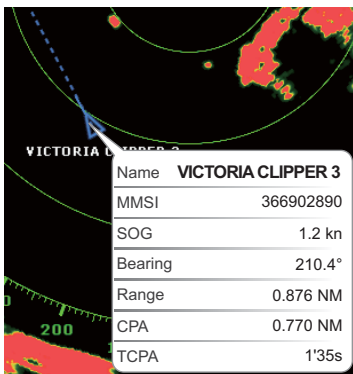
1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Targets] - [Hide AIS Targets Farther than...] menu.



3. Select a distance. Targets at a distance greater than set here are not shown on the screen.
4. Select [Close] to exit the menu.

12.6 How to Display the Target Data

Select an AIS target to display the simple information. To get the detailed information, select an AIS target to display the pop-up menu then select [Info]. The detailed information display can also be shown by selecting the simple information display.



Name	VICTORIA CLIPPER 3
MMSI	366902890
SOG	1.2 kn
Bearing	210.4°
Range	0.876 NM
CPA	0.770 NM
TCPA	1'35s

Simple information

Target Info	
Nickname	
Name	VIVTORIA 3
MMSI	366902890
Call Sign	WYX2158
COG	263.4°
SOG	0.0 kn
CPA	0.770 NM
TCPA	1'35s
Range	0.876 NM
Bearing	210.4°
Destination	WSF TERMINAL
Vessel Type	Passenger ships - All ships of this type
Vessel Status	0: Under Way Using Engine
Heading	294.0°
ROT	+0.0°/m
Status	Tracking
Time	0'00s
Vessel Length	800 ft
Vessel Width	120 ft
Danger	
Position	N 47°47.692'; W122°29.653'

Detailed information

12.7 How to Show and Hide the Target IDs

You can show or hide the target ID of AIS targets.

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Targets].
3. Select the [ON] or [OFF] icon in [Display Target IDs].

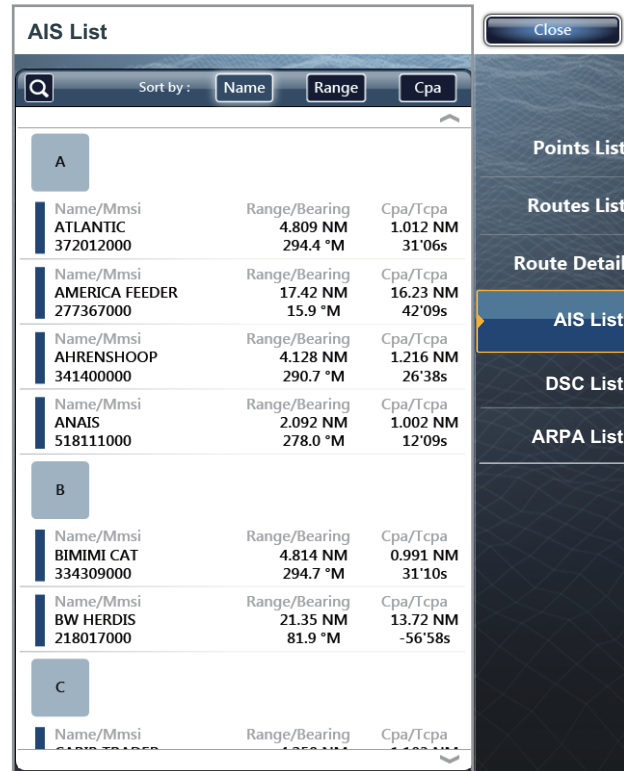


4. Select [Close] to exit the menu.

12.8 AIS List

How to open the AIS list

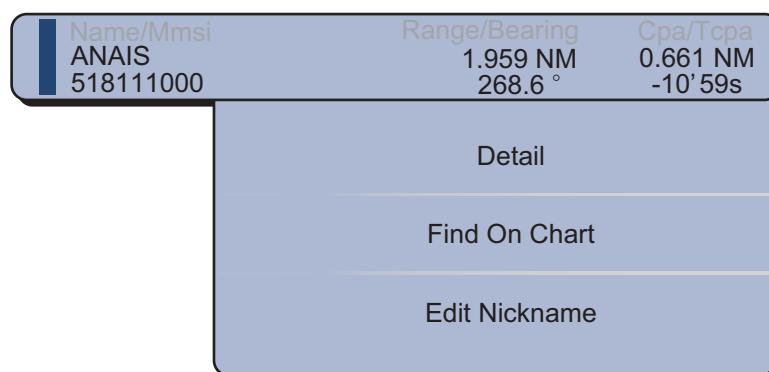
1. Select [Lists] on the menu icon bar to open the lists menu.
2. Select [AIS List].



The data for the AIS dangerous targets are displayed in red.

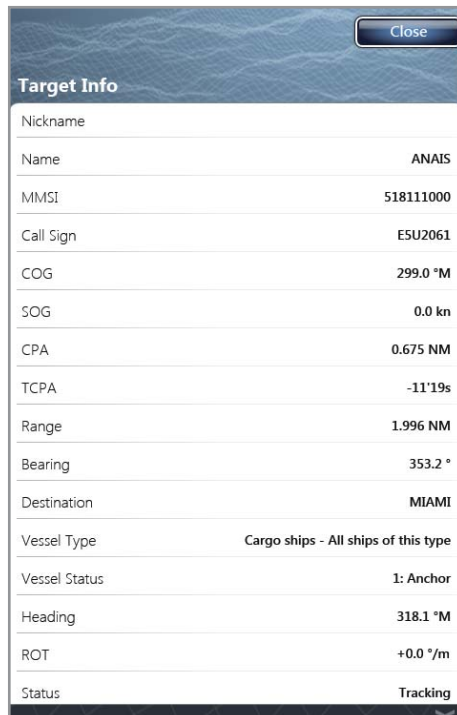
How to display the detailed information for AIS

1. Select the AIS to display the detailed information on the AIS list.



12. AUTOMATIC IDENTIFICATION SYSTEM (AIS)

2. Select [Detail].



The screenshot shows a 'Target Info' window with a 'Close' button in the top right corner. The window contains a table of ship data:

Target Info	
Nickname	
Name	ANAIS
MMSI	518111000
Call Sign	E5U2061
COG	299.0 °M
SOG	0.0 kn
CPA	0.675 NM
TCPA	-11'19s
Range	1.996 NM
Bearing	353.2 °
Destination	MIAMI
Vessel Type	Cargo ships - All ships of this type
Vessel Status	1: Anchor
Heading	318.1 °M
ROT	+0.0 °/m
Status	Tracking

3. Select [Close] to close the [Target Info] window.
4. Select [Close] to exit the menu.

How to find an AIS target on the chart display

1. Select the AIS target to find on the AIS list.
2. Select [Find On Chart].
The chart plotter display opens and the selected AIS is zoomed in.

How to edit an AIS nickname

1. Select the AIS target to edit the nickname on the AIS list.
2. Select [Edit Nickname] to display the software keyboard.
3. Enter the nickname. The maximum length of the nickname is 20 alphanumeric characters.
4. Select [Confirm].
5. Select [Close] to exit the menu.

12.9 How to Register an AIS or DSC to the Buddies List

The buddies list provides a quick reference to ships' MMSI and nickname. For example, you might want to enter the MMSI and nickname of partner ships or ships that often operate in your area.

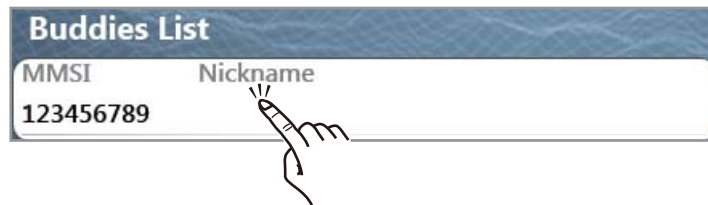
How to add an MMSI no. to the buddies list

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select [Targets].

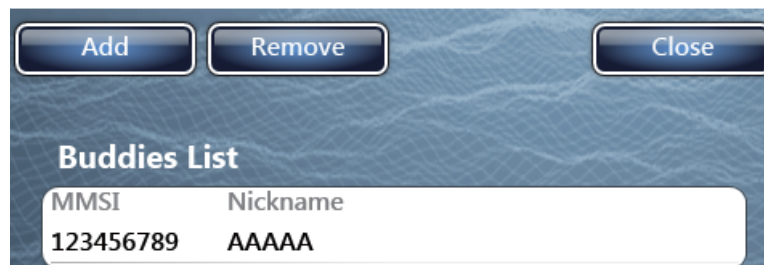
3. Select [Buddies List (AIS & DSC)].



4. Select [Add] to open the numeric software keyboard.
5. Enter the MMSI number then select [Confirm].
6. Select [Nickname] to open the alphabetical software keyboard.



7. Enter the nickname then select [Confirm].

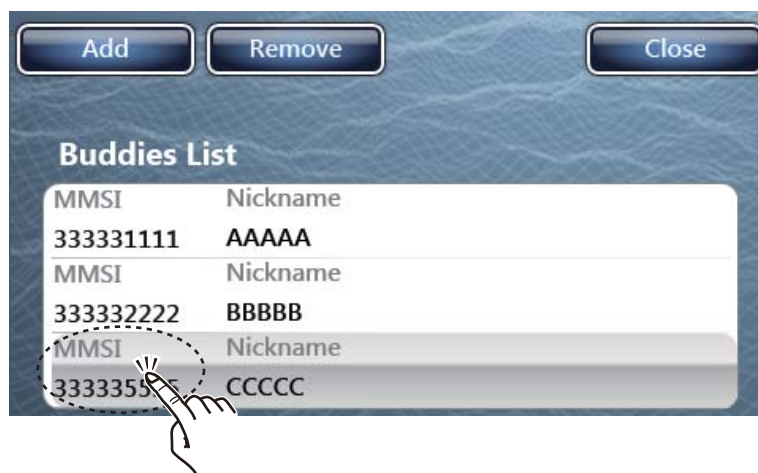


8. Select [Close].
9. Select [Close] to exit the menu.

12. AUTOMATIC IDENTIFICATION SYSTEM (AIS)

How to delete an entry from the buddies list

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [Targets] - [Buddies List (AIS & DSC)] menu.
3. Select the [MMSI] field in the AIS or DSC to delete then select [Remove].



4. Select [Close] twice to exit the menu.

13. HOW TO ADJUST SETTINGS

After you understand the basic operation procedures of your equipment, you can set the equipment according to your needs.

- Set the equipment according to your system configuration.
- Change how the equipment operates and displays information.

All the adjustments are done from the menu. To restore the default settings for the selected menu, select [Reset Default Settings] that is provided on each menu.

Some of the items which you can adjust are as follows:

- RotoKey mode
- Data boxes
- Units of measurement
- System settings
- Charts

13.1 RotoKey Mode

The user can select how many soft controls to make available with the **RotoKey™** in the chart plotter, weather, radar, sounder, instrument and camera modes. The two quantities are [Base] and [Full].

The table below shows the soft controls available for use in the chart plotter, weather, radar, sounder, instrument and camera modes.

Note: The soft controls shown on the screen depend on your system configuration, equipment settings or functions in current use.

Soft controls available in the chart plotter mode

Control label		Function	Base	Full
Level 1	Level 2			
Route	Stop Nav.	Stop following a route.	Yes	Yes
	Restart Nav.	Restart course.	Yes	Yes
	Skip Wpt	Skip a go to point on a route.	Yes	Yes
Orientation	North Up	Set orientation mode to north up.	Yes	Yes
	Head Up	Set orientation mode to head up.	Yes	Yes
Track Rec.	-	Record track of your ship.	Yes	Yes
Event	-	Put an event mark.	Yes	Yes
Lat/Lon	-	Create a point using the software keyboard.	Yes	Yes
3D	-	Switch the display view from 2D to 3D.	Yes	Yes
Chart	Raster	Show raster chart.	Yes	Yes
	S-57	Show S-57 chart.	Yes	Yes
	Jeppesen	Show Jeppesen chart.	Yes	Yes
	Navionics	Show navionics chart.	Yes	Yes
	Fishing	Show fishing chart.	Yes	Yes
	Auto	Switch the chart type automatically.	Yes	Yes

13. HOW TO ADJUST SETTINGS

Control label		Function	Base	Full
Level 1	Level 2			
Overlay	Radar	Show or hide radar overlay.	Yes	Yes
	Sat Photo	Show or hide satellite photo overlay.	Yes	Yes
	Dpth Shade	Show or hide depth shading overlay.	Yes	Yes
	Tide Icons	Show or hide tide icons.	Yes	Yes
	Currents	Show or hide tidal currents.	Yes	Yes
	Accu Fish	Activate or deactivate ACCU-FISH™.	No	Yes
	Points	Show or hide points.	No	Yes
	Routes	Show or hide routes.	No	Yes
	Tracks	Show or hide tracks.	No	Yes
Targets	AIS/DSC	Show or hide AIS and DSC icons.	No	Yes
	ARPA	Show or hide ARPA.	No	Yes
	Cancel All	Cancel tracking on all targets.	No	Yes
	Clear Lost	Clear lost ARPA targets.	No	Yes
Radar	Tx Radar	Switch between transmission and stand-by.	No	Yes
	Transparency	Set the degree of transparency for radar overlay display.	No	Yes
	Auto Gain	Adjust the gain automatically.	No	Yes
	Manual Gain	Adjust the gain manually.	No	Yes
	Auto Sea	Adjust the sea clutter automatically.	No	Yes
	Manual Sea	Adjust the sea clutter manually.	No	Yes
	Auto Rain	Adjust the rain clutter automatically.	No	Yes
	Manual Rain	Adjust the rain clutter manually.	No	Yes
	Echo Trail	Show or hide echo trail.	No	Yes
	Clear Trail	Clear echo trails and restart with new echo trails.	No	Yes
Display	NavData	Open the data boxes.	No	Yes
	Menu	Open the main menu.	No	Yes
	Lists	Open the lists.	No	Yes
	Tide	Open the tide graph.	No	Yes

Soft controls available in the weather mode

Control label		Function	Base	Full
Level 1	Level 2			
Wx Radar	-	Show or hide weather radar overlay.	Yes	Yes
Wx Data	Wind	Show or hide wind icon.	Yes	Yes
	Waves	Show or hide wave data.	Yes	Yes
	SST	Show or hide sea surface temperature data.	Yes	Yes
	Cloud	Show or hide cloud data.	Yes	Yes
	Rain	Show or hide rain data.	Yes	Yes
	Pressure	Show or hide surface pressure data.	Yes	Yes
	500mb	Show or hide contour lines over 500 mb.	No	Yes
	Air Temp	Show or hide air temperature data.	No	Yes
	Currents	Show or hide tidal current data by arrows.	No	Yes
	Altimetry	Show or hide sea height anomalies data.	No	Yes
	Plankton	Show or hide plankton data.	No	Yes
Adv Wx Data	Buoys	Show or hide buoy icon.	Yes	Yes
	City	Show or hide city icon.	Yes	Yes
	Storm	Show or hide storm cast icon.	Yes	Yes
	Lightning	Show or hide lighting icon.	Yes	Yes
	Storm Tracks	Show or hide storm track icon.	Yes	Yes
	Marine Zone	Show or hide marine zone. (The coastal waters are divided into zones for forecasts. These zones can be displayed on the screen with lines.)	Yes	Yes
Anim Radar	-	Display the animation for the past weather radar information.	Yes	Yes
Anim Forecast	-	Display the animation for the weather forecast.	Yes	Yes
Chart	Raster	Show raster chart.	Yes	Yes
	S-57	Show S-57 chart.	Yes	Yes
	Jeppesen	Show Jeppesen chart.	Yes	Yes
	Navionics	Show Navionics chart.	Yes	Yes
	Fishing	Show fishing chart.	Yes	Yes
	Auto	Switch the chart type automatically.	Yes	Yes
Overlay	Sat Photo	Show or hide satellite photo overlay.	Yes	Yes
	Tide Icons	Show or hide tide icons.	Yes	Yes
	Currents	Show or hide tidal currents.	Yes	Yes
	Points	Show or hide points and event marks.	Yes	Yes
Display	NavData	Open the data boxes.	No	Yes
	Menu	Open the main menu.	No	Yes
	Lists	Open the lists.	No	Yes
	Tide	Open the tide graph.	No	Yes
Get Latest Wx	-	Get the latest weather forecast with internet connection.	Yes	Yes

13. HOW TO ADJUST SETTINGS

Soft controls available in the radar mode

Control label		Function	Base	Full
Level 1	Level 2			
Tx Radar	-	Switch between transmission and stand-by.	Yes	Yes
Radar Adjust	Auto Gain	Adjust the gain automatically.	Yes	Yes
	Manual Gain	Adjust the gain manually.	Yes	Yes
	Auto Sea	Adjust the sea clutter automatically.	Yes	Yes
	Manual Sea	Adjust the sea clutter manually.	Yes	Yes
	Auto Rain	Adjust the rain clutter automatically.	Yes	Yes
	Manual Rain	Adjust the rain clutter manually.	Yes	Yes
Auto Sea Mode	Advanced	Activate or deactivate the auto sea for open waters.	No	Yes
	Coastal	Activate or deactivate the auto sea for coastal waters.	No	Yes
Radar Filters	Int Reject	Activate or deactivate the interference rejector.	No	Yes
	Stretch	Activate or deactivate the echo stretch.	No	Yes
	Average	Activate or deactivate the echo average.	No	Yes
Rings	-	Show or hide the range rings.	Yes	Yes
Orientation	Head Up	Set orientation mode to head up.	No	Yes
	North Up	Set orientation mode to north up.	No	Yes
Hdg Ln Off	-	Hide the heading line and range rings for a few seconds.	No	Yes
Echo Trail	-	Show or hide echo trails.	No	Yes
Clear Trail	-	Clear echo trails and restart with new echo trails.	No	Yes
EBL	Adjust	Set the EBL (setting range: 0.0 to 359.9°).	No	Yes
	Clear	Erase the EBL.	No	Yes
VRM	Adjust	Set the VRM (setting range: 0 yd to 8.000 NM)	No	Yes
	Clear	Erase the VRM.	No	Yes
Guard Zone	Visible	Show guard zone.	Yes	Yes
	Alarm	Activate or deactivate guard zone.	Yes	Yes
	Auto Acquire	Activate or deactivate auto acquisition of ARPA targets.	Yes	Yes
	Resize	Resize guard zone.	Yes	Yes
WatchMan	-	Turn on or off the watchman function.	No	Yes
Targets	AIS/DSC	Show or hide AIS and DSC.	Yes	Yes
	ARPA	Show or hide ARPA.	Yes	Yes
	Cancel All	Cancel tracking on all targets.	Yes	Yes
	Clear Lost	Clear lost ARPA targets.	Yes	Yes
Active Rte	-	Show or hide active route.	No	Yes
CPA Alarm	-	Activate or deactivate CPA alarm.	No	Yes
Display	NavData	Open the data boxes.	No	Yes
	Menu	Open the main menu.	No	Yes
	Lists	Open the lists.	No	Yes
	Tide	Open the tide graph.	No	Yes

Soft controls available in the sounder mode

Control label		Function	Base	Full
Level 1	Level 2			
Frequency	HF	Activate HF display.	Yes	Yes
	LF	Activate LF display.	Yes	Yes
Mode	Single Freq.	Activate single frequency display.	Yes	Yes
	Dual Freq.	Activate dual frequency display.	Yes	Yes
	Btm Lock	Activate bottom lock display.	Yes	Yes
	Btm Zoom	Activate bottom zoom display.	Yes	Yes
Adjust	Auto Fishing	Activate automatic fishing mode.	Yes	Yes
	Auto Cruising	Activate automatic cruising mode.	Yes	Yes
	Manual	Activate manual mode.	Yes	Yes
	HF Gain	Adjust the gain for high frequency individually in manual mode.	Yes	Yes
	LF Gain	Adjust the gain for low frequency individually in manual mode.	Yes	Yes
Auto Range	-	Activate or deactivate auto range.	Yes	Yes
A-scope	-	Show or hide A-scope display.	Yes	Yes
Fish Alarm	-	Activate or deactivate fish alarm.	No	Yes
Accu Fish	-	Activate or deactivate ACCU-FISH™.	Yes	Yes
Bottom Type (BBDS1 only)	-	Show or hide bottom discrimination display.	Yes	Yes
Event	-	Put an event mark.	No	Yes
Display	NavData	Open the data boxes.	No	Yes
	Menu	Open the main menu.	No	Yes
	Lists	Open the lists.	No	Yes
	Tide	Open the tide graph.	No	Yes

Soft controls available in the camera mode

Control label		Function	Base	Full
Level 1	Level 2			
Analog 1*	-	Display the image from analog 1.	Yes	Yes
Analog 2*	-	Display the image from analog 2.	Yes	Yes
IP 1*	-	Display the image from IP camera 1.	Yes	Yes
IP 2*	-	Display the image from IP camera 2.	Yes	Yes
IP 3*	-	Display the image from IP camera 3.	Yes	Yes
IP 4*	-	Display the image from IP camera 4.	Yes	Yes
Quad	-	Display the four images from axis server 241Q.	Yes	Yes
Input 1*	-	Display the image for input 1 from axis server 241Q.	Yes	Yes
Input 2*	-	Display the image for input 2 from axis server 241Q.	Yes	Yes
Input 3*	-	Display the image for input 3 from axis server 241Q.	Yes	Yes
Input 4*	-	Display the image for input 4 from axis server 241Q.	Yes	Yes
Quad 2	-	Display the four images from second axis server 241Q.	Yes	Yes
Input 1*	-	Display the image for input 1 from second axis server 241Q.	Yes	Yes

13. HOW TO ADJUST SETTINGS

Control label		Function	Base	Full
Level 1	Level 2			
Input 2*	-	Display the image for input 2 from second axis server 241Q.	Yes	Yes
Input 3*	-	Display the image for input 3 from second axis server 241Q.	Yes	Yes
Input 4*	-	Display the image for input 4 from second axis server 241Q.	Yes	Yes
Cycle	-	Cycle the images selected.	Yes	Yes
Cycle Config.	Analog 1*	Activate or deactivate cycle of the image from analog 1.	Yes	Yes
	Analog 2*	Activate or deactivate cycle of the image from analog 2.	Yes	Yes
	IP 1*	Activate or deactivate cycle of the image from IP camera 1.	Yes	Yes
	IP 2*	Activate or deactivate cycle of the image from IP camera 2.	Yes	Yes
	IP 3*	Activate or deactivate cycle of the image from IP camera 3.	Yes	Yes
	IP 4*	Activate or deactivate cycle of the image from IP camera 4.	Yes	Yes
	Quad	Activate or deactivate cycle of the four images from axis server 241Q.	Yes	Yes
	Input 1*	Activate or deactivate cycle of the image for input 1 from axis server 241Q.	Yes	Yes
	Input 2*	Activate or deactivate cycle of the image for input 2 from axis server 241Q.	Yes	Yes
	Input 3*	Activate or deactivate cycle of the image for input 3 from axis server 241Q.	Yes	Yes
	Input 4*	Activate or deactivate cycle of the image for input 4 from axis server 241Q.	Yes	Yes
	Quad 2	Activate or deactivate cycle of the four images from second axis server 241Q.	Yes	Yes
	Input 1*	Activate or deactivate cycle of the image for input 1 from second axis server 241Q.	Yes	Yes
	Input 2*	Activate or deactivate cycle of the image for input 2 from second axis server 241Q.	Yes	Yes
	Input 3*	Activate or deactivate cycle of the image for input 3 from second axis server 241Q.	Yes	Yes
	Input 4*	Activate or deactivate cycle of the image for input 4 from second axis server 241Q.	Yes	Yes
Zoom In	-	Zoom in the image from FLIR.	Yes	Yes
Zoom Out	-	Zoom out the image from FLIR.	Yes	Yes
FLIR Mode	Thermal	Display the thermal image from FLIR.	Yes	Yes
	Visible	Display the visible image from FLIR.	Yes	Yes
FLIR Scene	Day Running	Set the best viewing when navigating in day-time.	No	Yes
	Night Running	Set the best viewing when navigating in night-time.	No	Yes
	Night Docking	Set the best viewing when docking at night.	No	Yes
	MOB	Set the best viewing to detect the MOB position.	No	Yes

Control label		Function	Base	Full
Level 1	Level 2			
FLIR Home	-	Put the FLIR camera into the home position. Resore the FLIR camera to the normal magnification.	Yes	Yes
Contrast	-	Adjust the contrast for video image.	No	Yes
Brightness	-	Adjust the brightness for video image.	No	Yes
Display	NavData	Open the data boxes.	No	Yes
	Menu	Open the main menu.	No	Yes
	Lists	Open the lists.	No	Yes
	Tide	Open the tide graph.	No	Yes

*: These labels are replaced with the nicknames if they are set in [Camera] of the main menu.

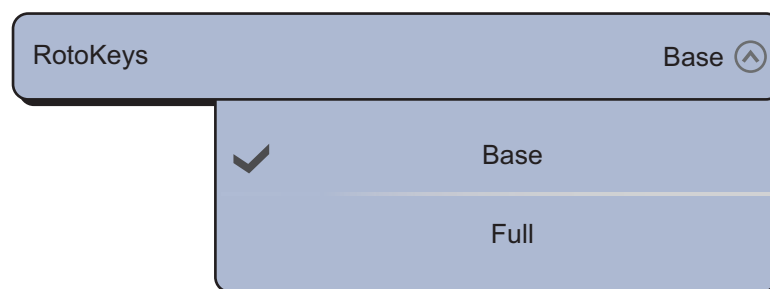
Soft controls available in the instruments mode

Control label		Function	Base	Full
Level 1	Level 2			
Steering	-	Show steering display.	Yes	Yes
Engine (If one engine only)	-	Show engine display.	Yes	Yes
Engines (If more than one engine)	All	Show all engines display.	Yes	Yes
	Engine 1	Show engine 1 display.	Yes	Yes
	Engine 2	Show engine 2 display.	Yes	Yes
	Engine 3	Show engine 3 display.	Yes	Yes
	Engine 4	Show engine 4 display.	Yes	Yes
Tank Level	-	Show tank level display.	Yes	Yes
Weather	-	Show weather display.	Yes	Yes
Wind	-	Show wind display.	Yes	Yes
Display	Menu	Open the main menu.	No	Yes
	Lists	Open the lists.	No	Yes
	Tide	Open the tide graph.	No	Yes

How to select the RotoKey mode to use

You can select the RotoKey mode to use from [Base] or [Full].

1. Select [Menu] on the menu icon bar to open the main menu.
2. Select the [General] - [RotoKeys] menu.



3. Select [Base] or [Full].
4. Select [Close] to exit the menu.

The [Base] set can be always selected by long pushing the **RotoKey™**.

13.2 How to Set the Display Selection Window

The section 1.4 shows how to arrange the display selection window to your liking. The default display selection window provides seven displays in configurations according to the equipment that you have in your network. If the arrangement does not meet your requirements, you can change the configurations as necessary. You can set a maximum of 10 displays to show and split a display up to three ways. For example, you can show the radar and sounder (fish finder) displays in a two-way split screen.

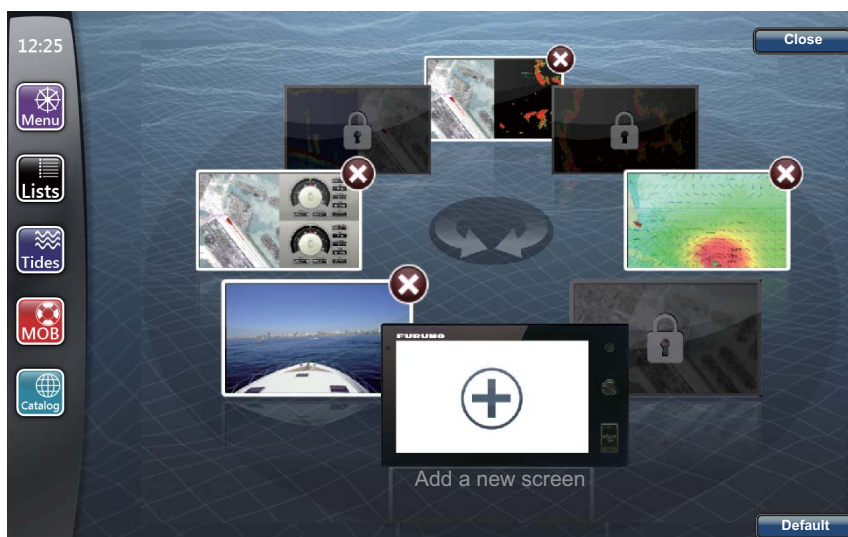
You can select how to split a display by three different methods: full-screen, two-way and three-way. The displays available depend on the display division selected and your system configuration. The table below describes display division and possible display.

Display division	Possible display
Full	Plotter, weather, radar, sounder, instrument, camera
Two-way split	Plotter, radar, sounder
Three-way split	Plotter, radar, sounder, instrument, camera

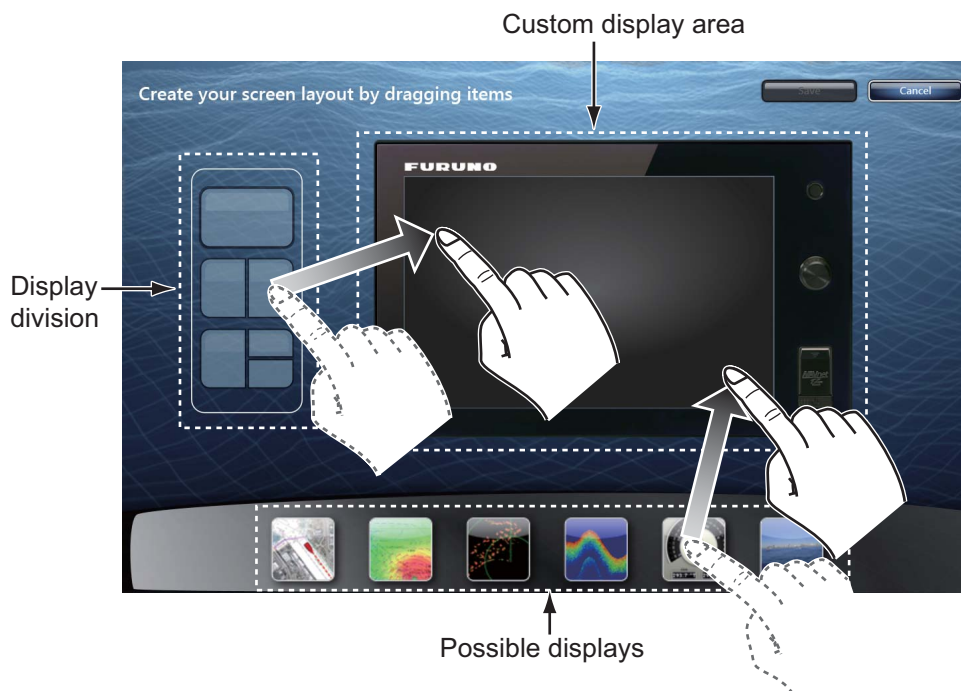
How to add a new screen

Set the display selection window as follows:

1. Press the **Home** key to show the display selection window.
2. Select [Edit] at the top right-hand corner of the screen.



3. Select [+] for [Add a new screen].

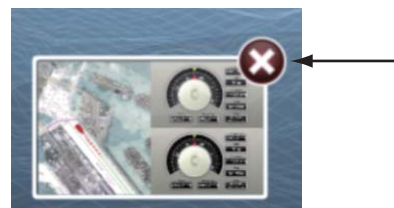


4. Drag the desired display division (full-screen, two-way or three-way) to the custom display area.
5. Drag the desired display from the possible displays to the custom display area.
6. Select [Save] to save the setting. Your arrangement of displays appears on the screen and the display selection window is updated according to your arrangement.

How to delete a screen

A maximum of 10 screens can be used. If you need to add another screen, delete an unnecessary screen to make space.

1. Press the **Home** key to show the display selection window.
2. Select [Edit] at the top right-hand corner of the screen.
3. Select [X] in the screen to delete.



4. Select [Close].

Note: When a sounder or plotter sensor is installed, the default screens are automatically set according to the sensor. The default screens cannot be deleted. The number of screens which you can add, edit or delete decreases according to the number of the default screens. For example, when a sounder, radar and plotter sensors are installed, the two-way split screen for sounder/plotter and the full screens for plotter and radar are set as the default screens. These three screens cannot be edited or deleted. In this case, a maximum of seven screens can be added, edited or deleted.


13.3 General and Units Menus

The [General] menu of the main menu includes the RotoKeys settings, data boxes settings, key beep, etc. The [Units] menu sets units of measurement for range, depth, height, speed, etc.

[General] menu

RotoKeys	Base	▼
Function Gesture	Event	▼
Connect to the Internet	When Necessary	▼
Wireless LAN Settings	<button>Select</button>	
Allow Remote Control	Full Control	▼
Local Time Offset	UTC	▼
Synchronize Time with GPS	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	
NavData Transparency	<div><div>10</div></div>	
NavData Multi Data Dwell Time	0'03s	▼
Camera Dwell Time	0'03s	▼
User Interface Auto-Hide	0'05s	▼
Synchronization Notification	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	
Key Beep	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	
Launch Demo Mode	<button>Select</button>	
Demo Slide Show	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	
Manual Demo Heading	45.0 °	
Manual Demo Speed	5.0 kn	
Language	English (United States)	▼
Check for Software Update	<button>Update</button>	
Reset Default Settings	<button>Reset</button>	

[General] menu description

Menu item	Function	Options
[RotoKeys]	Select the RotoKey menu to show with a short press of the RotoKey™ (see section 13.1).	[Base], [Full]
[Function Gesture]	Select the function to do by tapping the screen with two fingers (see section 1.14).	[None], [Screen Capture], [Event], [MOB], [Home], [Menu], [Lists], [Tide]
[Connect to the Internet]	Select when to connect to the internet. Select [When Necessary] normally.	[Never], [At Startup], [When Necessary]
[Wireless LAN Settings]	Create a local network or connect an existing LAN network (see section 1.21).	-
[Allow Remote Control]	Select the operating range by a remote control.	[Off], [View Only], [Full Control]
[Local Time Offset]	Select the time difference between local time and UTC time.	UTC -12:00 to UTC + 13:00 (at one-hour intervals)
[Synchronize Time with GPS]	Activate or deactivate synchronizing time with GPS.	[ON], [OFF]
[NavData Transparency]	Set the degree of transparency of the data box ([DATA 1], [DATA 2] and [RADAR]) (see paragraph 1.11.3).	0 to 80%
[NavData Multi Data Dwell Time]	Select the cycling time of data in the data box (see paragraph 1.11.2).	[2 s], [3 s], [5 s], [10 s]
[Camera Dwell Time]	Select the cycle period for video images (see paragraph 9.3.4).	[2 s], [3 s], [5 s], [10 s]
[User Interface Auto-Hide]	Select the time to wait before closing the RotoKey menu, pop-up menu and tooltip when no operation is found.	[2 s], [3 s], [5 s], [10 s]
[Synchronization Notification]	Turn on or off the notification for data sharing on multiple TZT network.	[ON], [OFF]
[Key Beep]	Activate or deactivate the key beep which sounds when a key (Home , RotoKey™ or ) is operated (see section 1.1).	[ON], [OFF]
[Launch Demo Mode]*	Open [Demo Files List]. Select the data to play.	-
[Demo Slide Show]*	Activate or deactivate switching the demo displays every minute between chart plotter, weather, radar and sounder.	[ON], [OFF]
[Manual Demo Heading]*	Set the heading in demo displays.	0 to 360°
[Manual Demo Speed]*	Set the ship's speed in demo displays.	0 to 20 kn
[Language]	Select the language to use (see section 1.15).	[English (United States)], [English (United Kingdom)], and others
[Check for Software Update]	Update the software version.	-
[Reset Default Settings]	Restore default settings for the [General] menu.	-

*: In the demo displays, you can move the position for the boat icon to the position tapped. Select [Move Boat] from the RotoKey menu. To return to the original position, select the boat icon then deselect [Manual Mode] from the RotoKey menu.

13. HOW TO ADJUST SETTINGS

[Units] menu


Bearing Display	Magnetic <input type="button" value="v"/>
Position Format	DDD°MM.mmm' <input type="button" value="v"/>
Loran C Station & GRI	<input type="button" value="Select"/>
Range (Long)	Nautical Mile <input type="button" value="v"/>
Range (Short)	Yard <input type="button" value="v"/>
Short/Long Change Over	0.500 NM <input type="button" value="v"/>
Depth	Foot <input type="button" value="v"/>
Height/Length	Foot <input type="button" value="v"/>
Temperature	Fahrenheit Degree <input type="button" value="v"/>
Boat Speed	Knot <input type="button" value="v"/>
Wind Speed	Knot <input type="button" value="v"/>
Atmospheric Pressure	HectoPascal <input type="button" value="v"/>
Oil Pressure	Pound per Square Inch <input type="button" value="v"/>
Volume	Gallon <input type="button" value="v"/>
Reset Default Settings	<input type="button" value="Reset"/>


[Units] menu description

Menu item	Options
[Bearing Display]	[Magnetic], [True] The mode (magnetic or true) of all heading and bearing data.
[Position Format]	[DDD°MM.mmmm'], [DDD°MM.mmm'], [DDD°MM.mm'], [DDD°MM'SS.ss"], [DDD.ddddd°], [Loran-C], [MGRS]
[Loran C Station & GRI]	Select the Loran C stations and GRIs to use to get Loran C position.
[Range (Long)]	[Nautical Mile], [Kilometer], [Mile]
[Range (Short)]	[Foot], [Meter], [Yard]
[Short/Long Change Over]	Set the distance at which to change between short and long range. Set the long range here.
[Depth]	[Foot], [Meter], [Fathom], [Passi Braza]
[Height/Length]	[Foot], [Meter]
[Temperature]	[Fahrenheit Degree], [Celsius Degree]
[Boat Speed]	[Knot], [Kilometer per Hour], [Mile per Hour], [Meter per Second]
[Wind Speed]	[Knot], [Kilometer per Hour], [Mile per Hour], [Meter per Second]
[Atmospheric Pressure]	[HectoPascal], [Millibar], [Millimeter of Mercury], [Inch of Mercury]
[Oil Pressure]	[KiloPascal], [Bar], [Pound per Square Inch]
[Volume]	[Gallon], [Liter]
[Reset Default Settings]	Restore default settings for the [Units] menu.

14. MAINTENANCE, TROUBLE-SHOOTING

This chapter has information about maintenance and troubleshooting that the user can follow to care for the equipment.

**WARNING**

**ELECTRICAL SHOCK HAZARD**
Do not open the equipment.
Only qualified persons can work inside the equipment.

NOTICE

Do not apply paint, anti-corrosive sealant or contact spray to plastic parts or equipment coating.
Those items contain products that can damage plastic parts and equipment coating.

14.1 Maintenance

Routine maintenance helps keep your equipment in good condition and prevents future problems. Check the items shown in the table below to help keep your equipment in good condition for years to come.


Check item	Check point	Remedy
Cables	Check that all cables are fastened. Check the cables for corrosion.	Connect the cables that have loosened. Replace any damaged cables.
Cabinet	Dust on the cabinet	Remove dust with a dry clean cloth. Do not use commercial cleaners to clean the equipment. Those cleaners can remove paint and markings.
LCD	Dust on the LCD	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. Do not use solvents such as thinner, acetone or benzene for cleaning. Also, do not use degreaser or anti-fog solution, as they can strip the coating from the LCD.
	Waterdrops on the LCD	Wipe the LCD with a dry cloth to remove the water. Waterdrops on the LCD can cause slow touch response.

Check item	Check point	Remedy
Radar antenna	Dirt on the radar antenna can reduce the sensitivity.	Clean the radiator (or radome) with a cloth wetted with freshwater. Do not use commercial cleaners to clean the radiator. Those cleaners can remove paint and markings.

14.2 Life of the Parts

Fuse replacement

The TZT has a fuse that protects the TZT from high electric current and equipment fault. If you cannot turn on the power, check the fuse to see if it has blown. Find the reason for the blown fuse before you replace the fuse. If the fuse blows again after the replacement, contact your dealer for information. A wrong fuse can damage the equipment.

 **WARNING**


Use the proper fuse.

A wrong fuse can damage the equipment and cause fire.

Name	Type	Code No.	Remarks
Fuse	FGBO-A 125V 4A PBF	000-155-851-10	For TZT9, 24 VDC
Fuse	FGBO 125V 7A PBF	000-155-831-10	For TZT9, 12 VDC
Fuse	FGBO-A 125V 5A PBF	000-155-853-10	For TZT14, 24 VDC
Fuse	FGBO 125V 10A PBF	000-155-826-10	For TZT14, 12 VDC

Lithium battery replacement

A lithium battery on the Main board in this equipment stores data when the power is turned off. The life of the battery is approximately three years. When the voltage of the battery is low, the message requesting replacement appears and all default settings are restored. When this occurs, contact your dealer about replacement of the battery.

 **CAUTION**

Use the proper lithium battery.

A wrong lithium battery may burst.

Note: Dispose of the battery in accordance with local regulations.

Part	Type	Code No.
Lithium battery	CR2032H	-

Magnetron replacement

When the life of the magnetron is reached, targets do not appear on the radar display. If long-range performance appears to have decreased, contact your dealer about replacement of the magnetron.

Radar Sensor	Magnetron	Code No.	Estimated Life
DRS2D	E3590	000-164-574-11	Approx. 2,000 hours
DRS4D	E3571	000-146-867-11	Approx. 2,000 hours
DRS4A	MAF1421B	000-158-786-11	Approx. 3,000 hours
DRS6A	MAF1422B	000-158-788-12	Approx. 3,000 hours
DRS12A	MAF1565N	000-174-559-10	Approx. 3,000 hours
DRS25A	MG5436(E2V)	000-140-762-10	Approx. 2,000 to 3,000 hours

The total time of power-on ("ON TIME") and transmission ("TX TIME") are displayed on the radar screen during the stand-by mode.

LCD replacement

The life of the LCD is approximately 18,000 hours for TZT14, 25,000 hours for TZT9. The actual number of hours depends on ambient temperature and humidity. When the brilliance cannot be raised sufficiently, contact your dealer about replacement of the LCD.

Fan replacement

The life of the each fan is shown in the table below. The actual number of hours depends on ambient temperature. When the fan does not rotate sufficiently, an applicable message appears. Turn off the power and contact your dealer about replacement of the fan.

Item	Type	Code No.	Estimated Life
FAN MOTOR	MFB52A-12HA-002	000-175-998-10	Approx. 21,000 hours
FAN MOTOR	MFB30G-12A-003	000-175-997-10	Approx. 21,000 hours


14.3 Troubleshooting

This section provides simple troubleshooting procedures which the user can follow to restore normal operation. If you cannot restore normal operation, do not check inside the unit. Have a qualified technician check the equipment.

14.3.1 General troubleshooting

Problem	Remedy
You can not turn on the power.	<ul style="list-style-type: none"> • Check for blown fuse. • Check that the power connector is fastened. • Check for corrosion on the power cable connector. • Check for damaged power cable. • Check battery for correct voltage output.
There is no response when a key is pressed.	Turn off and on the power. If you do not get a response, the key is damaged. Contact your dealer for instructions.

14.3.2 Radar troubleshooting

Problem	Remedy
Nothing appears on the screen after you press the  key and select [Tx Radar] from the RotoKey menu to transmit.	<ul style="list-style-type: none"> • Select [Tx Radar] from the RotoKey menu again. • Check that the antenna cable is fastened. • Check if the radar source is correct.
Marks and characters appear, but echoes do not appear.	Check that the antenna cable is fastened.
Picture is not updated or the picture freezes.	<ul style="list-style-type: none"> • Check antenna cable. • If the picture freezes, turn the power off and on.
You tuned the receiver, but the sensitivity is weak.	Have a technician check the magnetron.
You changed the range, but the radar picture does not change.	<ul style="list-style-type: none"> • Try to zoom in or out the radar display. • Turn the power off and on.
Poor discrimination in range.	Adjust the sea control.
Range rings are not displayed.	Select [Rings] from the RotoKey menu to activate the range rings.
You selected [Tx Radar] from the RotoKey menu to transmit. The "TX screen" appears, but the radar goes into stand-by.	This problem indicates that the overload protection has activated. To restore normal operation, turn off all equipment in the TZX network. Wait a few seconds then turn on all the equipment.

14.3.3 Chart plotter troubleshooting

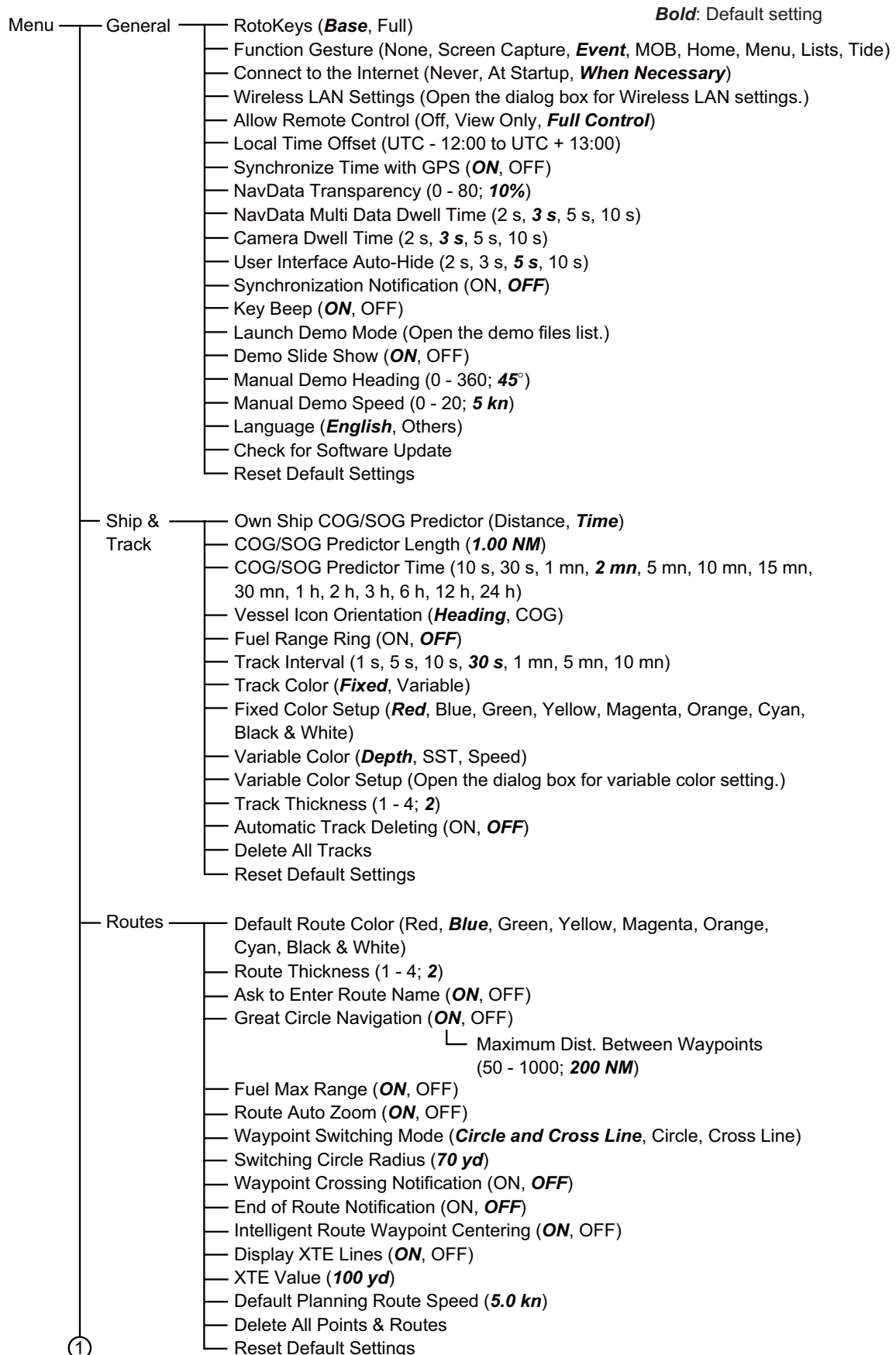
Problem	Remedy
Position is not fixed.	Check that antenna connector is fastened and navigator is correctly connected.
The track of your ship is not plotted.	Check that the track is turned on. Select the [Overlay] - [Tracks] menu from the RotoKey menu.

14.3.4 Fish finder troubleshooting

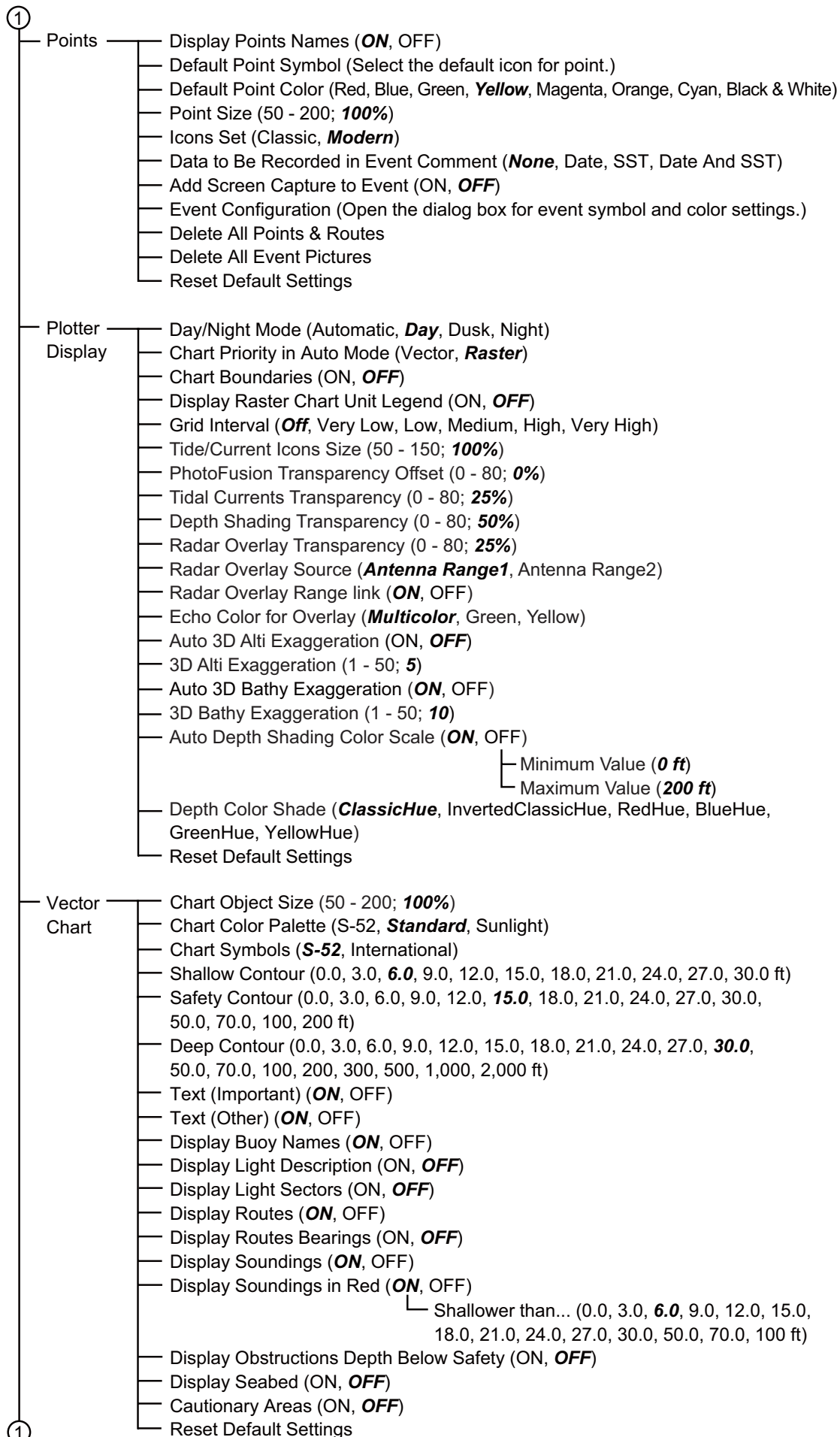
Problem	Remedy
You selected a fish finder display at the display selection window, but no picture appears.	<ul style="list-style-type: none"> • Check that the signal cable for the fish finder is fastened. • Check that the fish finder source is correct. • Check that the network fish finder is properly connected.
Marks and characters appear, but no picture appears.	Check that the transducer cable is connected.
Picture appears but zero line does not appear.	<ul style="list-style-type: none"> • The picture is shifted. Check the shift setting. • Check if draft is set to zero or higher.
The picture sensitivity is too low.	<ul style="list-style-type: none"> • Check the gain setting in manual operation. • The marine life or air bubbles can attach to the transducer face. • Bottom is too soft to return an acceptable echo.
The depth indication does not appear.	<ul style="list-style-type: none"> • For manual operation, adjust gain and range to display the bottom echo (in reddish-brown). • Adjust bottom level HF/LF.
Noise or interference shows on the display.	<ul style="list-style-type: none"> • Make sure the transducer cable is not near the engine. • Check the ground. • Check if another fish finder in the vicinity of your boat has the same frequency as your fish finder. • Try to adjust the interference rejection: Select the [Sounder] - [Interference Rejection] menu of the main menu.

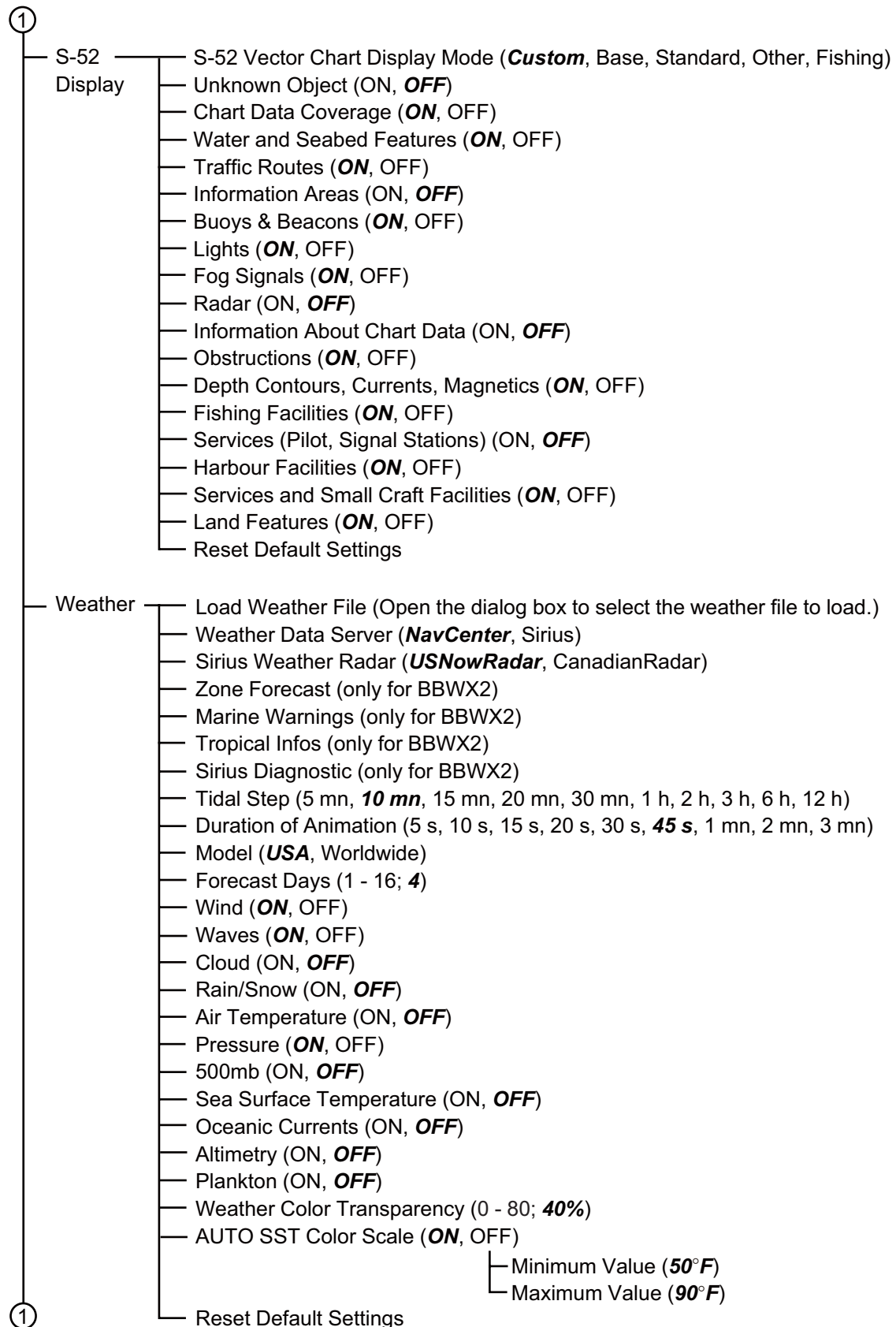
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APPENDIX 1 MENU TREE

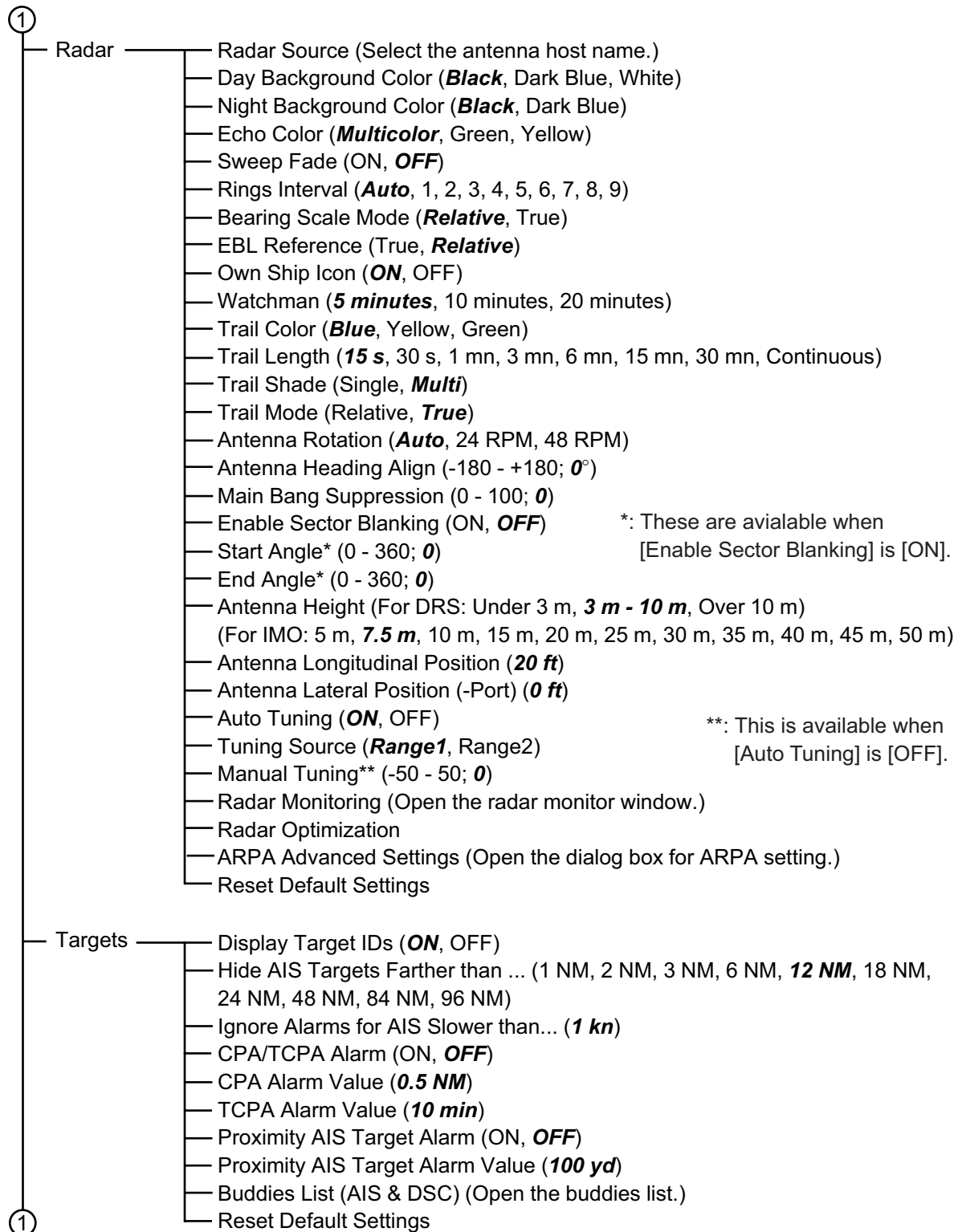


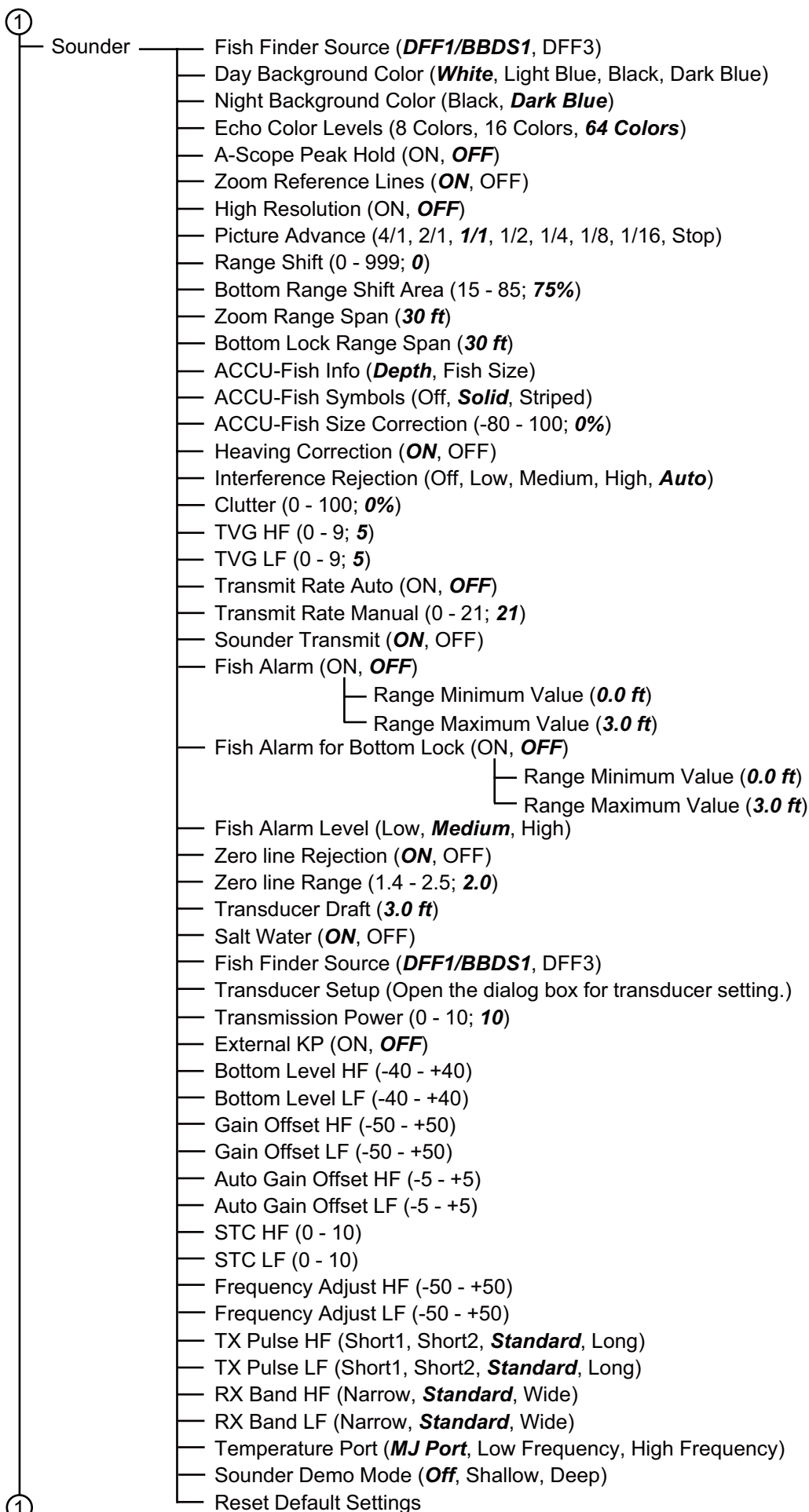
APPENDIX 1 MENU TREE

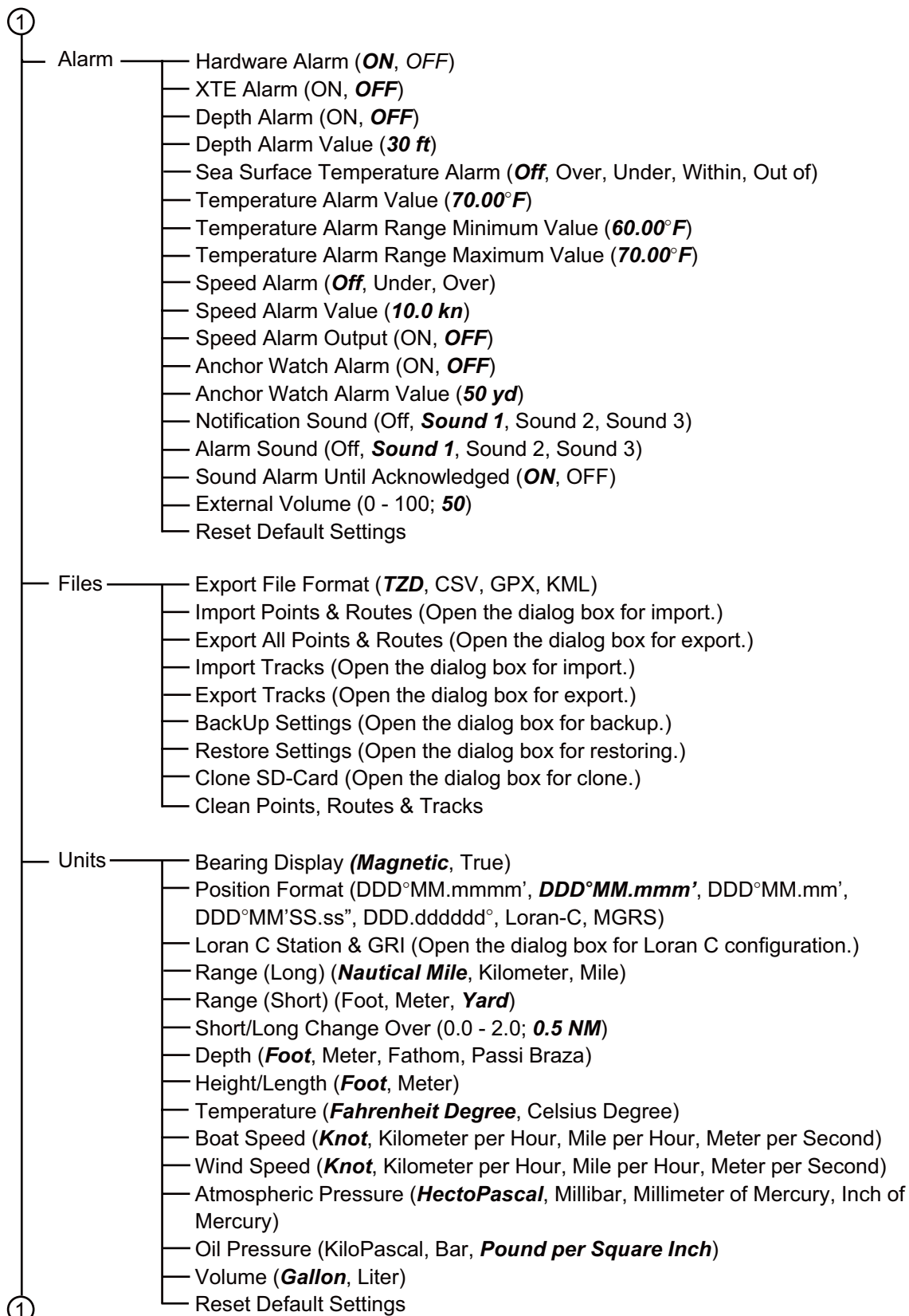


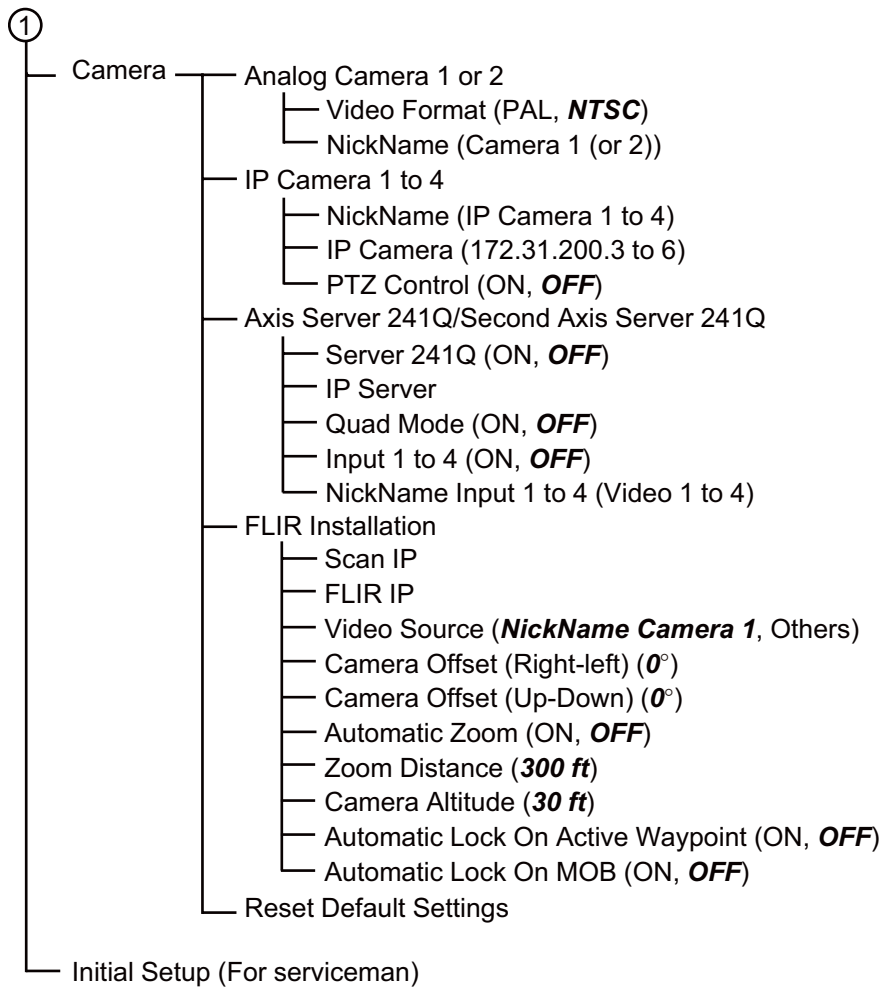


APPENDIX 1 MENU TREE









APPENDIX 2 RADIO REGULATORY INFORMATION

Wireless Interoperability

This product is designed to be interoperable with any wireless LAN product that is based on direct sequence spread spectrum (DSSS) and orthogonal frequency division multiplexing (OFDM) radio technology and to comply with the following standards.

- IEEE Std 802.11b Standard on 2.4 GHz Wireless LAN
- IEEE Std 802.11g Standard on 2.4 GHz Wireless LAN
- IEEE Std 802.11n Standard on 2.4 GHz Wireless LAN

Safety

This product, like other radio devices, emits radio frequency electromagnetic energy. The level of energy emitted by this device, however, is less than the electromagnetic energy emitted by other wireless devices such as mobile phones. This product operates within the guidelines found in radio frequency safety standards and recommendations. These standards and recommendations reflect the consensus of the scientific community and result from deliberations of panels and committees of scientists who continually review and interpret the extensive research literature. In some situations or environments, the use of this product may be restricted by the proprietor of the building or responsible representatives of the applicable organization. Examples of such situations include the following:

- Using this product onboard airplanes, or
- Using this product in any other environment where the risk of interference with other devices or services is perceived or identified as being harmful.

If uncertain of the policy that applies to the use of wireless devices in a specific organization or environment (an airplane, for example), ask for authorization to use this product before turning it on.

Export Regulation

Radio wave certification is necessary at the export destination. The Wireless LAN of this product operates in the 2.4 GHz band, which does not require a license in most countries. However, the conditions for use of the wireless LAN depend on the country or the area.

USA-Federal Communications Commission (FCC)

Below are descriptions for built-in Wireless LAN module.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and the receiver.
- Connect the equipment to outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Caution: Exposure to Radio Frequency Radiation.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65.

This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

This device must not be co-located or operating in conjunction with any other antenna or transmitter.

Canada-Industry Canada (IC)

Below are descriptions for built-in Wireless LAN module.

This device complies with RSS 210 of Industry Canada.

Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) This device must accept any interference, including interference that may cause undesired operation of this device.

L'utilisation de ce dispositif est autorisée seulement aux conditions suivantes :

- (1) il ne doit pas produire de brouillage et
- (2) l'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

Caution: Exposure to Radio Frequency Radiation.

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'IC. Cet équipement doit être installé et utilisé en gardant une distance de 20 cm ou plus entre le dispositif rayonnant et le corps.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

SPECIFICATIONS OF MULTI FUNCTION DISPLAY TZZ9

1 GENERAL

1.1	Display	9-inch wide color LCD, 196.8 x 118.08 mm
1.2	Resolution	800 x 480 dots (WVGA)
1.3	Indication system	Raster-scan, non-interlace, Horizontal: 31.7kHz, Vertical: 60Hz
1.4	Brightness	900 cd/m ² typical
1.5	Display colors	262,144 colors (plotter), 64 colors (echo), 16 colors (radar)

2 PLOTTER FUNCTION

2.1	Display mode	Course plot, NAV data
2.2	Projection	Mercator
2.3	Usable area	85° latitude or below
2.4	Memory capacity	Track: 30,000 points, Point: 30,000 points Route: 200 courses w/ 500 waypoints each
2.5	MOB	1 point

3 RADAR INDICATION

3.1	Orientation mode	Head-up, North-up (heading data required)
3.2	Echo trail	15/30s, 1/3/6/15/30 min. and continuous
3.3	ARPA	30 targets

4 OTHER FUNCTIONS

4.1	Sounder mode	Echo sounder data required
4.2	Weather information	External sensor data required
4.3	Instrument data display	Engine monitoring, other instruments required
4.4	Camera monitor	IP camera or NTSC/PAL data required
4.5	Language	Danish, Finnish, French, German, Greek, Italian, Japanese, Norwegian, Portuguese, Spanish, Swedish, UK/US
4.6	Alarms	Notification, Anchor watch, Cross track error, CPA/TCPA*, Proximity, Ship's speed under/over*, Sea surface temperature*, Depth*, Fish*, Bottom lock fish*, Hardware

*: External data required

5 INTERFACE

5.1	Number of port	
	LAN	1 ports, Ethernet 100Base-TX
	CAN bus	1 port
	USB	1 ports, USB2.0
	Video output	1 ports, DVI-D, VESA DDC
	Video input	2 ports, NTSC/PAL

	SD card slot	2 slots
	Line out	1 port
5.2	Wireless LAN	IEEE802.11b/g/n
	Transmitting frequency	2.412 to 2.462 GHz
	Output power	12 dBm max.
5.3	NMEA0183 (Ver2.0) sentences (Ethernet)	
	Input/Output	CUR, DPT, GGA, GSA, GSV, HDG, HDT, MDA, MTW, MWV, RSA, ROT, VDM, VHW, VTG, XDR, ZDA
5.4	CAN bus PGN (NMEA2000)	
	Input	059392/904, 060928, 061184, 065280, 126208/720/992/996, 127237/245/250/251/257/488/489/505, 128259/267, 129025/026/029/033/038/039/040/041/538/540/793/794/798, 129808/809/810, 130306/310/311/312/313/314/577/578
	Output	059392/904, 060928, 061184, 126208/464/720/992/996, 127250/251/257/258, 128259/267, 129025/026/029/033/283/284/285, 130306/310/312/313/314

6 POWER SUPPLY

6.1	Multi function display	12-24 VDC: 3.5-1.8 A
6.2	Rectifier (option)	100-115/220-230 VAC, 1 phase, 50/60Hz

7 ENVIRONMENTAL CONDITION

7.1	Ambient temperature	-15°C to +55°C (wireless LAN: 0°C to +55°C)
7.2	Relative humidity	93% or less at 40°C
7.3	Degree of protection	IP56 (w/ connector cover), IP22 (w/ connector boot)
7.4	Vibration	IEC 60945 Ed.4

8 UNIT COLOR

N2.5 (fixed)

SPECIFICATIONS OF MULTI FUNCTION DISPLAY TZZ14

1 GENERAL

1.1	Display	14.1-inch wide color LCD, 303.36 x 189.6 mm
1.2	Resolution	1280 x 800 dots (WXGA)
1.3	Indication system	Raster-scan, non-interlace, Horizontal: 49.4kHz, Vertical: 59.92Hz
1.4	Brightness	900 cd/m ² typical
1.5	Display colors	262,144 colors (plotter), 64 colors (echo), 16 colors (radar)

2 PLOTTER FUNCTION

2.1	Display mode	Course plot, NAV data
2.2	Projection	Mercator
2.3	Usable area	85° latitude or below
2.4	Memory capacity	Track: 30,000 points, Point: 30,000 points Route: 200 courses w/ 500 waypoints each
2.5	MOB	1 point

3 RADAR INDICATION

3.1	Orientation mode	Head-up, North-up (heading data required)
3.2	Echo trail	15/30s, 1/3/6/15/30 min. and continuous
3.3	ARPA	30 targets

4 OTHER FUNCTIONS

4.1	Sounder mode	Echo sounder data required
4.2	Weather information	External sensor data required
4.3	Instrument data display	Engine monitoring, other instruments required
4.4	Camera monitor	IP camera or NTSC/PAL data required
4.5	Language	Danish, Finnish, French, German, Greek, Italian, Japanese, Norwegian, Portuguese, Spanish, Swedish, UK/US
4.6	Alarms	Notification, Anchor watch, Cross track error, CPA/TCPA*, Proximity, Ship's speed under/over*, Sea surface temperature*, Depth*, Fish*, Bottom lock fish*, Hardware

*: External data required

5 INTERFACE

5.1	Number of port	
	LAN	3 ports, Ethernet 100Base-TX
	CAN bus	1 port
	USB	1 ports, USB2.0
	Video output	1 ports, DVI-D, VESA DDC
	Video input	2 ports, NTSC/PAL

	SD card slot	2 slots
	Line out	1 port
5.2	Wireless LAN	IEEE802.11b/g/n
	Transmitting frequency	2.412 to 2.462 GHz
	Output power	12 dBm max.
5.3	NMEA0183 (Ver2.0) sentences (Ethernet)	
	Input/Output	CUR, DPT, GGA, GSA, GSV, HDG, HDT, MDA, MTW, MWV, RSA, ROT, VDM, VHW, VTG, XDR, ZDA
5.4	CAN bus PGN (NMEA2000)	
	Input	059392/904, 060928, 061184, 065280, 126208/720/992/996, 127237/245/250/251/257/488/489/505, 128259/267, 129025/026/029/033/038/039/040/041/538/540/793/794/798, 129808/809/810, 130306/310/311/312/313/314/577/578
	Output	059392/904, 060928, 061184, 126208/464/720/992/996, 127250/251/257/258, 128259/267, 129025/026/029/033/283/284/285, 130306/310/312/313/314

6 POWER SUPPLY

6.1	Multi function display	12-24 VDC: 5.0-2.5 A
6.2	Rectifier (option)	100-115/220-230 VAC, 1 phase, 50/60Hz

7 ENVIRONMENTAL CONDITION

7.1	Ambient temperature	-15°C to +55°C (wireless LAN: 0°C to +55°C)
7.2	Relative humidity	93% or less at 40°C
7.3	Degree of protection	IP56 (w/ connector cover), IP22 (w/ connector boot)
7.4	Vibration	IEC 60945 Ed.4

8 UNIT COLOR

N2.5 (fixed)

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FURUNO Worldwide Warranty for Pleasure Boats (Except North America)

This warranty is valid for products manufactured by Furuno Electric Co. (hereafter FURUNO) and installed on a pleasure boat. Any web based purchases that are imported into other countries by anyone other than a FURUNO certified dealer may not comply with local standards. FURUNO strongly recommends against importing these products from international websites as the imported product may not work correctly and may interfere with other electronic devices. The imported product may also be in breach of the local laws and mandated technical requirements. Products imported into other countries as described previously shall not be eligible for local warranty service.

For products purchased outside of your country please contact the national distributor of Furuno products in the country where purchased.

This warranty is in addition to the customer's statutory legal rights.

1. Terms and Conditions of Warranty

FURUNO guarantees that each new FURUNO product is the result of quality materials and workmanship. The warranty is valid for a period of 2 years (24 months) from the date of the invoice, or the date of commissioning of the product by the installing certified dealer.

2. FURUNO Standard Warranty

The FURUNO standard warranty covers spare parts and labour costs associated with a warranty claim, provided that the product is returned to a FURUNO national distributor by prepaid carrier.

The FURUNO standard warranty includes:

- Repair at a FURUNO national distributor
- All spare parts for the repair
- Cost for economical shipment to customer

3. FURUNO Onboard Warranty

If the product was installed/commissioned and registered by a certified FURUNO dealer, the customer has the right to the onboard warranty.

The FURUNO onboard warranty includes

- Free shipping of the necessary parts
- Labour: Normal working hours only
- Travel time: Up to a maximum of two (2) hours
- Travel distance: Up to a maximum of one hundred and sixty (160) KM by car for the complete journey

4. Warranty Registration

For the Standard Warranty - presentation of product with serial number (8 digits serial number, 1234-5678) is sufficient. Otherwise, the invoice with serial number, name and stamp of the dealer and date of purchase is shown.

For the Onboard Warranty your FURUNO certified dealer will take care of all registrations.

5. Warranty Claims

For the Standard Warranty - simply send the defective product together with the invoice to a FURUNO national distributor. For the Onboard Warranty – contact a FURUNO national distributor or a certified dealer. Give the product's serial number and describe the problem as accurately as possible.

Warranty repairs carried out by companies/persons other than a FURUNO national distributor or a certified dealer is not covered by this warranty.

6. Warranty Limitations

When a claim is made, FURUNO has a right to choose whether to repair the product or replace it.

The FURUNO warranty is only valid if the product was correctly installed and used. Therefore, it is necessary for the customer to comply with the instructions in the handbook. Problems which result from not complying with the instruction manual are not covered by the warranty.

FURUNO is not liable for any damage caused to the vessel by using a FURUNO product.

The following are excluded from this warranty:

- a. Second-hand product
- b. Underwater unit such as transducer and hull unit
- c. Routine maintenance, alignment and calibration services.
- d. Replacement of consumable parts such as fuses, lamps, recording papers, drive belts, cables, protective covers and batteries.
- d. Magnetron and MIC with more than 1000 transmitting hours or older than 12 months, whichever comes first.
- e. Costs associated with the replacement of a transducer (e.g. Crane, docking or diver etc.).
- f. Sea trial, test and evaluation or other demonstrations.
- g. Products repaired or altered by anyone other than the FURUNO national distributor or an authorized dealer.
- h. Products on which the serial number is altered, defaced or removed.
- i. Problems resulting from an accident, negligence, misuse, improper installation, vandalism or water penetration.
- j. Damage resulting from a force majeure or other natural catastrophe or calamity.
- k. Damage from shipping or transit.
- l. Software updates, except when deemed necessary and warrantable by FURUNO.
- m. Overtime, extra labour outside of normal hours such as weekend/holiday, and travel costs above the 160 KM allowance
- n. Operator familiarization and orientation.

FURUNO Electric Company, March 1, 2011

FURUNO Warranty for North America

FURUNO U.S.A., Limited Warranty provides a twenty-four (24) months LABOR and twenty-four (24) months PARTS warranty on products from the date of installation or purchase by the original owner. Products or components that are represented as being waterproof are guaranteed to be waterproof only for, and within the limits, of the warranty period stated above. The warranty start date may not exceed eighteen (18) months from the original date of purchase by dealer from Furuno USA and applies to new equipment installed and operated in accordance with Furuno USA's published instructions.

Magnetrons and Microwave devices will be warranted for a period of 12 months from date of original equipment installation.

Furuno U.S.A., Inc. warrants each new product to be of sound material and workmanship and through its authorized dealer will exchange any parts proven to be defective in material or workmanship under normal use at no charge for a period of 24 months from the date of installation or purchase.

Furuno U.S.A., Inc., through an authorized Furuno dealer will provide labor at no cost to replace defective parts, exclusive of routine maintenance or normal adjustments, for a period of 24 months from installation date provided the work is done by Furuno U.S.A., Inc. or an AUTHORIZED Furuno dealer during normal shop hours and within a radius of 50 miles of the shop location.

A suitable proof of purchase showing date of purchase, or installation certification must be available to Furuno U.S.A., Inc., or its authorized dealer at the time of request for warranty service.

This warranty is valid for installation of products manufactured by Furuno Electric Co. (hereafter FURUNO). Any purchases from brick and mortar or web-based resellers that are imported into other countries by anyone other than a FURUNO certified dealer, agent or subsidiary may not comply with local standards. FURUNO strongly recommends against importing these products from international websites or other resellers, as the imported product may not work correctly and may interfere with other electronic devices. The imported product may also be in breach of the local laws and mandated technical requirements. Products imported into other countries, as described previously, shall not be eligible for local warranty service.

For products purchased outside of your country please contact the national distributor of Furuno products in the country where purchased.

WARRANTY REGISTRATION AND INFORMATION

To register your product for warranty, as well as see the complete warranty guidelines and limitations, please visit www.furunousa.com and click on "Support". In order to expedite repairs, warranty service on Furuno equipment is provided through its authorized dealer network. If this is not possible or practical, please contact Furuno U.S.A., Inc. to arrange warranty service.

FURUNO U.S.A., INC.
Attention: Service Coordinator
4400 N.W. Pacific Rim Boulevard
Camas, WA 98607-9408
Telephone: (360) 834-9300
FAX: (360) 834-9400

Furuno U.S.A., Inc. is proud to supply you with the highest quality in Marine Electronics. We know you had several choices when making your selection of equipment, and from everyone at Furuno we thank you. Furuno takes great pride in customer service.

Declaration of Conformity



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

(Manufacturer)

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

(Address)

declare under our sole responsibility that the product

NavNet TZT RADAR SENSOR DRS2D, DRS4D, DRS4A, DRS6A, DRS12A and DRS25A

(Model name, type number)

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

IEC 60945 Ed.4.0: 2002 incl.Corr.1: 2008 EMC related items	ITU-R M.1177-3: Spurious related items
IEC 60950-1 Ed.2.0: 2005 Safety related items	ITU-R SM.1539-1: Spurious related items
IEC 60950-1 Ed.2.0 A1: 2009 Safety related items	ITU-R SM.1541-2: Spurious related items
IEC 62252 Ed.1.0:2004(clauses 4.33,5.33,Annex D) Spurious related items	ITU-R SM. 329-10: Spurious related items

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

For assessment, see

- Statement of Opinion No.07214158 issued by Telefication, The Netherlands.

On behalf of Furuno Electric Co., Ltd.

Yoshitaka Shogaki
Department General Manager
Quality Assurance Department

Nishinomiya City, Japan
February 06, 2012

(Place and date of issue)

(name and signature or equivalent marking of authorized person)

Declaration of Conformity



We FURUNO ELECTRIC CO., LTD.

(Manufacturer)

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

(Address)

declare under our sole responsibility that the product

WIRELESS LAN MODULE WLAN-USB-01

(Model name, type number)

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

IEC 60950-1 Ed.2.0: 2005

EN 300 328 V1.7.1: 2006

IEC 60950-1 Ed.2.0 A1: 2009

EN 301 489-17 V2.1.1: 2009

IEC 62311 Ed.1.0:2007

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

For assessment, see

- Statement of Opinion No.AN12C10339 issued by Compliance Certification Services (UL CCS), United States of America.

On behalf of Furuno Electric Co., Ltd.



Yoshitaka Shogaki
Department General Manager
Quality Assurance Department

Nishinomiya City, Japan
February 06, 2012

(Place and date of issue)

(name and signature or equivalent marking of authorized person)