

FURUNO

OPERATOR'S MANUAL

ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS)

FMD-3200

FMD-3200-BB

Model FMD-3300

ECF

(Elemental Chlorine Free)

The paper used in this manual
is elemental chlorine free.

FURUNO ELECTRIC CO., LTD.

9-52 Ashihara-cho,
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• FURUNO Authorized Distributor/Dealer

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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.
- “C-MAP” means “C-MAP by Jeppesen” in this manual.

How to discard this product

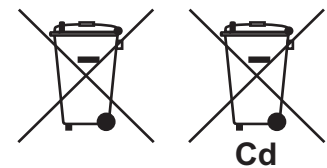
Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (<http://www.eiae.org/>) for the correct method of disposal.

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.

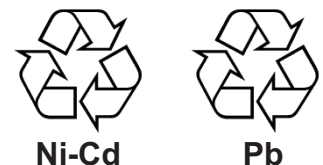
In the European Union

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 used 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

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

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

 Warning, Caution	 Prohibitive Action	 Mandatory Action
--	--	--

 WARNING	
	<p>Do not open the equipment.</p> <p>This equipment uses high voltage that can cause electrical shock. Only qualified persons can work inside the equipment.</p>
	<p>Turn off power at switchboard if the something is dropped inside the equipment.</p> <p>Fire or electrical shock can result if the power remains on.</p>
	<p>Turn off power at switchboard if the equipment is emitting smoke or fire.</p> <p>Fire or electrical shock can result if the power remains on.</p>
	<p>Do not place liquid filled containers on the top of the equipment.</p> <p>Fire or electrical shock can result if a liquid spills into the equipment.</p>
	<p>Use the correct fuse.</p> <p>Use of a wrong fuse can cause fire or damage the equipment.</p>

 WARNING	
	<p>Do not disassemble or modify the equipment.</p> <p>Fire, electrical shock or bodily injury can result.</p>
	<p>Do not operate the equipment with wet hands.</p> <p>Fire or electrical shock can result.</p>
	<p>Keep the equipment away from areas where contact with water is likely.</p> <p>Fire or electrical shock can result if water gets into the equipment.</p>



Warning Label

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

 WARNING 
To avoid electrical shock, do not remove cover. No user-serviceable parts inside.
 警告 
感電の恐れあり。サービスマン以外の方はカバーを開けないで下さい。内部には高電圧部分が多くあり、万一さわると危険です。

Name: Warning Label (1)
Type: 86-003-1011-3
Code No.: 100-236-233-10

Name: Warning Label (2)
Type: 03-129-1001-3
Code No.: 100-236-743-10

 WARNING 
To avoid electrical shock, do not remove cover. No user-serviceable parts inside.



 警告 
感電の恐れあり。サービスマン以外の方はカバーを開けないで下さい。内部には高電圧部分が多くあり、万一さわると危険です。

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FOREWORD

Congratulations on your choice of the FURUNO ECDIS (Electronic Chart Display and Information System) FMD-3200, FMD-3200-BB, FMD-3300. 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.

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

Features

The FMD-3000 series ECDIS is the product of FURUNO's extensive experience in computer technology and marine electronics. The ECDIS displays electronic charts, nav lines, TT data, AIS targets and other navigation data on a high-resolution 19-inch (FMD-3200) or 23.1-inch display (FMD-3300). The FMD-3200-BB is supplied without a monitor, permitting use of the commercial monitor of your choice.

The main features of this ECDIS series are

- Complies with IMO MSC.232(82), IMO A.694(17), IEC 61174 Ed. 3, IEC 61162-1 Ed. 4 2010-11, IEC 61162-2 Ed. 1, IEC 62288, IEC 60945 Ed. 4.
- Continuous monitoring of ship's position through multi-sensor Kalman filter processing using GPS, DGPS, SDME.
- Route planning and route monitoring facilities.
- Radar image can be overlaid on electronic charts. (Requires FURUNO FAR-2xx7 or FCR-2xx9 series radar.)
- Grounding warnings, safe depth contours.
- Chart database loaded and updated using DVD ROMs or CD ROMs.
- Target data from TT (Tracked Target) and AIS transponder to aid in collision avoidance.

Standards Used in this Manual

- The keys and controls of the ECDIS Control Unit RCU-024 are shown in bold face; for example, the **ENTER** key.
- The buttons on the InstantAccess bar and Status bar and menu items are shown in brackets; for example, the [PLAN] button.
- Context-sensitive menus are available with many buttons and boxes and objects within the display area. Right-click those items to display the related context-sensitive menu.
- Unless noted otherwise, "click" means to push the left button on a trackball module (in order to do a function).
- There are two types of Control Units: ECDIS Control Unit RCU-024 (alphabet keyboard, controls, trackball module) and Trackball Control Unit RCU-026 (trackball module only). Unless noted otherwise, "Control Unit" refers to the RCU-024.
- "Keyboard" refers to the alphabet keyboard of the ECDIS Control Unit RCU-024.
- The system can be operated with the controls of the ECDIS Control Unit or a trackball module. The descriptions in this manual use the trackball module.
- The color mentioned in this manual are the default colors. Your colors may vary.

Program No.

ECDIS: 2450074-01.xx, Conning: 2450079-01.xx (xx is version no.)

Data protection scheme

Product	Software Version	Testing Std.	Elec. Nav. Chart (ENC)	Raster Nav. Chart (RNC)	ECDIS Presentation Library	Data Protection Scheme
FMD-3xx0	01.xx	IEC 61174 Ed.3	S-57 Ed. 3.1, S-57 Ed. 3.1.1, and S-57 Maint. Doc. (Cumulative) No. 8	S-61 Ed.1.0	S-52 PresLib Ed.3.4	S-63 Ed.1.1.1

Virus Prevention

The ECDIS is not equipped with a virus checker. The ECDIS operates in real time; therefore, having a virus checker that periodically checks the equipment for viruses would increase the processing load, which can affect operation. However, you can avoid viruses by following the instructions in this section.

When you update a chart

The PC and medium (USB flash memory, etc.) used to download and store an update for an existing chart or a new chart may be infected with a virus. Check the PC and the medium for viruses with a commercial virus checker - BEFORE you connect them to the ECDIS. Be sure the virus checker contains the latest virus definition files.

Network connection

The ECDIS receives and displays information from various navigation equipment and radar via a LAN. A PC and other equipment connected to a network can carry viruses. To prevent the introduction of a virus to the LAN, DO NOT connect the ECDIS or HUB to an external network, including other shipboard LAN.

Do not install 3rd party programs in the ECDIS

Do not install any 3rd party software.

Open source software

This product includes software to be licensed under the GNU General Public License (GPL), GNU Lesser General Public License (LGPL), BSD, Apache, MIT and others. The program(s) is/are free software(s), and you can copy it and/or redistribute it and/or modify it under the terms of the GPL or LGPL as published by the Free Software Foundation. Please access to the following URL if you need source codes: https://www.furuno.co.jp/cgi/cnt_oss_e01.cgi.

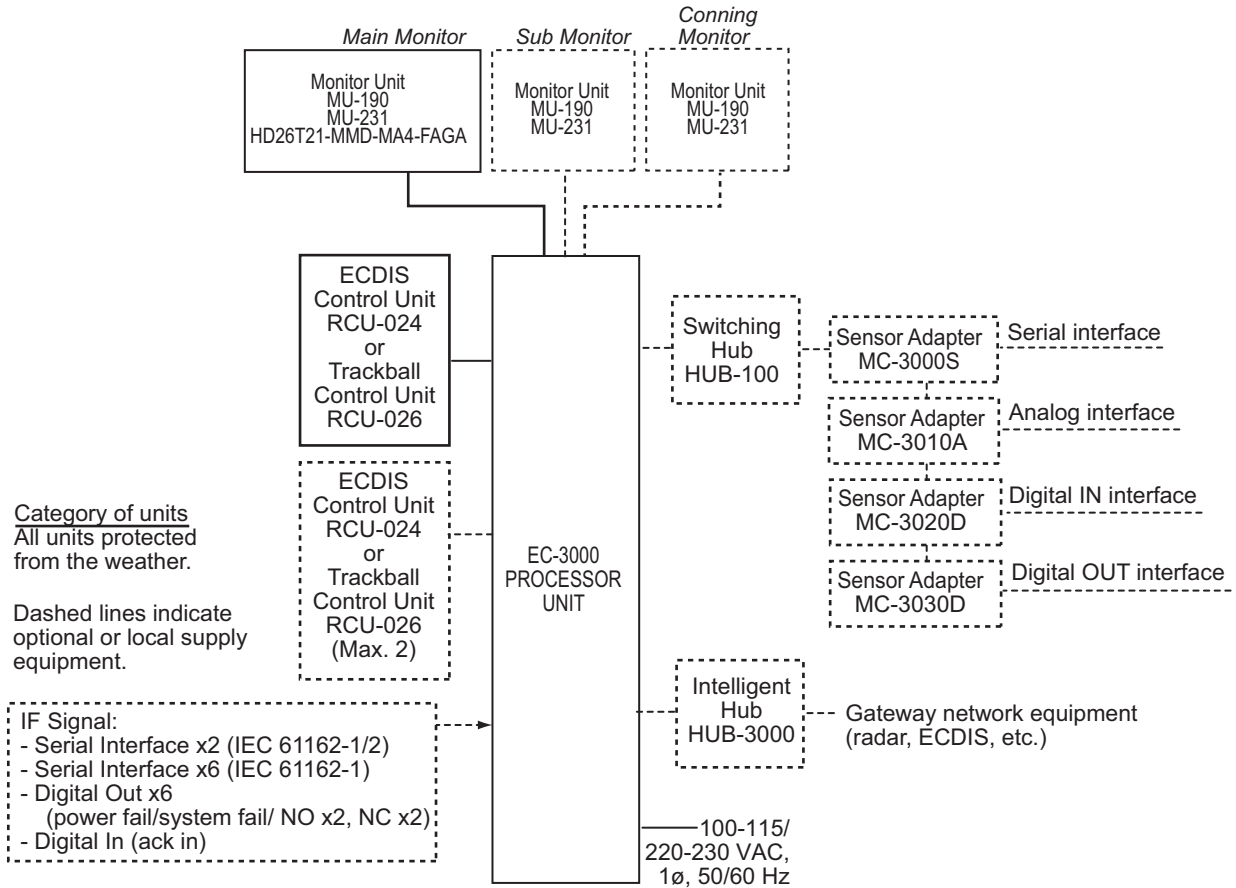
This product uses the software module that was developed by the Independent JPEG Group.

Reverse engineering

Reverse engineering (reverse assemble, reverse compiler) of the software of this equipment is strictly prohibited.

SYSTEM CONFIGURATION

Single workstation



Note: The following monitors are available with the FMD-3200-BB:

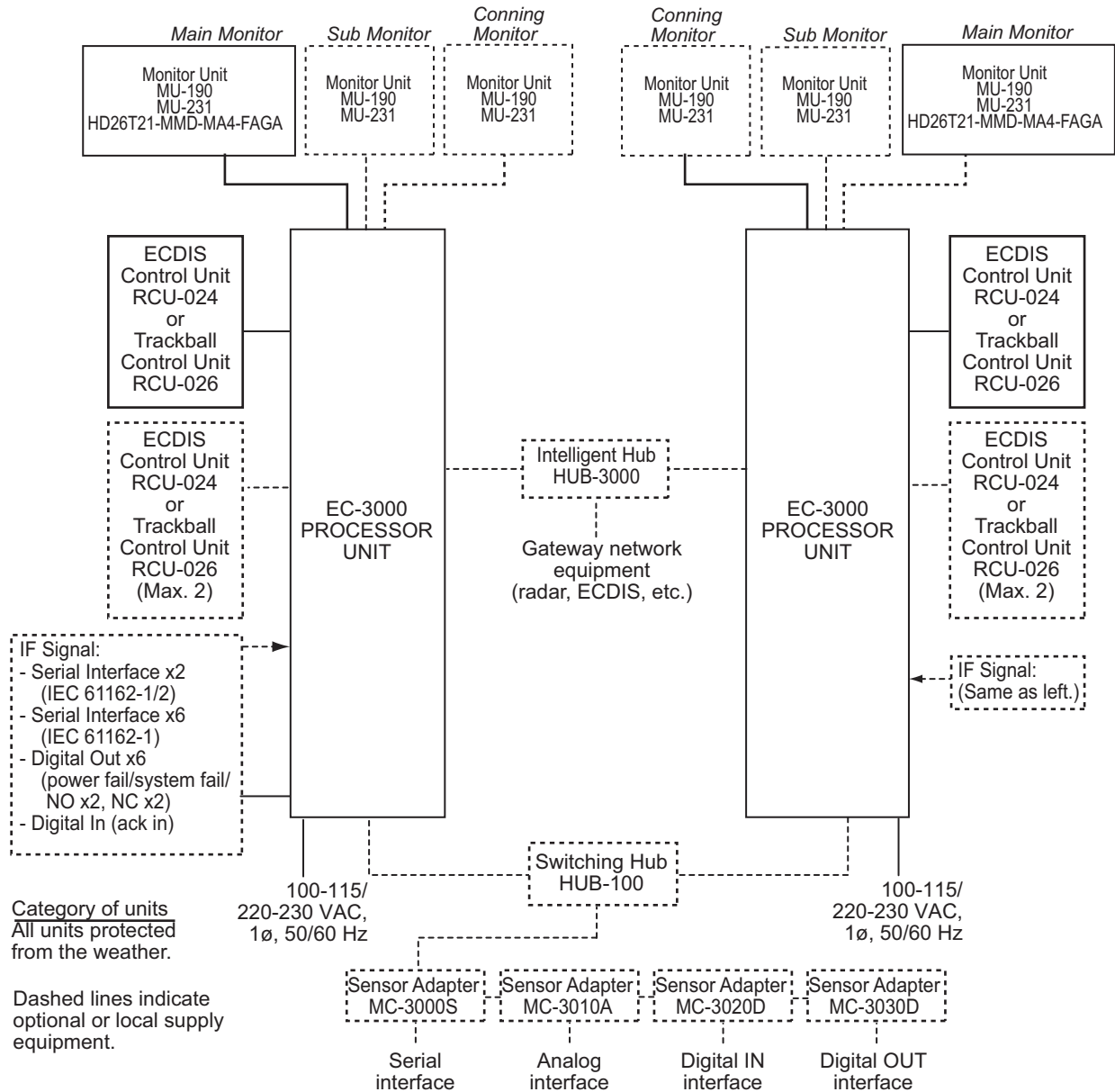
Model	Maker	Model	Maker
MU-190	FURUNO	JH23T12FUD	Hatteland
MU-231	FURUNO	JH23T14FUD	Hatteland
MU-201CE	FURUNO	HD24T21MMD	Hatteland
MU-231CE	FURUNO	JH26T11MMD	Hatteland
JH19T14FUD	Hatteland	HD26T21MMD	Hatteland
JH20T17FUD	Hatteland		

Monitor viewing distance (m):

Model	Viewing Dist.	Model	Viewing Dist.
MU-190	1.0138	JH23T12FUD	1.0138
MU-231	1.0138	JH23T14FUD	1.0138
MU-201CE	1.0759	HD24T21MMD	0.9517
MU-231CE	1.0138	JH26T11MMD	0.9879
JH19T14FUD	1.0138	HD26T21MMD	0.9879
JH20T17FUD	0.8793		

For information about a Hatteland monitor, see its Operator's Manual.

Multiple workstation



Category of units
All units protected from the weather.

Dashed lines indicate optional or local supply equipment.

Note: The following monitors are available with the FMD-3200-BB:

Model	Maker	Model	Maker
MU-190	FURUNO	JH23T12FUD	Hatteland
MU-231	FURUNO	JH23T14FUD	Hatteland
MU-201CE	FURUNO	HD24T21MMD	Hatteland
MU-231CE	FURUNO	JH26T11MMD	Hatteland
JH19T14FUD	Hatteland	HD26T21MMD	Hatteland
JH20T17FUD	Hatteland		

For information about a Hatteland monitor, see its Operator's Manual.

* Monitor viewing distance (m):

Model	Viewing Dist.	Model	Viewing Dist.
MU-190	1.0138	JH23T12FUD	1.0138
MU-231	1.0138	JH23T14FUD	1.0138
MU-201CE	1.0759	HD24T21MMD	0.9517
MU-231CE	1.0138	JH26T11MMD	0.9879
JH19T14FUD	1.0138	HD26T21MMD	0.9879
JH20T17FUD	0.8793		

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1. INTRODUCTION

1.1 System Configuration

This ECDIS series is comprised of the components shown in the illustration on the System Configuration page.

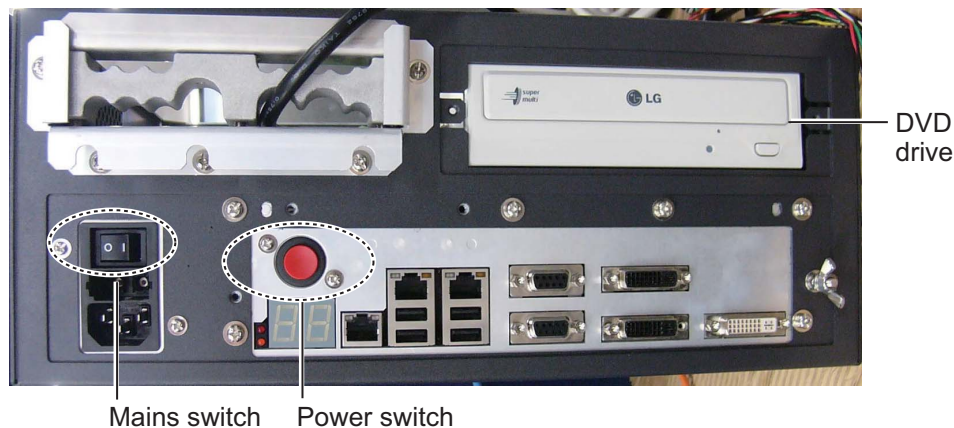
The Processor Unit is connected to various sensors, and performs navigation calculations, route planning and route monitoring. The Sensor Adapters interface between the Processor Unit and external equipment.

The operator controls the ECDIS with the ECDIS Control Unit RCU-024 or the Trackball Control Unit RCU-026. Both units are equipped with a trackball module (trackball, right and left mouse buttons and a scrollwheel). The RCU-024 is additionally equipped with an alphabet keyboard. All functions of the ECDIS can be accessed from the trackball module.

1.2 Processor Unit EC-3000

The Processor Unit is the heart of the ECDIS system, and is mainly responsible for the chart management, route planning and route navigation.

The Processor Unit has two power switches. The Mains switch controls the power from the switchboard, and the Power switch controls the power to the ECDIS system.



Note 1: Do not operate the system with a medium inserted in the DVD drive when its use is not required, to prevent damage to the drive and medium. After use of a medium is completed, remove the medium from the drive and store it in its case.

Note 2: To keep the system stable, restart the unit at least once every two weeks.

Note 3: Close the lid of the DVD drive when the drive is not in use.

Note 4: The DVD ROM provided with this equipment contains the ECDIS program. Store the DVD in a place where the temperature and humidity are moderate. The recommended storage temperature is -10°C(50°F) to 40°C(104°F).

1.3 How to Turn the Power On/Off

Normally, leave the power switches at the front of the Processor Unit on and control the power with the power key on a Control Unit (RCU-024, RCU-026). The Monitor Unit is powered independently.

How to power the system

Push the Mains switch on the Processor Unit for the "I" position. Turn on the power switch on the Processor Unit or the power key on the Control Unit. The start-up display appears on the monitor.

Note: If the ambient temperature is less than 0°C (32°F) when the power is applied, nothing appears on the display. This is because the heater is warming the Processor Unit. The display appears after the Processor Unit becomes warm, in approx. two minutes.

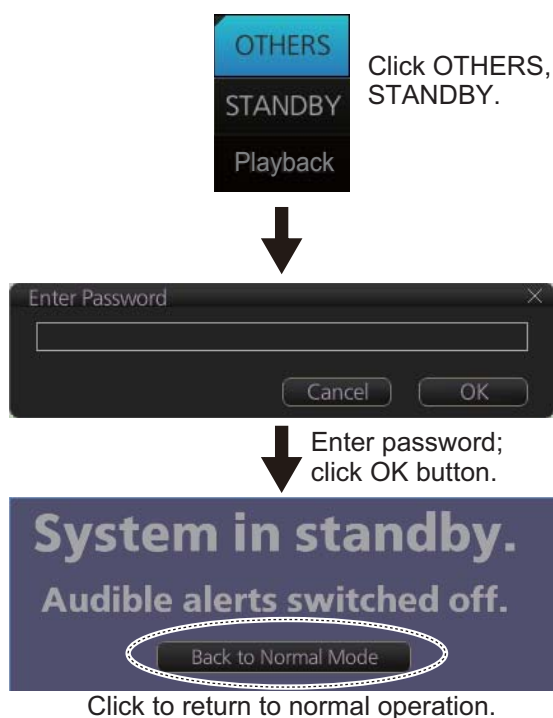
How to power off the system

Press the power switch on the Processor Unit or the power key on the Control Unit. Then, push the Mains switch for the "O" position.

1.4 The Standby Mode

The standby mode, which requires a password to activate, deactivates the audio alarms from the ECDIS. Use this mode when the ECDIS is not required, like in a harbor.

To go to the standby mode, first click the [OTHERS] button on the Status bar then click [STANDBY]. Have the holder of the password enter the password then click the [OK] button.



To return to normal operation, click [Back to Normal Mode].

1.5 ECDIS Control Unit RCU-024

The RCU-024 consists of controls, keys, alphabet keyboard and trackball module (trackball, scrollwheel and left and right mouse buttons). The trackball module functions like a PC mouse. The operator rolls the trackball and operates the left and right mouse buttons and the scrollwheel to do various functions.



1.5.1 Control description

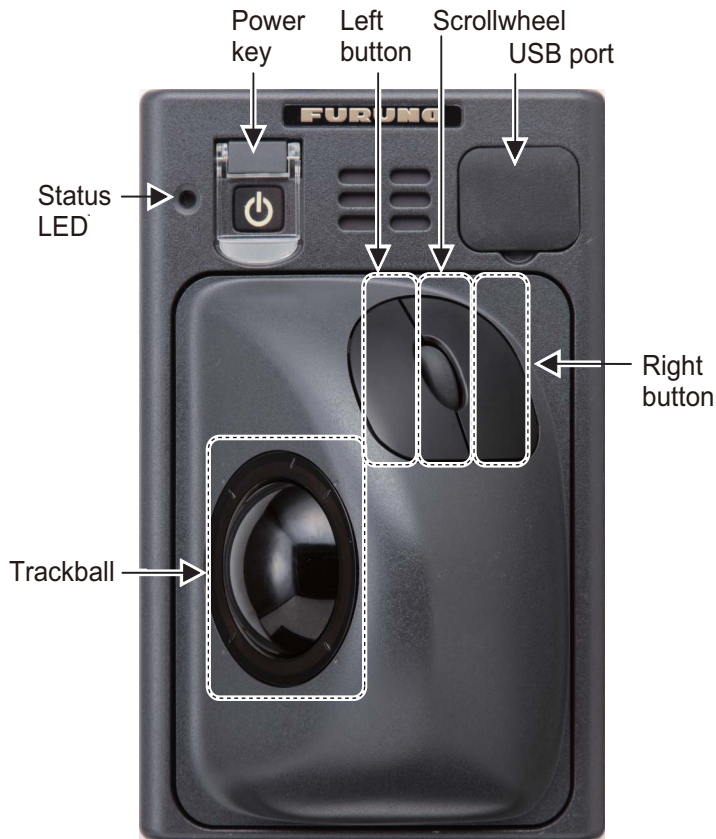
Key	Description
POWER key	Turns the system on or off. (With a FURUNO or Hatteland monitor unit, the monitor is also turned on or off with this key.)
Status LED	The color and state of the LED change according to system or alert status. Green, lighting: Normal operation status; no alerts generated. Red, lighting: Acknowledged alert (but not rectified) or SYSTEM FAIL. SYSTEM FAIL occurs when there is trouble in the Processor Unit or communication failure between the Processor Unit and an ECDIS Control Unit. Each Control Unit detects trouble and its lamp flashes in red and the buzzer sounds. If this condition occurs at the No. 1 ECDIS Control Unit, the SYSTEM FAIL signal is output. Red, flashing rapidly: Alert not acknowledged nor rectified. Red, flashing slowly: Alert not acknowledged but rectified. OFF: The heater on the CPU board is on, because the ambient temperature is not at least 0°C. The heater takes about two minutes to warm the equipment. The LED lights green after the heater goes off.
EBL rotary encoder	Adjusts active EBL.
EBL 1	Activates or deactivates EBL 1.

1. INTRODUCTION

Key	Description
EBL 2	Activates or deactivates EBL 2.
ALARM ACK	Alert acknowledgement for alerts generated by chart, navigation, etc.
InstantAccess knob, ESC key	Selects and processes the functions on the InstantAccess bar. Rotate: Selects item. Push: Confirms selection. ESC key: Goes back one step in the current operating sequence on the InstantAccess bar.
BRILL	Rotate: Adjusts the brilliance of a FURUNO or Hatteland monitor. Push: Selects a color palette.
A/C RAIN	No use.
A/C SEA	No use.
GAIN	No use.
Alphabet keyboard	Enter alphanumeric data. The CTRL key has no function.
VRM rotary encoder	Adjusts active VRM.
MFD	Switches between the ECDIS and CONNING modes.
VRM 1	Activates or deactivates VRM1.
VRM 2	Activates or deactivates VRM2.
UNDO	Undo the last operation, when creating a route or user chart.
VIEW/HIDE	Shows or hides the Instant Access bar, [Route Information] box, VRMs, EBLs, [Overlay/NAV Tools] box.
RANGE	Selects the display scale.
ACQ/ACT	Activates cursor-selected sleeping AIS target.
TARGET DATA	Displays detailed target data for selected TT, AIS target.
TARGET CANCEL	Sleeps cursor-selected activated AIS target.
USB port	For connection of USB flash memory (FAT16 or FAT32 format only). Do not connect a USB HDD or PC keyboard. The DVD drive (Maker: TEAC, Type: PU-DRV10) is for chart updates.
Trackball module	See the description in section 1.6.

1.6 Trackball Control Unit RCU-026

The RCU-026 has a power key, a trackball module (trackball, scrollwheel and left and right mouse buttons), a status LED, and a USB port. The trackball module functions like a PC mouse; the user rolls the trackball and operates the left and right buttons and the scrollwheel to do various functions.



Control	Description
Power key	Turns the system on or off. (With a FURUNO or Hatteland monitor unit, the monitor is also turned on/off with this key.)
Status LED	The color and state of the LED change according to system or alert status. See the LED status description on page 1-3.
Left button	<ul style="list-style-type: none"> • Does the operation related to the object selected. • Confirms the operation done for the object selected.
Scrollwheel	<ul style="list-style-type: none"> • Select options. • Selects chart scale. • Sets numeric data. The scrollwheel does not have a “push” function.
Right button	<ul style="list-style-type: none"> • Displays context-sensitive menu when cursor is put in the display area. • Cancels operation done on the object selected.
Trackball	<ul style="list-style-type: none"> • Moves the cursor. • Selects an object.
USB port	For connection of USB flash memory (FAT16 or FAT32 format). Do not connect a USB HDD or PC keyboard. The DVD drive (Maker: TEAC, Type: PU-DRV10) is for chart updates.

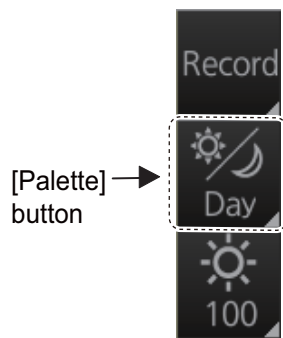
1.7 How to Select a Color Palette

The system provides three sets of color and brilliance sets (palette), day, dusk and night, to match any ambient lighting condition. The default specifications of each set are as shown in the table below. The panel dimmer setting is automatically changed, and the number of steps depends on the color palette selected.

Palette	Brilliance		Panel dimmer (step)	Text color	Background color
	19" display unit	23" display unit			
Day-gray	110 cd/m ²	120 cd/m ²	15	White	Gray
Day-blue	110 cd/m ²	120 cd/m ²	15	White	Blue
Dusk-gray	50 cd/m ²	50 cd/m ²	7	Light gray	Dark gray
Dusk-blue	50 cd/m ²	50 cd/m ²	7	Light gray	Dark blue
Night-gray	5 cd/m ²	5 cd/m ²	3	Orange	Dark gray
Night-blue	5 cd/m ²	5 cd/m ²	3	Light gray	Dark blue

To select a palette, do the following:

1. Click the [Palette] button.



2. Select [Day], [Dusk] or [Night] as appropriate. For example, select [Day] to show its options.



3. Click the palette desired.

Note 1: A palette can also be selected by pushing the **BRILL** control on the Control Unit.

Note 2: If the display cannot be seen when switching from a Night to Day palette, push and hold the right button (approx. 2 seconds) to switch to the dusk-gray mode.

Note 3: The color palette setting may not get synchronized among ECDIS units selected for synchronization if a unit is being booted during the selection of the color palette. If this occurs, wait until all ECDIS units selected for synchronization have booted then reselect required color palette.

1.8 How to Adjust the Display Brilliance (FURUNO or Hatteland monitor)

The brilliance setting is defined according to the color palette setting. However, manual adjustment of the brilliance is also possible.

Note 1: The brilliance of only the FURUNO or Hatteland monitor can be adjusted from the Control Unit. Use a serial cable for brilliance adjustment to make the connection between the Processor Unit and the Control Unit.

Note 2: For how to adjust display brilliance from the Hatteland monitor, see its operator's manual.

Note 3: Improper brilliance may affect the visibility of information, especially on the night display.

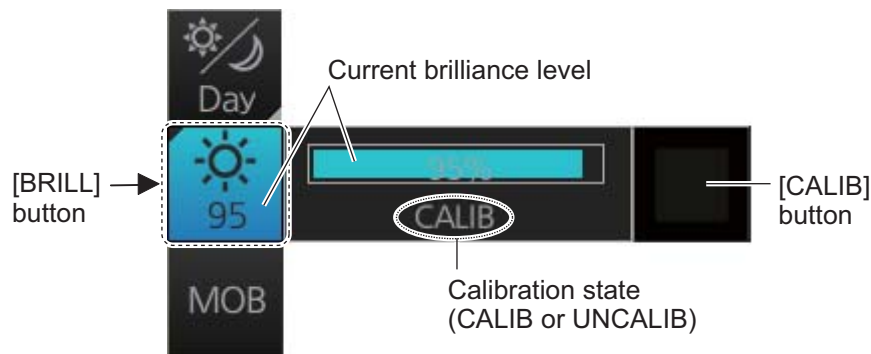
1.8.1 Manual brilliance adjustment

Manual adjustment with the BRILL control on the ECDIS control unit

Operate the **BRILL** control to adjust brilliance. Turn it clockwise to increase the brilliance; counterclockwise to decrease the brilliance. Watch the brilliance level indication on the [BRILL] button (see the illustration below) to see the current brilliance level.

Manual adjustment with the InstantAccess knob

1. Push the **InstantAccess** knob.
2. Rotate the knob to select the [BRILL] button then push the knob to show the brilliance adjustment window.



3. Push the knob, rotate the knob to set the brilliance then push the knob to confirm the setting. The calibration state indication changes to "UNCALIB".
4. Rotate the knob to select the [CALIB] button then push the knob to calibrate the brilliance. The calibration state indication changes to "CALIB".

Manual adjustment with the trackball module

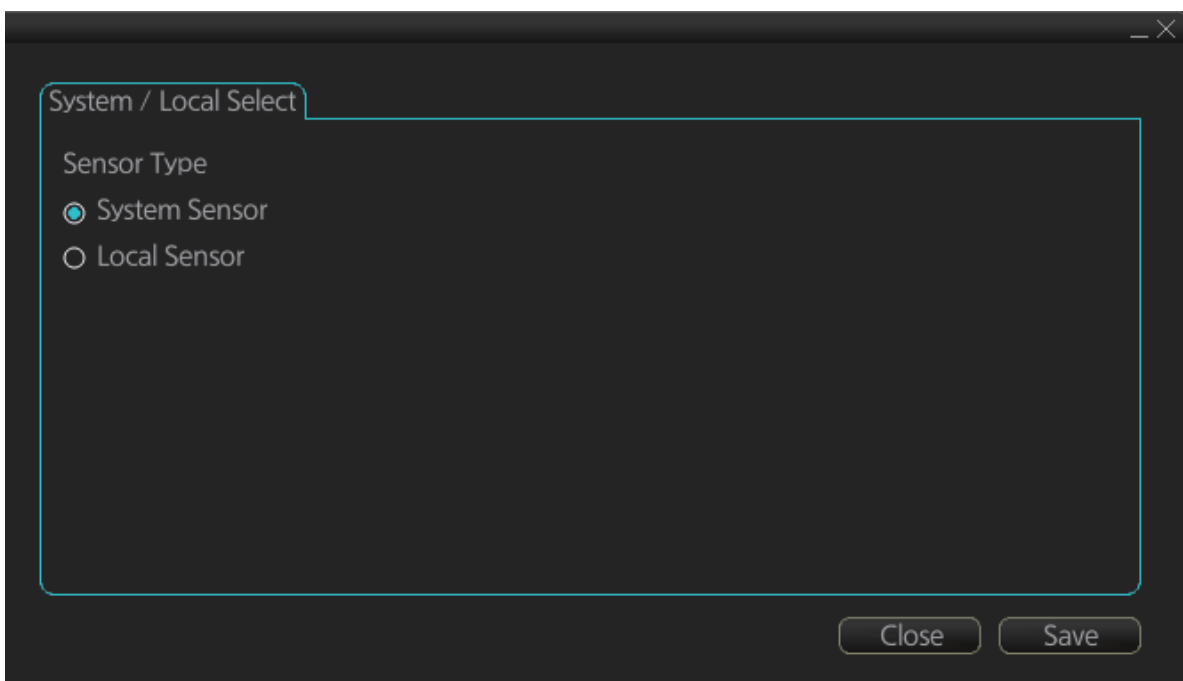
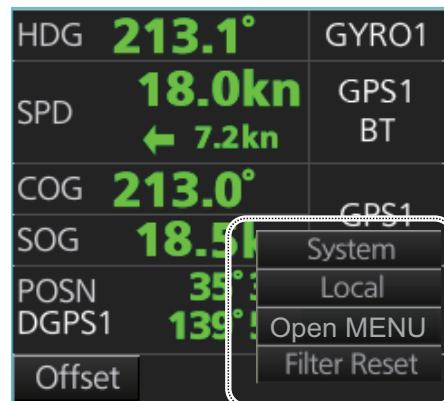
1. Click the [BRILL] button on the InstantAccess bar to show the brilliance adjustment window.
2. **For coarse adjustment**, put the cursor on a location within the slider bar area then push the left button. **For fine adjustment**, put the cursor on the end of the slider bar and roll the trackball while holding down the left button.
3. Release the left button to confirm setting. The calibration state indication changes to "UNCALIB".
4. Click the [CALIB] button to calibrate the brilliance. The calibration state indication changes to "CALIB".

1.9 How to Select Sensor Settings

This ECDIS system accepts navigation data input two ways: System or Local. System shares sensor data among multiple ECDIS in network. Sensor priority is also commonly shared among the ECDIS. Local selects a sensor outside the network.

1. Right-click anywhere in the [Sensor information] box to show the context-sensitive menu.
2. Click [Local] or [System] as applicable.

Note: Sensor system can also be selected from the menu. Open the menu and click [System/Local Select] on the [Sensor] menu. Click the circle next to [System Sensor] or [Local Sensor] as appropriate then click the [Save] button.



1.10 How to Enter Ship Speed

The speed can be entered from a log (STW) or GPS (SOG), or manually on the menu. Note that FURUNO GPS Navigator GP-150 provides both COG and SOG.

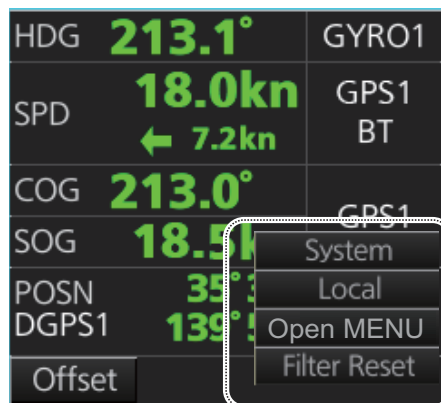
Speed data is checked for integrity (see section 18.7 for details), and the data is judged as Passed, Doubtful or Failed. The results of the check appear on the [SPD] page, shown below. (The results do not appear when the TCS is engaged.)

Passed (green): Data is available for comparison and data is normal.

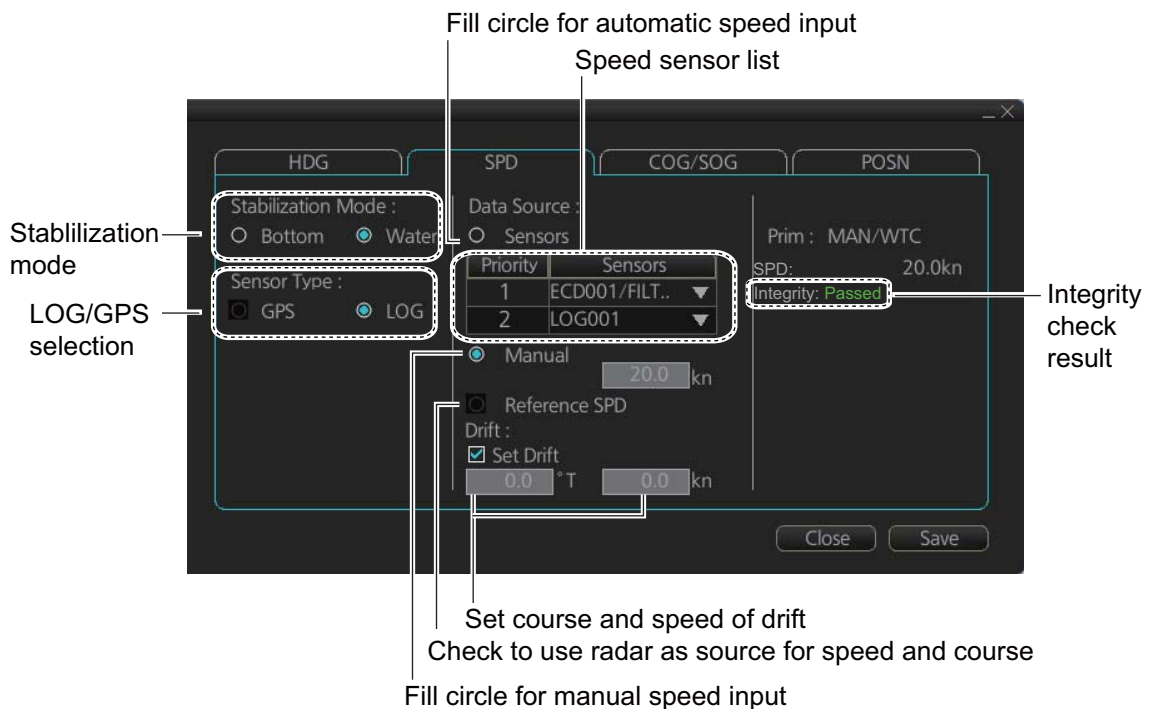
Doubtful (yellow): Data is not available for comparison, but data is normal.

Failed (red): Data may or may not be available for comparison, and data is abnormal.

1. Right-click anywhere in the [Own ship information] box to show the context-sensitive menu.

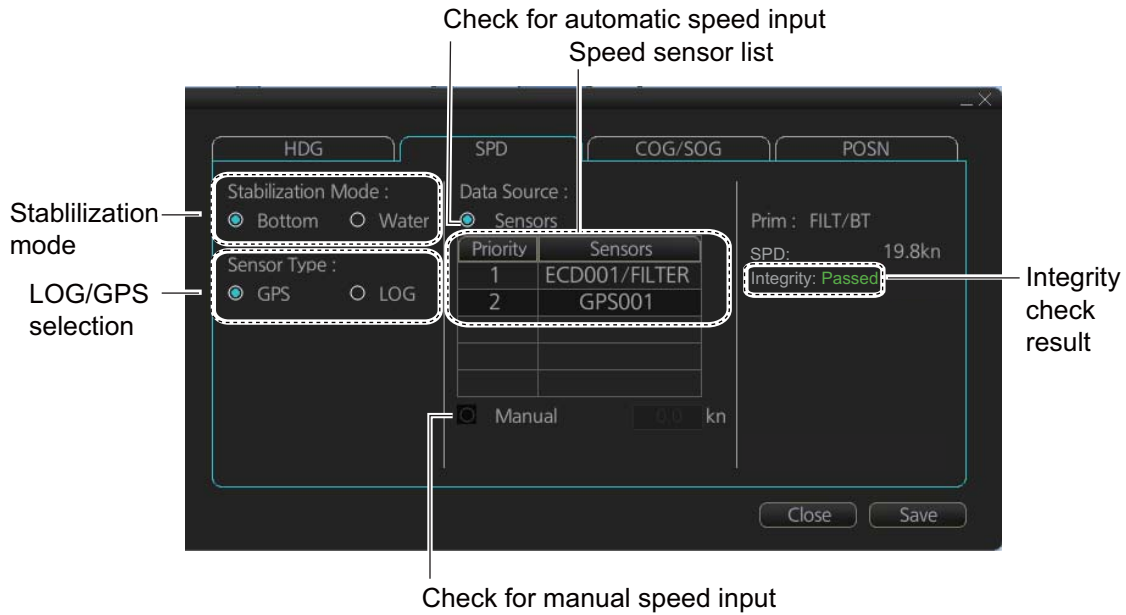


2. Click [Open MENU].
3. Click [System Sensor Settings] or [Local System Settings] as applicable.
4. Click the [SPD] tab.



SPD page, local sensor

1. INTRODUCTION



SPD page, system sensor

- For automatic input**, follow the procedure below. **For manual input**, go to step 6.
 - 1) Check [Sensors].
 - 2) Set the priority for the speed sensors in case of Local sensor. Click the triangle on the Priority1 line to select the sensor to be the Priority1 sensor. Do the same for the Priority2. Only one sensor can be Priority1; all others are priority 2. If a speed sensor is changed from Priority2 to Priority1, then that sensor previously selected to Priority1 is then automatically selected to Priority2 state.
 - 3) Check [LOG] or [GPS] at [Sensor Type] as appropriate.
 - 4) Select [Bottom] or [Water] at [Stabilization Mode]. Select [Bottom] if GPS is the source of speed data, or [Water] if a speed log is the source of speed data.
 - 5) Go to step 7.
- For manual input, set the stabilization mode for [Water] and check [Manual]. Enter the speed, using the scrollwheel or software keyboard.
Note: For set and drift, see page 18-3.
- Click the [Save] button to save settings then click the [Close] button to close the menu.

Notes on speed input

- Be sure not to select a LOG option when a speed log is not connected. If the log signal is lost, the GPS sensor is used. In the event of GPS loss, the SPD is shown as "***.* kn".
- The SPD is shown as "***.* kn", and the label "LOG" is erased if no log signal is present for a certain amount of time. The timeout varies according to ship.
- If SOG is changed to STW, the label "LOG" (in orange) appears. If log signal is lost "LOG" is colored yellow.
- A single-axis water log cannot measure speed when the wind is coming from the leeway direction.

1.11 How to Enter Heading

Heading can be entered manually or automatically. Heading data is checked for integrity (see section 18.7 for details), and the data is judged as [Passed], [Doubtful] or [Failed]. The integrity check results appear on the [HDG] page, shown below. (The results do not appear when the TCS is engaged.)

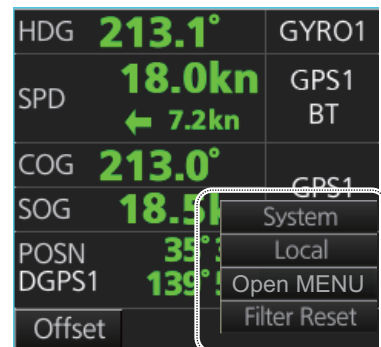
Passed (green): Data is available for comparison and data is normal.

Doubtful (yellow): Data is not available for comparison, but data is normal.

Failed (red): Data may or may not be available for comparison, and data is abnormal.

Note: If there is only one gyro connected to the ECDIS, heading data is compared to COG from GPS. When the speed is five knots or less, and COG is unstable when it is compared to heading data, the message “Doubtful” appears for heading data. When the ship’s speed becomes greater than 10 knots and COG stabilizes, the message disappears after a short while.

1. Right-click anywhere in the [Own ship information] box to show the context-sensitive menu.
2. Click [Open MENU].
3. Click [System Sensor Settings] or [Local System Settings] as applicable.
4. Click the [HDG] tab.

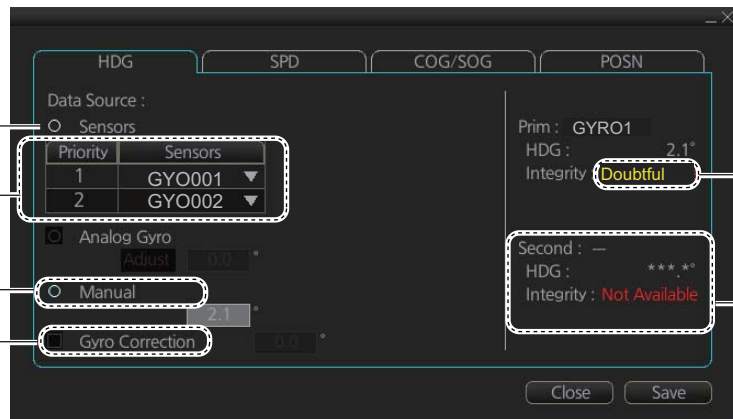


Fill circle for automatic heading input

Sensor list

Fill circle for manual heading

Fill circle for gyro correction



Local sensor settings

Integrity check result

Second shows Integrity as “Not available” when only one gyrocompass is connected.



System sensor settings

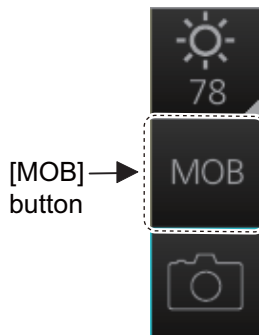
1. INTRODUCTION

5. For automatic input follow the procedure below. For manual input go to step 6.
 - 1) Check [Sensors].
 - 2) For local system settings, set the priority for each sensor connected, referring to section 1.10.
 - 3) Go to step 7.

Note: For the local sensor, an offset can be applied to the gyro reading if it is wrong. Check [Gyro Correction], then spin the scrollwheel to set the offset.
6. For manual input, check [Manual]. Enter heading by spinning the scrollwheel or entering numeric data with the keyboard on the Control Unit.
7. Click the [Save] button to save settings then click the [Close] button to close the menu.

1.12 How to Mark MOB Position

Use the MOB (man overboard) feature to mark the position of man overboard on the display screen. Access the [MOB] button (in any mode) on the InstantAccess bar.



The MOB mark (orange) instantly appears at the system position when the button is operated.



Up to 100 MOB marks can be saved. When the capacity for MOB marks is reached, the oldest mark is automatically erased to make room for the latest.

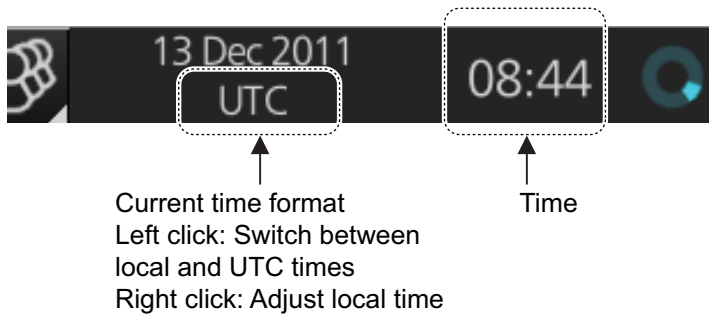
To hide an MOB mark, get into the Navigation voyage mode (NAVI) or Voyage planning mode (PLAN), right-click the mark to show the context-sensitive menu then select [Hide MOB].

Exercise caution when using this feature in strong tide or current. The person will not be at the MOB position for a very long time.

1.13 How to Select Time Format, Set Local Time

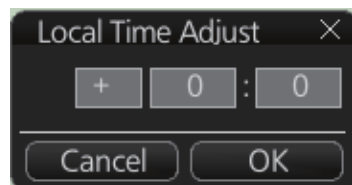
A GPS navigator feeds time and date data (ZDA sentence) to the ECDIS and they appear on the Status bar. Neither the time nor the date can be adjusted, however you can select between UTC time (default) and local time. You can switch between the local time and the UTC time by left-clicking the Current time format indication.

Note: The date and time are yellow when the ZDA sentence is lost.



To set the local time, enter the time difference between the local time and the UTC time as shown below.

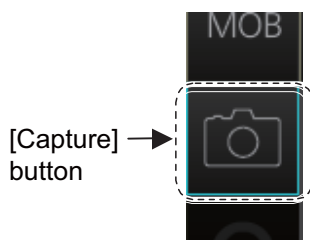
1. Right-click the Current time format indication to show the context-sensitive menu then click [Adjust Local Time] to display the [Local Time Adjust] dialog box.



2. Enter the time difference between the local time and the UTC time, in hours and minutes. Use the button on the left to select the time offset direction. Select "+" if the local time is ahead of the UTC time, or "-" if it is behind the UTC time.

1.14 How to Take a Screenshot of the Display

Click the [Capture] button on the InstantAccess bar to take a screenshot and save it to the SSD (Solid State Drive). You can save a maximum of 100 screenshots. When the memory for screenshots becomes full, you cannot take any more screenshots. In this case, delete unnecessary screenshots. You cannot take a screenshot when a menu or a dialog box is open. Screenshots can be copied to a USB flash memory. For how to process screenshots, see section 23.10.



1.15 The Settings Menu


The [Settings] button gives you access to the user profiles and the [Settings] menu. The [Settings] menu has facilities for screenshot management, file management, diagnostic tests and customizing. See chapter 23.



1.16 How to Manage User Profiles

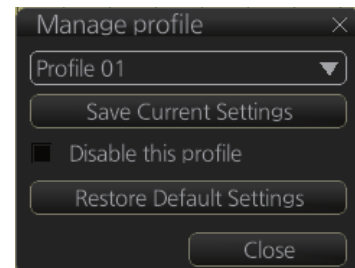
Ten sets of [Chart Display], [Symbol Display] and [Chart Alert] menu settings can be stored in user profiles for later retrieval.

1.16.1 How to create a profile

1. Set the [Chart Display], [Symbol Display] and [Chart Alert] menus as desired.
2. Click  on the Status bar then click [Manage Profile].
3. Select a profile number from the "Profile" drop-down list.

Note: Profiles 06-10 are disabled in the default setting. To enable a disabled profile, select the profile to enable from the "Profile" drop-down list then uncheck [Disable this profile].

4. Click [Save Current Settings].




1.16.2 How to disable a profile

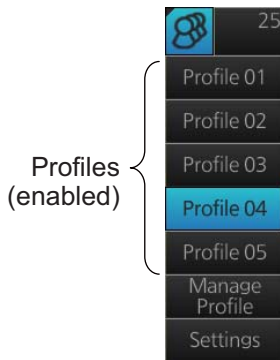
Select the profile to disable from the "Profile" drop-down list then check [Disable this profile]. Profile 01 cannot be disabled.

1.16.3 How to restore default settings to a profile


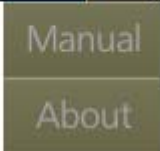

Select the applicable profile from the "Profile" drop-down list then click [Restore Default Settings].

1.16.4 How to activate a profile

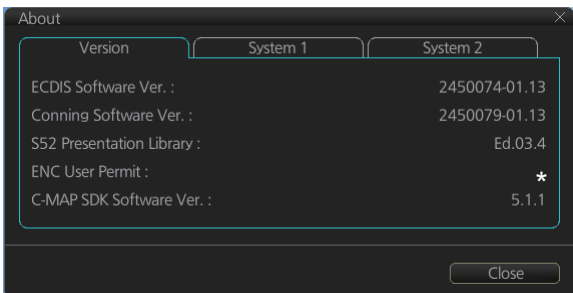




Click  on the Status bar then click the profile number to activate.



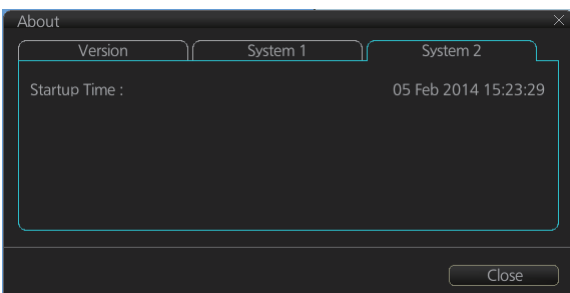
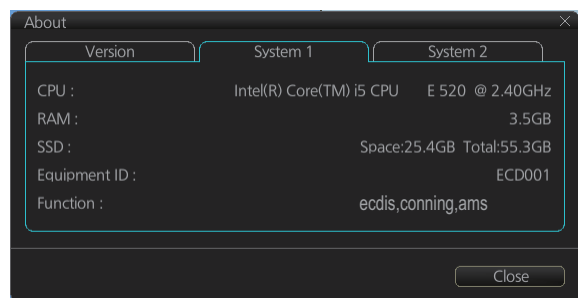
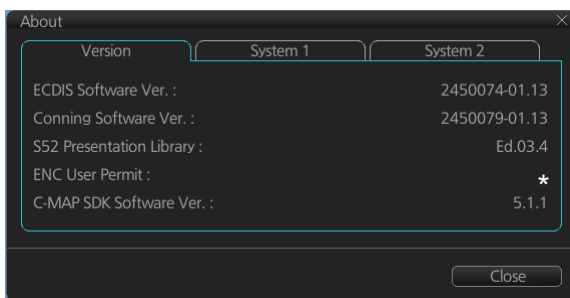
1.17 How to View ECDIS Software Version No., ECDIS System Information, and Operator's Manual

You can show ECDIS program no., ECDIS system information, and the operator's manual. Click the  button on the Status bar then select  to show the operator's manual, or  to show ECDIS and system related information.



On the  screen, click the  to show the ECDIS software version no., conning software version no., S52 presentation library version, ENC user permit no., and C-MAP SDK software version no. Click the  to show ECDIS system information: CPU type, RAM capacity, SSD free/SSD capacity, Equipment ID and dongle information.  shows the system's capabilities. The  shows the startup time of the current session.

The information shown may be different than what appears on your display.



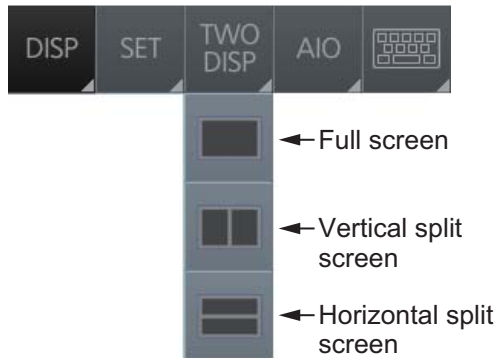
* Actual number appears.
Version and ID nos. subject to change.

1.18 Split Screen

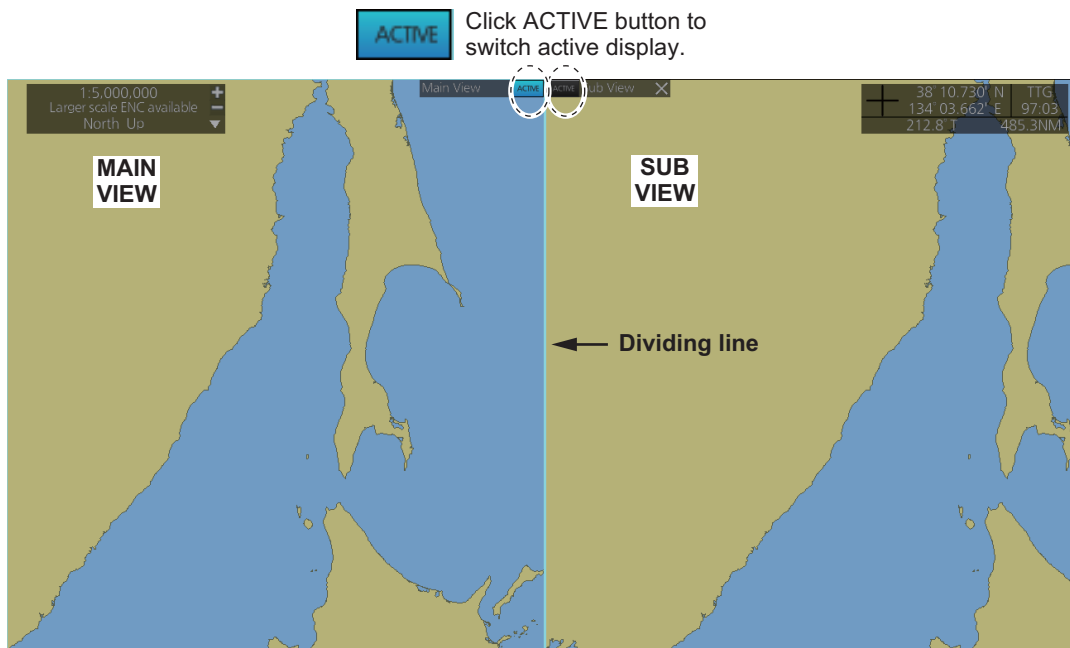
You can split the screen in two, horizontally or vertically, in the Voyage navigation mode.

1.18.1 How to activate, deactivate the split screen

To activate the split screen or return to the full screen, click the [DISP] and [TWO DISP] buttons on the InstantAccess bar to show the choices for screen division. Click the screen division desired.



The example below shows the vertical split screen. The active display can be switched by clicking an [ACTIVE] button at the top of the display. The dividing line between the main and sub views cannot be moved.



1.18.2 Function availability

Item	Viewable		Operable	
	Main	Sub	Main	Sub
AIS target	Yes	Yes	Yes	Yes
Anchor watch	Yes	Yes	Yes	No
Chart display	Yes	Yes	Yes	No
Danger highlight	Yes	Yes	Yes	No
Divider	Yes	Yes	Yes	No
EBL, VRM	Yes	Yes	Yes	Yes
Parallel index lines	Yes	Yes	Yes	Yes
Radar overlay	Yes	No	Yes	-
Range rings	Yes	Yes	Yes	No
TT	Yes	Yes	Yes	Yes
Weather overlay	Yes	No	Yes	-

1.18.3 Split screen usage characteristics

- If the sub view is not displayed correctly, restore the full screen display then try to activate the split screen again.
- The display may not be updated when switching to the Voyage planning mode. If this occurs, switch to the Voyage navigation mode, restore the split screen display then return to the Voyage planning mode.
- The own ship mark may not appear at the screen center when releasing the split screen display. If this occurs, click the indication "TM/CU Reset" at the top right position on the screen to show the own ship mark at the screen center.
- The TM reset feature only works on the active display. To return the own ship mark to the screen center, click the indication [TM/CU Reset] at the top right position on the screen.
- The sub view can use a location and chart scale different from the main view.
- The chart scale related messages (overscale, larger ENC available, etc.), which appear beneath the chart scale indication, show only on the main view.



CAUTION

Changes to settings, including safety features such as safety contour, are only reflected on the main view when the split screen is in use.

For that reason use caution when observing the sub view.

1.19 Tips

This ECDIS provides operational tips for the display area and the InstantAccess bar. To get a tip, simply put the cursor on an object. The tip appears to the right of the object. For example, put the cursor on the [BRILL] button on the InstantAccess bar. The tip "Adjust brilliance" appears.



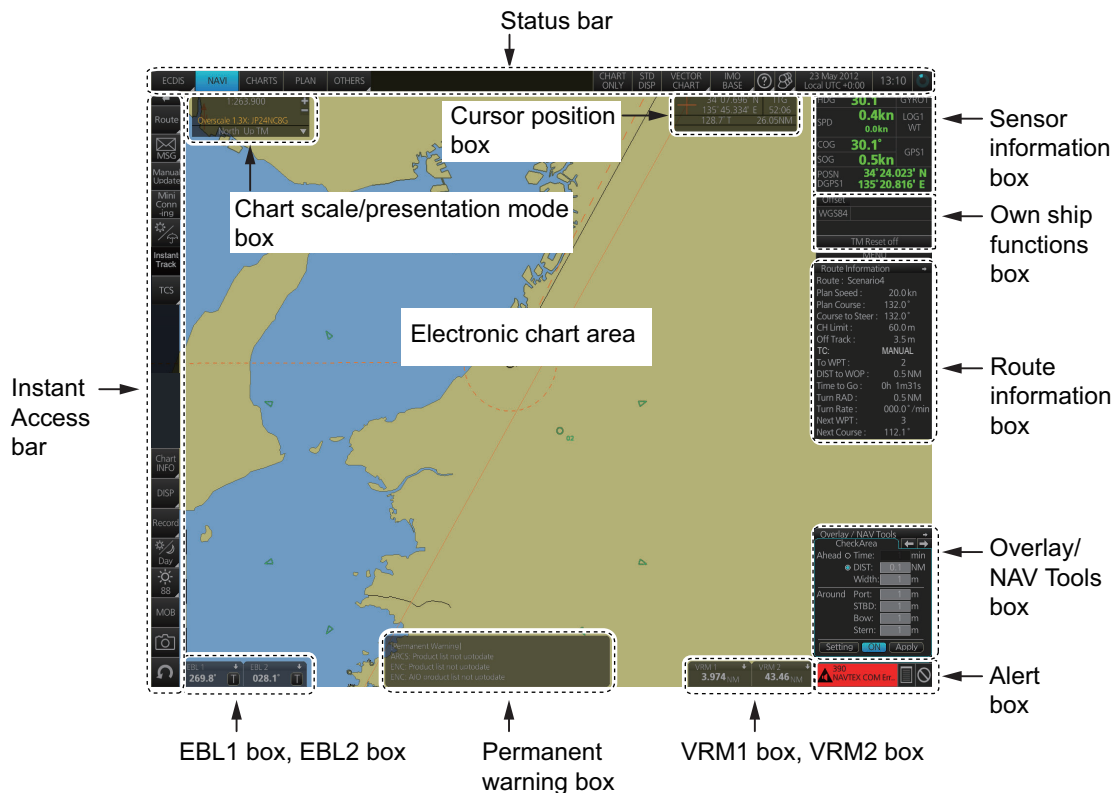
1.20 Printer Information

A Hewlett Packard (HP) printer may be connected to the system to print ENC Publisher's Notes, reports, logs, etc. The available HP printers are Officejet Pro 8000, Officejet Pro 8100 and Officejet 100 Mobile. No other makes or models are permitted.

2. OPERATIONAL OVERVIEW

2.1 ECDIS Display

The ECDIS (Electronic Chart Display and Information Systems) screen is divided into several areas, as illustrated below. (The illustration shows the layout for the FURUNO-monitor. The layout may be slightly different with the Hatteland monitor.)



- The **Status bar** provides for selection of operating mode, chart format, IMO chart display; one-click restoration of IMO standard display, etc.
- The **Sensor information box** displays ship's speed, course and position and selects sensors.
- The **Own ship functions box** applies offset to the chart; changes geodetic data system, and provides true motion reset.
- The **Route information box** shows route and waypoint data, when a route is selected for navigation.
- The **Overlay/NAV Tools** box provides for setup of the radar overlay and navigation-related functions.
- The **Alert box** shows operational and system alert messages.
- The **VRM boxes** measure the range to an object.
- The **Permanent warning box** displays chart-related warning messages.
- The **EBL boxes** measure the bearing to an object.
- The **InstantAccess bar** provides quick access to functions such as brilliance adjustment, display palette and the menu. The contents change according to the ECDIS mode selected.
- The **Chart scale/presentation mode box** selects the chart scale and presentation mode.
- The **Cursor position box** shows the latitude and longitude position of the cursor and the TTTG to the cursor.
- The **Electronic chart area** shows the ECDIS chart.

2.1.1 Electronic chart area

The ECDIS can use the following types of charts:

- S-57 (IHO)
- S-63 (IHO) (S-63 encrypted)
- ARCS (UKHO)
- CM-ENC (C-MAP by Jeppesen)
- CM-93/3 (C-MAP by Jeppesen)

The following information can also be displayed:

- Cursor (moved by trackball)
- Planned route
- EBL (Electronic Bearing Line) and VRM (Variable Range Marker)
- Radar image
- Own ship symbol with speed vector
- TT (Tracked Target, acquired from radar)
- AIS target

Electronic charts in ECDIS

The electronic navigational charts are displayed in the electronic chart area. There are two kinds of electronic navigational charts available for use in the ECDIS:

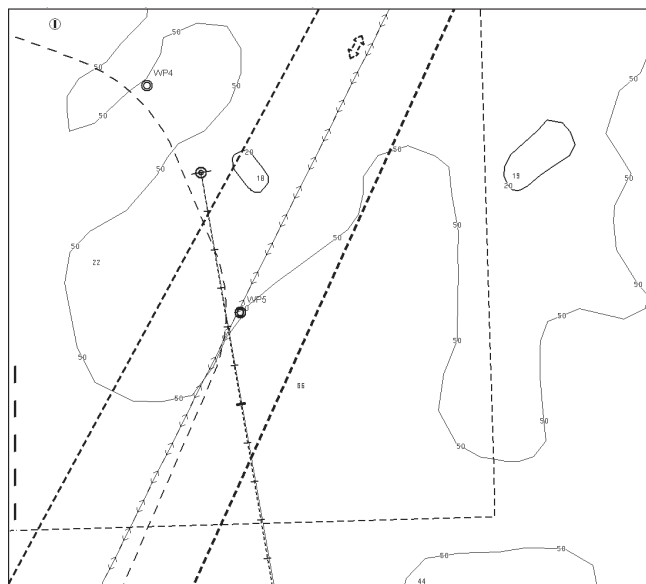
- S57ed3 ENC or CM-93 (vector format)
- ARCS (raster format)

The ECDIS combines chart and navigational information. It should be noted that modern navigation systems (e.g., differential GPS) may offer more accurate positioning than what was used to position some of the surveys from which the electronic navigational chart was derived.

S57 vector format

ECDIS is compatible with S57 Ed.3 ENC format charts. ENC charts are converted to SENC for use with ECDIS.

The details for the chart are displayed in the electronic chart area and these can be modified. You can change the chart scale with the ZOOM IN and ZOOM OUT functions, and the scale range is 1:1,000 - 1:70,000,000.



CM-93 vector format

The CM-93 charts require a contract with applicable provider. These charts are from a private source and they cannot be used as a substitute for paper charts under any condition. To emphasize this point these charts are called "Non-ENC" charts in this manual. Note that some eToken dongles from the FEA-2xx7 can be used. These are labeled "JeT FURUNO XXXXX".

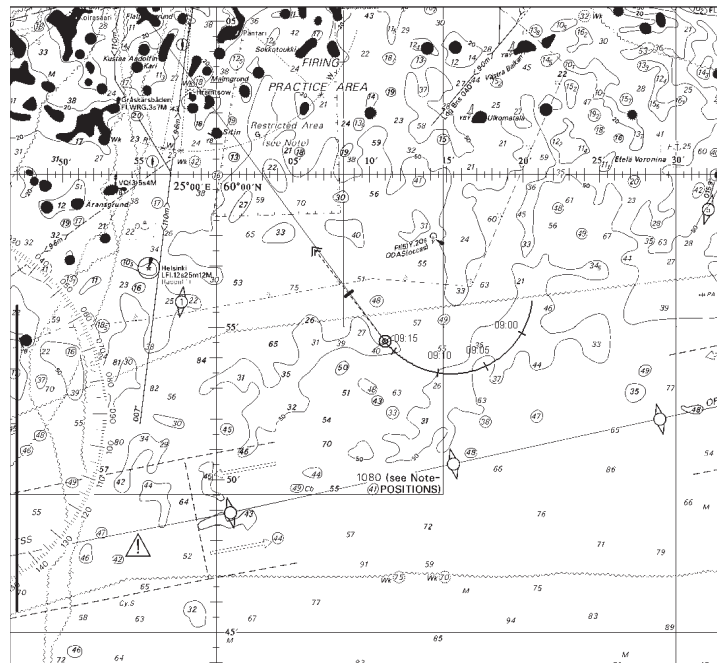
This ECDIS accepts the following C-MAP chart types: CM-ENC, Professional, Professional+ and Jeppesen Primary ECDIS Service.

C-MAP produced official ENC chart that complies with the IHO's (International Hydrographic Organization's) S-57 Edition 3 product specification. When used in an ECDIS, the ENC data improves the safety of navigation at sea.

ARCS raster format

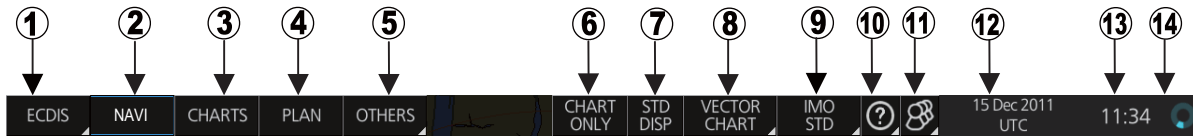
ARCS charts are digital reproductions of British Admiralty (BA) paper charts. They retain the same standards of accuracy, reliability and clarity as paper charts.




Zooming into the ARCS chart can be useful for magnifying a complex detail, however this decreases the density of the data displayed, and can give a false impression of the distance from danger.



2.1.2 Status bar

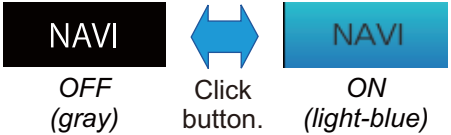

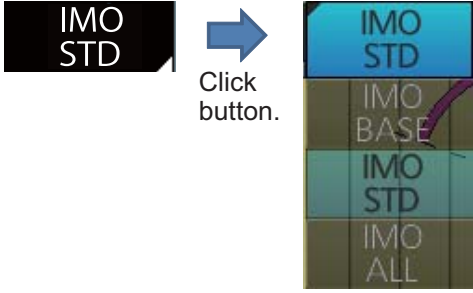
The Status bar mainly provides for selection of operating mode, chart type and IMO chart display setting.



No.	Button	Description
1	Operating mode	Selects the operating mode, ECDIS or conning. (If the conning display is fed to a separate monitor, only ECDIS is available; the button is inoperative.)
2	NAVI	Selects the Voyage navigation mode.
3	CHARTS	Goes to the Chart maintenance mode.
4	PLAN	Selects the Voyage planning mode.
5	OTHERS	<ul style="list-style-type: none"> • Sets system in standby. • Plays back log data (AMS connection must be off).
6	CHART ONLY	Shows only the chart, when the left button is pressed and held down.
7	STD DISP	Restores the IMO standard display instantly.
8	Chart priority	Selects chart priority when both vector or raster are available.
9	Chart database	Selects the pre-defined presentations of ENC content: IMO BASE, IMO STD or IMO ALL. CUSTOM appears when the symbols selected or de-selected on the [Chart Display] menu do not match the preset conditions for IMO BASE, IMO STD or IMO ALL.
10		Displays the operator's manual, ECDIS program no. and system info.
11		Manages user profiles; opens the Settings menu.
12	Date	<ul style="list-style-type: none"> • Displays the date. • Selects the time to use, local or UTC. • Sets the time difference between local and UTC (to use local time).
13	Time	Shows the time, UTC or local.
14		Rotates clockwise if the system is working properly. If it is not spinning the system is not working. Shortly after it stops spinning the buzzer sounds. Reset the power to restore normal operation.

How to operate the buttons on the Status bar





There are two types of buttons on the Status bar: Toggle button and Drop-down list button. You operate the buttons with the trackball module.

Button type	Operating procedure
<p>Toggle button</p> <p>A toggle button alternately selects one of two functions assigned to a button. The background color of a toggle button is light-blue when the button's function is enabled; gray (default color) when disabled. The [NAVI] button is an example of a toggle button.</p>	
<p>Drop-down list button</p> <p>A drop-down list button provides a drop-down list from which to select an option related to the label on the button. The [Chart Database] button is an example of a drop-down list button. See the right figure. A drop-down list button has a list status indicator whose position changes according to list status.</p> 	





2.1.3 InstantAccess bar

The InstantAccess bar contains all the operating functions related to the selected ECDIS mode (Voyage planning, Voyage navigation and Chart maintenance). The bar is divided into two sections, upper and lower. The buttons in the upper section change according to the mode selected. The buttons in the lower section are static in all modes. A button with a triangle mark at its bottom right corner indicates a button with multiple functions.



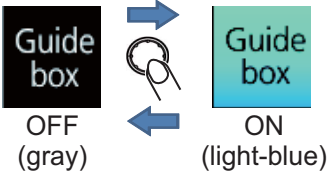
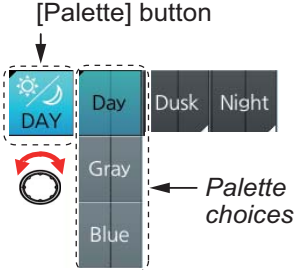
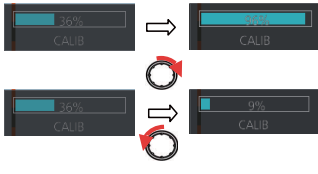
Button	Description
Voyage navigation mode bar	
←	Minimizes the InstantAccess bar. To restore the maximized bar, click anywhere on the minimized bar. 
Route	Route functions: select route, deselect route, move route to plan, monitor route.
	Processes AIS Safety and Navtex messages. If you have unread Navtex or Safety messages, the icon changes as shown right; “S” for unread Safety, “N” for unread Navtex, “S/N” for unread Safety and Navtex. 
Manual Update	Shows the menu for manual update of chart objects.
Mini Conning	Shows, hides the mini conning display.
	Activates or deactivates the weather overlay.
Instant Track	Creates a temporary track to return to or make a temporary detour from the monitored course.
TCS	Controls for use with specific Autopilots (see chapter 26). TCS Setting* has two buttons for selection of steering mode, Go AW and Go SEA . TCS State shows or hides the [Track Control Status] window. *Not shown with Autopilot FAP-2000.
Chart maintenance mode bar	
←	Minimizes the InstantAccess bar.
AUTO Load	Automatically loads and installs ENC charts.
Manage Charts	Deletes charts; installs charts manually.
Cell Status	Finds cell status.
License	Enters license information.
Public Key	Shows the current public key. The public key changes each time a new one is installed.
System	Functions for chart synchronization. Sync Config selects the ECDIS units to synchronize. Sync Status checks synchronization status. Reconvert reconverts outdated SENC charts to the corresponding current ones.
Voyage planning mode bar	
←	Minimizes the InstantAccess bar.
Planning	Creates routes and user charts.
Report	Displays route and user chart reports.
Guide Box	Shows or hides the guide box, which provides range and bearing measurement between waypoints when creating a route.
Manage Data	Manages routes and user charts. Route imports, exports, deletes routes. User Chart deletes user charts. Data Import imports routes and user charts.

2. OPERATIONAL OVERVIEW

Button	Description
Common bar	
Chart INFO	Provides chart information. Chart Legend shows chart legend, in the Voyage planning and Voyage navigation modes. Viewing Dates sets Display date and Approved until dates. Chart 1 displays an overview of the ECDIS chart symbols.
DISP	SET shows the [Basic Setting] dialog box, [Chart Display] menu, [Symbol Display] menu, [Chart Alert] dialog box. TWO DISP splits the screen in two, vertically or horizontally, in the Voyage navigation mode. AIO shows, hides the AIO overlay. Keyboard shows, hides the software keyboard.
Record	Displays Chart log (ENC, ARCS, C-MAP), Event log (user event, POSN event)*, NAV log (Voyage, Details, Chart Usage), Target log (Danger Target). *Voyage navigation and Voyage planning modes
	Selects a color palette, day, dusk or night.
	Adjusts the brilliance of a FURUNO or Hatteland monitor unit.
MOB	Inscribes the MOB (ManOverBoard) mark.
	Takes a screenshot.
	Restores the previous condition in route and user chart creation.

How to operate the buttons on the InstantAccess bar

The InstantAccess bar has four types of buttons: toggle button, drop-down list button, slider bar button, and specialty button. (The MOB, Capture and Undo buttons are specialty buttons that provide a single-action function.) The buttons can be operated with the trackball module or the **InstantAccess** knob. This section shows you how to operate the buttons with the **InstantAccess** knob.

Toggle button	Drop-down list button	Slider bar button
		

1. Push the **InstantAccess** knob to enable its use with the InstantAccess bar.
2. Rotate the **InstantAccess** knob to select a button. The background color of the button selected is light blue.
3. Do one of the following depending on button type.
 - 1) **Toggle button**: Push the knob to select setting.
 - 2) **Drop-down list button** or **slider bar**: Rotate the knob to select an item or adjust the slider bar. Push the knob to confirm your selection or setting.

Note 1: You can use the **ESC** key to go back one step in the current operating sequence.

Note 2: The **InstantAccess** knob only adjusts the slider bar on the InstantAccess bar.

2.1.4 Sensor information box

The sensor information box displays ship's heading, speed, course over the ground, speed over the ground and position. When the user-selected sensor fails, the system automatically selects another sensor. When this occurs, the color of the sensor name changes from green to yellow. See the table below.

The digital indications and sensor names are colored according to sensor state. See the table below.

- **HDG**: Heading and its source.
- **SPD**: Longitudinal speed and its source. The direction of transverse speed is indicated with arrows, ►, Starboard, ◄, Port.
- **COG**: Course over ground and its source.
- **SOG**: Speed over ground and its source.
- **POSN**: Latitude and longitude position of own ship and its source.

Note: The position source shall meet the requirements of IMO MSC.112(73).

HDG	213.1°	GYRO1
SPD	18.0 kn ◄ 7.2kn	GPS1 BT
COG	213.0°	GPS1
SOG	18.5kn	
POSN DGPS1	35°44.507' N 139°43.779' E	

Color of nav data indications and sensor name


The color of the nav data indications and sensor name change according to the state of the sensor data. The table shown below provides basic information. For detailed information, see Appendix 4. When no sensor data is received, the sensor source indication is blank.

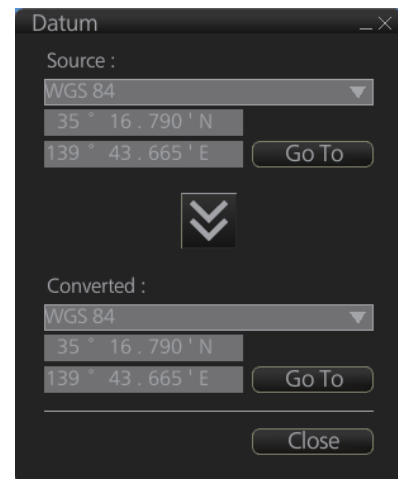
Nav data indication	Color of nav data indication	Color of sensor name	State
	Green	White	Sensor is normal.
	Yellow	White	Validity of data is low or offset is applied.
	Red	Red	Validity of data is critically low.
	Green, data shown with asterisks (***)	No display	Data is not being received.
	Yellow	Yellow	Data is input manually (dead reckoning).

2.1.5 Own ship functions box

The own ship functions box shows information about own ship, enables offset, and does TM reset.



- **[Offset]** button: See section 18.8.1. This button is only operative in the Voyage navigation mode.
- **[WGS84]** button: Convert position data between datum; go to selected position on the current chart. Click the button to show the dialog box below. To convert a position from one datum to another, select the datum source at the [Source] pull-down list and enter position. Select the datum to convert to at the [Converted] pull-down list then click the  button. The position on the chart selected is shown below the [Converted] pull-down list. To go to a position, click a [Go To] button.
- **ENC info:** ENC chart info appears here.
 No indication: ENC chart is currently displayed.
 "ENC data available": Currently, RNC chart is shown, but ENC chart is available.
 "Non-ENC data": Non-official ENC material, in yellow characters. See section 3.20.
- **RNC info:** "RNC data" appears (in yellow) when raster chart is in use.
- **TM/CU status:**
 "TM/CU Reset": True motion reset is active. (Chart is stationary and own ship moves on the chart.)
 "TM Reset off": When dragging the chart; true motion is OFF. To restart true motion, click the indication,
 "Ship off screen": Ship is out of the display area.



2.1.6 Route information box

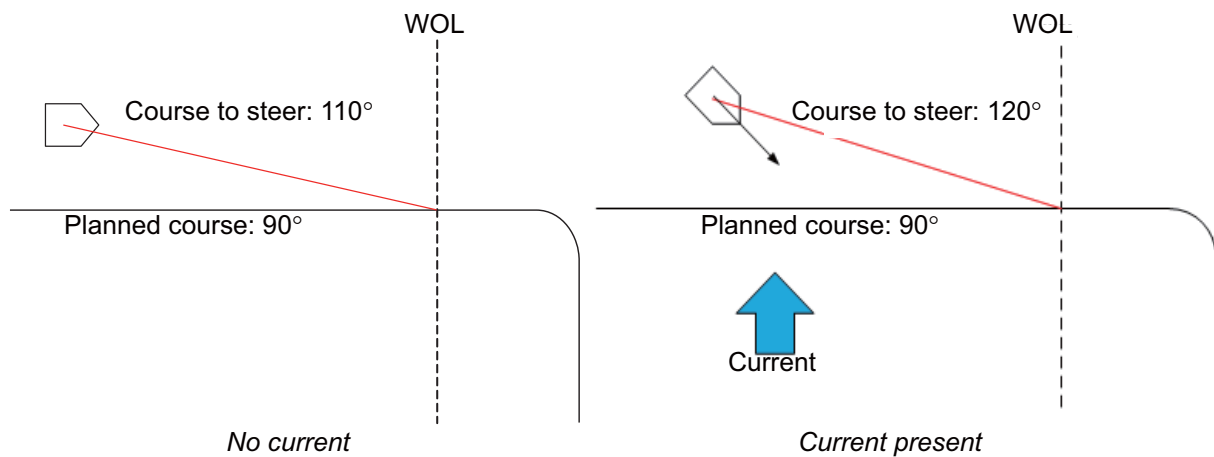
Asterisks appear in data locations when no route is selected for navigation.

- **Route:** Name of monitored route
- **Plan Speed:** Planned speed to approach "To WPT".
- **Plan Course:** Planned course between previous WPT and "To WPT".
- **Course to Steer:** Calculated set course to follow the monitored route, including off track, drift and gyro error compensations.
- **CH Limit:** Planned width of channel to approach "To WPT".
- **Off Track:** Perpendicular distance the ship is from the intended track.
- **TC:** Track Control System status. No indication if TCS is disengaged from the ECDIS.
- **To WPT:** The waypoint that the ship is approaching.
- **DIST to WOP (Wheel Over Point):** Distance to the point where rudder order for course change at "To WPT" is given.
- **Time to Go:** Time to go to WOP (hh:mm:ss).
- **Turn RAD:** Planned turning radius at "To WPT".
- **Turn Rate:** Calculated rate of turn that is based on current speed and planned turning radius.
- **Next WPT:** The WPT following the "To WPT".
- **Next Course:** Next course (in degrees).

Minimize button
↓

Route Information	
Route :	Scenario4
Plan Speed :	20.0 kn
Plan Course :	132.0°
Course to Steer :	132.0°
CH Limit :	60.0 m
Off Track :	3.5 m
TC:	MANUAL
To WPT :	2
DIST to WOP :	0.5 NM
Time to Go :	0h 1m31s
Turn RAD :	0.5 NM
Turn Rate :	000.0° /min
Next WPT :	3
Next Course :	112.1°

Course to steer

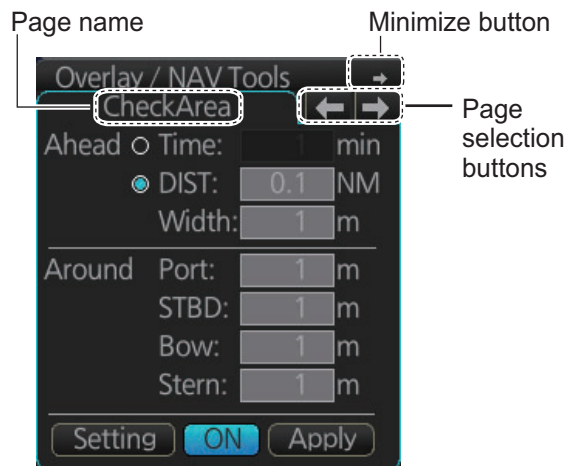


2.1.7 Overlay/NAV Tools box

The Overlay/NAV Tools box sets up the following:

- TT/AIS
- Echo (radar overlay)
- Parallel index lines
- Range rings
- Predictor (predicts ship's future movements)
- Under the keel clearance graphic
- Anchor watch
- Check area

See chapter 13 and 14 for TT/AIS descriptions. Refer to section 16.2 for the radar overlay.



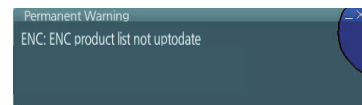
2.1.8 Alert box

The [Alert] box shows operational and system alert messages, with alert ID no. and alert message. See chapter 20.



2.1.9 Permanent warning box

The permanent warning box displays chart-related warning messages. The box cannot be closed or minimized.

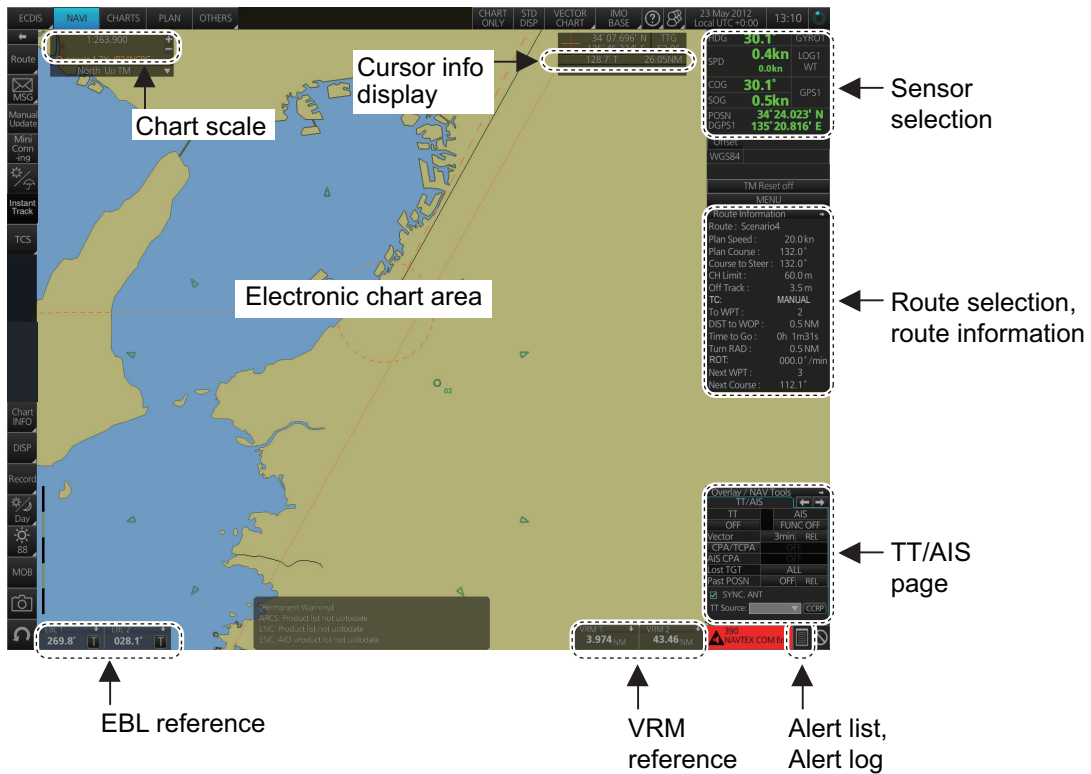


2.1.10 EBL, VRM boxes

The EBL measures the bearing to an object, and the VRM measures the range to an object. See section 2.9.

2.1.11 Context-sensitive menus

Context-sensitive menus are available at the locations shown below. Right-click the applicable area then select the appropriate item from the menu. The availability of the context-sensitive menu depends on the mode in use, as shown in the table below.



Item	Functions	Mode and availability		
		NAVI	CHART	PLAN
Chart scale	Drop-down list of chart scales.	Yes	Yes	Yes
Cursor info display	Switch cursor displays.	Yes	Yes	Yes
Sensor selection	Select sensors.	Yes	Yes	Yes
Route selection, route information	Select route; unselect route; move route to plan; show route info.	Yes	No	No
TT, AIS page	Access TT, AIS functions.	Yes	Yes	Yes
Alert list, Alert log	Open alert list, alert log.	Yes	Yes	Yes
VRM reference	Select VRM reference; offset (heading or north).	Yes	Yes	Yes
EBL reference	Select EBL reference; offset (heading or north).	Yes	Yes	Yes
Electronic chart area	Ship offcenter; object info; radar info erase; chart legend; manual update*; divider, hide MOB, weather info**	Yes	No	Yes

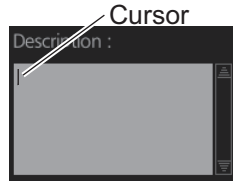
*NAVI only **Available when weather overlay is active.

2.1.12 How to enter alphanumeric data

On some screens it is necessary to enter alphanumeric data. The data can be input three ways: keyboard of the Control Unit, software keyboard or trackball.

Alphanumeric data entry from the keyboard of the Control Unit

1. Click the input box.



Input box example

2. Press appropriate keys and press the **ENTER** key.

Key	Function	Keyboard
TAB	Move the selection cursor.	<p>Space bar</p>
CAPS LOCK	Switch between upper case and lower case alphabet.	
SHIFT	Turn caps lock on and off with the CAPS LOCK key.	
BS	Erase the character left of the cursor.	
ENTER	Terminate keyboard input; insert line feed.	
↑, ↓, ←, →	Move cursor in direction of arrow.	
Spacebar	Insert a space	
CTRL	No use.	

Alphanumeric data entry from the software keyboard

A software keyboard is also available for entry of alphanumeric data. Do as follows to use the software keyboard. Display the keyboard before opening menus.

1. On the InstantAccess bar, press the [DISP], [Keyboard] and [ON] buttons to show the software keyboard. The [BS], [Enter], [↑], [↓], [←], [→] and [Spacebar] on the keyboard function the same as those keys on the keyboard of the Control Unit.



- To switch between the alphabet keyboard and symbols keyboard, click the [!\$&] key.



Alphabet keyboard



Symbols keyboard

- Click the input box.
- Click appropriate keys and finally click the [Enter] key.

To erase the software keyboard, click the X button at the top right corner of the keyboard.

Alphanumeric data entry with the trackball module

The trackball module can also be used to enter alphanumeric data.

- Put the cursor in the input box. Up and down arrows appear at the right side of the box.



- Enter data by one of the methods shown below.

- Spin the scrollwheel to set data. Upward to decrease the value; downward to increase the value.

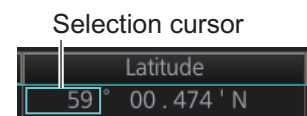
Note: The incrementing direction can be changed with [Wheel rotation] in the [Customize] menu of the [Settings] menu.

- Click ▲ to increase the value; ▼ to decrease the value.

How to enter latitude and longitude data with the trackball module

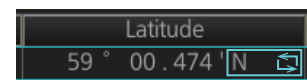
The trackball module can also be used to enter latitude and longitude data.

- Put the cursor in the input box. A selection cursor (light-blue) appears.



- Enter data by spinning the scrollwheel.

- To switch coordinate between N and S and vice versa, put the cursor at the right edge of the input box. Dual arrows appear



- Click to switch the coordinates. The method to switch E to W and vice versa is the same.

2.2 How to Select the Operating Mode

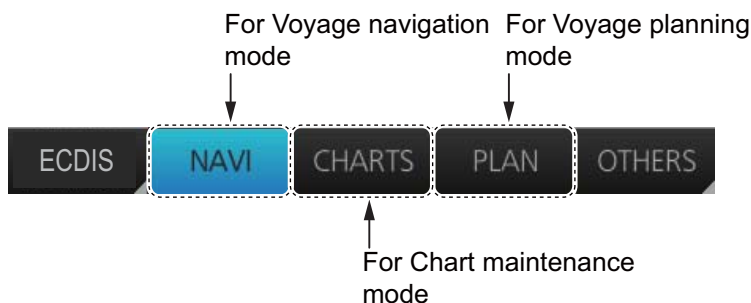
Click the [Display Mode] button at the far left side of the Status bar to select the operating mode, [ECDIS], [CONNING] or AMS (option). [ECDIS] displays electronic charts. [CONNING] display provides comprehensive navigation displays such as wind direction and rudder angle, in analog and digital formats. (Note that this button is inoperative if the conning display is fed to another monitor.) See section 22.1. [AMS] opens the Alert Management System. See Chapter 25.

[Display Mode] button



2.3 How to Select the ECDIS Operating Mode

The ECDIS has three operating modes: Voyage navigation, Chart maintenance, and Voyage planning. Select the mode from the Status bar with the [PLAN], [CHARTS] and [NAVI] buttons. The background of the button of the active mode is blue.



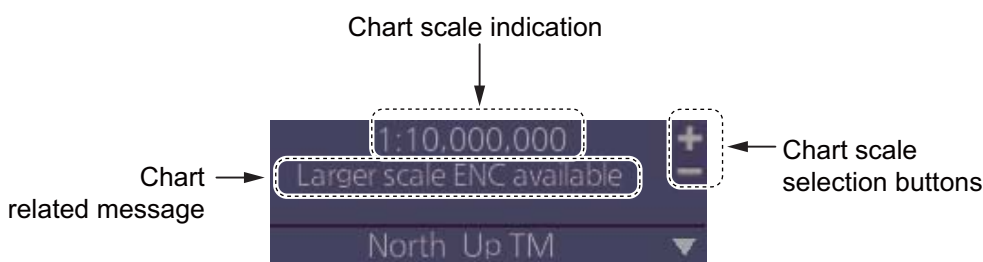
Note 1: When switching between the Voyage navigation and Chart maintenance modes it may take several minutes to read the chart database when using C-MAP charts or there are many charts installed.

Note 2: If the equipment accepts no key operation after switching to the Chart maintenance mode, reset the power.

2.4 How to Select the Chart Scale

When you open a chart it is displayed with the default scale, called the compilation scale. To change the chart scale, do one of the procedures shown below. The scale range is 1:1,000 to 1:70,000,000.

- Click the chart scale selection buttons in the Chart scale/presentation mode box.
- Right-click anywhere inside the Chart scale/presentation mode to show a drop-down list of chart scales.
- Put the cursor anywhere on the chart and spin the scrollwheel.



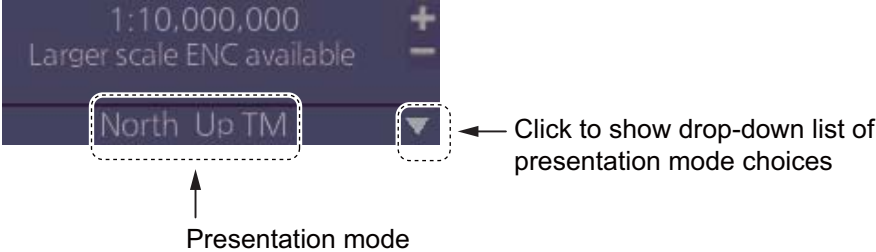
Note: When the radar overlay is active the chart scale is shown in nautical miles (NM). The table below lists the chart related messages and their meanings.

Message	Meaning	Remarks
Display date is not current	Displayed date is not the current date.	
Non-ENC data	ENC non-compatible chart in use.	
Large scale ENC available	Larger scale available at current position (TM reset ON) or cursor location (TM reset OFF).	
Overscale	Scale too large.	

Message	Meaning	Remarks
RNC data	RNC chart in use.	ARCS only
Larger RNC available	Larger RNC is available.	ARCS only
Underscale	Scale too small.	ARCS only
ENC data available	ENC data available for current area.	ARCS only
WGS shift undefined	WGS shift is not defined.	ARCS only
RM(OFF)	Relative motion off.	

2.5 How to Select the Presentation Mode

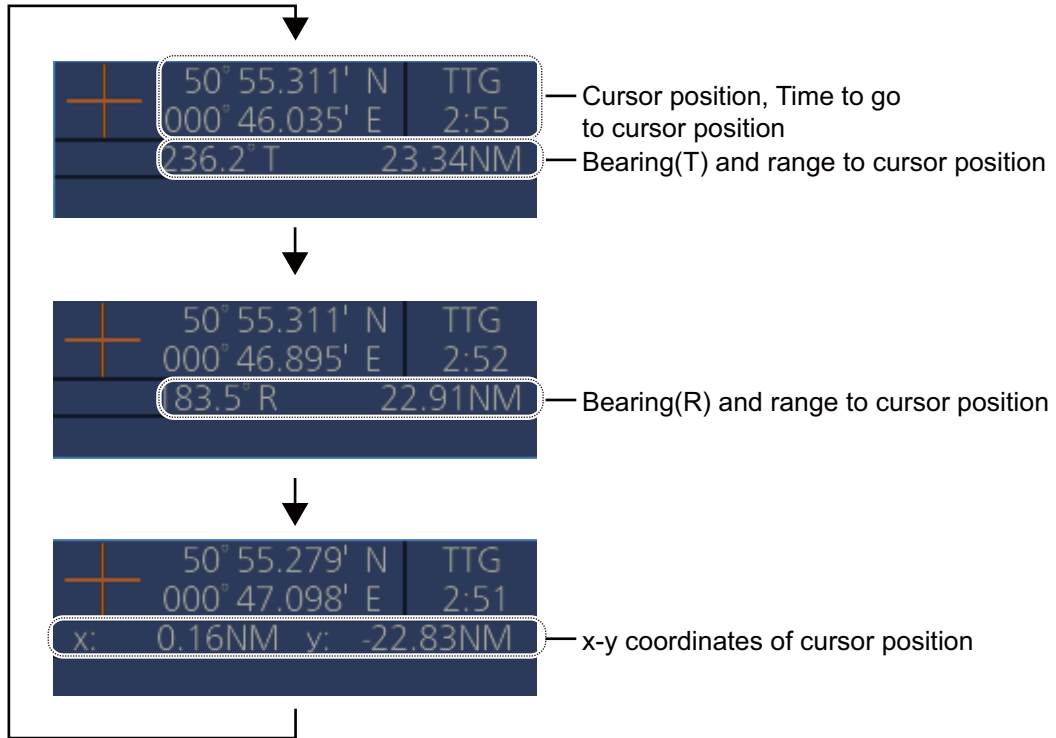
The presentation mode is available in North-up TM, North-up RM, Course-up TM, Course-up RM, Route-up RM and Head-up RM. To select a presentation mode, click the presentation mode indication to cycle through the presentation mode choices, or click the triangle to show the drop-down list of presentation modes.



2.6 Cursor Position Box

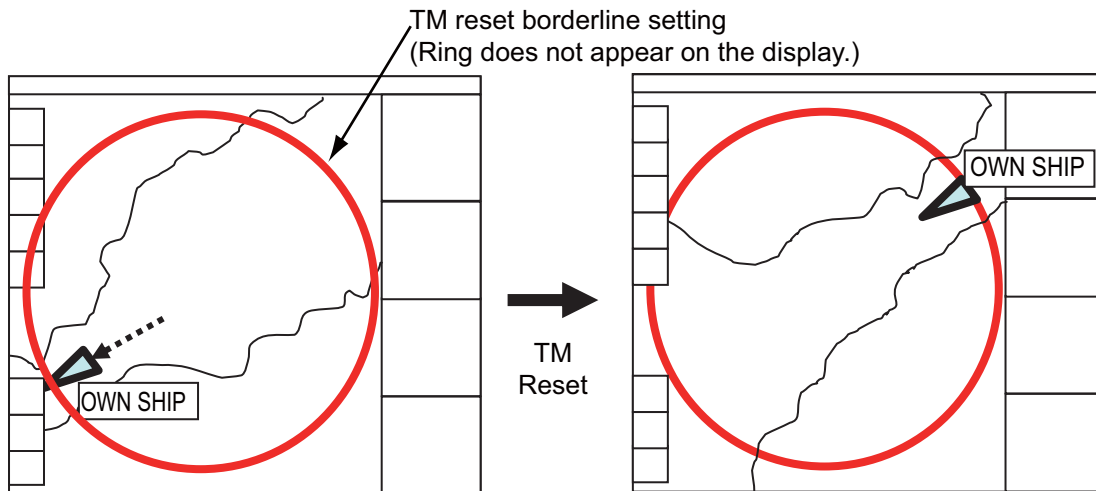
The Cursor position box shows

- Cursor position in latitude and longitude
- Time to go to the cursor position
- The bearing (True or Relative) and range to the cursor position, or x-y coordinates of cursor position. Click the bearing and range or x-y coordinates indication to switch the display, in the sequence shown below.



2.7 True Motion Reset

In the true motion mode, the chart is stationary and own ship moves on the screen. With TM reset active, own ship moves until it reaches the true motion reset border-line(s), then the chart is redrawn and own ship jumps back to an opposite position on screen based on its course. (This resetting can also be done manually by clicking the [TM/CU Reset] button.) When the TM reset function is active, "TM/CU Reset" appears at the right side of the display.



How to enable, disable automatic TM reset

To enable automatic TM reset, click the [TM Reset off] indication at the right side of the display to show [TM/CU Reset].

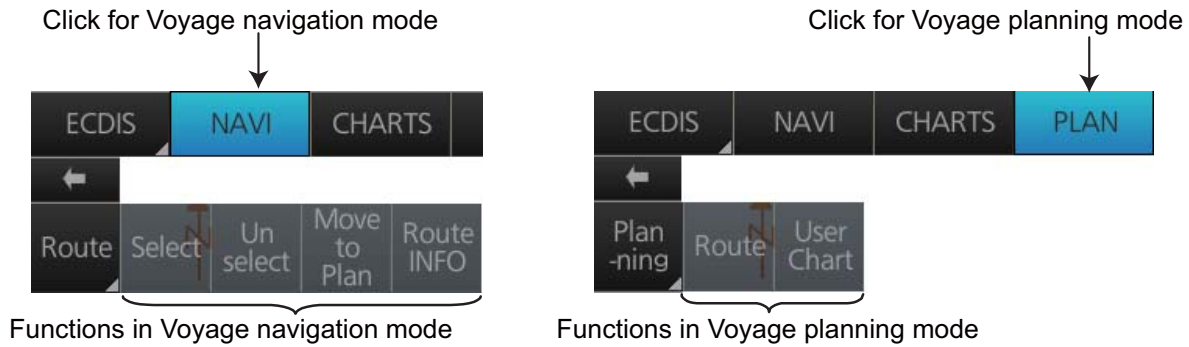


When the TM reset is disabled, change the chart scale with the scrollwheel and scroll the chart by drag and drop. The own ship information box shows [TM Reset off]. When own ship moves off the screen the box shows [Ship off screen].

How to set the true motion reset borderline

You can set the limit for TM reset (in percentage) on the [Basic Setting] page. See section 4.2.2.

2.8 How to Control Route and User Charts in Voyage Navigation and Voyage Planning Modes

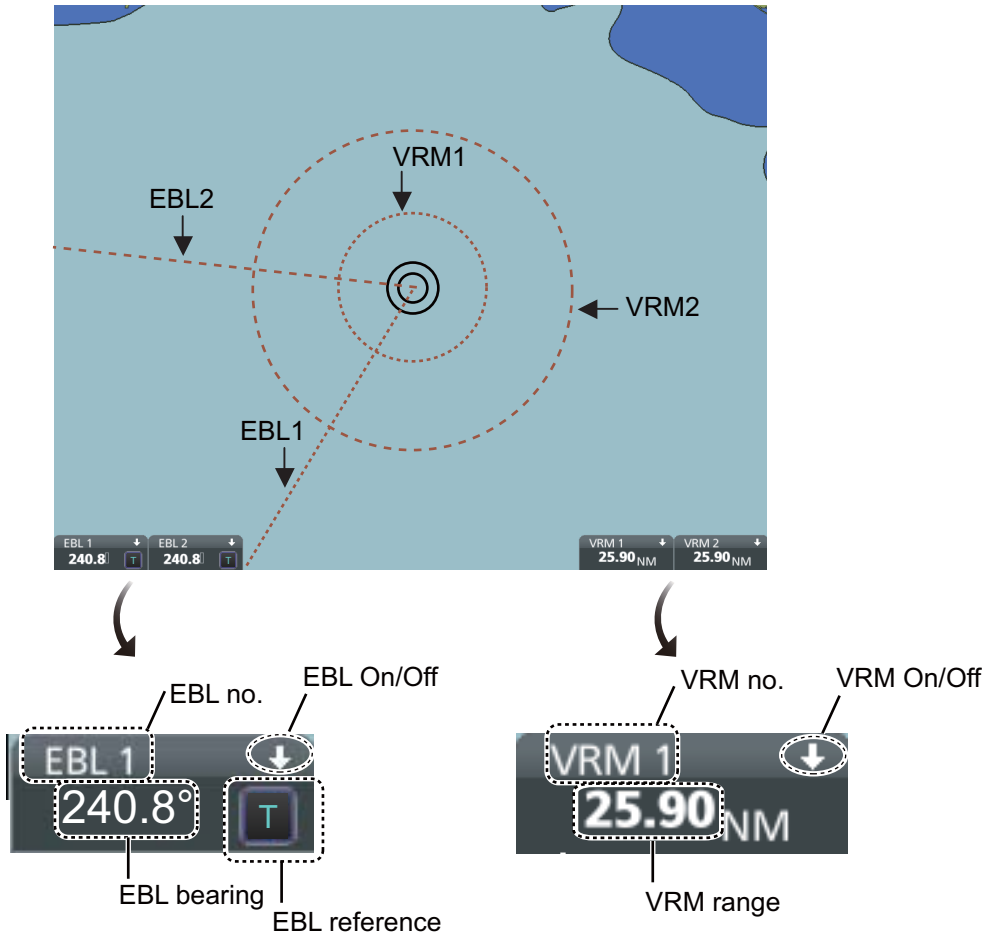


Click the appropriate chart mode button [PLAN] or [NAVI] at the top of the display to go to respective mode. For the Voyage navigation mode, click the [Route] button then click the button corresponding to the action to take. For the Voyage planning mode, click the [Planning] button followed by the [Route] button to select a route, or [User Chart] button to select a user chart.

Voyage navigation mode functions	Voyage planning mode functions
Select: Selects the route to use in the Voyage navigation mode.	Route: Shows the [Route Plan] dialog box to create or edit a route.
Unselect: Deselects active route.	User Chart: Shows the [User Chart] dialog box to create or edit a user chart.
Move to Plan: Moves active route to Voyage planning mode.	
Route INFO: Shows the [Route Information] dialog box.	

2.9 How to Use the VRM and EBL

The VRM measures the range to an object and the EBL measures the bearing to an object. There are two each of VRMs and EBLs. The lengths of the dashes on the EBL2 and VRM2 are longer than those of the EBL1 and VRM1 to distinguish them. The color of the VRMs and EBLs is orange.



2.9.1 How to hide/show an EBL, VRM

Control Unit: Push EBL or VRM key to hide or show respective marker.

Trackball: Click the arrow on an EBL or VRM box to hide the respective marker. To redisplay the marker, click the minimized box.

2.9.2 How to measure the range and bearing

Range: Put the cursor on the VRM then drag the cursor until the VRM is on the inner edge of the object.

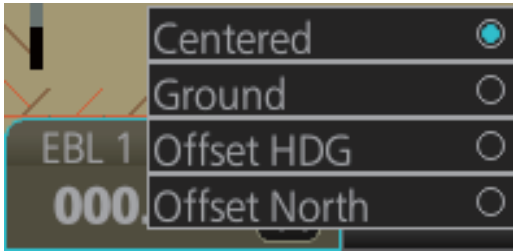
Bearing: Put the cursor on the EBL then drag the cursor until the EBL bisects the object.

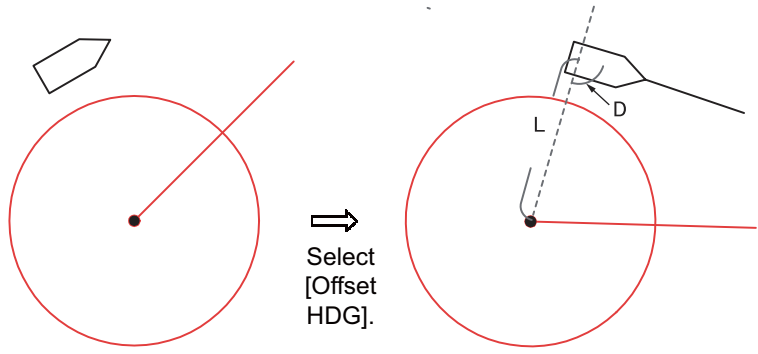
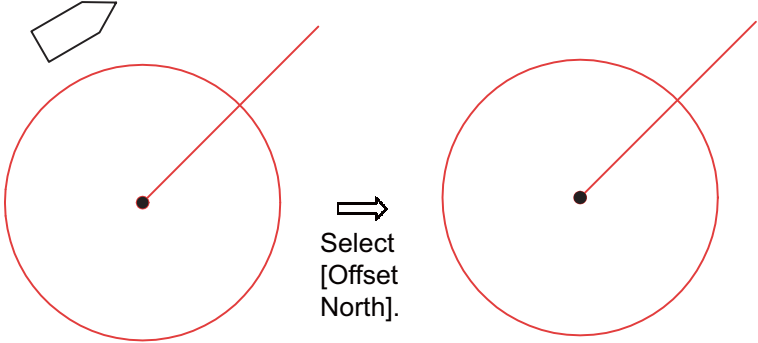
2.9.3 How to select bearing reference

The EBL bearing reference can be true or relative. Click the EBL reference indication to display T (True) or R (Relative).

2.9.4 EBL, VRM functions available with the context-sensitive menu

The EBLs and VRMs have additional functions that are accessed from the context-sensitive menu. Right-click any VRM or EBL box to show the context-sensitive menu.



Function	Description
Centered	Centers the origin of the EBL and VRM on the current position.
Ground	Anchors the EBL and VRM to ground; neither the EBL or VRM move with ship's movement.
Offset HDG	 <p data-bbox="571 1182 845 1243">Drag and drop EBL, VRM on desired location.</p> <p data-bbox="874 1064 949 1153">Select [Offset HDG].</p> <p data-bbox="906 1182 1332 1272">When vessel changes course, the EBL, VRM move so that the angle (D) to their centers stays fixed.</p>
Offset North	 <p data-bbox="571 1686 845 1747">Drag and drop EBL, VRM on desired location.</p> <p data-bbox="874 1534 949 1624">Select [Offset North].</p> <p data-bbox="906 1686 1332 1848">The EBL, VRM move to keep the angle from North to the center of the EBL, VRM, even if the vessel changes course. The distance to the center of the EBL, VRM is fixed.</p>

2.10 Datum

2.10.1 General

Datum is a mathematical model of the earth based on which a sea chart is produced. If the datum of a position sensor and that of a sea chart are different, a transformation has to be made somewhere in the system. Not doing so can result in errors of several sea miles. The difference between two datum is never constant, but depends on position. This means that the difference between WGS-84 and local datum, generally used in paper charts, is not generally valid with electronic sea charts.

2.10.2 Paper charts

Datum used in paper charts have been traditionally national datum for historical reasons. Many paper charts do not have a marked datum, therefore compatibility with electronic charts may be complicated. In some paper charts, the correction terms are printed in lieu of datum, for correction of the WGS-84 system satellite locations. The correction terms are usable but only with the paper chart in question.

2.10.3 Electronic sea charts

- The ENC vector material has to be produced by a National Hydrographic Office in the WGS-84 datum.
- The ARCS (raster) material includes polynomials for each chart, making it possible for the ECS system to solve the difference between the WGS-84 datum and the local datum with an accuracy sufficient for authority responsibility. In some charts, the mentioned difference is not known with sufficient accuracy, resulting in displaying a message in the Cursor position box when displayed in ARCS compatible systems.

2.10.4 Positioning devices and datum

In early days of electronic positioning devices, datum received little attention because the commonly used systems utilized special charts (like Decca charts). Later on, data output was added to these systems, but still no attention was paid to datum and the position errors were considered as an inaccuracy of the system. With the spread of the GPS, however, datum has become better known. An accurate position is of no value if co-ordinates are in a wrong datum. GPS satellites utilize the WGS-84 datum.

2.10.5 ECDIS and datum

The ECDIS uses ENC material, produced to standards using WGS-84 datum. Positioning devices connected to the ECDIS must work in the WGS-84 datum. IMO requires that the ECDIS must give an alert if the datum of a positioning device is not the WGS-84.

2.11 Set up Before Departure

2.11.1 Updates before departure

Update chart material

Update your chart material before embarking on a new voyage. See section 3.21.

Display and approve dates for charts and manual updates

Note: It is very important that you set the Display and Approve dates for charts as the current date.

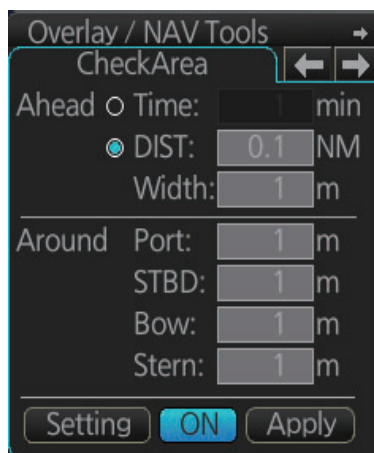
There may be features that require chart viewing dates or seasonal dates in charts. Accordingly, if you have not set Display and Approve dates as the current date there is a possibility that you can get a wrong presentation or some feature may be absent. See section 5.2.

Create or update user chart, Notes

If necessary, create a new user chart and Notes or modify existing ones. See chapter 10.

Chart alert calculation

Set chart alert areas suitable for your coming voyage, on the [Check Area] page in the [Overlay/NAV Tools] box. See section 8.2.



2.11.2 Create or update a route

Create a new route or modify an existing one. See chapter 9.

Check your route against chart alerts

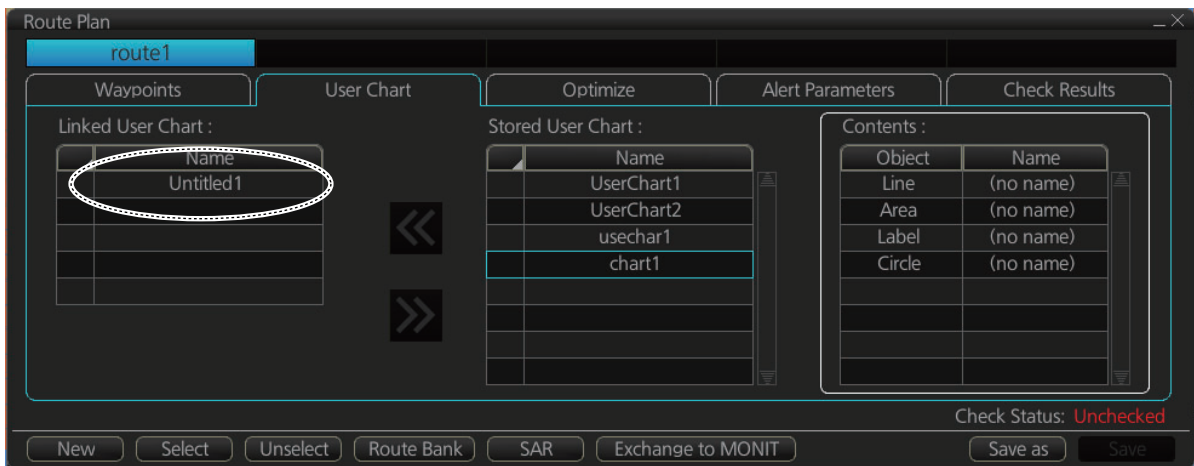
Before you sail your route, you should always check your route against chart alerts. This is important because your S57 charts and manual updates may contain chart viewing dates information. You can check chart alerts from the [Check Results] page on the [Route Plan] dialog box.

The following information is stored with the monitoring route plan:

- Conditions for chart alerts during route monitoring, which includes safety contour and other chart alerts, on the [Alert Parameters] page of the [Route Plan] dialog box.



- Name of the user chart to be used during route monitoring together with this planned route, on the [User Chart] page of the [Route Plan] dialog box.



- Name of the Notes to be used during route monitoring together with this planned route, on the [User Chart] dialog box.

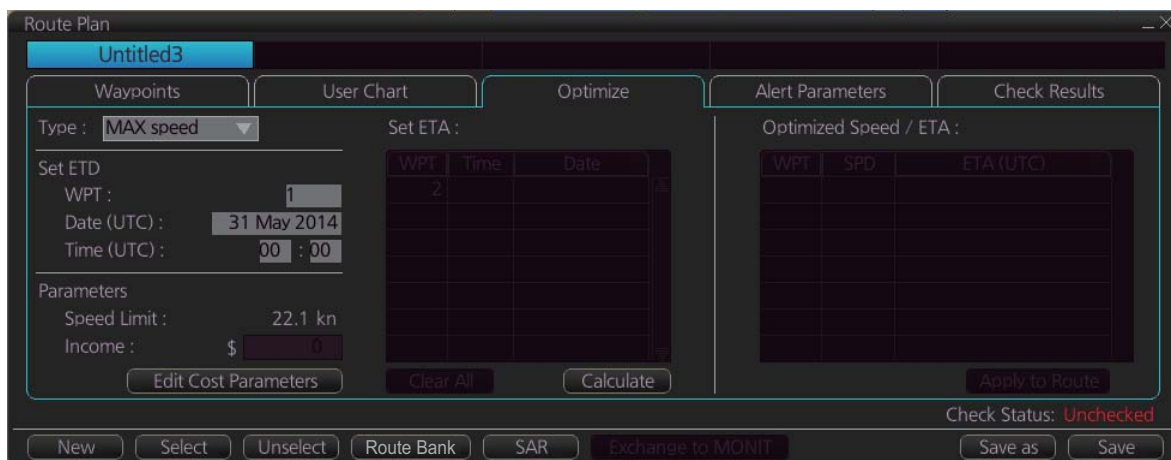
Check in Notes column indicates Notes is used with route monitoring and planned route



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Recalculate timetable and ETA values

Timetable and ETA values can be recalculated from the [Optimize] page in the [Route Plan] dialog box. Minimally set ETD to equal departure time, and set optimization values.

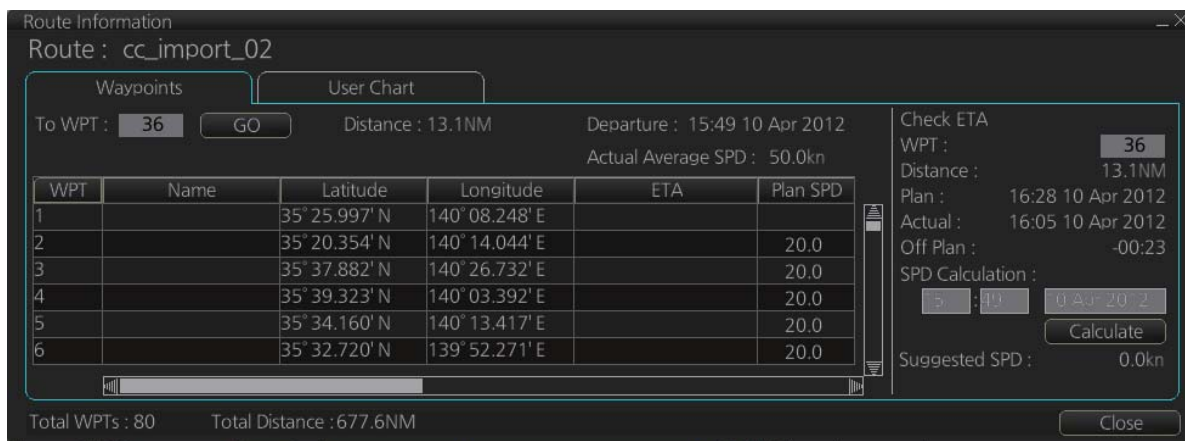


2.11.3 How to check and prepare route to monitor

Select a route for the voyage: In the Voyage navigation mode, click the [Route] button followed by the [Select] button, or right-click the route indication in the [Route Information] box (right edge of screen) then select [Select Route]. See chapter 11.

Note: A route cannot be opened if its planned settings are different from its navigation settings. The reason is given on the [Select Route] dialog box. In this case, open the route in the Voyage planning mode and click the [Check Route] button, on the [Alert Parameters] page. Adjust the route as necessary.

The To WPT can be selected, however WPT 01 cannot be selected.



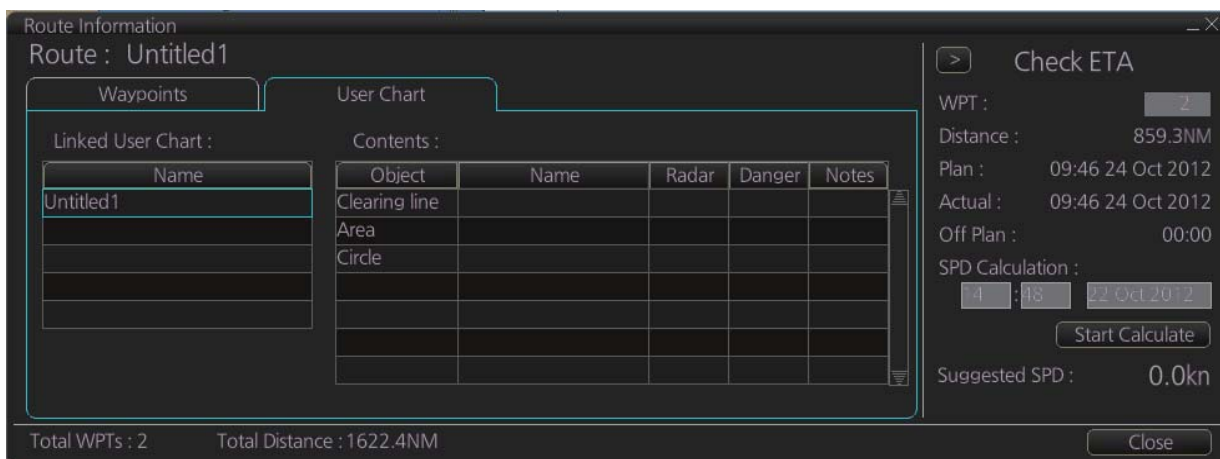
Select confirm conditions of the route plan

Check the setting on the [Chart Alert] dialog box; click the [DISP], [SET] and [Chart Alert] buttons to show that dialog box.



Planned user chart. Notes

To check what planned user chart is selected, open the [Route Information] dialog box and click the [User Chart] tab. The name of the user chart(s) to be used is in the [Linked User Chart] window.

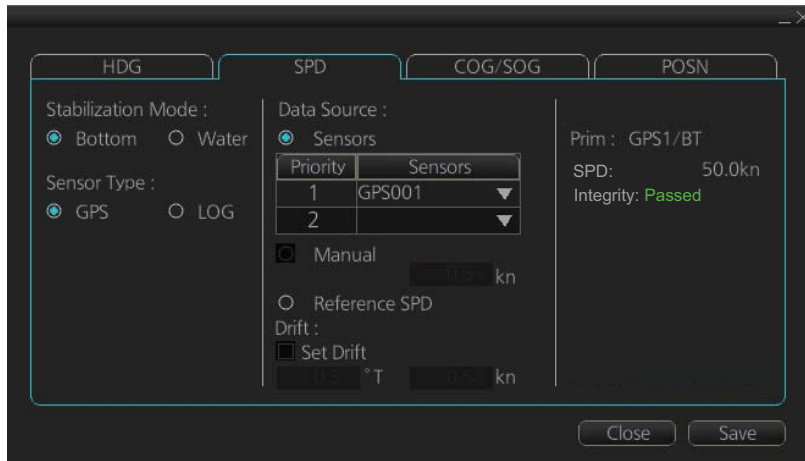


2.11.4 Check configuration of navigation sensors

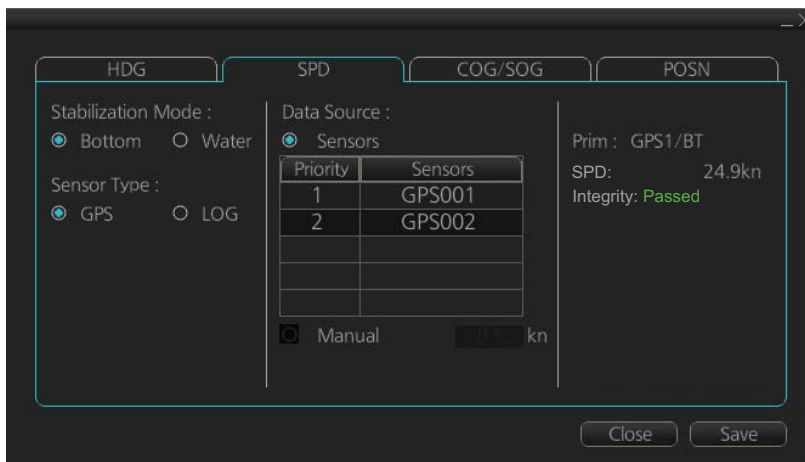
You can check the configuration of your navigation sensors in the [System Sensor Settings] page and [Local System Settings] page in the [Sensor] menu.

Check speed settings ([SPD] page)

Open the menu and click the [SPD] tab in the [System Sensor Settings] page or [Local System Settings] page. The user can select navigation sensors for use in navigation and view their current values.



SPD page, local sensor



SPD page, system sensor

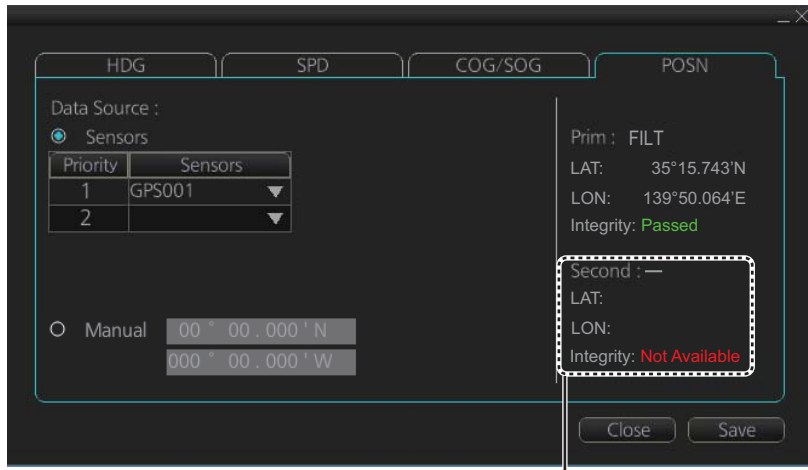
If there is no value shown for a sensor, this means that the sensor is not valid. Note that the content of these pages depends on the sensors that are in use on the ship.

The content of the display changes with sensor.

Note that manual speed should only be used in an emergency, when no other speed reference is available. Remember that position sensors are also available as speed sources.

Check position sensors (POSN page)

Open the menu and click the [POSN] tab in the [System Sensor Settings] page or [Local System Settings] page. The [Prim] and [Second] labels indicate the type of the position sensor. (In the figure below the [Prim] label shows FILT). [Prim] and [Second] indicate sensor status and priority.



Second shows Integrity as “Not available” when only one position-fixing equipment is connected.

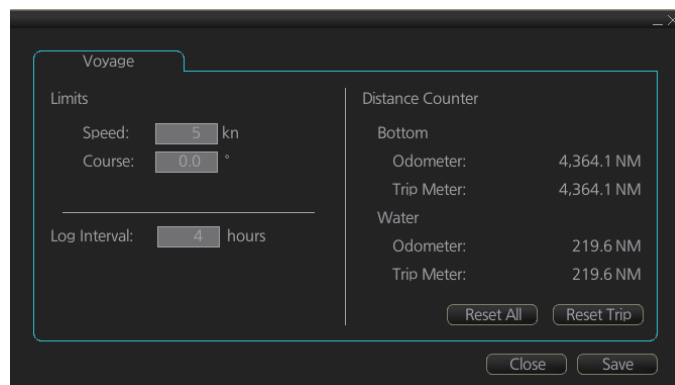
Only one sensor can be Primary1 while the others are Primary2 or off position. After a sensor is turned off, its status is changed to Primary2 state. When a position sensor state is changed to Primary1 and another sensor was Primary1, the sensor formerly primary1 becomes Primary2.

Select the Primary1 navigation sensor as the sensor that is considered to be most accurate and reliable. Set all other navigation sensors as Primary2.

2.11.5 How to reset odometer and trip meter

To reset the odometer and/or trip meter do as follows:

1. Open the menu and select the [Voyage] menu from the [NAVI Log] menu.



2. Click one of the following buttons as appropriate.
 - Reset Trip:** Reset the trip distance (ground and water).
 - Reset All:** Reset both the odometer and the trip meter (ground and water).
3. Click the [Close] button to finish.

2. OPERATIONAL OVERVIEW

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3. HOW TO MANAGE CHARTS

This chapter mainly shows you how to install the public keys, licenses and charts, manually update chart objects, and synchronize charts. All chart-related operations begin from the Chart maintenance mode, which you access by clicking the [CHARTS] button on the Status bar.

Note 1: Charts, routes and user charts are shared with other FMD-3xx0, FCR-2xx9 and FAR-3x00 units, via LAN. Data is shared automatically; no operation is required.

Note 2: Chart processing (installation, deletion, etc.) may take several minutes depending on the number of charts to be processed.

Note 3: If, when attempting to install charts, nothing appears on the display at the start of the procedure, reset the power and try again.

Note 4: If installation of AVCS charts stops, the message "Chart installation has stopped. Run the installation again. Installation will continue from the chart not yet installed." appears. This does not indicate completion of the installation. Restart the installation. The installation resumes from the chart not yet installed.

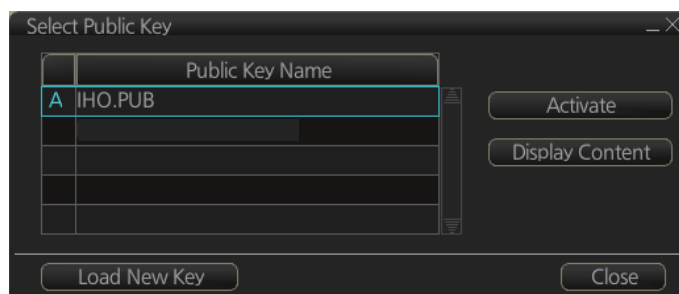
This message may also appear when installing CM-ENC, C-MAP Professional and C-MAP Professional+ charts if the user does not confirm completion of the installation within approx. one hour. (Installation window remains on the screen.) However, this is not an indication of failed installation.

Note 5: When installing the AVCS LargeMedia, the message "No connection to dongle" may appear in the [Error/Warning Guidance] window at the completion of the installation. If this occurs, reinstall the media.

3.1 How to Install Public Keys for ENC Charts

Public keys authenticate the source and integrity of the ENC chart materials used in this chart system. Before you install a new ENC chart, confirm that the corresponding public key is installed.

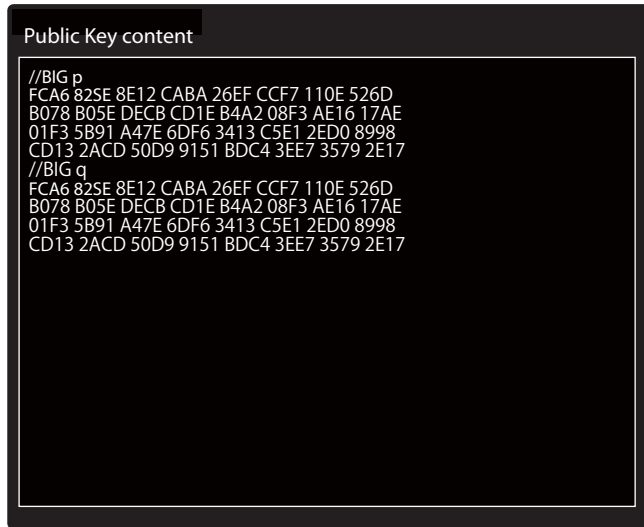
1. Set the medium (DVD, USB flash memory, etc.) that contains the public key. (The IHO public key is preinstalled.)
2. Get into the Chart maintenance mode then click the [Public Key] button on the InstantAccess bar.



3. Click the [Load New Key] button to show the [Open File] dialog box.
4. Find the .pub file then click the [Open] button. The [Public Key] dialog box reappears.

3. HOW TO MANAGE CHARTS

5. Click the [Display Content] button on the [Public Key] dialog box to show the display contents.



6. To accept the contents, click the [Activate] button on the [Public Key] dialog box.

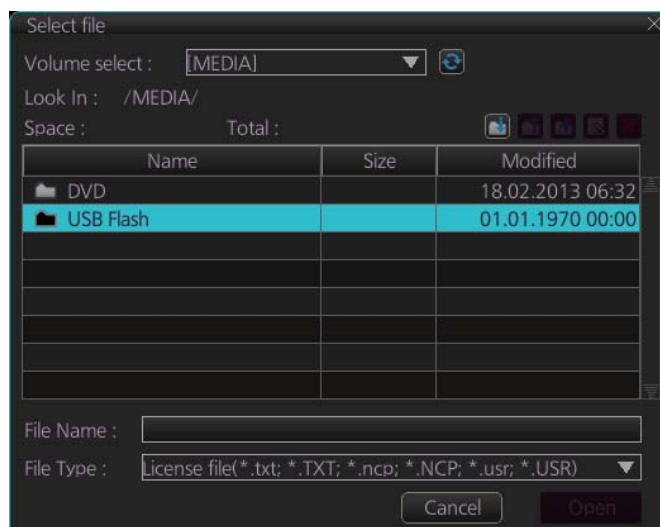
3.2 How to Install ENC Licenses, Charts

Install your ENC licenses and charts, in that order.

3.2.1 How to install an ENC license

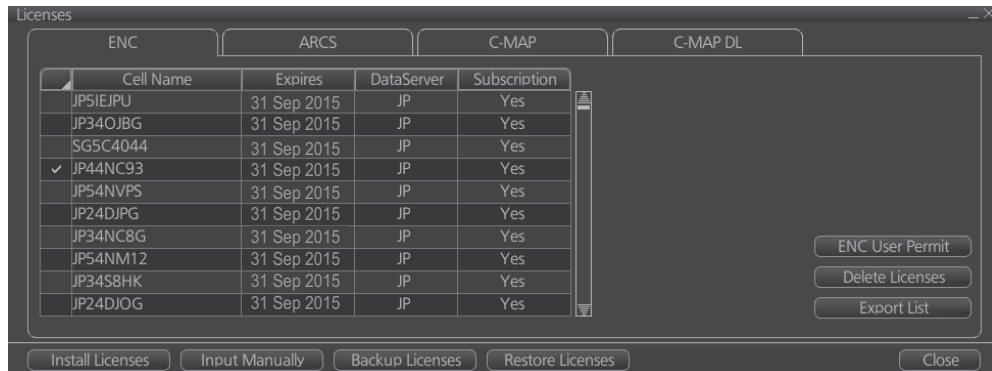
Automatic installation

1. Set the medium (DVD, USB flash memory, etc.) that contains the ENC license.
2. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar to show the [Licenses] dialog box.
3. Click the [Install Licenses] button.



4. Select the medium that contains the license then click the [Open] button.

- Find the license (permit.txt) then click the [OK] button to install the license. The [Licenses] dialog box then shows cell name, date of expiration, data server name and subscription type of the license.

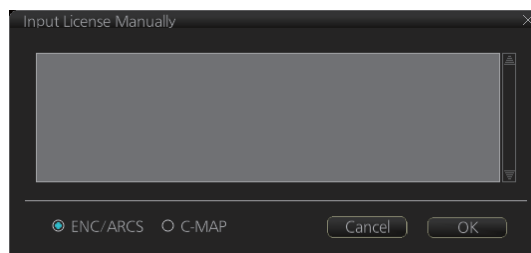


- Click the [Close] button to finish.

Manual installation

If you do not have the medium which has your ENC license, you can enter the license number manually.

- Click the [CHARTS] button on the Status bar to go the Chart maintenance mode, then click the [License] button on the InstantAccess bar.
- Click the [Input Manually] button to show the [Input License Manually] box.



- Select the type [ENC/ARCS] at the bottom of the screen.
- Enter the license number(s) then click the [OK] button.

3.2.2 How to install ENC charts

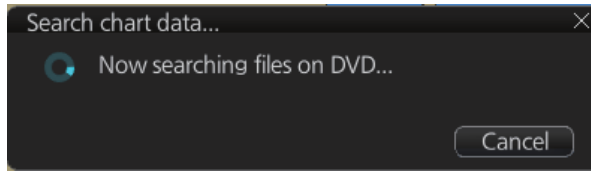
When you install charts from a medium, the system first loads a catalog, which stores certain information into your SSD such as cell IDs, their position, and edition number, from the install medium. Then, the system asks which charts you want to install from the chosen medium. After building the catalog, you can view the contents of it by clicking the [Cell Status] button.

Note: Do not cancel the installation (with the [Cancel] button) while it is in progress. Cancellation automatically resets the power, stopping the installation. If the power is reset, try to install the charts again. If the installation fails, reset the power and try again.

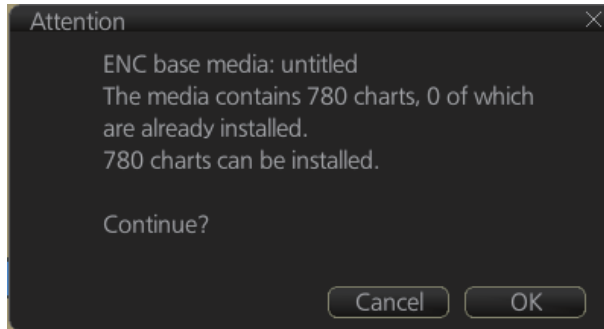
- Set the medium that contains the ENC charts.
- Get into the Chart maintenance mode then click the [AUTO Load] button on the InstantAccess bar. A prompt informs you that it may take a while to do the installation and are you sure to continue. Click the [OK] button to continue. A message

3. HOW TO MANAGE CHARTS

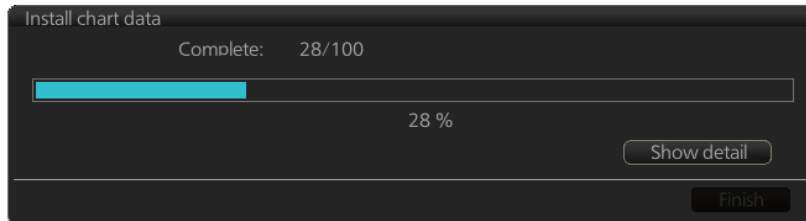
informs you that the system is searching the medium (in the figure below the medium is a DVD) for chart data.



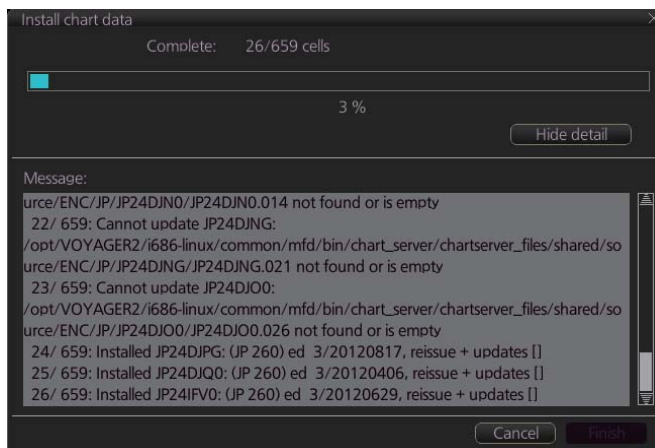
The results of the search are displayed, an example of which is shown below. To cancel the installation, click the [Cancel] button.



3. Click the [OK] button to install the charts. The [Install chart data] window appears and shows the percentage of completion, with digital and analog indications.

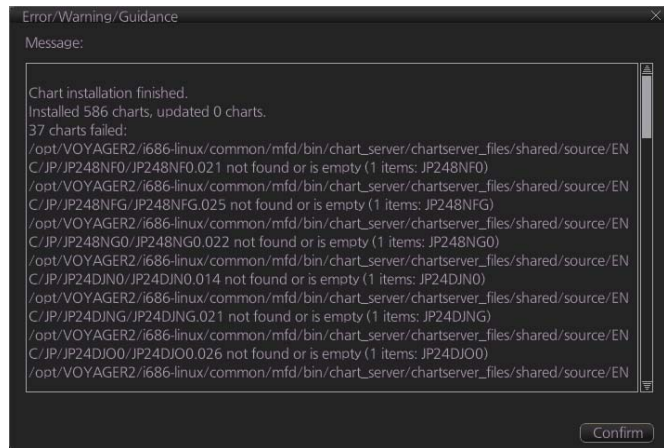


To show details during the installation, click the [Show detail] button.



To close the [Message] window, click the [Hide detail] button.

4. When the installation is completed, information about the installation appears in the [Error/Warning/Guidance] window. Click the [Confirm] button to finish.
5. If applicable, set the next sequential medium and repeat steps 2-4 to install the next charts.



Note 1: When many charts are installed, the ECDIS

checks for error in the installed chart data at the next power up. This is not an indication of malfunction.

Note 2: Previous versions of charts cannot be displayed if installed after installing the latest versions.

3.3 How to Install ARCS Licenses, Charts

3.3.1 How to install an ARCS license

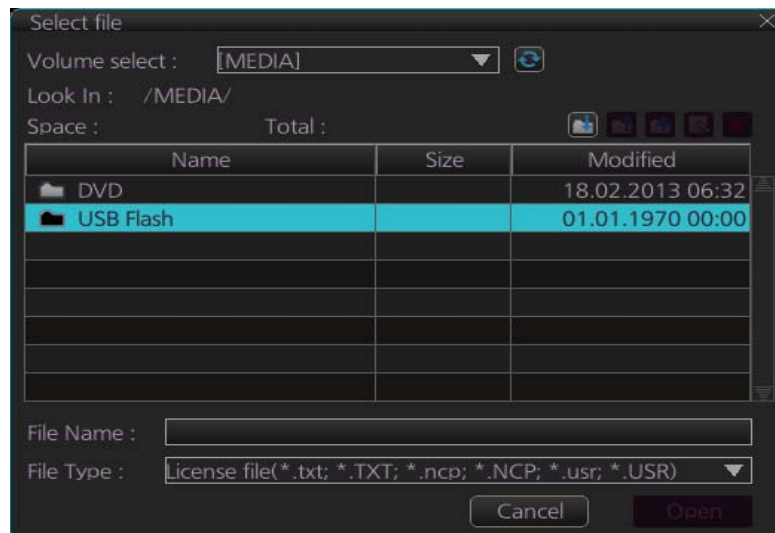
An ARCS license can be installed automatically or manually. The procedure which follows is for automatic installation. For manual installation, see "Manual installation" on page 3-3.

Note: Do not cancel the installation (with the [Cancel] button) while it is in progress. Cancellation automatically resets the power, stopping the installation. If the power is reset, try to install the charts again. If the installation fails, reset the power and try again.

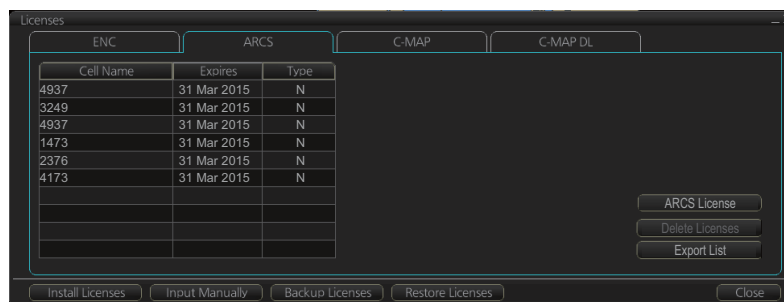
1. Insert the medium (DVD, USB flash memory, etc.) that contains the ARCS license.
2. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar to show the [Licenses] dialog box.

3. HOW TO MANAGE CHARTS

3. Click the [Install Licenses] button.



4. Find the medium that contains the license then click the [Open] button.
5. Click the [OK] button to install the license.



6. Click the [Close] button to finish.

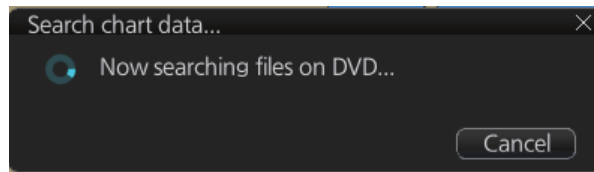
3.3.2 How to install ARCS charts

When you install charts from a medium, the system first loads a catalog, which stores certain information into your SSD such as cell IDs, their position, and edition number, from the install medium. Then, the system asks which charts you want to install from the chosen medium. After building the catalog, you can view the contents of it by clicking the [Cell Status] button.

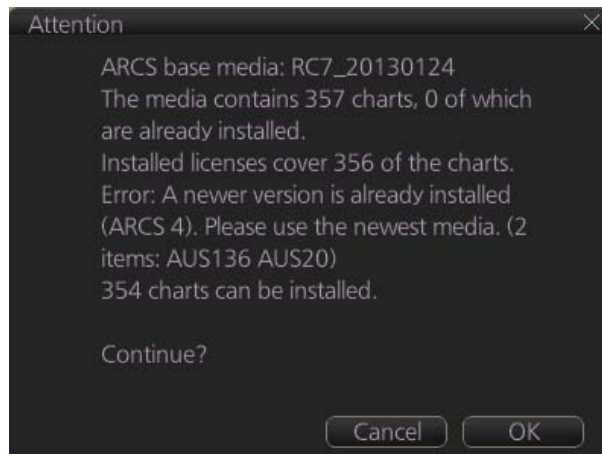
Note: Do not cancel the installation (with the [Cancel] button) of a chart while it is in progress. Cancellation will automatically reset the power, stopping the installation. If this occurs, try to install the chart again. If the installation fails, reset the power and try again.

1. Set the medium that contains the ARCS charts.
2. Get into the Chart maintenance mode then click the [AUTO Load] button on the InstantAccess bar. A prompt informs you that it may take a while to do the installation and are you sure to continue. Click the [OK] button. A message informs you

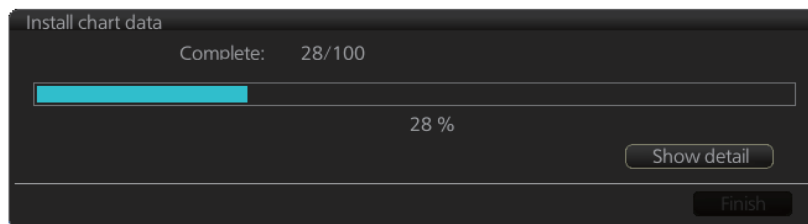
that the system is searching the medium (in the figure below the medium is a DVD) for chart data.



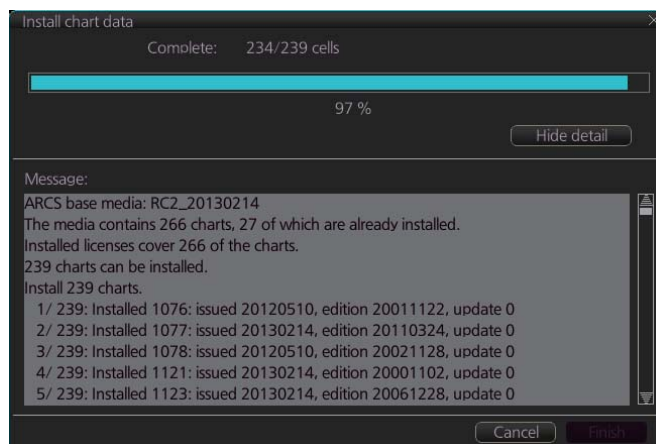
The results of the search are displayed, an example of which is shown below. To cancel the search, click the [Cancel] button.



3. Click the [OK] button to install the charts. The [Install chart data] window appears and shows the percentage of completion, with digital and analog indications.



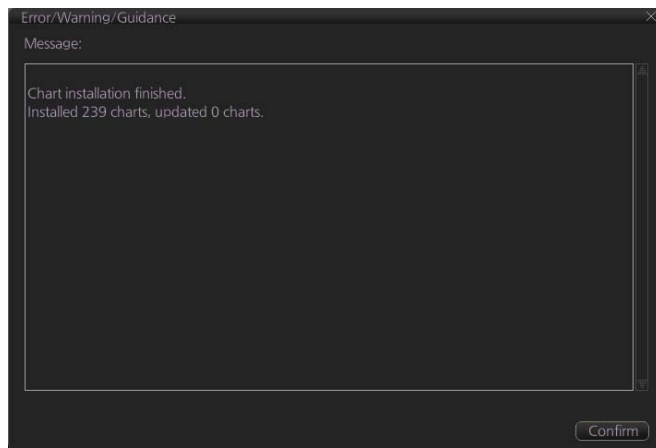
To show details during the installation, click the [Show detail] button.



To close the [Message] window, click the [Hide detail] button.

3. HOW TO MANAGE CHARTS

4. When the installation is completed, information about the installation appears in the [Error/Warning/Guidance] window. Click the [Confirm] button to finish.



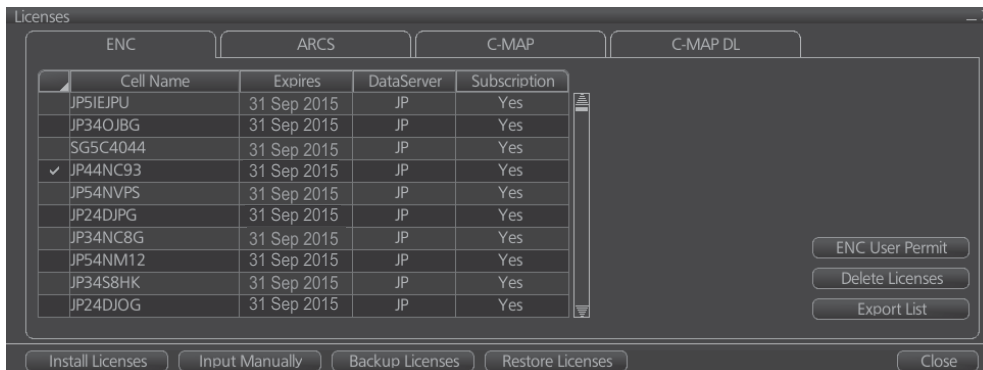
5. If applicable, set the next sequential medium then repeat steps 2-4 to install the next charts.

Note 1: When many charts are installed, the ECDIS checks for error in the installed data at the next power up. This is not an indication of malfunction.

Note 2: If, after installation, no ARCS chart appears, delete all ARCS charts and then reinstall them.

3.4 How to Delete ENC, ARCS Licenses


1. Get into the Chart maintenance mode.
2. Click the [License] button on the InstantAccess bar.
3. Click the [ENC] or [ARCS] tab as appropriate to show a list of licenses.

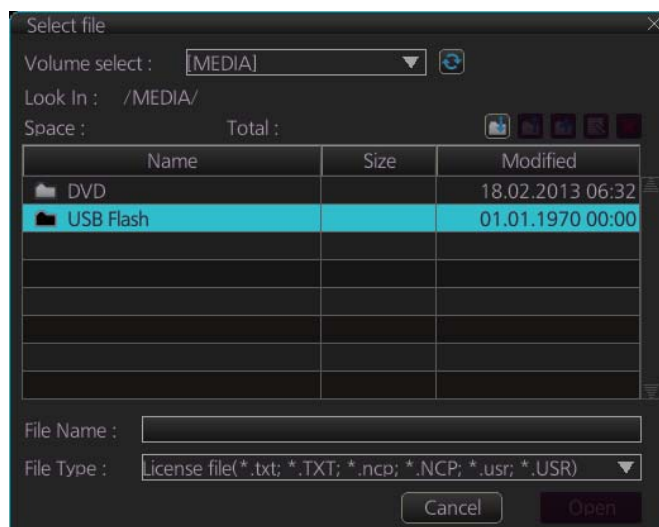


4. Put a checkmark next to the license(s) to delete.
5. Click the [Delete Licenses] button to delete the license(s) selected.

3.5 How to Read ENC Judgment Information

You can find out if your installed ENC charts are official or unofficial, with the [Producer Code] button in the [Licenses] dialog box. The following functions use this feature.

- [Filter] window (see section 3.15) can show or hide official or unofficial charts.
- 
- .Chart judgment is shown for unofficial charts on the [Check Results] of the [Route Plan] dialog box (see section 9.3.5) if the corresponding alert check is active.
1. In the Chart maintenance mode, click the [License] button to show the [Licenses] dialog box.
 2. Click the [ENC] tab.
 3. Click the [Producer Code] button.



4. Select the judgment information file then click the [Open] button.

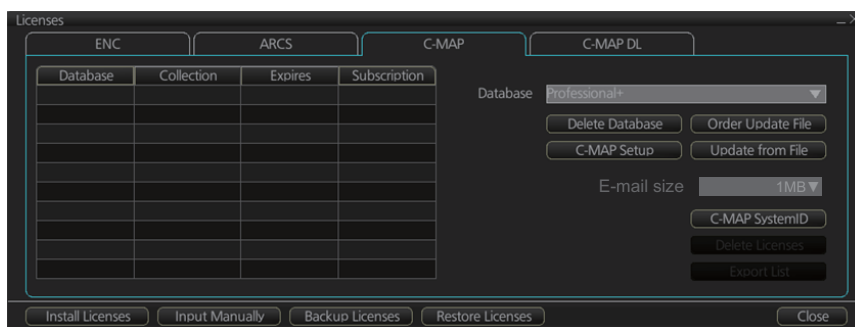
3.6 How to Install C-MAP Charts

Synchronize chart data before you install C-MAP charts, grouping the ECDIS units to synchronize, otherwise the chart data cannot be shared. See the procedure in section 3.22.1 for how to synchronize chart data. If C-MAP charts are not synchronized after installation, delete all C-MAP charts, and do the above procedure again.

3.6.1 How to register the eToken

The eToken is a hardware mechanism (installed inside the PCU) used for password authentication. Registration of the eToken is required only once, before you install the C-MAP database.

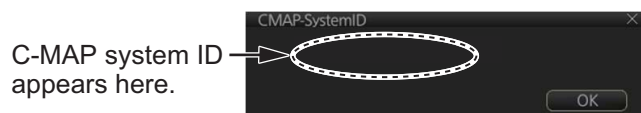
1. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar to show the [Licenses] dialog box.
2. Click the [C-MAP] tab to show the [Licenses] dialog box for C-MAP.



3. Click the [C-MAP Setup] button.
4. You are asked if you are sure to continue; click the [OK] button to continue and register the eToken.

Note 1: "C-MAP: No connection to eToken" disappears from the Permanent warning box after completion of the registration.

Note 2: You can show your C-MAP system ID by clicking the [C-MAP System ID] button on the [Licenses] dialog box for C-MAP.



3.6.2 How to install the C-MAP database and licenses

When you install the C-MAP database from a medium, all data is saved to the SSD.

Note 1: If several ECDIS units are installed, synchronize C-MAP charts among the units after you have installed the database.

Note 2: The installation of a chart cannot be cancelled while it is in progress. If you get an error message, try to install the charts again.

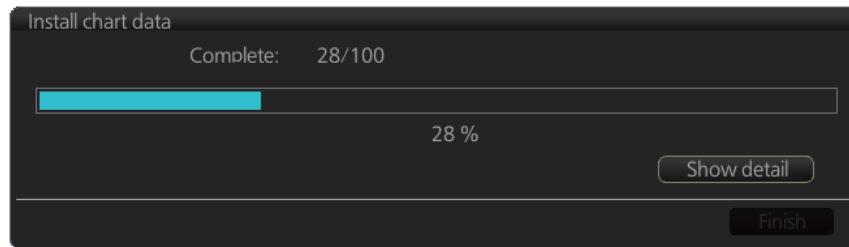
Note 3: Disable the Chart Alert function at the [Check Area] page of the [NAV Tools] box (see section 8.2) before removing any C-MAP charts.

Note 4: The C-MAP database in the units selected for synchronization are synchronized upon the successful completion of the database installation.

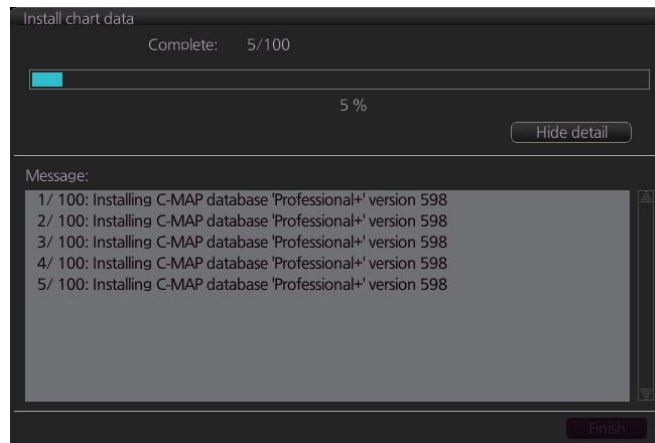
How to install the C-MAP database

1. Insert the medium that contains the C-MAP database.
2. Get into the Chart maintenance mode then click the [AUTO Load] button on the InstantAccess bar.

The [Install chart data] window appears and shows the percentage of completion, with digital and analog indication.

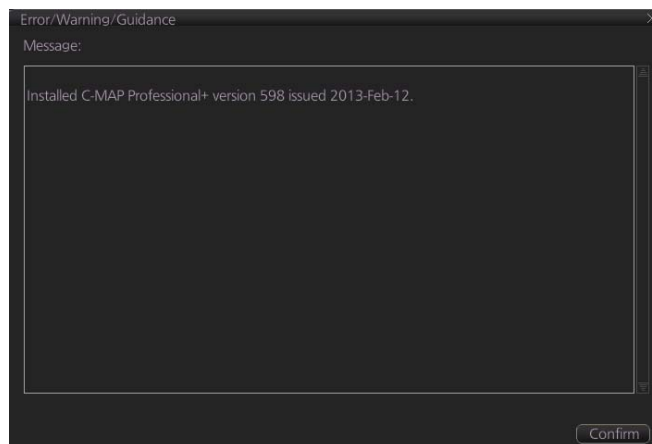


To show details during the installation, click the [Show detail] button.



To close the [Message] window, click the [Hide detail] button.

3. When the installation is completed, information about the chart database installed appears in the [Error/Warning/Guidance] window. Click the [Confirm] button to finish.



4. If applicable, set the next sequential medium and repeat steps 2-3 to install the next databases.

Note 1: If, after installation, C-MAP Pro+ charts do not appear, delete all corresponding charts and then reinstall them.

3. HOW TO MANAGE CHARTS

Note 2: Synchronization is not done for charts which could not be installed successfully. Reinstall failed charts.

How to install C-MAP licenses

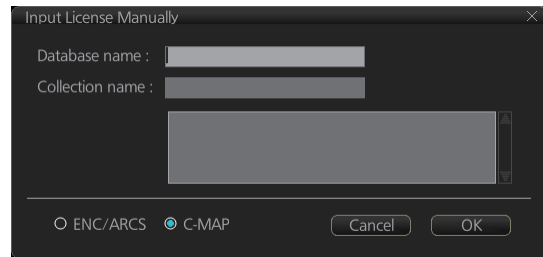
A C-MAP license file is normally installed automatically. Manual installation is also available.

Automatic installation:

1. Set the medium (DVD, USB flash memory, etc.) that contains the C-MAP license.
2. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar.
3. Click the [Install Licenses] button.
4. Select the medium that contains the license then click the [Open] button.
5. Click the [OK] button to install the license.
6. Click the [Close] button to finish.

Manual installation:

1. Click the [CHARTS] button on the Status bar to go the Chart maintenance mode, then click the [License] button on the InstantAccess bar.
2. Click the [Input Manually] button to show the [Input License Manually] box.
3. Select the type [C-MAP] at the bottom of the window.
4. Enter the [Database name] and [Collection name] information as shown in the table below. Enter the names exactly as shown to ensure correct installation.



Database name		Collection name
<u>Chart type</u>	<u>Name to enter</u>	Enter the contracted zone number according to chart type as follows: Professional/Professional+: Enter "Zone *" (without quotations) Ex. Zone 0 CM-ENC/JeppesenPRIMAR: Enter "Zone * ENC" (without quotations) Ex. Zone 0 ENC *=Zone no.
Professional:	World	
Professional+:	Professional+	
CM-ENC:	ENC	
JeppesenPRIMAR:	JeppesenPRIMAR	

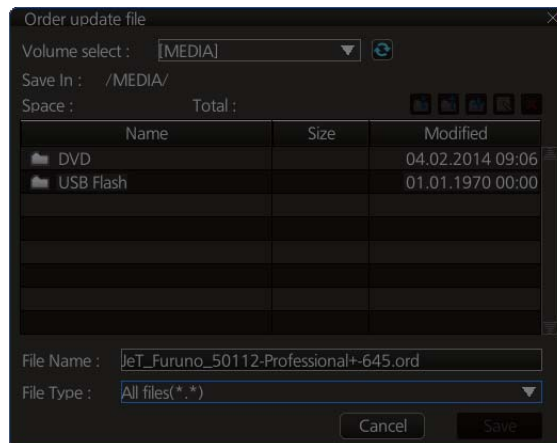
5. Enter the license (max. 16 characters) in the bottommost window.
6. Click the [OK] button to finish.

3.6.3 How to generate, order and apply an update file

How to generate and order an update file

To update the C-MAP chart database, you have to generate an update file, and e-mail the file directly to C-MAP. The update file defines coverage of charts you can display on your chart radar.

1. Connect a USB flash memory to the USB port on the Control Unit.
2. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar.
3. Click the [C-MAP] tab to show the [Licenses] dialog box for C-MAP.
4. From the [E-mail Size] drop-down list, select the size of the update file. The choices are [100KB], [200KB], [300KB], [400KB], [500KB], [750KB], [1MB], [2MB], [3MB], [4MB], [10MB], [Unlimited]. This is the size of the data file in an e-mail. The file may be sent in pieces depending of the size selected.
5. Click the [Order Update File] button. A file name (C-MAP system ID and chart type) is automatically created, with the extension .ord.



6. Select the USB flash memory.
7. Click the [Save] button to save the order file to the USB flash memory.
8. Send the order file to updates@c-map.no.

Within a few minutes you will receive a file that includes the terms for using the chart service and the chart updates. Save the file to a USB flash memory and apply it as shown in the next section.

How to apply the update file

1. Insert the USB flash memory that contains the update file (.ans extension) into the USB port on the Control Unit.
2. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar.
3. Click the [C-MAP] tab to show the [Licenses] dialog box for C-MAP.
4. Click the [Update from File] button.
5. Find the update file on the USB flash memory then click the [Open] button.

3.7 How to Delete a C-MAP Database

1. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar.
2. Click the [C-MAP] tab to show the [Licenses] dialog box for C-MAP.
3. Select the database to delete with the [Database] pull-down list.
4. Click the [Delete Database] button.

3.8 How to Install C-MAP DL (Dynamic Licensing) Charts

Register the eToken if it has not already been registered. See section 3.6.1.

3.8.1 How to generate, order and apply an update file

How to generate and order an update file

To update the C-MAP chart database, you have to create an update file, and e-mail the file directly to C-MAP. The update file defines coverage of charts you can display on your ECDIS.

1. Insert a USB flash memory to the USB port on the Control Unit.
2. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar.
3. Click the [C-MAP] tab to show the [Licenses] dialog box for C-MAP.
4. Click the [Order Update File] button. A file name (C-MAP system ID and chart type) is automatically created, with the extension .ord.
5. Select the USB flash memory.
6. Click the [Save] button to save the order file to the USB flash memory.
7. Send the order file to updates@c-map.no.

Within a few minutes you will receive a file that includes the terms for using the chart service and the chart updates. Save the file to a USB flash memory and apply it as shown in the next section.

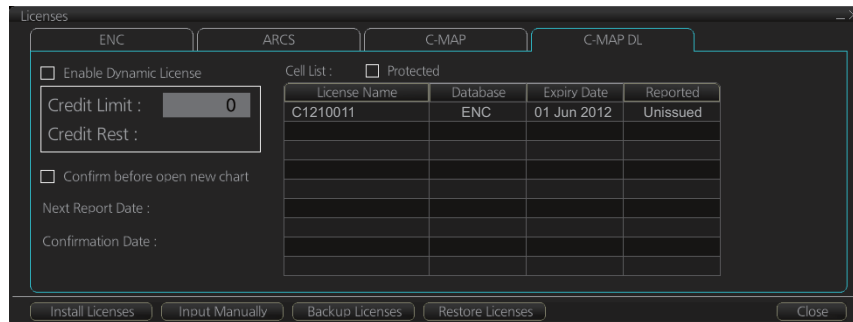
How to apply the update file

1. Insert the USB flash memory that contains the update file (.ans extension) into the USB port on the Control Unit.
2. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar.
3. Click the [C-MAP] tab to show the [Licenses] dialog box for C-MAP.
4. Click the [Update from File] button.
5. Find the update file on the USB flash memory then click the [Open] button.

Note: If the .ans file does not update the status of all shared C-MAP DL charts, reset the power of all Processor Units.

3.8.2 How to enable and set up the C-MAP DL

1. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar.
2. Click the [C-MAP DL] tab to show the [Licenses] dialog box for C-MAP DL.



3. Check [Enable Dynamic License] to enable the dynamic licensing.

You now have access to all the charts contained within the selected subscription zones - both already licensed charts and new charts.

Settings, indications on the Licenses dialog box for C-MAP DL

- Set your annual credit limit with [**Credit Limit**]. A permanent warning is given if your credit goes below this value. A new chart cannot be enabled if it causes the credit to go below this value.
- [**Credit Rest**] shows the amount of credit remaining and is updated each time you receive a confirmation answer for your request via e-mail.
- [**Next Report Date**] is the date when the next report should be sent to Jeppesen. If charts are not reported before the mandatory report date, access to all non-reported charts is discontinued and can be resumed only after the confirmation answer allowing use of the charts is received via e-mail.
- [**Confirmation Date**] is the date when you receive the confirmation answer for your request via e-mail.
- [**Confirm before open new chart**], if checked, a confirmation window asks for confirmation before opening charts that require issuing a new license. A chart denied is added to the list of protected charts, so the confirmation request will not be repeated for that chart. Those charts cannot be opened until they are removed from the list of protected charts.
- [**Protected**], if checked, shows the protected charts in the cell list. To remove a chart from protection, select it then click the [Release] button. Then, when an attempt is made to open that chart, the confirmation window appears. Note that multiple confirmation windows open when releasing multiple charts from protection.

3.9 How to Export a List of Charts

Get into the Chart maintenance mode, click the [Manage Charts] button on the InstantAccess bar to show the [Manage Charts] dialog box. Check the charts to add to the list. Click the [Export List] button to export the checked charts to a USB flash memory, in .txt format.

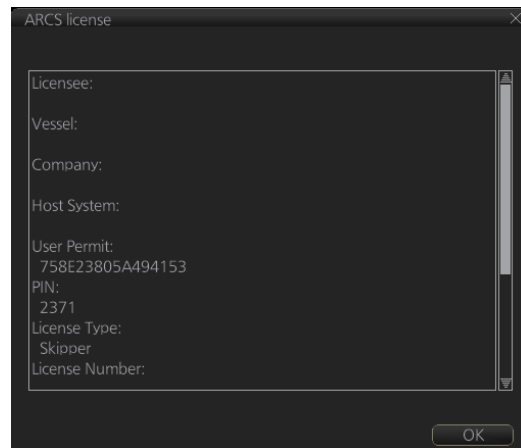
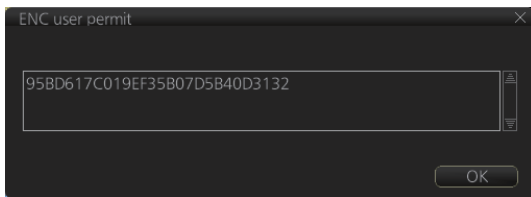
3.10 How to Export a List of Specific Licenses

You can export a list of your ENC, ARCS or C-MAP (excluding C-MAP DL) licenses to a USB flash memory, in .txt format.

1. Set a USB flash memory in the USB port on the Control Unit.
2. Get into the Chart maintenance mode then click the [License] button.
3. Click the [ENC], [ARCS] or [C-MAP] tab.
4. Click the [Export List] button.
5. Change the file name at [File Name] if desired.
6. Select the USB flash memory then click the [Save] button.
7. Click the [OK] button to finish.

3.11 How to Show the ENC Permit, ARCS License

1. Get into the Chart maintenance mode then click the [License] button.
2. Click the [ENC] or [ARCS] tab as applicable.
3. Click the [ENC User Permit] or [ARCS Licenses] button as applicable to show permit or license.



4. Click the [OK] button to finish.

3.12 How to Backup, Restore Licenses

You can make backup copies of your ENC, ARCS and AVCS (AIO) licenses and save them to a USB flash memory. If re-installation of the licenses becomes necessary, you can reinstall them from the USB flash memory. The backup and restore functions are not available with C-MAP charts.

To backup licenses:

1. Insert a USB flash memory into the USB port on the Control Unit.
2. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar to show the [Licenses] dialog box.
3. Click the [Backup Licenses] button.
4. Select the USB flash memory then click the [OK] button to save the licenses.

To restore licenses:

1. Insert the USB flash memory that has the licenses into the USB port on the Control Unit.
2. Get into the Chart maintenance mode then click the [License] button on the InstantAccess bar to show the [Licenses] dialog box.
3. Click the [Restore Licenses] button.
4. Select the licenses from the USB flash memory then click the [OK] button.

3.13 How to View Permit Expiration Date

Permits are used to control the right to use chart data in the ECDIS. A permit is connected to the edition of a chart. Permits are issued in two different types:

- **Subscription permit:** This type of permit includes updates for subsequent 3, 6, 9 or 12 months.
- **One-Off permit:** This type of permit includes only updates up to the issue date of the permit.

The expiry date of a permit controls the loading of Base charts and their updates to the chart. The system will warn you when you are installing charts or updates that are issued less than 30 days before the expiration date of a permit. If a permit has expired, it is impossible to install a chart or its update that was issued after the expiration date of the permit. The user has a right to view a chart forever, except C-MAP charts that have viewing periods which end two months after the expiry date of the license. If the charts are not updated regularly it will not complete the requirements for having up-to-date charts. To view the permit status of a chart, click the [License] button on the InstantAccess bar and then click the applicable "chart" tab ([ENC], [ARCS], [C-MAP] or [C-MAP DL]).

The example below shows the status of ENC charts. The expiration date of each cell appears in the [Expires] window.

Cell Name	Expires	DataServer	Subscription
NO4G3039	30 Jun 2012	GB	Yes
TR53131D	30 Jun 2012	GB	Yes
LV613250	30 Jun 2012	GB	Yes
UA4T3406	30 Jun 2012	GB	Yes
JP551E13	30 Jun 2012	GB	Yes
NO4E2225	30 Jun 2012	GB	Yes
SE5F18PA	30 Jun 2012	GB	Yes
GB603683	30 Jun 2012	GB	Yes
RU5M6MNO	30 Jun 2012	GB	Yes
HR3C0021	30 Jun 2012	GB	Yes

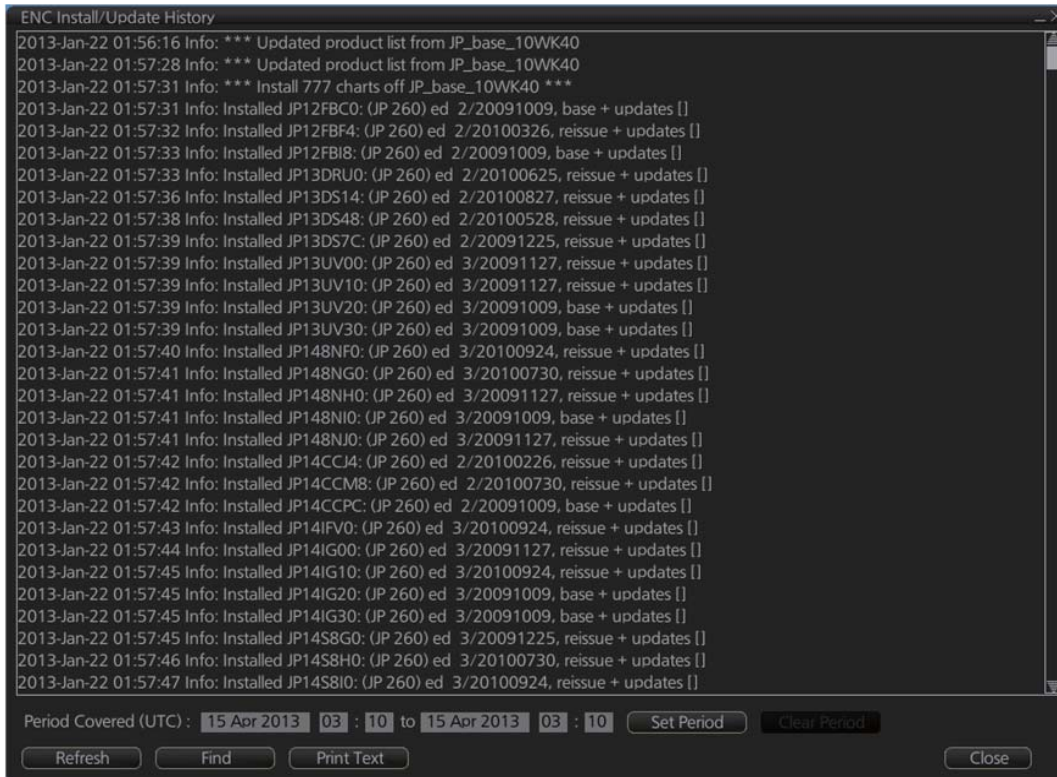
Subscription warnings for RENC

If you have at least one subscription-type permit, the system will automatically warn you about the expiration date of your subscription license, in the Permanent warning box.

Note: If you change service provider for some reason, it is recommended that you remove all the charts from the ECDIS before installing new charts of new service provider.

3.14 How to Display Install/Update History

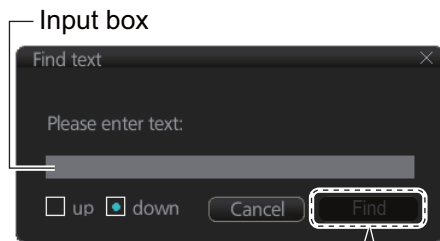
You can see a history of chart installations and updates. On the InstantAccess bar, click the [Record] and [Chart Log] buttons followed by the [ENC], [ARCS] or [C-MAP] button. The example below shows the install/update history for ENC charts.



You can filter the log with [Period Covered (UTC)]. Enter the period to display then click the [Set Period] button. Click the [Clear Period] button to display all entries. The [Refresh] button updates the list. [Print Text] prints hard copy of the history.

The [Find] button searches required text string as follows:

- 1) Click the [Find] button to show the [Find text] box.



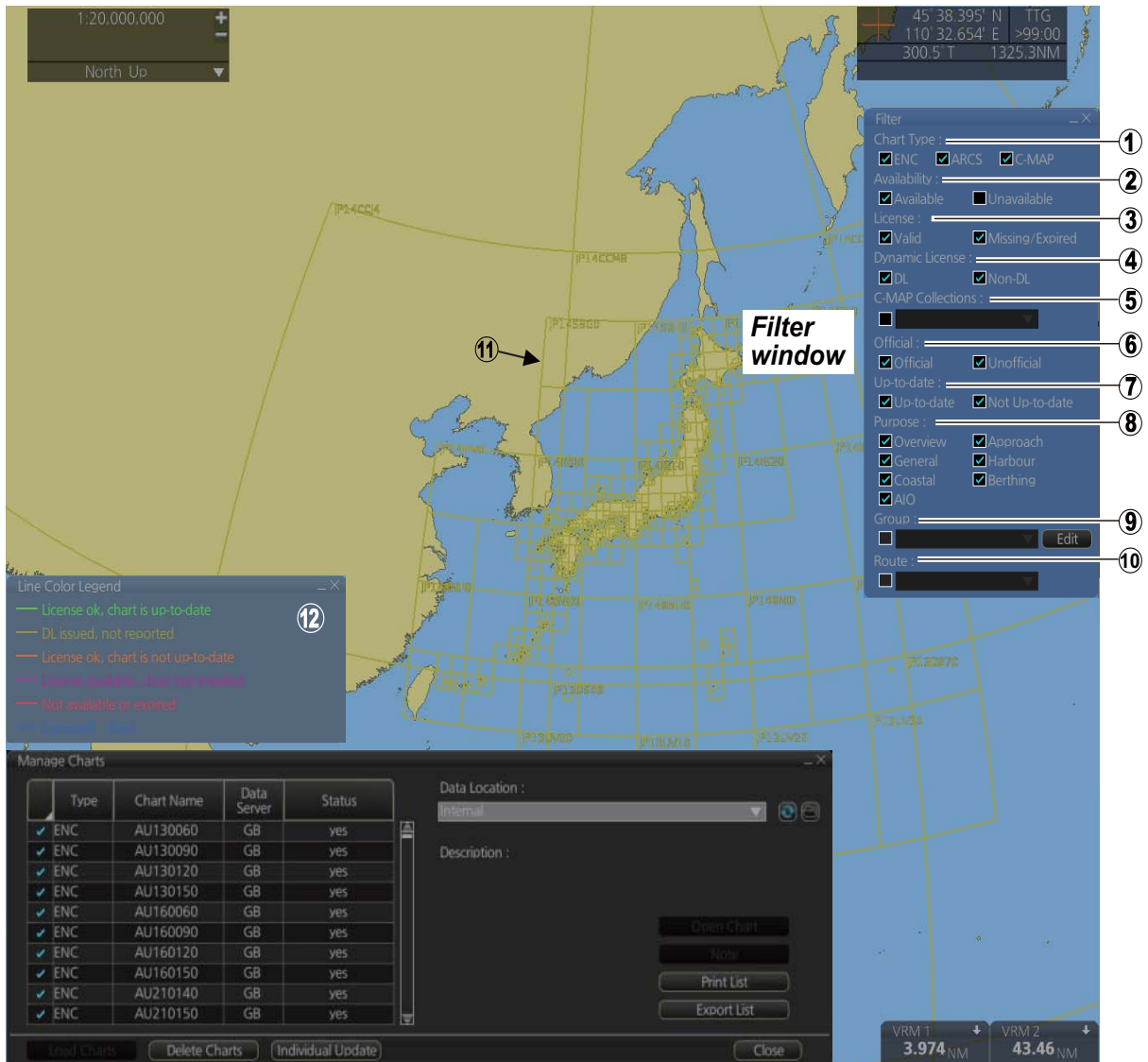
Enter text in box and [Find] button appears.

- 2) Click the input box then enter the text to search.
- 3) Select the search direction with the up or down radio button.
- 4) Click the [Find] button. The first matching text is highlighted in yellow at the top of the screen.
- 5) To continue the search click the [Find] button. To cancel the search, click the [Cancel] button.

3.15 Catalog of Chart Cells

A catalog is used to view graphical coverage of the charts stored in your SSD, available in a named "medium". Available charts are displayed using their limits of charts. Note that sometimes the real coverage of the charts may be considerably less than the declared limits of it.

To display the catalog, get into the Chart maintenance mode then click the [Manage Charts] button on the InstantAccess bar. The [Filter] window lets you choose what to display. Check or uncheck items as appropriate.



- 1) Chart Type
 ENC: Display ENC charts.
 ARCS: Display ARCS charts.
 C-MAP: Display C-MAP charts.
- 2) Availability
 Display available or unavailable charts.

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- 3) License
 - Valid: Cell with valid license.
 - Missing/Expired: Cell with missing or expired license.
 - Valid + Missing/Expired: Display cell regardless of license.
 - Uncheck both: Hide all cells.
- 4) Dynamic License
 - Display DL or non-DL C-MAP charts.
- 5) C-MAP Collections
 - A collection is a pre-defined dataset, the contents of which can be defined by zone, individual chart or any of those combinations. Applicable to C-MAP charts also.
- 6) Official
 - Display official or unofficial charts.
- 7) Up-to-date
 - Display charts which are or are not up to date.
- 8) Purpose
 - Display chart according to its purpose - Overview, General, Coastal, AIO, Approach, Harbor, Berthing.
- 9) Group
 - See the next section for how to group charts.
- 10) Route
 - Show or hide chart area with route.
- 11) Chart boundary boxes
 - Define the area covered by a chart and are color-coded according license and permit status.
- 12) Line color legend
 - The line color legend provides information about license validity.

Color	Message
Green	License ok, chart is up-to-date
Yellow	DL issued, not reported
Orange	License ok, chart is not up-to-date
Magenta	License available, chart not installed
Red	Not available or expired
Blue	Canceled chart

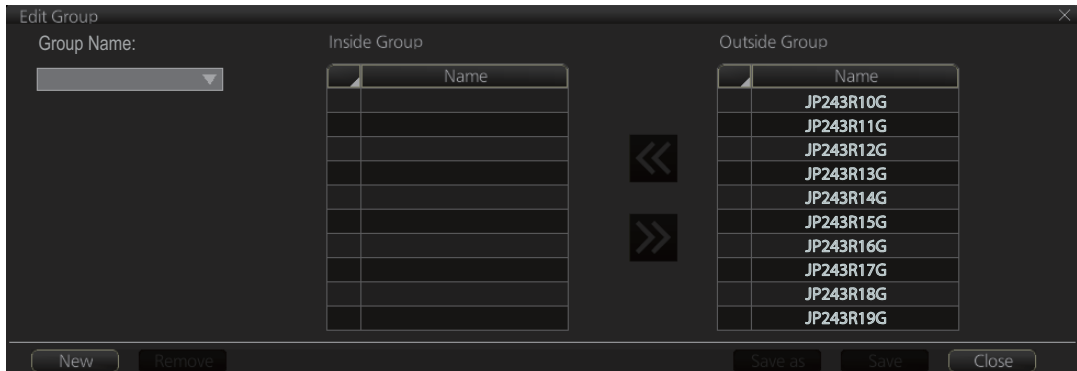
3.15.1 How to group chart cells

You can define groups of like-format chart cells. This means you can collect related charts, for example, all cells that cover a route from Liverpool to New York or all cells available from a National Hydrographic Office.

You can make a group and define charts from the [Edit Group] dialog box.

How to make a new group of chart cells

1. In the Chart maintenance mode, click the [Manage Charts] button on the InstantAccess bar.
2. Click the [Edit] button in the [Filter] window to show the [Edit Group] dialog box.



3. Click the [New] button.
4. In the [Outside Group] window, click the box to the left of the chart cell you want to add to the group to show a checkmark. (A context-sensitive menu with "Select all" and "Deselect all" functions is available by right-clicking the box to the left of [Name], in either window.)
5. After you have selected the cells to add to the group, click the << button to move the names of the selected cells to the [Inside Group] window. If you want to remove a chart from the group, select it then click the >> button.
6. Click the [Save] button.
7. Enter a name for the group, using the keyboard on the Control Unit or software keyboard, then click the [OK] button.
8. Click the [Close] button to finish.

How to edit a group of chart cells

You can edit a group of chart cells from a group as follows:

1. In the Chart maintenance mode, click the [Manage Charts] button on the InstantAccess bar to show the [Filter] window.
2. Click the [Edit] button.
3. At the item [Group Name], select the name of the group with the pull-down list.
4. In the [Inside Group] window, click the box to the left of the chart cell you want to remove from the group to show a checkmark. (A context-sensitive menu with "Select all" and "Deselect all" functions is available by right-clicking the box to the left of [Name].)
5. After you have selected the charts to remove to the group, click the >> button to remove the selected charts cells from the group.
6. Click the [Save] button to finish.

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How to delete a group of chart cells

You can delete group of chart cells as follows:

1. In the Chart maintenance mode, click the [Manage Charts] button on the InstantAccess bar to show the [Filter] window.
2. Click the [Edit] button.
3. Select the name of the group with the pull-down list at the item [Group Name].
4. Click the [Remove] button.
5. Click the [OK] button.
6. Click the [Close] button.

How to select the group to view

In the Chart maintenance mode, click the [Manage Charts] button on the InstantAccess bar to show the [Filter] window. Check [Group] then select the group to view from the pull-down list at [Group].

3.15.2 How to view status of chart cells

The [Cell Status] dialog box shows the status of the chart cells stored in the system. To show this dialog box, get into the Chart maintenance mode then click the [Cell Status] button on the InstantAccess bar.



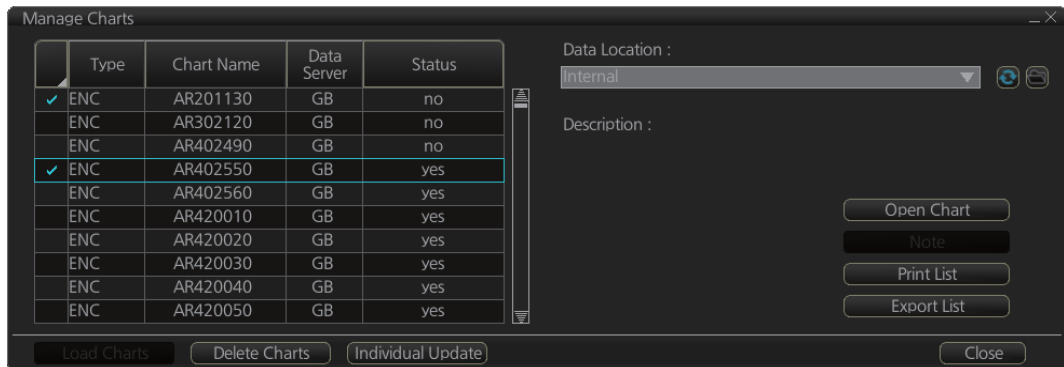
The screenshot shows a dialog box titled "Cell Status" with a table of chart cell information. The table has seven columns: a checkbox, Type, Chart Name, Data Server, Edition/Issued Date, Update: Num/Date, and Updated. There are 12 rows of data, all with checked checkboxes and "yes" in the Updated column. Below the table are buttons for "Print List", "Export List", and "Close".

	Type	Chart Name	Data Server	Edition/ Issued Date	Update: Num/Date	Updated
<input checked="" type="checkbox"/>	ENC	AU130060	GB	1/22 Jun 2007	1/12 Aug 2011	yes
<input checked="" type="checkbox"/>	ENC	AU130090	GB	3/22 Apr 2011	3/26 Aug 2011	yes
<input checked="" type="checkbox"/>	ENC	AU130120	GB	9/05 May 2011	-/-	yes
<input checked="" type="checkbox"/>	ENC	AU130150	GB	7/11 Mar 2011	1/12 Aug 2011	yes
<input checked="" type="checkbox"/>	ENC	AU160060	GB	2/04 Feb 2009	1/17 Mar 2010	yes
<input checked="" type="checkbox"/>	ENC	AU160090	GB	2/18 Jun 2010	-/-	yes
<input checked="" type="checkbox"/>	ENC	AU160120	GB	2/07 Apr 2010	3/08 Apr 2011	yes
<input checked="" type="checkbox"/>	ENC	AU160150	GB	5/24 Nov 2009	1/22 Apr 2011	yes
<input checked="" type="checkbox"/>	ENC	AU210140	GB	6/04 Mar 2011	1/01 Jul 2011	yes
<input checked="" type="checkbox"/>	ENC	AU210150	GB	4/23 Feb 2010	6/01 Jul 2011	yes

- **Type:** Type of chart cell, ENC, C-MAP or ARCS.
- **Chart Name:** Chart name
- **Data Server:** The name of the data server where the chart was downloaded from.
- **Edition/Issued Date:** Edition no. and issued date of the chart cell.
- **Update: Num/Date:** No. and date of the update of the chart cell.
- **Updated:** [yes] is shown if the cell is up-to-date, [no] if the cell is not up-to-date.

3.16 How to Open Charts

In the Chart maintenance mode, click the [Manage Charts] button on the InstantAccess bar to display the dialog box shown below. Select the chart to open then click the [Open Chart] button.



3.17 How to Print Chart List, Cell Status List

3.17.1 How to print the chart list

1. In the Chart maintenance mode, click the [Manage Charts] button on the InstantAccess bar to show the [Manage Charts] dialog box.
2. Check the charts to print.
3. On the [Filter] window, check the information to print.
4. Click the [Print List] button to print. (If you have selected more than 30 charts, the message "The number of pages is 1. Do you want to continue?." appears. Click the [OK] button to continue, or the [Cancel] button to escape.)

```

Chart Management Report
Ship Name:                               Call Sign:
IMO Number:                              MMSI Number:
Printing Date: 2013-06-18 21:14:00
Data Location: Internal

Filter
Chart Type: ENC/ARCS/C-MAP                Availability: Available
License: Valid/Missing/Expired            Dynamic License: DL/Non-DL
Official: Official/Unofficial             Up-to-date: Up-to-date/Not Up-to-date
Purpose: Overview/General/Coastal/Approach/Harbour/Berthing
Group: test_all

Status Summary
yes                                     1251/1884
no                                      633/1884

Type   Chart Name   Data Server   Status
-----
ENC    AU130060    GB            yes
ENC    AU130090    GB            yes
ENC    AU130120    GB            yes
ENC    AU130150    GB            yes

```

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Description of chart list printout

Item	Description
Ship Name	Name of ship
IMO Number	Ship's IMO number
Call Sign	Ship's call sign
MMSI	Ship's MMSI number
Printing Date	Date list printed
Data Location	Location of charts; normally "Internal".
Filter	Settings of the items in the [Filter] window.
Status Summary	[yes]: charts with yes status/total number of charts [no]: charts with no status/total number of charts

3.17.2 How to print the cell status list

1. In the Chart maintenance mode, click the [Cell Status] button on the InstantAccess bar to show the [Cell Status] dialog box.
2. On the [Filter] window, check the information to print.
3. Check the charts to print on the [Cell Status] dialog box.
4. Click the [Print List] button to print. (If you have selected more than 30 charts, the message "The number of pages is 1 Do you want to continue?." appears. Click the [OK] button to continue, or the [Cancel] button to escape.)

Cell Status Report						
Ship Name:			Call Sign:			
IMO Number:			MMSI Number:			
Printing Date: 2013-06-18 21:12:12						
Filter						
Chart Type: ENC/ARCS			Official: Official			
Status Summary						
yes		1205/1717				
no		512/1717				
Type	Chart Name	Data Server	Edition/ Issued Date	Update: Num/Date	Updated	
ENC	AU130060	GB	1/22 Jun 2007	1/12 Aug 2011	yes	
ENC	AU130090	GB	3/22 Apr 2011	3/26 Aug 2011	yes	
ENC	AU130120	GB	9/05 May 2011	-/-	yes	
ENC	AU130150	GB	7/11 Mar 2011	1/12 Aug 2011	yes	

Description of cell status printout

Item	Description
Ship Name	Name of ship
IMO Number	Ship's IMO number
Call Sign	Ship's call sign
MMSI	Ship's MMSI number
Printing Date	Date list printed
Filter	Settings of the items in the [Filter] window.
Status Summary	[yes]: charts with yes status/total number of charts [no]: charts with no status/total number of charts

3.18 How to Delete Charts

Click the [Manage Charts] button to show the [Manage Charts] dialog box. Click the block to the left of the chart to remove to show a checkmark. A context-sensitive menu with "Select all" and "Deselect all" functions is available by right-clicking the block to the left of "Type". Click the [Delete Charts] button to delete the charts selected.

3.19 How to Show Publishers Notes for ENC Charts

You should read the text file associated with each catalog, which you can view when installing a chart from a medium. Click the [Note] button in the [Manage Charts] dialog box. You can print a hard copy with the [Print Text] button.



3.20 How to Find the Chart Type

The electronic chart system can display more than one ENC chart cell at a time. This feature is called multi-cell display. If one ENC chart cell does not cover the whole display, the system opens more ENC chart cells for display, if appropriate cells for the displayed area are available. The Own ship functions box shows information about ENC chart cells displayed on the electronic chart display area. When automatic TM reset is active, the information is displayed with reference to your ship's position. If TM reset is OFF, the information is displayed with reference to current cursor position.

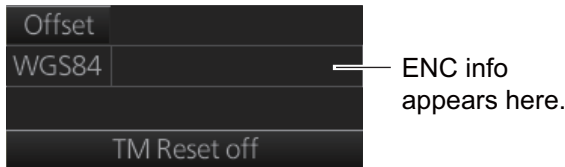


Chart type indication

No indication (Official ENC chart)

“Non-ENC data” (Unofficial ENC chart, indication in yellow)

“ENC data available” (Currently, RNC chart is in use, but ENC material is available. Indication shown in yellow.)

3.21 How to Update ENC, C-MAP Charts Manually

Manual update may include deleting an already existing object, modifying a position or other characteristics of an already existing object or inserting of a new object. In this system, manual updates are stored in a common database.

Mariners cannot permanently remove any of the official objects from the chart display. If a mariner needs to make obsolete any of the official objects he “deletes” them. Then, in practice, the deleted objects are still visible, but a diagonal line on the object indicates it is a deleted object.

However, a mariner can remove objects that he has inserted himself.

Note that the manual updates have no automatic connection to any automatic update received later for charts. If a manual update itself became obsolete, because the official chart has been updated to include the update defined as a manual update, the mariner must himself delete the obsolete manual update in question.

The system records complete usage of manual updates. All deletions, modifications and insertions are recorded and time stamped. If the mariner wishes to see what kind of manual updates he had in the past, for example, two weeks ago, he uses Update History to specify the relevant date range. For information on how to set Display date and Approved until dates, see section 5.2.3.

Note: Do not manually update charts while charts are being synchronized. Wait until synchronization is completed.

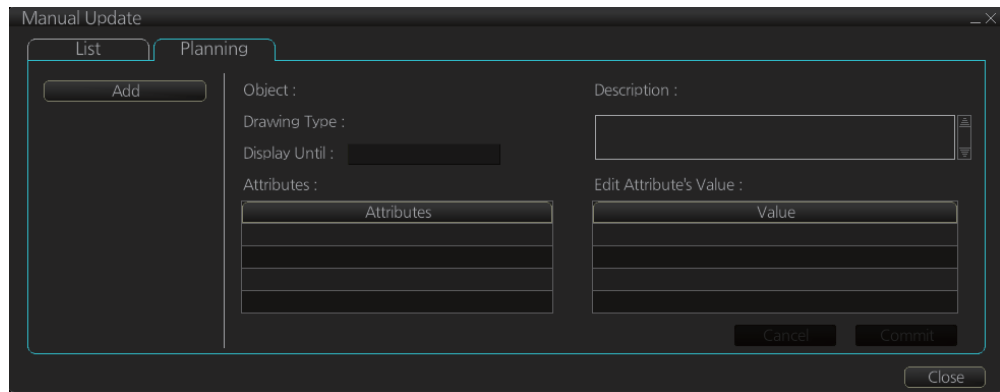
3.21.1 How to insert update symbols

An update symbol can be added as shown in the procedure below.

Note 1: If the system freezes when updating the drawing type [area], reset the power.

Note 2: An update symbol that straddles the international date line cannot be edited. In this case, insert the same symbol on each side of the line.

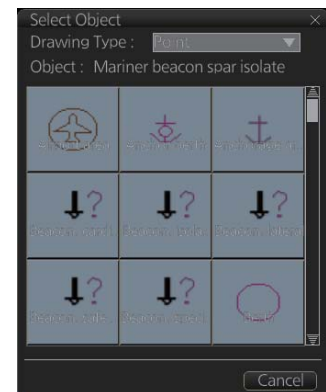
1. Go to the Voyage navigation mode.
2. Click the [Manual Update] button on the InstantAccess bar to open the [Manual Update] dialog box.
3. Click the [Planning] tab.



4. Click the [Add] button.

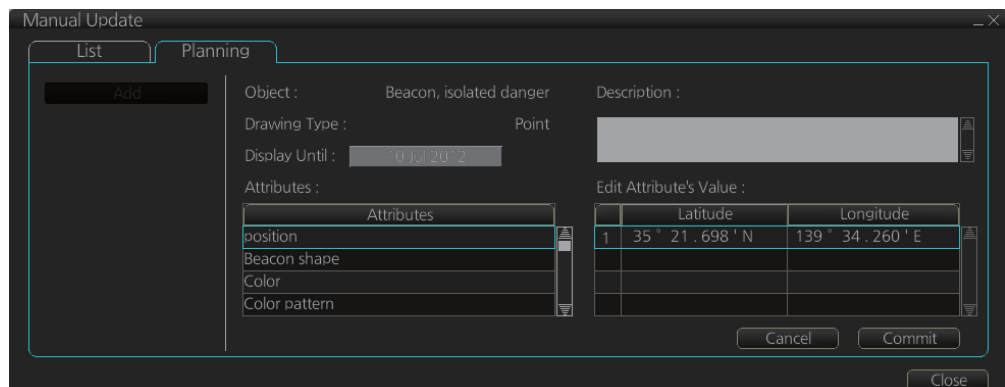
Note: This window can also be shown from the context-sensitive menu. Right-click the display area then select [Manual Update] and [Add New].

5. Use the [Drawing Type] pull-down list to select drawing type: point, line or area.
6. Click desired object.
7. Put the cursor on the location where to insert the symbol then left click. The [Manual Update] dialog box shows:



- Object
- Drawing type
- Display until date*

* Set as desired; default setting is three months from date of entry.



8. You can add a comment related to a manual update object in the [Description] box.

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9. To add textual information to an attribute, select the attribute from the [Attributes] window then add text in the [Edit Attribute's Value] window.
10. Click the [Commit] button to add all selected objects to the chart.

Note: A manual update object is displayed until the Display until date entered for it has passed. If the object remains on the screen after the Display Until date has passed, do some operation on the screen to refresh the screen to erase the object.

3.21.2 How to delete update symbols

Manually entered update symbols cannot be deleted until the "Display Until" date arrives or is changed. However, you can mark the symbol to indicate that it can be ignored.

1. Put the cursor on the symbol then right click to show the context-sensitive menu.
2. Select [Manual Update] and [Delete].

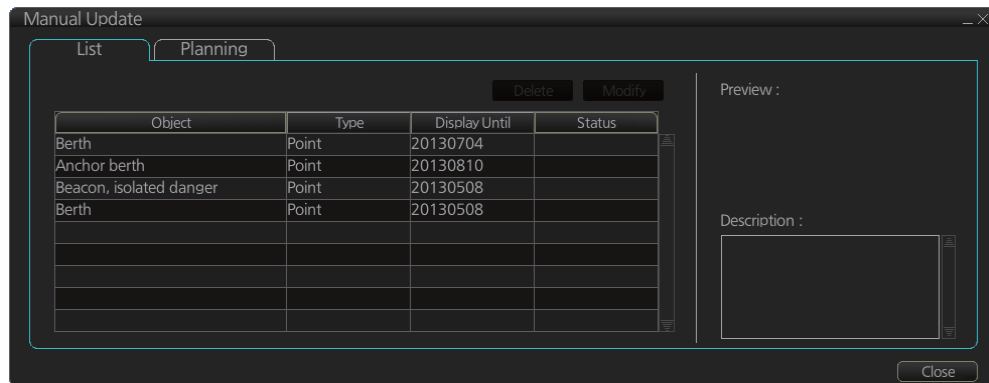
The symbol is marked with a diagonal line.

Note: A symbol can also be deleted from the [Manual Update] dialog box. Follow steps 1 and 2 in section 3.21.1, click the [List] tab, select the symbol to delete then click the [Delete] button.

3.21.3 How to modify existing update symbols

The position, Display until date and description of an update symbol can be modified. A symbol that is marked as "deleted" cannot be modified.

1. Follow steps 1-2 in section 3.21.1 to display the [Manual Update] dialog box.
2. Click the [List] tab.



3. Select the object to modify then click the [Modify] button. The [Planning] dialog box appears.
4. Modify the object referring to steps 8 and 9 in section 3.21.1.
5. Click the [Commit] button.

3.22 How to Synchronize Chart Data

This section shows you how to synchronize chart data between FMD-3xx0 and FCR-2xx9 units, so that all units share the same chart data. Synchronization can be done automatically or manually (see section 3.22.2), however all units selected for synchronization must be powered to complete the synchronization. Synchronization includes the following actions:

- Synchronize public keys
- Synchronize chart permits and licenses
- Synchronize chart data
- Synchronize manual updates

Note 1: Before synchronizing chart data, confirm that all units selected for synchronization are powered. (Do not turn off a unit during synchronizing.) If a unit is turned off during the synchronizing, do the following on the unit which contains the medium:

- Open the [Sync Status] dialog box then click the [Disable Sync] button to disable synchronization. Power all units registered for synchronization, then click the [Urge Sync] button on the [Sync Status] dialog box on the unit containing the media to forcibly synchronize.
- Make a group of all the units currently powered, referring to section 3.22.1, and register the group with [Grouped with This Unit]. Reset the power on all units selected for synchronization.

Note 2: C-MAP charts are not automatically synchronized. C-MAP charts are only synchronized immediately after installing or updating the C-MAP database. If the system has several FMDs, make a group of associated units before you install C-MAP charts.

3.22.1 How to select the units to synchronize

Do as follows to select the units to synchronize.

1. Get into the Chart maintenance mode. On the InstantAccess bar, click [System] followed by [Sync Config] to show the [Sync Config] dialog box.



[Grouped with This Unit]: This window shows the units currently selected for synchronization.

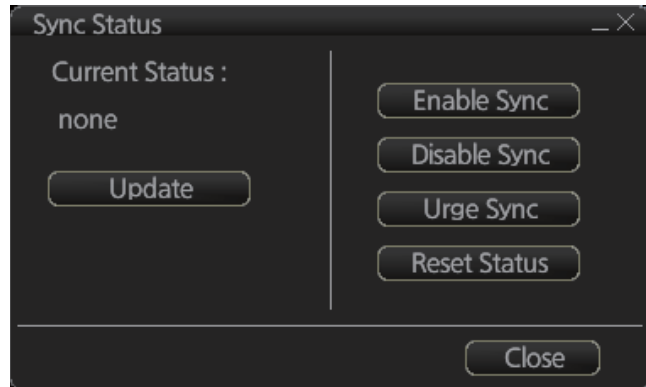
[Not Synchronize with This Unit]: This window shows the units not selected for synchronization.

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- To select a unit for synchronization:** Put a checkmark next to the unit's name in the [Not Synchronize with This Unit] window then click the << button. That unit's name is moved to the [Grouped with This Unit] window.
To deselect a unit from synchronization: Put a checkmark next to the unit's name in the [Grouped with This Unit] window then click the >> button. That unit's name is moved to the [Not Synchronize with This Unit] window.
To deselect all units, click the [Reset All] button.
- Click the [Save] button to finish.
- Restart the power on applicable units to apply synchronization configuration changes.

3.22.2 How to check synchronization status

You can check chart synchronization status on the [Sync Status] dialog box. Chart synchronization operations also are available from this dialog box. Normally, chart synchronization is done automatically, according to the sync settings on the [Sync Config] dialog box. Use the [Sync Status] dialog box to manually synchronize chart data when there is network failure, for example.



Get into the Chart maintenance mode. On the InstantAccess bar, click [System] followed by [Sync Status] to show the [Sync Status] dialog box.

[Current Status]: Displays current synchronization status. The table below shows all the synchronization status messages.

Sync status	Meaning
disabled	Synchronization is disabled.
must receive	This ECDIS will receive chart data from another FMD-3xx0 or FCR-2xx9 series.
must send	This ECDIS will send chart data to another FMD-3xx0 or FCR-2xx9 series.
none	No synchronization task ready.

[Update] button: Click this button to update [Current Status].

[Enable Sync] button: Enables synchronization. You are asked, "Do you want to enable sync?" Click the [OK] button to enable synchronization. Synchronization is always enabled when ECDIS starts. A progress bar indicates progress in synchronization. The bar is erased within five minutes after completion of synchronization.

[Disable Sync] button: Disables synchronization function temporarily. Use this feature to enable chart administration in case of network failure, for example. You are asked, "Do you want to disable sync?" Click the [OK] button to temporarily disable synchronization.

Note 1: In normal operation do not disable synchronization. If you accidentally disable synchronization, try to synchronize by clicking the [Enable Sync] button. If that does not work, reset the power of all units selected for synchronization then click the [Urge Sync] button to synchronize.

Note 2: With synchronization disabled, the message "Synchronization disabled" may appear twice when installing a license. This does not affect installation of a license.

[Urge Sync] button: Does immediate synchronization. You are asked, "Chart data in other units will be overwritten by this unit. Do you wish to continue?" Click the [OK] button to synchronize. If synchronization is not successful, restart applicable units and try again.

[Reset Status] button: Reset synchronization status to recover from synchronization status conflict. You are asked, "Do you want to reset sync status? This unit may be synchronized from the other unit." Click the [OK] button to reset.

3.22.3 Manual updates and synchronization

If you are synchronizing multiple FMD-3xx0 units while manual updating is being done on one of the units, the message "File not found" may appear, meaning the manual update data was deleted. If this occurs, follow the procedure below to synchronize the FMD-3xx0 units. The procedure uses ECD001 and ECD002 as an example.

1. At the ECD001, get into the Chart maintenance mode, then click [System] and [Sync Config] on the InstantAccess bar.
2. Add ECD002 to [Grouped with This Unit] then click the [Save] button.
3. Reset the power on the ECD001 and ECD002.
4. At the ECD001, get into the Chart maintenance mode, then click the [System] and [Sync Status] buttons on InstantAccess bar to show the [Sync Status] dialog box.
5. Click the [Urge Sync] button to synchronize charts between ECD001 and ECD002.
6. To confirm synchronization, do as follows:
 - 1) At the ECD001, get into the Voyage navigation mode then click the Manual Update button on the Instant Access bar.
 - 2) Click the [Planning] tab followed by the [Add] button.
 - 3) Insert an object at the ECD001.
 - 4) At the ECD002, move the cursor or change the chart scale. Confirm that the chart is updated.

3.23 How to Reconvert All SENC Charts

If you unintentionally installed outdated SENC charts, you can reconvert those charts to the latest SENC charts. Get into the Chart maintenance mode, click the [System] and [Reconvert] buttons on the InstantAccess bar to reconvert all your SENC charts.

Note: All manual updates are removed in the reversion.

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4. HOW TO CONTROL CHART OBJECTS

This chapter provides the information necessary for controlling chart features.

4.1 How to Browse Your Charts

You can view your charts using different positions and different scales. The basic tools for browsing charts are the **RANGE** key, chart offcenter, and scroll.

RANGE - and **RANGE +** change the chart scale. (The scrollwheel also can change the chart scale. Spin to change.) If true motion reset is active, ZOOM IN and ZOOM OUT keep the relative position of your ship with respect to the display. If true motion reset is off, ZOOM IN and ZOOM OUT keep the relative position pointed by the cursor with respect to the display. The system automatically chooses next larger or smaller scale. If a chart with larger compilation scale is available at your current viewing position, the message "Larger Scale ENC Available" appears.

The own ship position can be easily relocated to the screen center in the Navigation voyage and Navigation planning modes. Further, in the Navigation voyage mode, the own ship position can be put at the cursor position.

To move the own ship mark to the screen center, put the cursor in the chart area and right click [Ship on center]. **To move the own ship mark to a location**, right-click the position on the chart where to put the own ship mark then right click [Ship off center].

([Ship off center] is not available in the Voyage planning mode.)

To scroll your chart, simply drag and drop.

4.2 How to Control Visibility of Chart Objects

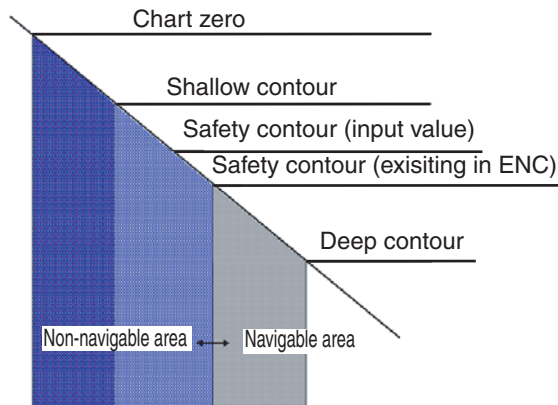
The [Chart Display] menu has several pages of chart features that you may show or hide as appropriate. To display this menu, click the [DISP], [SET] and [Chart DISP] menu on the InstantAccess bar.

4.2.1 How to set value for shallow contour, safety depth, safety contour and deep contour

You can set values for Shallow Contour, Safety Depth, Safety Contour and Deep Contour, on the [Chart Alert] dialog box (sequence: [DISP], [SET], [Chart Alert]). Colors used for depth presentation on the electronic chart are controlled by setting values for Shallow Contour, Safety Depth, Safety Contour and Deep Contour. Soundings on the electronic chart, which are equal to or less than the value of Safety Depth, are highlighted. See the illustrations on the next page for multi-color presentation and two-color presentation. Selection of multi- and two-color presentations can be done by selecting from the list box of "Depths" on the [Chart] page of [Basic Setting] menu.

Note: The shallow contour cannot be set higher than the safety contour.

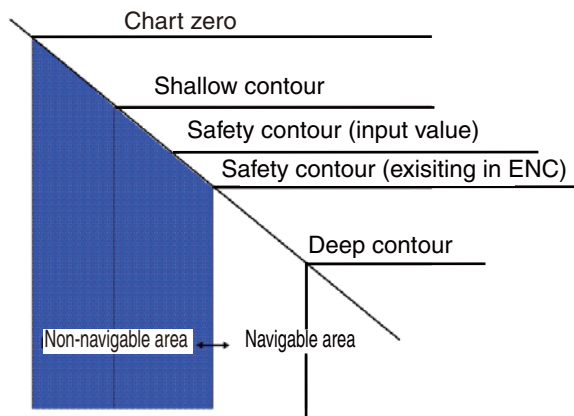
MULTI-COLOR presentation



In the multi-color presentation four colors are used for depths. If the value entered as the safety contour does not exist in the electronic chart, the system automatically selects the next available deeper depth contour as the safety contour. For example, the input value is 8 m, but there is no 8 m depth contour in the electronic chart. Then, the system automatically selects the next available deeper depth contour (10 m) as the safety contour. The depth contour value of 10 m is used as the safety contour in the electronic chart.

The shallow contour shows visual color change inside an unsafe water area. An unsafe water area is all areas shallower than the "safety contour". Set the value for the shallow contour less than the value of the safety contour.

TWO-COLOR presentation

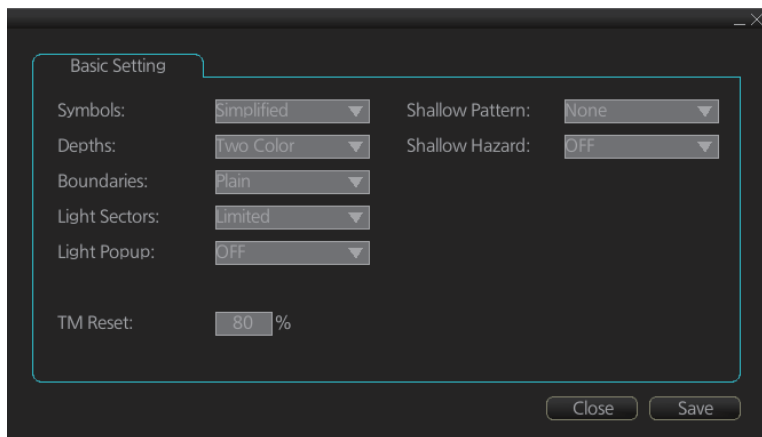


In the two-color presentation, unsafe water is shown in blue and safe water is shown in white. The safety contour is used to qualify unsafe water (depth shallower than safety contour) and safe water (depths deeper than safety contour).

If the value entered as the safety contour does not exist in the electronic chart, the system automatically selects the next deeper available depth contour as the safety contour, the same as with the multi-color presentation.

4.2.2 Basic Setting menu

To display this menu, click [DISP], [SET] and [Basic Setting] on the InstantAccess bar.



Symbols: Select how to display chart symbols. The options are [Simplified] and [Paper Chart]. **Simplified:** The shape of symbols is of modern design and the sea mark symbols are filled in a color. **Paper Chart:** The shape of symbols imitates traditional symbols used in paper charts.

Depths: Set how to display different depth zones on the chart display.

Boundaries: Set how to display boundaries of some chart features. The options are [Plain] and [Symbolized]. **Plain:** The line styles are limited to plain solid and dashed lines. **Symbolized:** Some of the line styles use symbols to highlight the purpose of a line.

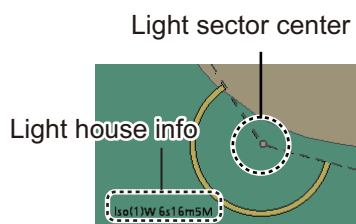
Paper Chart: The shape of symbols imitates traditional symbols used in paper charts.

Depths: Set how to display different depth zones on the chart display. The choices are [Two Color] or [Multi Color]. **Two Color** uses only two colors, deeper than safety contour and shallower than safety contour. Multi Color uses four different colors for contours: (1) Deeper than user-chosen deep contour, (2) Between deep contour and user-chosen safety contour, (3) Between safety contour and user-chosen shallow water contour, and (4) Between shallow water contour and coastline.

Light Sectors: Set how to display light sectors. The options are [Limited] and [Full].

Limited: The length of a light sector is fixed at 25 mm independently of the displayed scale. **Full:** The length of a light sector represents its nominal range as defined by the chart producer.

Light Popup: Show or hide light sectors information. [ON] provides light sector information (including length of arc of visibility) when the cursor is put on a light or light sector.



Shallow Pattern: Set how to display shallow water area. The options are: [None] and [Diamond]. **None:** Shallow water areas are not shown. **Diamond:** Provided to distinguish shallow water at night.

4. HOW TO CONTROL CHART OBJECTS

Shallow Hazard: Show or hide the shallow hazard symbols (⊗).

TM Reset: In the true motion mode, own ship moves until it reaches the true motion reset borderline (set here), and then it jumps back to an opposite position on screen based on its course. Set the limit for TM reset (in percentage). For example, “80” resets the position when the own ship marker is at a location which is 80% of the range.

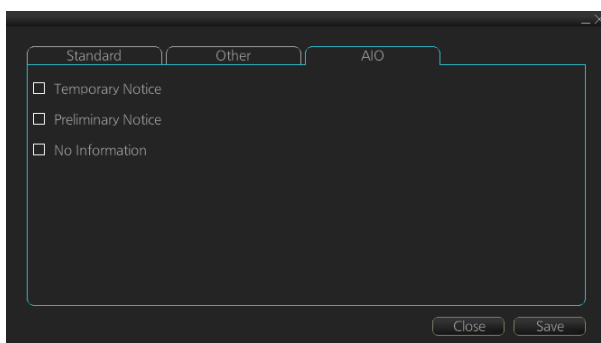
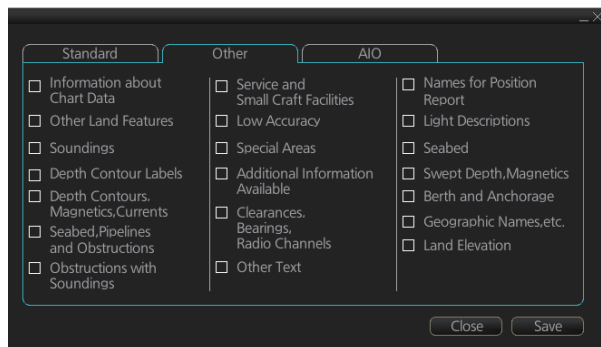
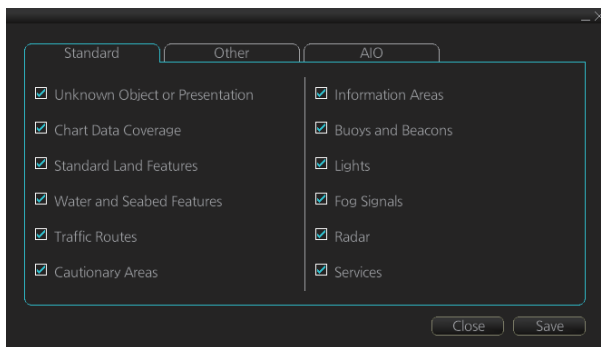
4.2.3 Chart Display menu

To access this menu and its pages, click [DISP], [SET] and [Chart DISP] on the InstantAccess bar then open the [Standard], [Other] or [AIO] page as appropriate.

The [Standard] page contains chart features defined by IMO that comprise a standard display. You can recall the standard display at any time in a single action; click the [STD DISP] button on the Status bar to get the standard display.

The [Other] page contains chart features for which you can control visibility and that are not part of IMO-defined standard display.

The [AIO] page controls what to display on the Admiralty Information Overlay.



Note: To use the Info request feature, which provides information for cursor-chosen chart feature, the associated chart feature must be turned on from the [Standard], [Other] or [AIO] page.

4.2.4 Display base

A subset of chart features is called the “display base”. As required by IMO, these features cannot be made invisible. To get the display base, uncheck all items on the [Standard] and [Other] pages in the [Chart Display] menu.

The display base consists of the following chart features:

- Coastline (high water)
- Own ship's safety contour, which is chosen by the user
- Indication of isolated underwater dangers of depths less than the safety contour that lie within the safe waters defined by the safety contour
- Indication of isolated dangers that lie within the safe water defined by the safety contour such as bridges, overhead wires, etc., and including buoys and beacons whether or not these are being used as aids to navigation.
- Traffic routine systems
- Scale, range, orientation and display mode
- Units of depth and height

4.3 How to Control Visibility of Symbols, Features

Control of symbols and features is divided into five pages in the [Symbol Display] menu, which you can access by clicking the [DISP], [SET] and [Symb DISP] buttons on the InstantAccess bar.

[General] page: Controls own ship and target related items.

[Tracking] page: Controls past tracks and some other features.

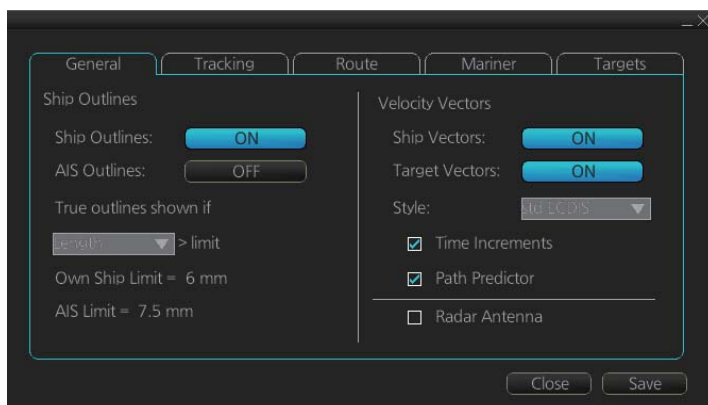
[Route] page: Controls planned and monitored route.

[Mariner] page: Controls user charts.

[Targets] page: Controls TT and AIS targets.

The user can define settings for chart details that are displayed over the chart area.

4.3.1 General page



Ship, AIS Outlines

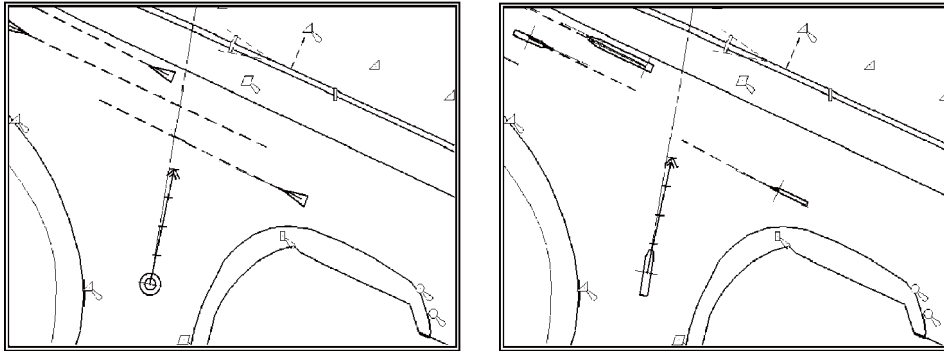
Ship Outlines: Select OFF or ON to show minimized or scaled symbol, respectively.

AIS Outlines: Select OFF or ON to show AIS targets in same size or scaled symbol, respectively.

4. HOW TO CONTROL CHART OBJECTS

True outlines shown if: If the length or width of the own ship mark is greater than 6 mm, the own ship mark is shown with the true scale symbol. Select [Length] or [Width].

The right illustration in the figure below shows own ship mark and AIS targets with scaled symbols. The left illustrations shows own ship mark and AIS targets with point symbols. AIS targets are displayed as true scale symbol if the displayed chart scale is larger than set with "Outlines" limit (length>7.5 mm) on the [General] page in the [Symbol Display] menu and your own ship are displayed as true symbol scale if the size of the true scale symbol is larger than 6 mm on the chart display.



Velocity Vectors

Ship Vectors: Show or hide own ship vector.

Target Vectors: Show or hide target vectors.

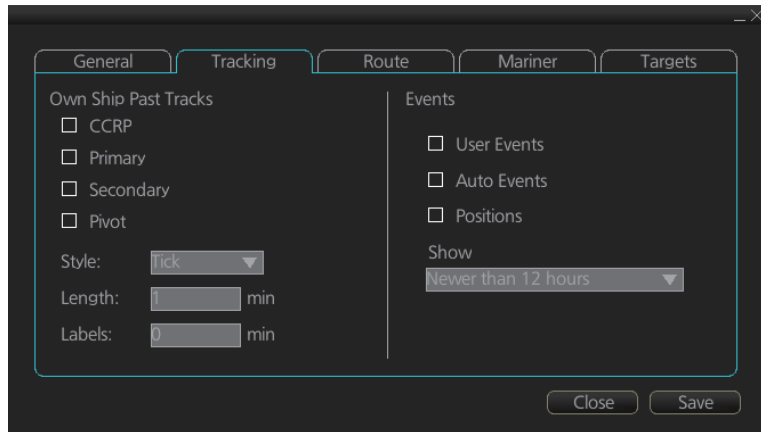
Style: Select the vector style. The [std ECDIS] vector is a speed-referenced vector symbol. [Conventional] is a simplified symbol.

Time Increments: Check to show ticks of velocity vector. This controls both own ship and targets ticks. If ticks are too tightly spaced, they will be automatically removed from the display, until spacing between ticks is sufficient to distinguish them separately. This depends on display scale and speed of vessel and target.

Path Predictor: Check to show the path predictor. The path predictor is a single dashed line originating at the CCRP and drawn at a length to represent the distance and path own ship will travel over the ground in the user-selected time interval for own ship speed vector.

Radar Antenna: Check to mark position of radar antenna (with "x").

4.3.2 Tracking page



Own ship past tracks

CCRP: Check to plot own ship's track with CCRP position as reference.

Primary: Check to plot own ship's track with position fed from sensor with highest priority.

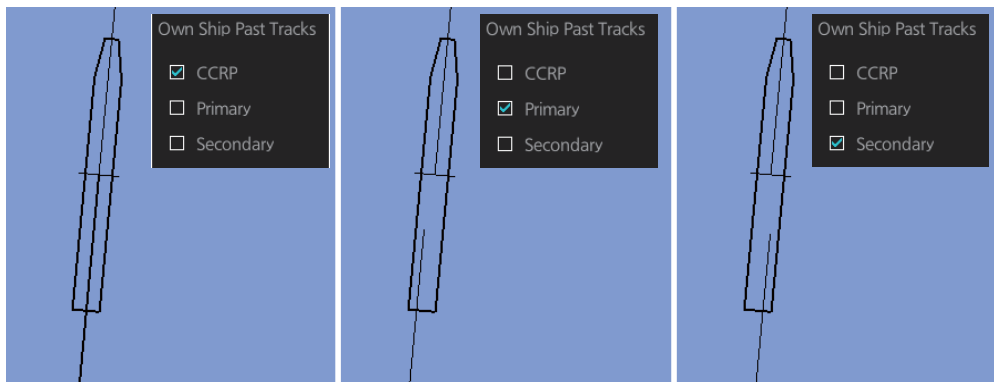
Secondary: Check to plot own ship's track with position fed from sensor with 2nd highest priority.

Pivot: Check to plot own ship's track with own ship's pivot position as reference.

Style: Select time stamp position for past track (indicated by Tick or Point).

Length: Select length of past track.

Labels: Select label interval.



Events

Events marks are based on the [Voyage] log records.

User Events: Display event symbols on the chart. User events are recorded by clicking [Record], [Event Log] and [User Event] on the InstantAccess bar.

Auto Events: Display automatically entered event symbols, where the system has recorded an event based on conditions you have set.

Positions: Display the latitude and longitude of an event, recorded by clicking [Record], [Event Log] and [POSN Event] on the InstantAccess bar.

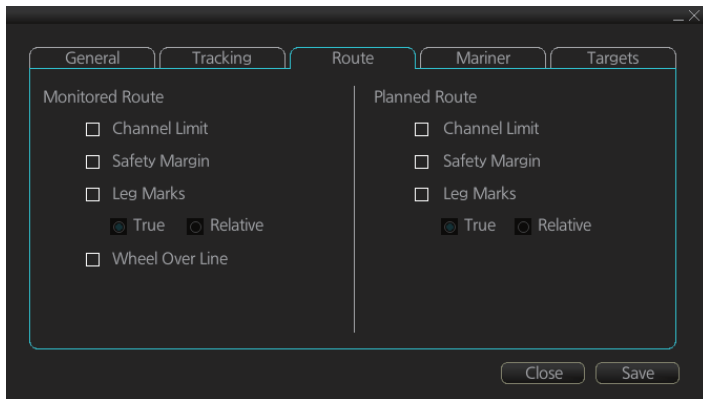
Note 1: A MOB event is visible always.

Note 2: You can choose the period of time to display events, from the [Show] list box. [Newer than 12 hours], [Newer than 24 hours], [Newer than 1 week], [Newer than 2 weeks], [Newer than 1 month], [Newer than 3 months], or [All].

4. HOW TO CONTROL CHART OBJECTS

4.3.3 Route page

The [Route] page selects the route parts of the monitored and planned routes to show on the ECDIS.

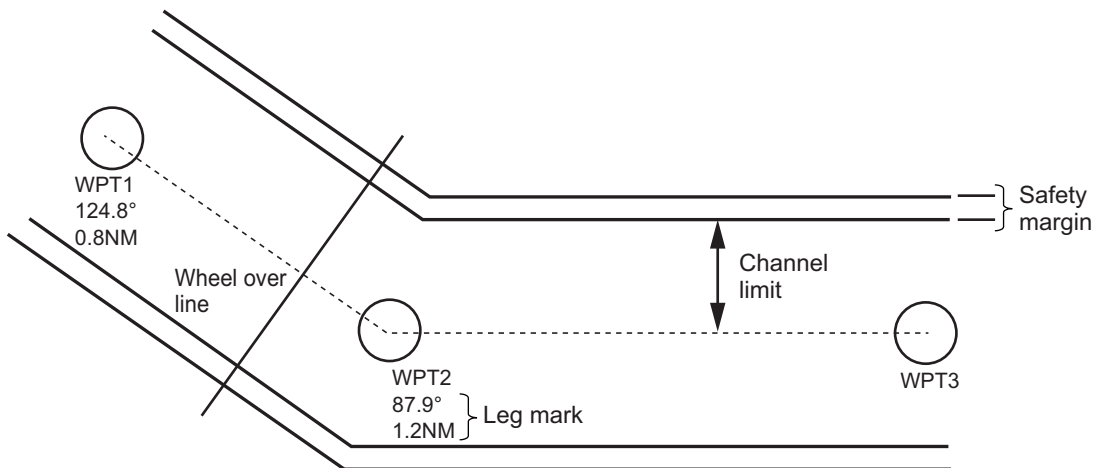


Channel Limit: The distance from the centerline to one side of the nav lane.

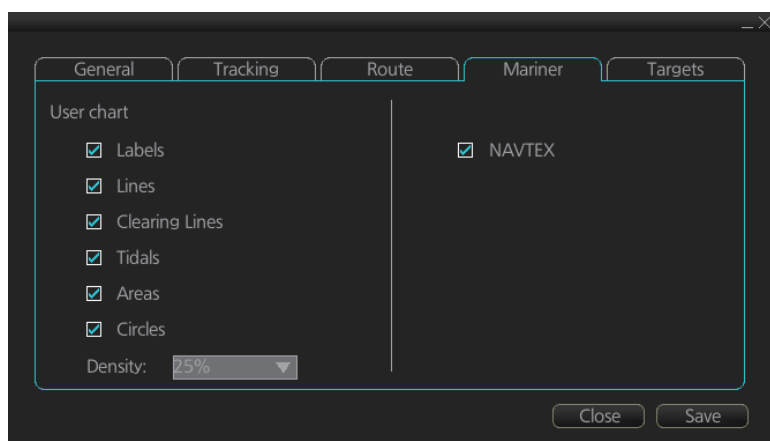
Safety Margin: The distance from one side of the channel limit to the safety margin distance.

Leg Mark: Indications of waypoint no. and range and bearing to next waypoint. (**True:** Reference to North; **Relative:** Reference to heading)

Wheel Over Line: The location where the ship turns toward new course.



4.3.4 Mariner page



User chart

Labels: Check to show labels on user charts.

Lines: Check to show lines on user charts.

Clearing Lines: Check to show clearing lines (for marking dangerous areas) on user charts.

Tidals: Check to show tidal symbols and tidal data on user charts.

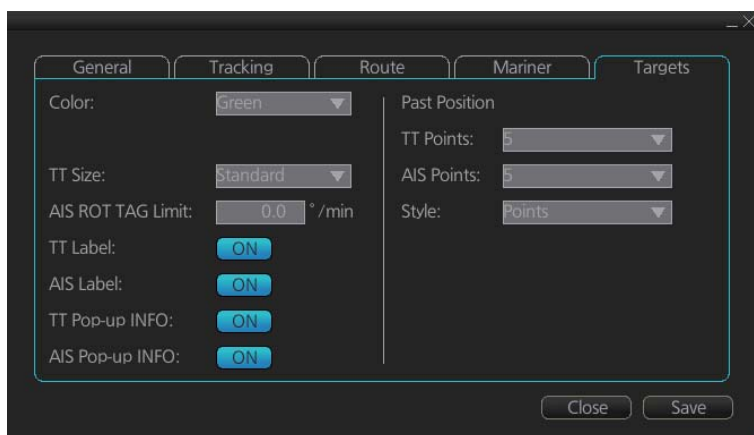
Areas: Check to show areas on the user charts.

Circles: Check to show circles on user charts.

Density: Set the degree of transparency for the user chart objects. Color fill for the areas can be chosen as transparent from 0%, 25%, 50% or 75%. Select [0%] to show only boundary lines.

NAVTEX: Check to put the Navtex symbol () at the position of the ship from which you have received a Navtex message. (Navtex receiver must be enabled during installation.)

4.3.5 Targets page



Color: Select color of target (TT and AIS, common) from the list box.

TT Size: Select symbol size for tracked targets, Standard or Small.

AIS ROT TAG Limit: Show target turning direction.

TT Label: Show or hide the TT label (target no.).

AIS Label: Show or hide the AIS label (ship's name).

TT Pop-up INFO: Show or hide the TT pop-up, which is shown by right-clicking a TT.

AIS Pop-up INFO: Show or hide the AIS pop-up, which is shown by right-clicking an AIS target.

TT(04)	NAME VOYA...
COG: 235.0°T	COG: 324.0°T
SOG: 6.1kn	SOG: 8.1kn
CPA: 0.23NM	CPA: 0.12NM
TCPA: -10:18	TCPA: -19:18

TT pop-up info AIS pop-up info

Past position

TT Points: Select the number of TT past position points to display.

AIS Points: Select the number of AIS past position points to display.

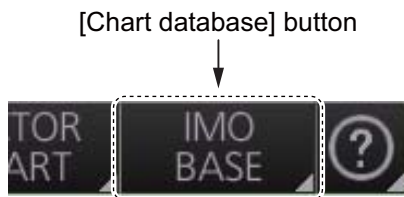
Style: Select style of presentation of target's past position.

4.4 Control of Predefined IMO Chart Display Settings

There are three sets of predefined chart display settings that can be used to display charts with certain chart features. The predefined chart display settings are

- IMO BASE
- IMO STD(STANDARD)
- IMO ALL

You can change the chart display setting in use with the [Chart database] button on the Status bar.



5. VECTOR (S57) CHARTS

Theoretically a chart can be coded for use on a computer as a vector chart. Vector-coded charts are coded using a variety of techniques. One technique is called S57ed3 and it has been chosen by IMO as the only alternative for SOLAS compliant electronic charts. If an S57ed3-coded chart is published by a government-authorized Hydrographic Office, then it is called "ENC". You can read more about ENC and related legal issues in this chapter. Hereafter, all references to vector chart material are referred to as "S57 charts" regardless of their source.

Sometimes you may wish to manually add Notices to Mariners or Navtex warnings into your S57 charts. This is called "manual updates". Also, manual updates are valid for all scales so that you don't need to repeat them for charts published in different scales from the same area.

5.1 Introduction to S57 Charts

An ENC chart is encrypted to prevent unauthorized use so the user needs a permit to view the ENC. This permit could be entered manually from the Control Unit, loaded from a USB flash memory.

Any new ENC must be loaded into the system. Some parts of the charts may be date dependent, i.e., they are visible after a set date or they are visible only for a limited period, etc. In the electronic chart system, you control all date-dependent objects with Display date and Approved until dates. In the paper chart world, the Preliminary and Temporary Notices to Mariners represent the date dependency described above for S57 charts.

An important part of ENCs are the updates. Hydrographic Offices can issue two kinds of updates:

1. Incremental updates, which are small additions to original base cells.
2. Reissues and new editions, which are complete replacements of previous base cells and their updates.

All updates are date stamped and they may also contain date-dependent parts. You control usage of updates in the electronic chart system from Display date and Approved until dates. Using Display date and Approved until dates, you can view your charts correctly drawn on any date in the past or in the future.

Chart material is stored in media such as DVD ROM, CD ROMs and USB flash memory or electronically through from LAN (Local Area Network) in which it could have arrived in DVD ROMs, CD ROMs or USB memories. Such material can contain only basic cells, cells and updates or only updates. The electronic chart system contains as standard the software required to access a medium.

Each S57 chart may contain additional links to textual descriptions or pictures, besides the chart itself. Typically additional textual descriptions and pictures contain important sailing directions, tidal tables and other traditional paper chart features that do not have any other method to be included into the S57 chart. This system copies these textual descriptions and pictures into its SSD so the user may cursor-pick them for viewing purposes.

5. VECTOR (S57) CHARTS

5.1.1 Definitions of terms

Cell	A cell is a geographical area containing ENC data and it is the smallest division of ENC data. Each cell has a separate unique name. Hydrographic Offices divide their responsibility area by the cells that they publish.
S57 chart	A database, standardized as to content, structure and format, is issued for use with this system without any authority of government-authorized Hydrographic Office.
ENC	A database, standardized as to content, structure and format, is issued for use with this system on the authority of government-authorized Hydrographic Offices. The ENC contains all the chart information necessary for safe navigation and may contain supplementary information in addition to that contained in the paper chart (e.g., sailing directions) that may be considered necessary for safe navigation. The name of the coding standard for ENC is S57ed3.
SENC	A database resulting from the transformation of the ENC by the system for appropriate use, updates to the ENC by appropriate means, and other data added by the mariner. It is this database that is actually accessed by the system for display and other navigational functions. The SENC may also contain information from other sources.

5.1.2 Chart legend for S57 charts

The chart legend provides various data about the chart currently displayed. To find info for current position, turn on TM reset, then click the [Chart INFO] button on the InstantAccess bar followed by the [Chart Legend] button, in the Voyage planning mode or Voyage navigation mode. To find info for a specific location, put the cursor on the location then right-click and select [Chart Legend]. The figure below shows the Chart Legend display for a specific location. Click the Close button to close the display.

This system is capable of showing more than one S57 chart at a time. This feature is called the multi-chart display. If one S57 chart does not cover the whole display, the system will open more S57 chart cells for display, if appropriate cells for the displayed area are available. The chart legend shows information about S57 charts displayed on the electronic chart display area.

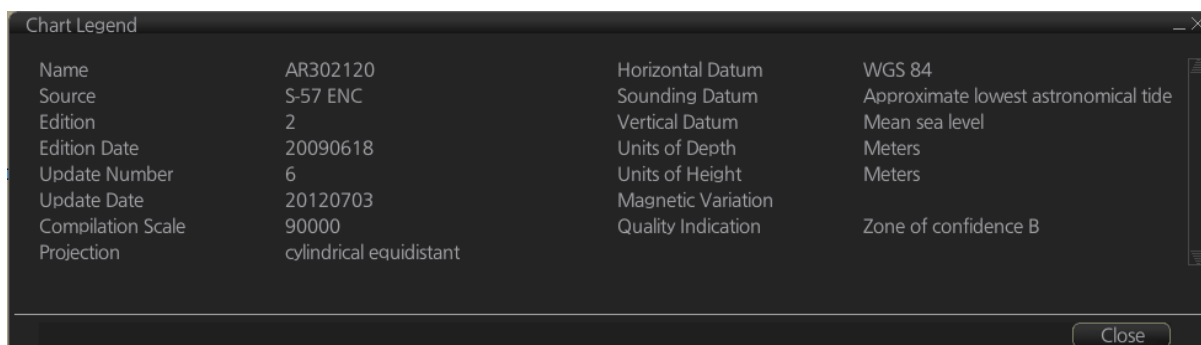


Chart Legend			
Name	AR302120	Horizontal Datum	WGS 84
Source	S-57 ENC	Sounding Datum	Approximate lowest astronomical tide
Edition	2	Vertical Datum	Mean sea level
Edition Date	20090618	Units of Depth	Meters
Update Number	6	Units of Height	Meters
Update Date	20120703	Magnetic Variation	
Compilation Scale	90000	Quality Indication	Zone of confidence B
Projection	cylindrical equidistant		

Name: Name of chart.

Source: Source of chart.

Edition: Edition number of the chart.

Edition Date: Date the edition was published.

Update Number: Update number

Update Date: Date of update

Compilation Scale: The scale of the original paper chart is shown here.

Projection: Projection of current chart.

Horizontal Datum: Horizontal datum used with current chart.

Sounding Datum: Datum used to create sounding data.

Vertical Datum: Vertical datum used with current chart.

Units of Depth: Unit of depth used with current chart.

Units of Height: Unit of measurement used to measure height of objects above sea level.

Magnetic Variation: Amount of magnetic variation. A positive value indicates a change in an easterly direction and a negative value indicates a change in a westerly direction.

Quality Indication: Quantitative estimate of the accuracy of chart features, given by the chart producer.

5.1.3 Permanent warnings for S57 charts

Permanent warnings help you keep the S57 charts up-to-date and these are shown at the bottom of the screen. Permanent warnings appear if the system detects a condition that may cause a chart to be not up-to-date.

Message	Meaning, Remedy
Display date is not current	Display date is not the current date. Set Display date and Approved until date to the current date.
ENC: permits have expired	You have an expired permit for a chart. Remove the chart or renew subscription for the permit.
ENC: Product list not up to date	The product list is not up to date. Appears 30 days after the issued date of the chart. Get the latest chart.
ENC: AIO product list not up to date	The AIO data is not up to date. Appears 30 days after the issued date of the AIO data. Get the latest AIO data.
No connection to dongle	The dongle is not inserted or not recognized. Check that the dongle is inserted to the EC-3000.
Not up to date (SSE 27): XXXXXXXX (Chart name appears at location of Xs.)	At least one chart is not up to date. Load updated material.
Permit expired (SSE 25): XXXXXXXX (Chart name appears at location of Xs.)	You have an expired permit for a chart. Remove the chart or renew subscription for the permit.

Note: The system can assist in keeping RENC-received charts up-to-date. For charts that have been loaded from sources other than an RENC, the system is unable to know the exact up-to-date situation.

5.2 Chart Viewing Dates and Seasonal Features of the S57 Chart

5.2.1 Introduction

S57 charts contain date-dependent features. Updating in general, including reissues, new editions and updates, creates date dependency. In addition to the obvious date dependency, some features of the S57 charts create additional date dependency. These features include "Date Start", "Date End", "Seasonal date start" and "Seasonal date end". Hydrographic Offices use these features to publish Temporary and Preliminary Notices to Mariners, as their paper chart equivalent updates are called. "Seasonal date start" and "Seasonal date end" are used for seasonal chart features such as summer-only sea marks, seasonal yacht race areas, etc.

You can efficiently use chart viewing date dependency in order to use the valid data for any given date applicable for your navigation or planning purposes. For example, you can check for existence of changes and restrictions weeks before they became valid. Date dependency is a part of the new electronic method to keep your chart up-to-date and valid for your intended use. Normally you should set Display date and Approved until once per week to keep your chart up-to-date.

5.2.2 How to approve and highlight S57 chart updates

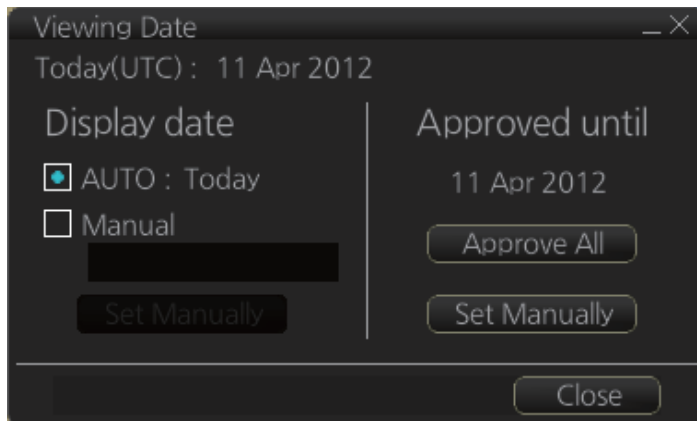
Before you approve updates, you can display (highlight) updates that are included into S57 charts. Normally you have selected for automatic after the SENC conversion. In this case, after all the SENC conversions have been finished, all updates are automatically highlighted and you can view and approve them after viewing. See the next section for how to set Display date and Approved until dates.

If you want to review updates after the initial approval of the updates do the following:

1. Use [Approved until] to set the begin date for the update highlight. See the next section.
2. Use [Display date] to set the end date for the update highlight. See the next section.
3. Review the changes. Added features are highlighted with orange circles. Removed features are highlighted with orange slashes. Changed features are highlighted with both orange circles and slashes.
4. After reviewing, set [Approved until] and [Display date] back to the current system date.

5.2.3 How to set Display date and Approved until dates

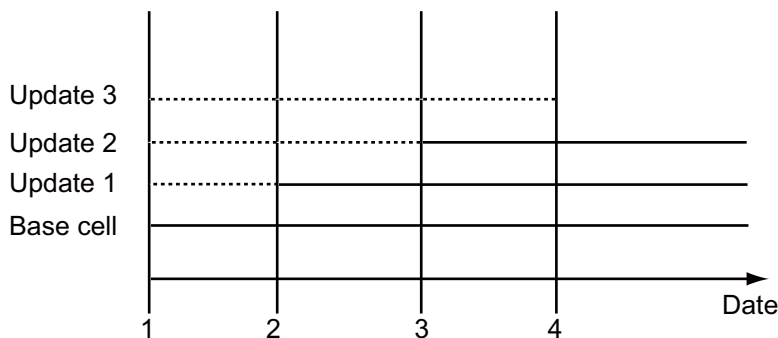
Click the [Chart INFO] and [Viewing Dates] button on the InstantAccess bar to show the [Viewing Date] dialog box. Set desired dates then click the [Close] button.



5.2.4 About chart viewing date dependency of S57 standard

How the issue date of updates changes the visibility of the changes

Study the example below to understand the behavior of updates relative to date.



The figure above shows how updates are dependent Chart viewing dates set in Display/Approved date settings by user. Actions 1 to 4 areas as follows:

1. Base cell including three updates is converted into SENC. Display date is set as current date of the system. Approve date has to be set to current date.
2. The date in which update 1 was issued. Display and Approved dates have to be set to correct date in order to see the chart with update 1.
3. The date in which update 2 was issued. Display and Approved dates have to be set to correct date in order to see the chart with update 1 and update 2.
4. The date in which update 3 was issued. Display and Approve dates have to be set to correct date in order to see the chart with update 1, update 2 and update 3.

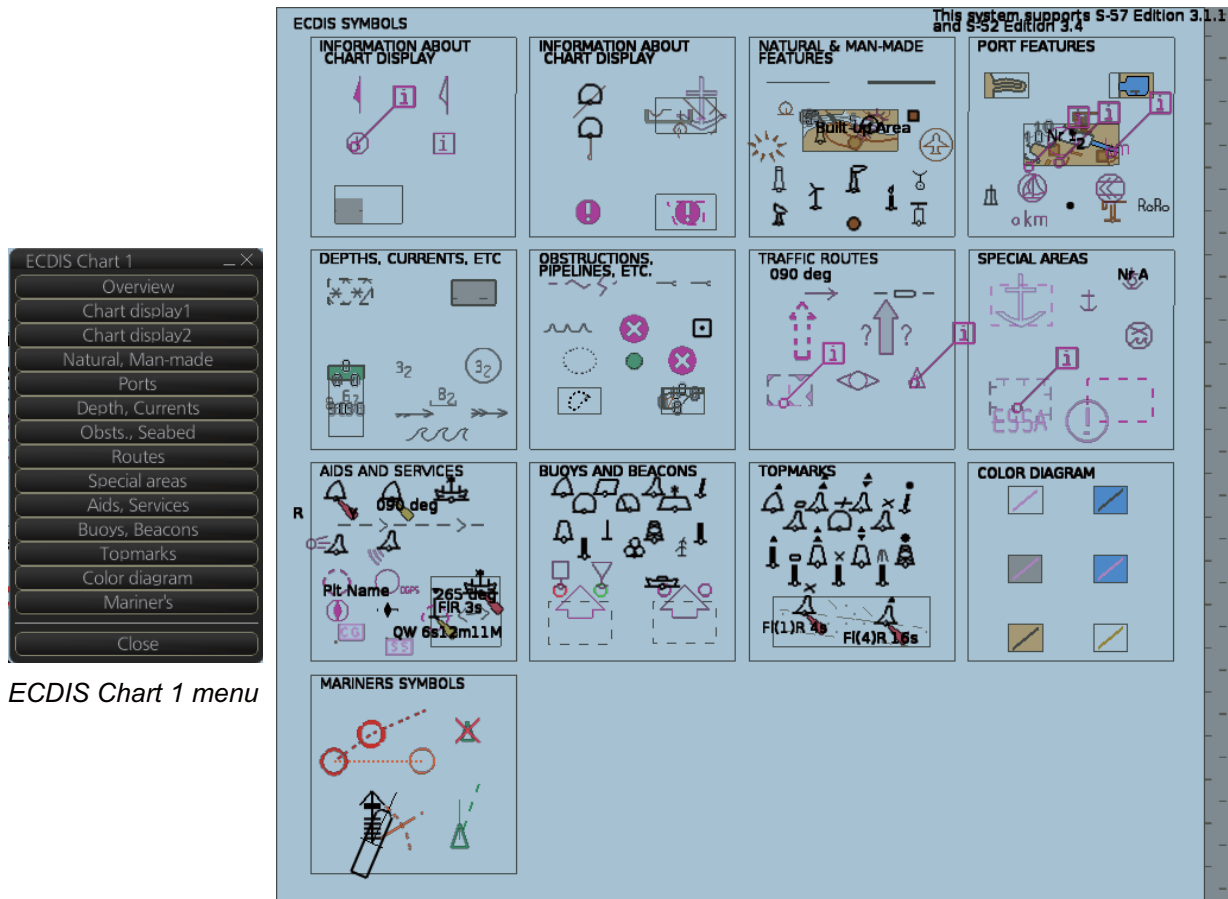
Note 1: In order to display charts with correct updated situation, always use current date during your voyage. If your voyage lasts more than one week, set current date at least once per week during your voyage.

Note 2: In order to display charts with correct updated situation during route planning, always use planned date of each waypoint to check your plan.

5.3 Symbology Used in S57 Charts

You can familiarize yourself with the symbology used by browsing IHO Chart 1, which is included in this system. Note that it behaves as any S57 chart and it follows your selections. See section 4.2.

1. Click the [Chart INFO] and [Chart 1] buttons on the InstantAccess bar to show to the [ECDIS Chart 1] menu, shown below.
2. Click a chart feature to show detailed information about the feature. Click [Overview] to show a compilation of all features, shown below.



ECDIS Chart 1 menu

5.3.1 Presentation library used for S57 chart features

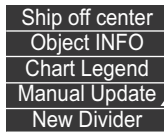
The system uses the official IHO presentation library to draw S57 charts.

When this manual was published the official presentation library was "pslb03_4.dai", known as "Official IHO presentation library for system Ed 3 revision 1, Edition: 3.4".

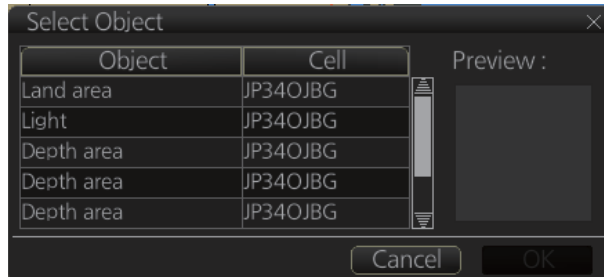
5.4 How to Find Information about S57 Chart Objects

The ability to cursor-pick an object to find additional information about the object is an important function of the system. However, an unprocessed cursor pick, which does not discriminate or interpret and merely dumps on the interface panel all the information available at that point on the display, will normally result in pages of unsorted and barely intelligible attribute information.

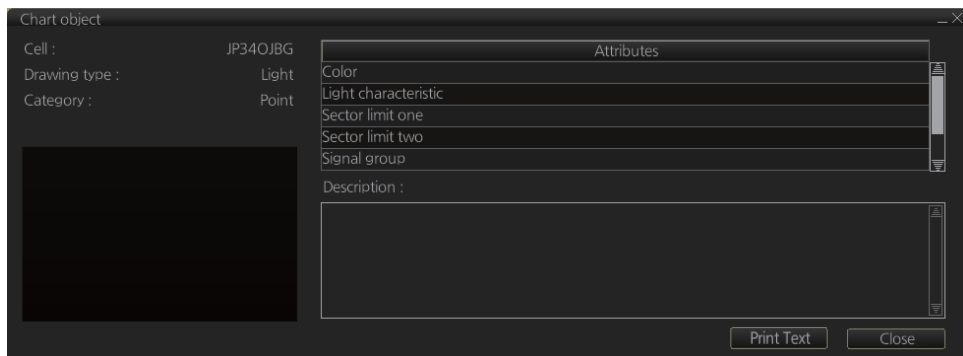
1. Get into the Voyage navigation mode or Voyage planning mode then right-click an object to show the context-sensitive menu. (The menu shown below appears in the Voyage navigation mode.)



2. Click [Object INFO] to show the [Select Object] dialog box.



3. Click the object for which you want to know its details then click the [OK] button.



Note: If another window is active, the preview window may be partially obscured by that window. Move the window to display the entire preview.

4. To print the chart object information, click the [Print Text] button. Below is a sample chart object printout.

```

Chart object

Cell: US1GC09M
Drawing type: Caution area
Category: Area

Scale minimum: 3000000
Textual description: USNOTES3.TXT

```

5.5 Admiralty Information Overlay (AIO)

The Admiralty Information Overlay includes all Admiralty Temporary and Preliminary Notices to Mariners (T&P NMs) and provides additional navigationally significant information from UKHO's ENC validation programme. The AIO is displayed as a single layer on top of the basic ENC and is available free of charge as part of the Admiralty S57 Chart Service and within Admiralty Value Added Resellers' services.

The AIO has been developed to ensure mariners can simply view the information they need - in addition to the standard chart - to navigate safely and compliantly. By clearly showing where important Temporary or Preliminary changes may impact a voyage, the Admiralty Information Overlay will give seafarers the same consistent picture of the maritime environment on their charts as they have always had.

The AIO license is free of charge for AVCS license holders.

5.5.1 Installation

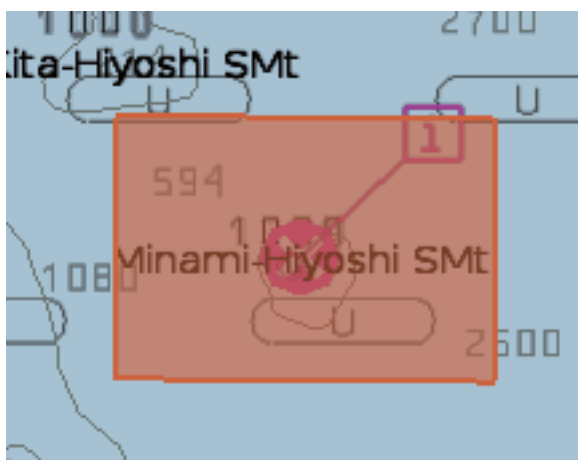
Installation is the same as that for the ENC chart. See section 3.2.

5.5.2 How to display the AIO

Click the [DISP], [AIO] and [ALL] buttons to show the AIO. To hide the AIO, click the [DISP], [AIO] and [OFF] buttons.

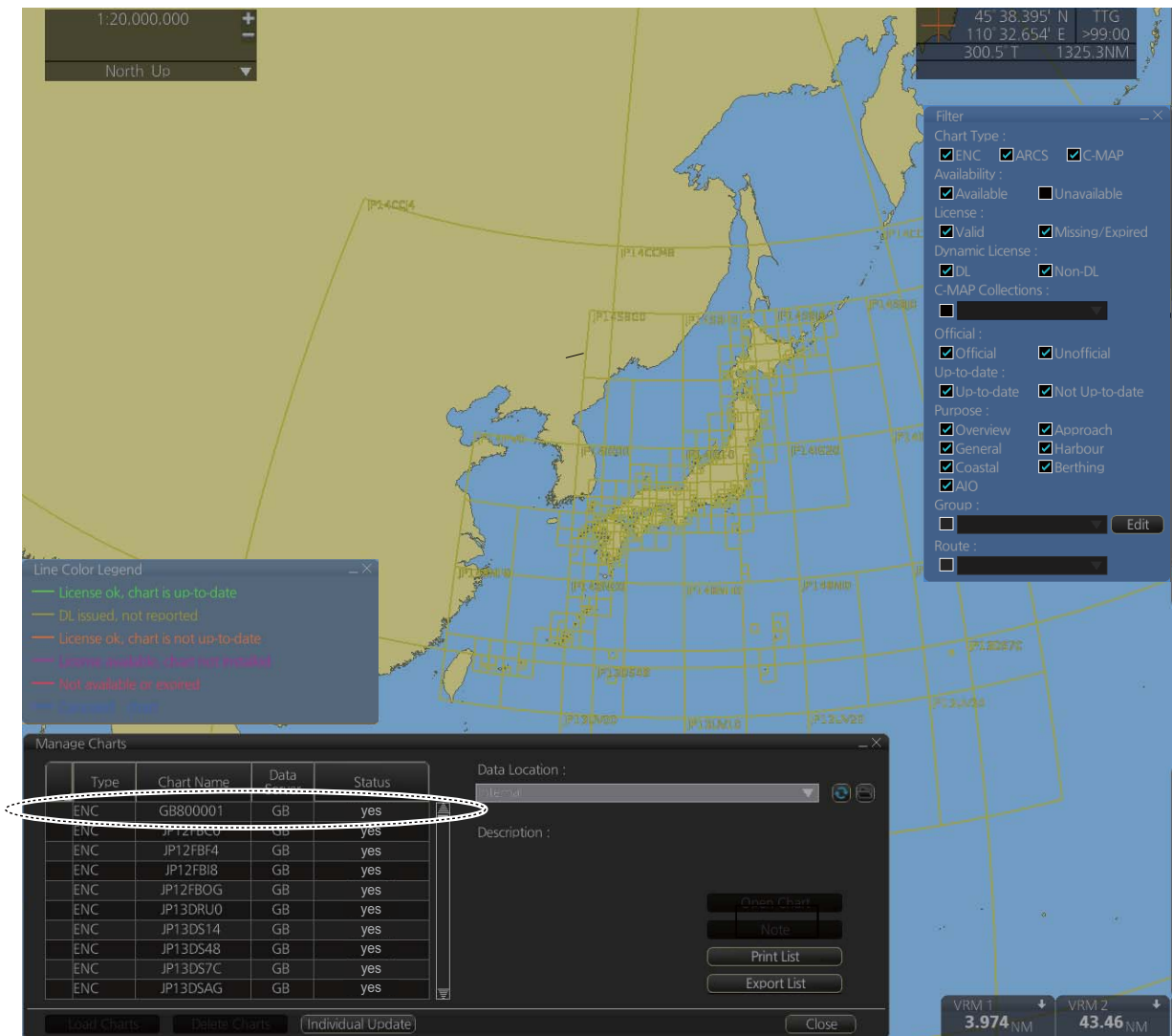


The area(s) that contain temporary or preliminary changes are marked with a hatched red rectangle.



5.5.3 Catalog of AIO cells

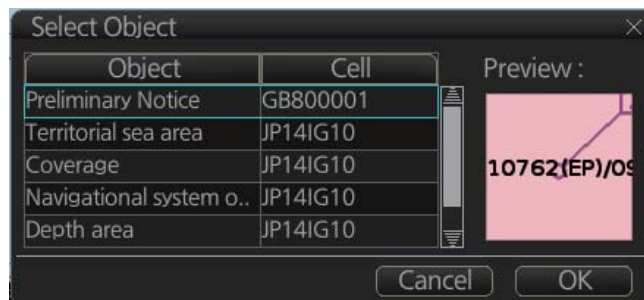
A catalog of AIO cells is maintained in the [Manage Charts] dialog box. To show this box, get into the Chart maintenance mode then click the [Manage Charts] button on the InstantAccess bar. The AIO cell is GB800001.



5.5.4 How to find AIO chart object information

Do the following to find chart object information contained in the AIO.

1. Right click a red hatched area in the chart area, then select [Object INFO] to show the [Select Object] dialog box.



2. Click [Preliminary Notice] in the dialog box to show the [Chart object] dialog box.



The [Chart object] dialog box shows the following information:

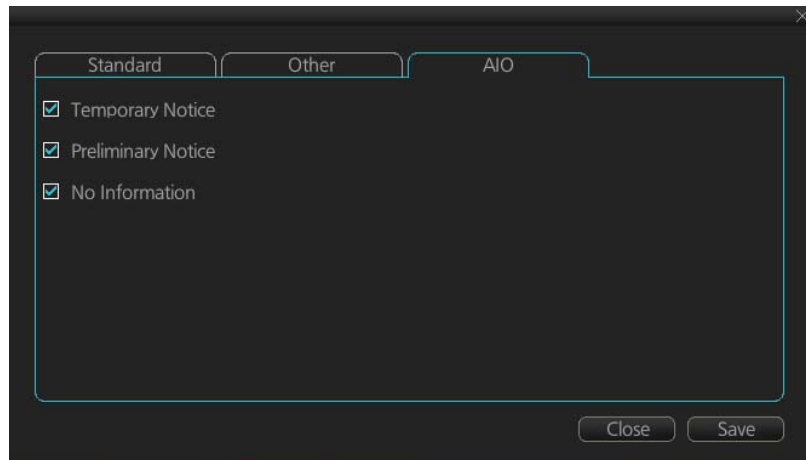
- Cell (name)
- Drawing type (Preliminary Notice, Temporary Notice)
- Category (AIO)
- The preview box provides a scaled-down image of the area selected. Click the image to enlarge it.
- The [Attribute] window shows the attributes for the AIO area selected. To find information about an attribute, click it to show its information in the [Description] box.
 - Information:** Description of area (for example, danger area).
 - Object name:** Object name (number)
 - Pictorial representation:** Associated diagram when applicable.
 - ENC affected:** ENC affected by the NM
 - Textual description:** Full text of the Notice to Mariners (NM) appears below [ENC Affected].

To print the chart object information, click the [Print Text] button.

5.5.5 How to select the information to display

Select what type of notices to display as follows:

1. Click the [DISP], [SET] and [Chart DISP] buttons on the InstantAccess bar.
2. Click the [AIO] tab.



3. Check or uncheck items as appropriate.
4. Click the [Save] button to save settings then click the [Close] button to close the menu.

5. VECTOR (S57) CHARTS

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6. RASTER (ARCS) CHARTS

6.1 ARCS Charts

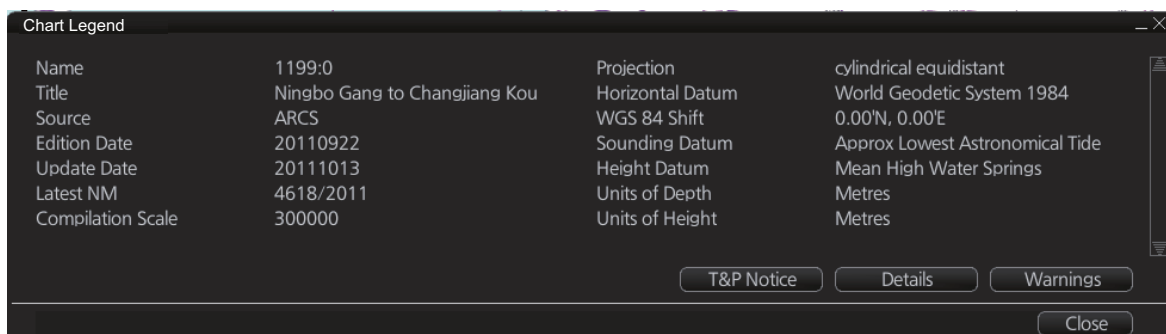
Approximately 2,700 ARCS charts are available on 11 chart CD-ROMs, covering the world's major trading routes and ports. Regionally based chart CD-ROMs RC1 to RC10 contain standard BA navigation charts, while RC11 contains ocean charts at scales of 1:3,500,000 and smaller. ARCS charts are facsimile copies of BA paper charts, and as such share a common numbering system. New editions and new charts for ARCS and BA paper charts are issued simultaneously. They are supplied on each Weekly Update CD-ROM until incorporated into the chart CD-ROMs at the next issue.

Occasionally, it is necessary to issue new charts in advance of their intended date of validity, for example a change in regulations commencing on a future date. In such cases the current chart will co-exist with the new chart until the date of implementation, the earlier chart having the suffix "X" after the chart number. The system will allow access to both charts for the period of overlap by issue of new chart permits.

Sometimes you may wish to manually add Notices to Mariners or Navtex warnings into your ARCS charts. In this system this is called Manual Updates. Manual updates are valid for both ARCS and S57 charts so that you need to define them only once. Further, manual updates are valid for all scales so that you don't need to repeat them for charts published in different scales from the same area.

6.1.1 Chart legend of ARCS chart

The chart legend provides various data about the chart currently displayed. To find info for current position, turn on RM reset, then click the [Chart INFO] button on the InstantAccess bar followed by the [Chart Legend] button, in the Voyage planning mode or Voyage navigation mode. To find info for a specific location, put the cursor on the location then right-click and select [Chart Legend]. Click the Close button to close the display.



Name: Name of the chart.

Title: Title of the chart.

Source: Source of the chart.

Edition Date: Date when the chart was issued.

Update Date: Issue date of Update CD-ROM used to update the system

Latest NM: Date of the latest Notice to Mariners included in the chart.

Compilation Scale: The scale of the original paper chart is shown here.

6. RASTER (ARCS) CHARTS

Projection: Projection of current chart.

Horizontal Datum: Horizontal datum used with current chart.

WGS 84 Shift: Datum shift between local datum and WGS-84 datum is known (=Defined), unknown, operator defined (=Undefined) or shift is known only some parts of chart (=Partially defined).

Sounding Datum: Datum used to create sounding data.

Height Datum: Vertical datum for objects located above sea.

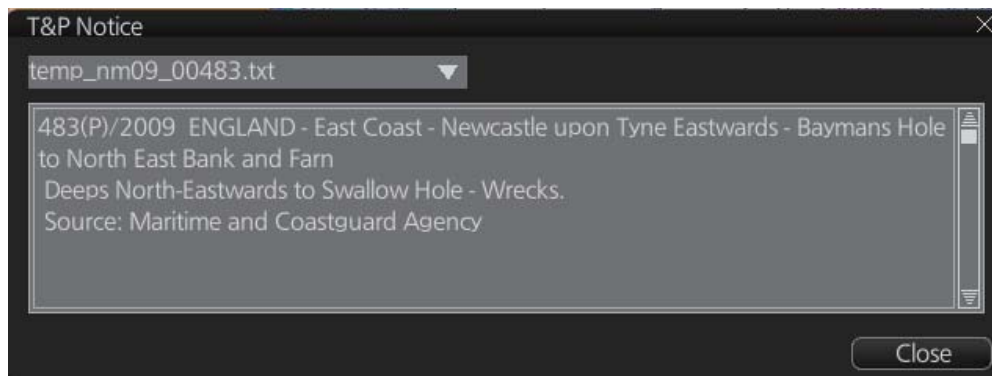
Units of Depth: Unit of depth used with current chart.

Units of Height: Unit of measurement used to measure height of objects above sea level.

[T&P Notice], [Details] and [Warnings] buttons: See the descriptions below.

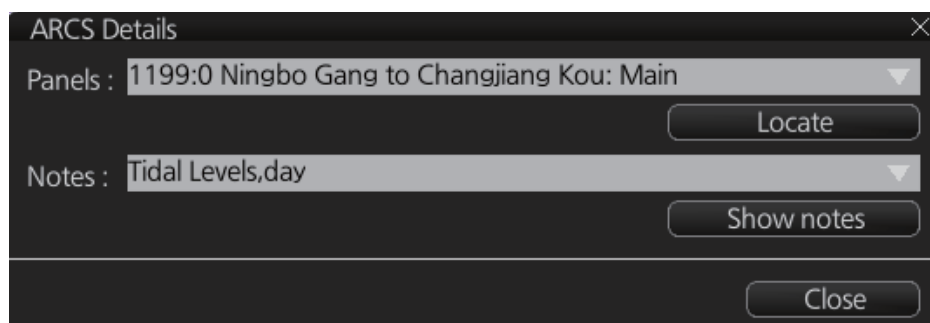
T&P notice

T&P Notices are also known as Temporary and Preliminary Notices to Mariners and they provide chart information that does not warrant permanent chart correction. To show the T&P Notices, click the [T&P Notice] button on the [Chart Legend] dialog box.



Details

Click the [Details] button on the [Chart Legend] dialog box to show detailed information about current chart.

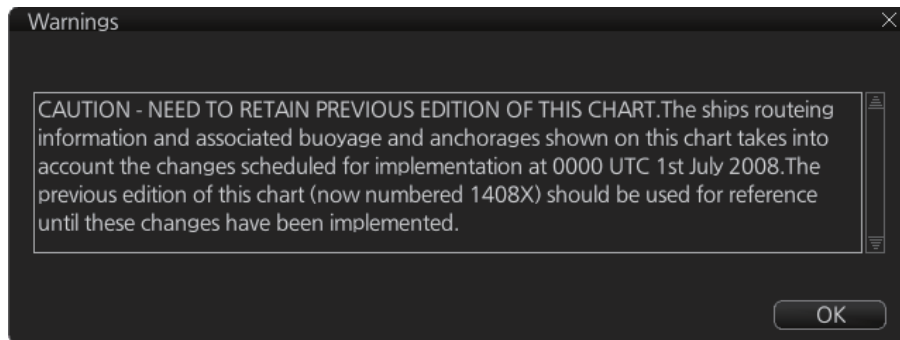


Panels: Selects desired inset (Panel) from the combo box. This works in conjunction with [Notes].

Notes: Select desired Notes from drop-down list then click the [Show Notes] button to display the Notes.

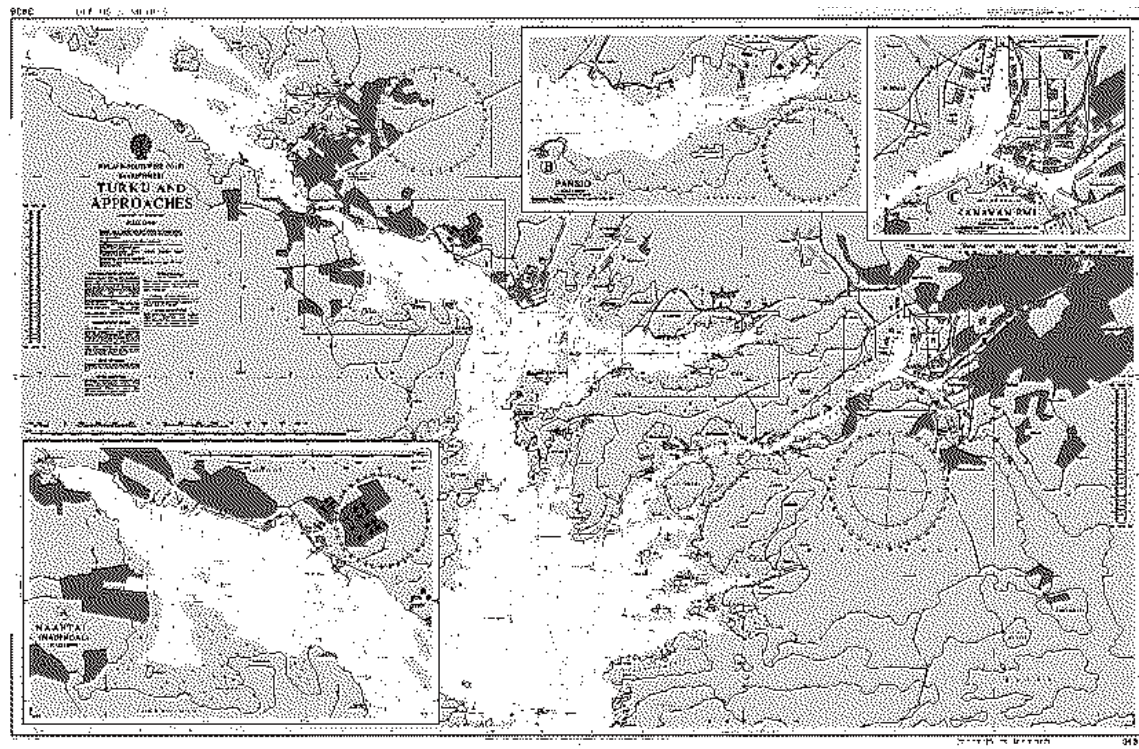
Warnings

There could be warnings not included in Notices to Mariners. British Admiralty may release textual warnings for any chart and they are available here. Click the [Warnings] button to display the [Warnings] window.

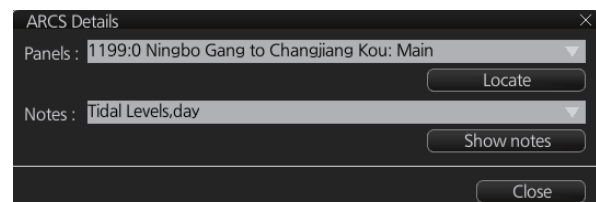


How to set preference for inset (panel)

If there are the different insets with the same position, the operator can select preferred inset, which displays your ship's position.



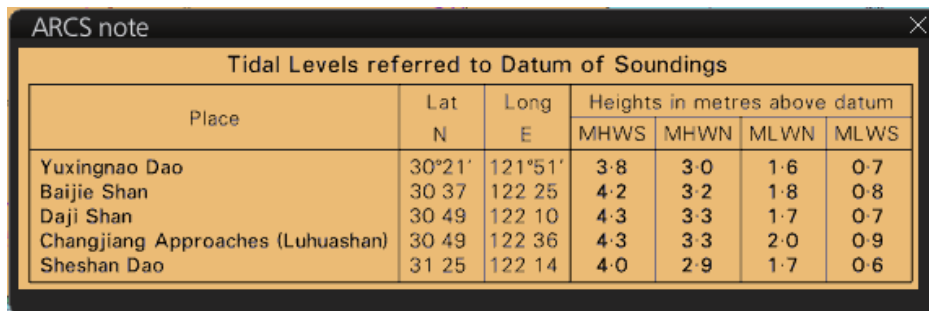
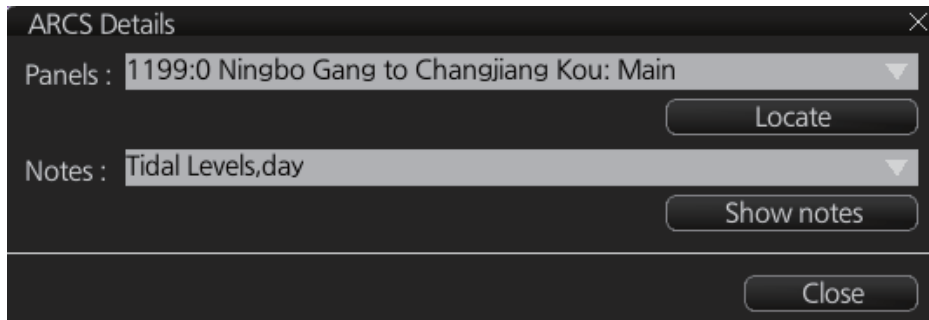
1. In the Voyage navigation mode or the Voyage planning mode, put the cursor at the desired location in the chart area, then right click to select [Chart Legend] to show the [Chart Legend] dialog box. If the own ship mark is at the screen center, the Chart Legend dialog box may be displayed by clicking [Chart INFO] and [Chart Legend] on the InstantAccess bar.
2. Click the [Details] button.
3. Select desired inset from the [Panels] drop-down list.



6. RASTER (ARCS) CHARTS

How to display notes of ARCS chart

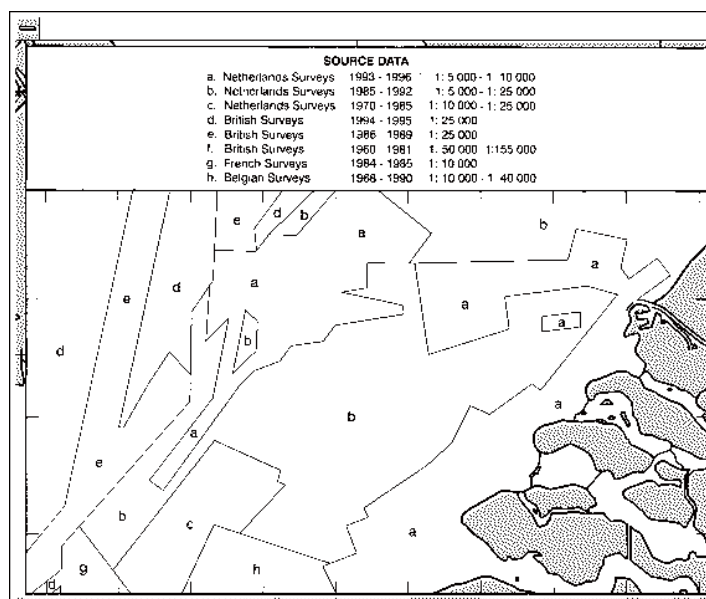
The operator can select a desired item from the combo box in the [ARCS Details] dialog box in order to view notes for that item. Select an item on the [Notes] combo box then click the [Show Notes] button to show the notes for the selected item.



Place	Lat N	Long E	Heights in metres above datum			
			MHWS	MHWN	MLWN	MLWS
Yuxingnao Dao	30°21'	121°51'	3.8	3.0	1.6	0.7
Baijie Shan	30 37	122 25	4.2	3.2	1.8	0.8
Daji Shan	30 49	122 10	4.3	3.3	1.7	0.7
Changjiang Approaches (Luhuashan)	30 49	122 36	4.3	3.3	2.0	0.9
Sheshan Dao	31 25	122 14	4.0	2.9	1.7	0.6

Source Data Diagram (SDD)

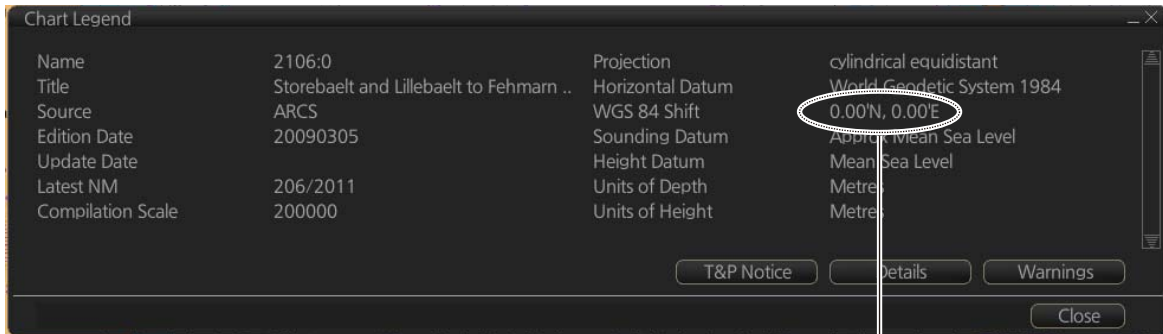
A Source Data Diagram (SDD) consists of two parts: a graphic showing the areas covered by each type of source material from which the chart was compiled, and a tabulation, keyed to a graphic, giving details of source dates and scales. The layout of the graphic corresponds to the layout of the chart, and the borders of the diagram equate to the limits of the chart panels. You can show the SDD by selecting [Source] from the [Notes] drop-down list and clicking the [Show Notes] button.



6.2 Datum and ARCS Charts

The difference between ARCS chart local datum and WGS 84 datum is known as WGS 84 shift. This difference is known and the system does the conversion automatically. If the WGS shift for a chart is defined, the amount of shift is indicated. If the WGS shift is not defined, "Undefined" is displayed. For no WGS shift, the indication 0.00'N, 0.00'E appears.

To find the WGS shift of the current chart, in the Voyage navigation or Voyage planning mode, right click the desired area on the chart to show the [Chart Legend] dialog box.



WGS 84 shift indication
(0.00'N, 0.00'E means no shift)

6.3 Permanent Warnings of ARCS

The system can help you to keep your ARCS charts up-to-date for the charts that you have received from ARCS. Producers of ARCS charts store up-to-date status on an ARCS Weekly Update CD-ROM (system files). This information is loaded into the ECDIS when you update, either by permits or by active group. Based on this information, ARCS permanent messages are displayed to help you keep your ARCS charts up-to-date.

Message	Meaning, Remedy
ARCS: permits have expired	You have an expired permit for a chart. Remove the chart or renew subscription for the permit.
ARCS: Product list not up to date	The product list is not up to date. Update the product list.
No connection to dongle	Dongle not inserted. Insert dongle.

6.4 ARCS Subscriptions

ARCS customers can subscribe to one of two service levels, ARCS Navigator or ARCS Skipper.

Note: If you receive an ARCS chart permit on a floppy disk, copy the contents of the disk to a USB flash memory and then install the permit files.

6.4.1 ARCS Navigator

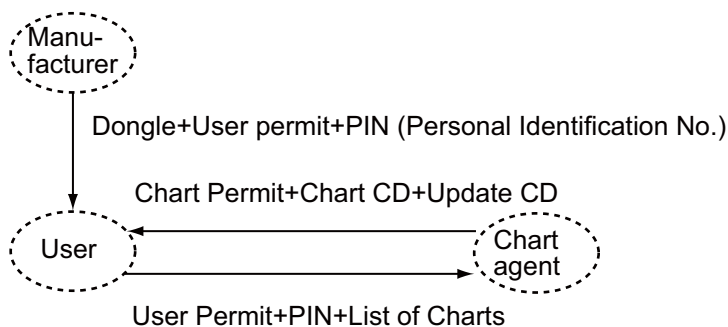
ARCS Navigator operators receive a comprehensive weekly updating service on a CD-ROM that mirrors the Admiralty Notices to Mariners (NMs) used to correct Admiralty paper charts. The update information is cumulative, ensuring that only the most recent Update CD-ROM is necessary. ARCS Navigator license is valid for 12 months. During this period, weekly updates will be delivered on Weekly Update CD-ROMs. ARCS Navigator is intended for SOLAS class operators who require that their charts are up-to-date.

Content of ARCS Navigator pack:

- One (1) or more Chart CD-ROMs (RC1-RC11) containing ARCS charts
- One (1) Update CD-ROM containing the latest ARCS chart corrections

6.4.2 ARCS license information

Licensee information, which is transferred between participants, is as shown below.



7. C-MAP CHARTS

The descriptions in this chapter apply to the CM-93/3 charts. (This system does not support CM-93/2 charts.)

7.1 C-MAP Cartographic Service

Your chart system has the capability of using and displaying the latest C-MAP world-wide vector chart database. These charts are fully compliant with the latest IHO S-57 3.1 specifications.

In order to prepare the system for use with the C-MAP database, there are a number of things that must be done.

7.2 How to Register the System at C-MAP Norway

Your system has the capability to use the C-MAP database. To do so an Aladdin eToken (supplied by C-MAP) must be connected to the system. The eToken provides the system with a unique System ID that enables C-MAP to issue correct licenses. The actual System ID can be found on the eToken itself, on the installation medium or on a sticker placed on the equipment. This ID must be provided on all chart orders, by e-mail (license@C-MAP.no).

7.3 How to Order Charts

A chart order may be sent together with system registration as described above. It is essential that the required information be sent to C-MAP when ordering charts for a system. C-MAP issues order forms specifying the information that is required, and contains vital information that will allow C-MAP to monitor and maintain your licenses throughout the lifetime of the system. Charts can be ordered by Zone, Area or Cell and these can be seen on the C-MAP web site or by downloading the Chart Product catalog also available on the web site. Price quotations can be obtained via your chart dealer or direct from your local C-MAP office. Once the license order has been prepared it should be emailed to license@C-MAP.no.

7.4 How to Apply for Licenses

Once the order has been received at C-MAP, a license will be generated and transmitted back to the operator. This may be in the form of a single alphanumeric string (16 characters), or in the form of a file called PASSWORD.USR. Once this license has been received it should be input using the License Administrator software designed and supplied by the chart manufacturer. There are two types of licenses, purchase and subscription. Purchase licenses are valid indefinitely while subscription licenses need to be renewed every 12 months from the start of the subscription. Failure to renew a subscription will result in the charts becoming unavailable.

7.5 Troubleshooting

If you are having problems installing your software or charts please check the following before contacting C-MAP:

- Check that the charts are available, with the chart management function.
- Check that the license is correctly installed, with the license function

Contact Information: For information or help please call you're nearest C-MAP Office (details can be found on the reverse side of the C-MAP chart CO box) or contact C-MAP Norway. E-mail: technical@C-MAP.no

7.6 Chart Subscription Services

7.6.1 C-MAP Dynamic Licensing (DL) service

The C-MAP DL service is an ENC service available on DVD or online, in C-MAP SENC format. The C-MAP DL ensures immediate access to ENC licenses whenever they are needed. ENC licenses available in seconds automatically via online C-MAP service providers. Cost is controlled via pre-set budgets and spending limits, giving shipowners a true "pay-as-you-go" service. For further details about C-MAP DL, contact a C-MAP provider.

Note 1: CM-ENC is available. If you change CD-ROM service to DVD service, you need to also have a new license for the DVD service. Contact your chart agent or C-MAP for details.

Note 2: PC and internet connection with e-mail are required. Further it is necessary to access Jeppesen approx. once every two weeks.

7.6.2 What is ENC delivery?

ENCs can be distributed as ENC delivery or SENC delivery. Both deliveries can be used in this system.

In ENC delivery, charts are distributed directly from source like PRIMAR, IC-ENC, JHA, etc. They are delivered onboard in ENC format (using S-57 and S-63) then the charts are installed into the system.

In SENC delivery, charts are converted from ENC to SENC before delivery to onboard and then installed into the system. A CM-ENC delivery is SENC delivery.

Important notices

- If you are using both services (ENC and SENC deliveries) having the same chart name installed into the system through both deliveries, priority of displaying the chart is in ENC delivery.
- Chart updates for ENC delivery are only for charts of ENC delivery and chart updates for SENC delivery is only for charts of SENC delivery. You have to keep charts up-to-date separately.
- If you change from ENC delivery to SENC delivery, remove old charts from the system before installing charts from new delivery.

7.7 Chart Display

7.7.1 Introduction

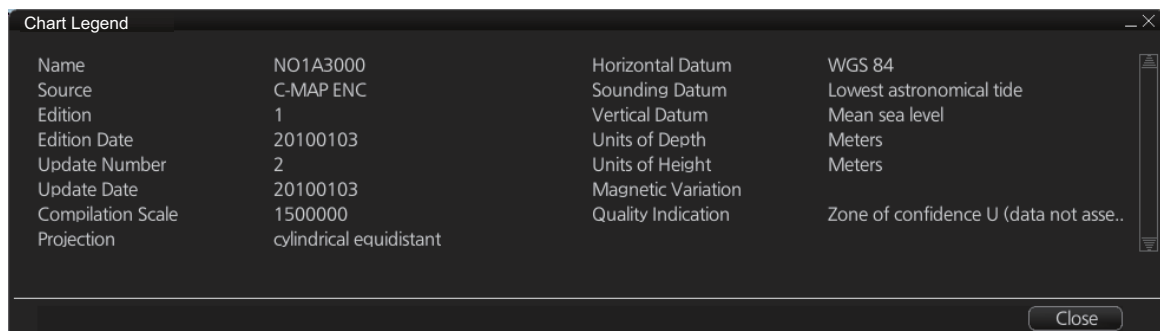
C-MAP charts are S57 charts displayed together with ENC (S57) and CM93/3 charts. These charts have the priority order shown below.

1. CM- ENC
2. C-MAP 93/3 Prof and C-MAP 93/3 Prof+

If the same navigational purpose charts are available over an area, priority is as shown above. Areas where ENC is not available CM-ENC charts are shown. Where C-MAP Prof or CM93 Prof+ are available, CM 93/3 charts are displayed.

The chart legend provides various data about the chart currently displayed. To find info for current position, click the [TM/CU Reset] button then click the [Chart INFO] button on the InstantAccess bar followed by the [Chart Legend] button. To find info for a specific location, put the cursor on the location then right-click and select [Chart Legend]. Click the Close button to close the display.

This system is capable of showing more than one chart at a time. This feature is called the multi-chart display. If one chart does not cover the whole display, the system will open more chart cells for display, if appropriate cells for the displayed area are available. The chart legend shows information about charts displayed on the electronic chart display area.



Name: Name of chart.

Source: Source of chart.

Edition: Edition number of the chart.

Edition Date: Date the edition was published.

Update Number: Update number

Update Date: Date of update

Compilation Scale: The scale of the original paper chart is shown here.

Projection: Projection of current chart.

Horizontal Datum: Horizontal datum used with current chart.

Sounding Datum: Datum used to create sounding data.

Vertical Datum: Vertical datum used with current chart.

Units of Depth: Unit of depth used with current chart.

Units of Height: Unit of measurement used to measure height of objects above sea level.

Magnetic Variation: Amount of magnetic variation. A positive value indicates a change in an easterly direction and a negative value indicates a change in a westerly direction.

Quality Indication: Quantitative estimate of the accuracy of chart features, given by the chart producer.

7.8 Permanent Warnings

Permanent warnings help you keep the C-MAP up-to-date and these are shown at the bottom of the screen. Permanent warnings appear if the system detects a condition that may cause a chart to be not up-to-date.

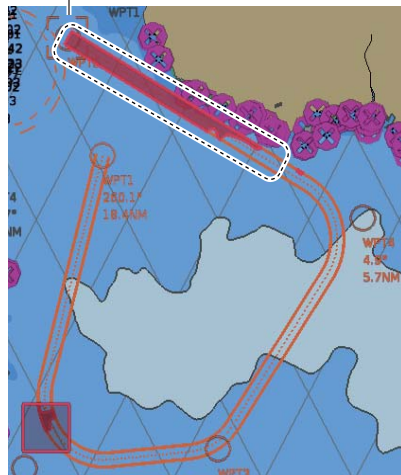
Message	Meaning, Remedy
CMAP: Database not up to date	Database is not up to date. Update the data base.
CMAP: Dynamic license reporting overdue	The time for the "Next Report Date" has passed. This occurs once every 12 hours if the condition continues. Get into the Chart maintenance mode then click the [License] button. Click the [C-MAP] tab then the [Order Update File] button.
CMAP: Dynamic licensing credit limit	You have exceeded the allotted credit limit. Raise credit limit.
CMAP: No connection to eToken	eToken is not connected (inside the Processor Unit).
CMAP: permits have expired	You have an expired permit for a chart. Remove the chart or renew subscription for the permit.
No connection to dongle	The dongle is not inserted or not recognized. Check that the dongle is inserted to the EC-3000.
Permit expired (SSE 25): XXXXXXXX (Chart name replaces Xs.)	You have an expired permit for a chart. Remove the chart or renew subscription for the permit.

8. CHART ALERTS

The ECDIS can detect areas where the depth is less than the safety contour or detect an area where a specified condition exists. If prediction of own ship movement goes across a safety contour or an area where a specified condition exists, the system does the following:

- Highlights in red alarms and chart objects specified as alarm or warning category (planned route, navigation route).
- Shows alarms and chart objects specified as alarm, warning or caution category in the [Alert] box (route navigation).
- Sounds an aural alarm for alarms and chart objects specified as alarm or warning category (route navigation).

Chart object set for Alarm or Warning category is highlighted in red.



For this function, the ECDIS utilizes the chart database (S57 charts) stored on the SSD in SENC format. **Note that the ECDIS calculates dangerous areas using the largest scale chart available, which may not be the visualized chart.**

You can choose objects that are included for calculation of danger area (for example, restricted areas). A dialog box lists the various areas that activate danger warnings.

You can also define your own safe area by creating a user chart area. The system can utilize these areas when calculating chart alerts.

- The ECDIS can check the following for you:
 - Predicted movement area of own ship
 - Planned route with an easy to use locator function to find dangerous areas
- The ECDIS will highlight the following for you
 - Dangerous areas inside predicted movement area of the own ship
 - Dangerous areas inside your monitored route
 - Dangerous areas inside your planned route

8.1 Chart Alerts

Official S57 chart material contains depth contours that can be used for calculation of chart alerts. A chart database also includes different types of objects that the operator can use for chart alerts. The procedure for setting chart alerts is outlined below.

1. Choose suitable safety contour for your own ship. See the next section for how to set the safety contour.
2. In the Voyage planning mode, define a new route or choose an existing one. Make a chart alert calculation of the route if there are indications of danger areas in the route. Modify your route if necessary and do the chart alert calculation again. To modify an existing route see section 9.4.
3. Choose route as monitored route.
4. Set check area for your own ship.

The system is now ready for chart alert calculation of monitored route and estimated own ship position.

8.1.1 How to set safety contour

Select safety contour suitable for the own ship.

1. Click the [DISP], [SET] and [Chart Alert] buttons on the InstantAccess bar to show the [Chart Alert] page.



2. Enter desired depth at [Safety Contour] then click the [Save] button.

A depth contour is created on the chart according to the safety contour value entered.

Note: If the chart does not contain chosen depth contour, the system will automatically choose next deeper contour.

8.1.2 How to select objects used in chart alerts

You can also include calculation areas that have to be noted when sailing (for example, restricted areas). To include these areas in chart alerts, do the following:

1. Click the [DISP], [SET] and [Chart Alert] buttons on the InstantAccess bar to show the [Chart Alert] page.



2. Click a circle to select the type of alert to receive for the given chart object. [Safety Contours] is fixed to "red".
Orange: Visual and aural alerts
Yellow: Visual alert only
 In the example above, [Safety Contour] provides an [Alarm], [Areas to be Avoided] provides a [Caution] and all other items are set for [Warning].
3. Click the [Save] button to finish.

Note: C-MAP Pro+ charts may take several minutes to identify danger areas.

List of areas

There are the areas that the ECDIS detects and provides the audible alert and/or visual alert if estimated own ship position or planned or monitored route crosses the area defined on the [Chart Alert] page. You can choose from the following areas:

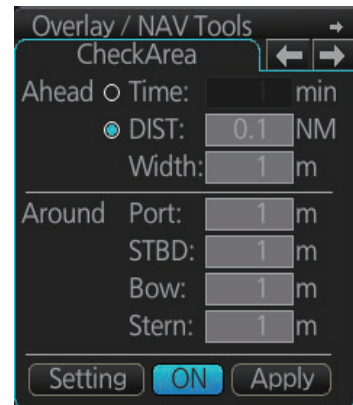
- Safety Contour
- Areas to be Avoided
- User Chart Danger
- Traffic Separation Zone
- Inshore Traffic Zone
- Restricted Area
- Caution Area
- Offshore Production Area
- Military Practice Area
- Seaplane Landing Area
- Submarine Transit Lane
- Anchorage Area
- Marine Farm/Aqua Culture
- PSSA Area
- Non-official ENC
- No Vector Chart
- Not Up-to-date
- Permit Expired
- UKC Limit

8.2 How to Activate Own Ship Check

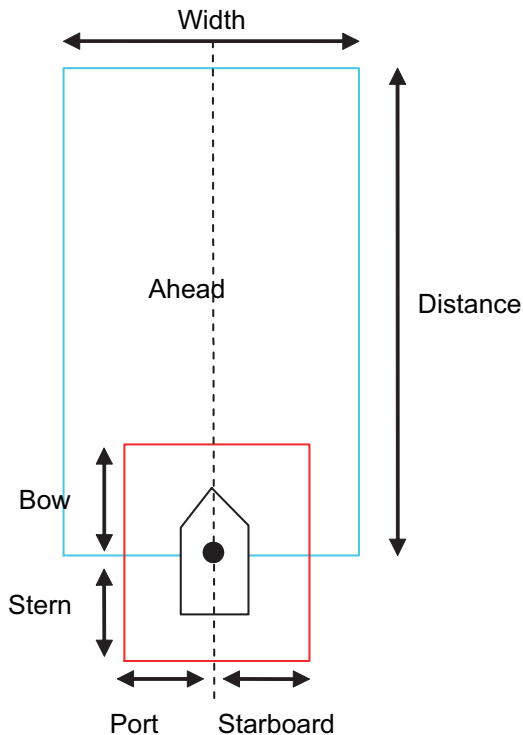
Calculation of own ship predicted movement area is done using a check area about own ship position. Set the check area as follows:

1. Select the [Check Area] page from the [Overlay/ NAV Tools] box.

Note: The [ON] button may not be shown depending on installation setting.



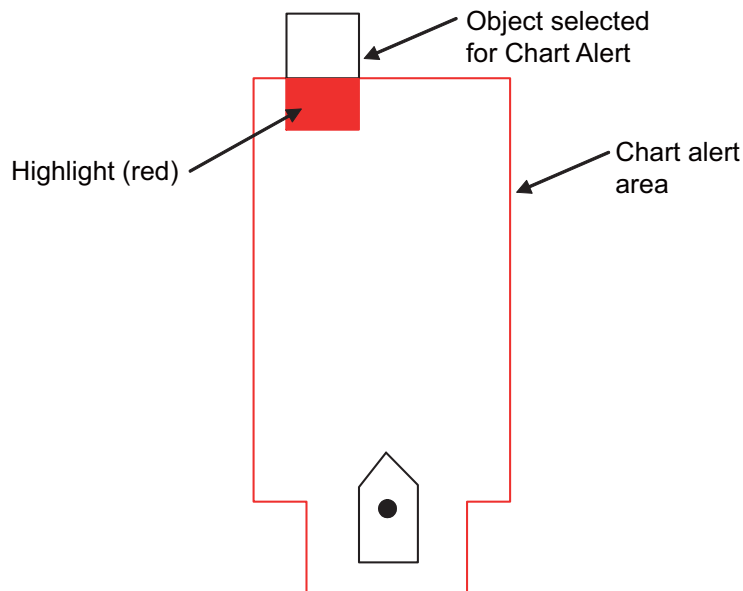
2. Set the ahead time or distance and ahead width, referring to the figure below. Also, set the "Around" figures: port, starboard, bow and stern check distance. The reference point is the conning position (CCRP).



3. To select the objects to use in chart alerts, click the [Chart Alert] button and see section 8.1.2.
4. To show or hide the chart alert area figure, click the [Chart Alert] button to show [ON] or [OFF]. Any Alarm or Warning chart object in the chart area is highlighted in red. Chart objects assigned Alarm status additionally give the aural alarm.
5. Click the [Apply] button to affect changes.

Note: When the button to the right of the [Chart Alert] button is not displayed, this means that the own ship check is active always.

When an object having a Warning setting enters the Check Area, the object is highlighted in red and the aural alarm sounds.



8.3 Route Planning

The system will calculate chart alerts using user-defined channel limit for routes. Danger areas are shown highlighted if safety contour or user-chosen chart alert areas are crossed by the planned route. For more information on route planning, see chapter 9.

Note: If your voyage is going to take a long time or you are planning it much earlier than it is to take place, use the Display date and Approved until dates corresponding to the dates you are going to sail.

8.3.1 Chart alerts for route planning

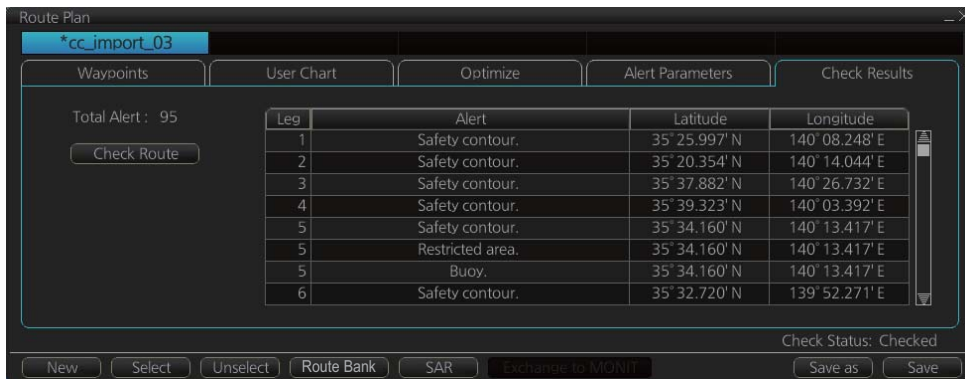
You can generate a list of chart alerts that cross by the planned route. This can be done as follows:

1. Enter safety contour you want to use.
2. Plan a route; define waypoints and other necessary information. See chapter 9 for route planning.
3. Choose dangerous objects to be monitored during route monitoring, on the [Alert Parameters] page in the [Route Plan] dialog box, shown below.
 - a) Click the [PLAN], [Planning] and [Route] buttons.
 - b) Click the [Alert Parameters] tab.
 - c) Click the alert to process. Show an orange circle for visual and aural alerts, or yellow circle for only the visual alert. Note that the safety contour is always shown in red.

8. CHART ALERTS

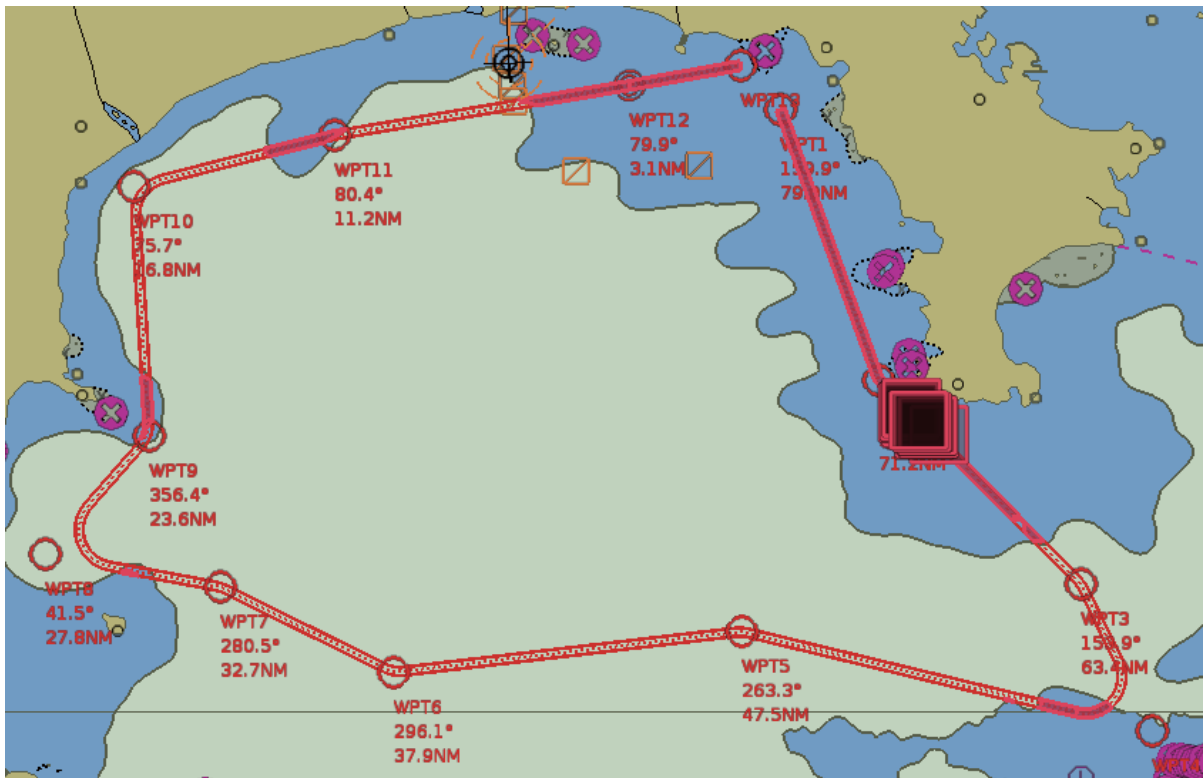


4. Click the [Check Route] button to generate a list of chart alerts. The results appear on the [Check Results] page.



The figure above shows the alerts to be monitored. If there are alerts included in the planned route, check alerts leg by leg, or check alerts by using category of alert.

8.4 Route Monitoring



- When the ship enters a check area, a visual alert (caution level) is generated. Neither objects or routes are highlighted.
- When the ship enters a check area, a visual alert (alarm, warning level) is generated. Objects and routes in the area are highlighted.
- A red box indicates an area having several highlighted objects.

The system has a route monitor that facilitates safe use of routes. You can check your route plan for safe water and you can attach a user chart and Notes that you intend to use together with a route plan. To show the [Route Information] dialog box, get into the Voyage navigation mode, then click the [Route] and [Route Information] buttons. Click the [Waypoints] tab.

Route Information
Route : 001

Waypoints User Chart

To WPT : 2 GO Distance : 246.6NM Departure : 14:06 22 Oct 2012
Actual Average SPD : 20.0kn

WPT	Name	Latitude	Longitude	ETA	Plan SPD
1		35° 17.193' N	139° 50.305' E		
2		35° 15.986' N	139° 50.428' E	02:26 23 Oct 2012	20.0
3		35° 13.877' N	139° 50.438' E	02:32 23 Oct 2012	20.0

Total WPTs : 3 Total Distance : 3.3NM

Check ETA

WPT : 2
Distance : 246.6NM
Plan : 02:26 23 Oct 2012
Actual : 02:26 23 Oct 2012
Off Plan : 00:00
SPD Calculation : 14 : 5 22 Oct 2012
Start Calculate
Suggested SPD : 0.0kn
Close

8. CHART ALERTS

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9. ROUTES

9.1 Route Planning Overview

A route plan defines the navigation plan from starting point to the final destination. The plan includes:

- Route name
- Name, latitude and longitude of each waypoint
- Radius of turn circle at each waypoint
- Safe channel limits
- Chart alarm calculation based on channel limits against chart database and user chart danger
- UKC calculation
- Deadband width, nominal deadband width used for operating modes with moderate accuracy and economical sailing behavior
- Minimum and maximum speed for each leg
- The navigation method (rhumb line, great circle)
- Fuel saving
- ETD for the first waypoint
- ETA for the last waypoint
- Ship and environmental condition affecting the ship speed calculation
- Name of the user chart to use during route navigation together with the planned route
- Name of the Notes to use during route navigation together with this planned route, in the user chart dialog box.

Using the above-mentioned data, the system calculates speed, course and length for each leg, ETAs for each waypoint, fuel consumption and WOP. It also calculates safe water areas based on user-defined channel limits. The calculated data is displayed in tabular form, which can be printed as a documented route plan and also stored in a file for later use.

Main functions of route planning are:

- Define waypoints
- Define turnings for each waypoint
- Define channel limits for each leg (a leg is the line connected between two waypoints). The channel limits are used to detect chart alerts when you are planning or monitoring your route.
- Define the speed for each leg
- Calculation for ETD and ETA
- Calculation for most economical sailing

Note 1: Limitation of displayed route

If you have small scale chart(s) on display having the whole eastern/western (0-180°E/0-180°W) hemisphere and a part of the other hemisphere on display, there is a limitation to display a route. To avoid this, set chart center so that the whole eastern/western hemisphere is not on the display. A maximum of five routes can be edited simultaneously.

Note 2: If a planned route's Safety Margin or Channel Limit contains excessive land masses, the ECDIS may freeze during a route check. When this happens, reset the ECDIS, then adjust the Channel Limit and Safety Margin settings in the Route Plan dialog box's Waypoints so that land mass is not included in the route.

9.2 Main Menu for Route Planning

The main parameters for the route planning are:

- Latitude and longitude of the waypoint
- Channel limits to the waypoint
- Turning radius of the waypoint
- Maximum speed limit and planned speed for each leg

There are two phases for a route: Route Plan and Route Monitor. Route plan is used for planning the route and route monitor is used to control a route for monitoring.

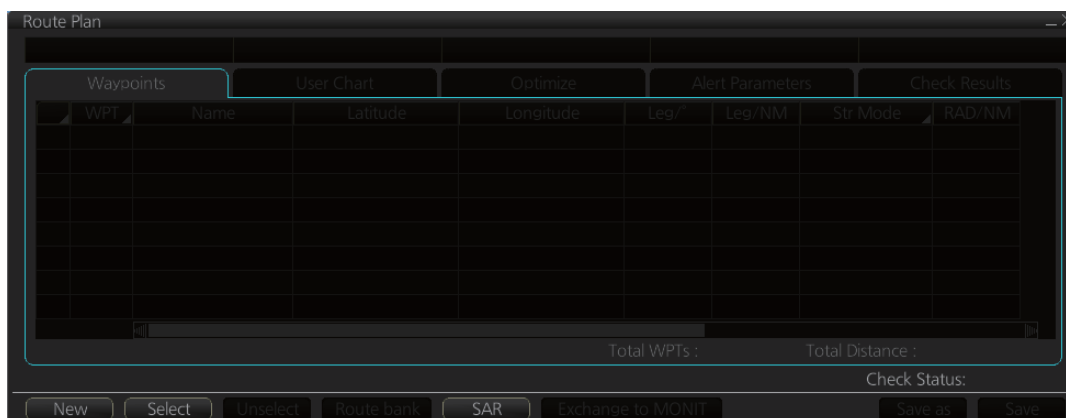
To complete route planning, do the following.

1. Create a new route or choose an existing one. See section 9.3.
2. Modify your route if necessary. See section 9.4.
3. Make chart alert (safe water) calculation. See section 9.3.5.
4. Optimize your route. See section 9.7.

9.3 How to Create a New Route

To make a complete route for a voyage, do the following:

1. Click the [PLAN] button on the Status bar to activate the Voyage planning mode.
2. On the InstantAccess bar, click the [Planning] button followed by the [Route] button to open the [Route Plan] dialog box.

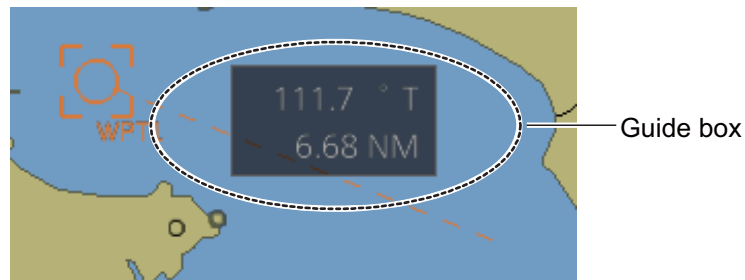


3. Click the [New] button.
4. Use the cursor to select a position for the first waypoint then push the left mouse button. A waypoint mark appears on the position selected, and the latitude and longitude of the position, etc. are entered into the [Route Plan] dialog box. After entering a waypoint, edit Name, Steering mode, Radius, Channel limit, Plan SPD, SPD Max and Margin as appropriate in the [Route Plan] dialog box, using the keyboard on the Control Unit or software keyboard.

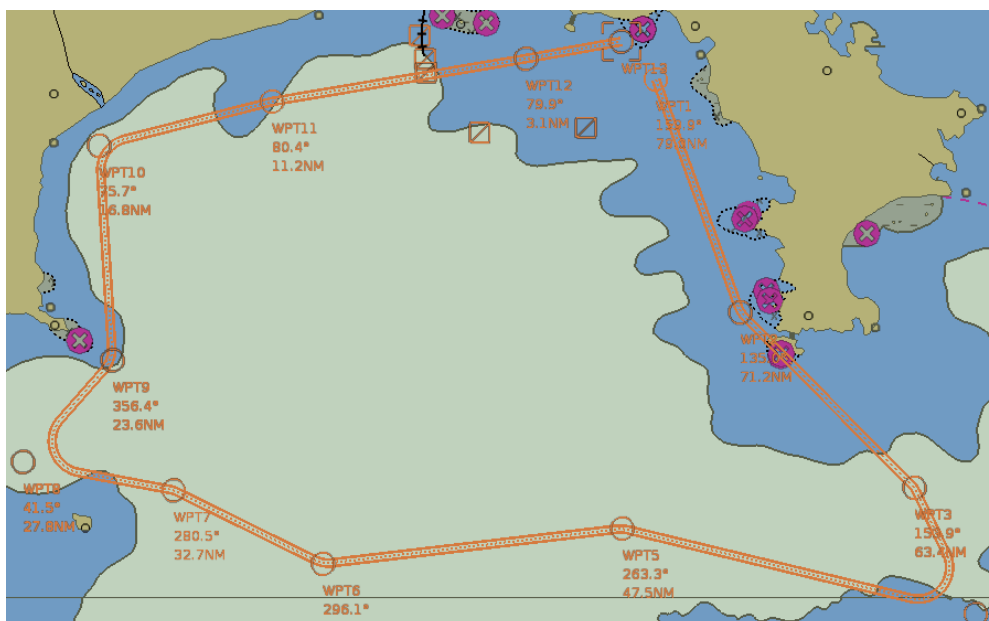
To change the settings of items other than L/L position: Put the cursor on an item to show up and down arrows then click required arrow.

To change L/L position: Put the cursor on the digit to change and roll the scroll-wheel.

Note: A guide box that shows the range and bearing between waypoints as you drag the cursor is available. You can show or hide the box with the [Guide Box] button on the InstantAccess bar. Click the button to show its background color in light-blue to display the guide box.



5. Repeat step 4 to enter other waypoints.
6. After you enter the final waypoint, right-click the display area to show the context-sensitive menu then select [Finish].
7. Click the [Save] button. Enter a name (max. 63 characters) for the route, using the keyboard on the Control Unit or software keyboard. Click the [OK] button to finish.
8. Use the [Alert Parameters] page to define the safety contour and other specified conditions for checking the route. Click a "block" under a check item to select a red circle or yellow circle. Also, input value for [Draught/m]. A parameter for [Draught/m] can also be assigned globally to all legs from the context-sensitive menu. See section 9.3.4 for how to use the [Alert Parameters] page.
9. Use the [Check Route] button on the [Alert Parameters] page to detect areas where the depth is less than the safety contour or where specified conditions exist. The results appear on the [Check Results] page. This system can examine chart database against planned route to make a list of alerts where a route crosses a safety contour or specified areas used in chart alerts.
10. Use the [User Chart] page to link, de-link a user chart(s) with the route. See section 9.3.2.
11. Use the [Optimize] page to enter parameters for route optimization. See section 9.3.3.



How to use the Undo feature

The Undo feature, available when creating a route and a user chart, can be accessed from the [Undo] button on the InstantAccess bar. In route creation the feature is used with waypoint and text input as follows:

Waypoint input: Delete last-entered waypoint.

Text input: Erase last-entered character or character string.

9.3.1 How to use the Waypoints page

WPT	Name	Latitude	Longitude	Leg/°	Leg/NM	Str Mode	RAD/NM
1		35 ° 25 .997 'N	140 ° 08 .248 'E	139.9	7.4	Rhumbline	1.00
2		35 ° 20 .354 'N	140 ° 14 .044 'E	30.6	20.3	Rhumbline	1.00
3		35 ° 37 .882 'N	140 ° 26 .732 'E	274.3	19.1	Rhumbline	1.00
4		35 ° 39 .323 'N	140 ° 03 .392 'E	122.2	9.7	Rhumbline	1.00
5		35 ° 34 .160 'N	140 ° 13 .417 'E	265.2	17.3	Rhumbline	1.00
6		35 ° 32 .720 'N	139 ° 52 .271 'E	131.9	4.1	Rhumbline	1.00
7		35 ° 29 .958 'N	139 ° 56 .030 'E	213.5	4.2	Rhumbline	1.00
8		35 ° 26 .477 'N	139 ° 53 .211 'E				

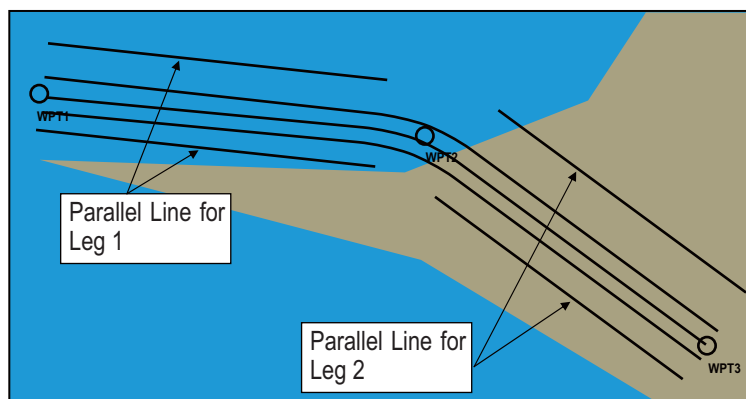
Total WPTs : 80 Total Distance : 677.6NM

Check Status: Checked

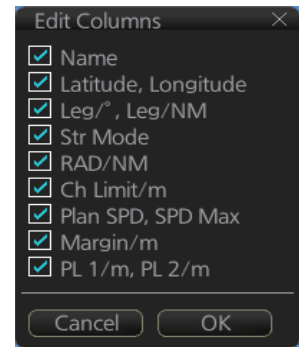
New Select Unselect Route Bank SAR Exchange to MONIT Save as Save

The following fields and boxes can be found in the [Waypoints] page. Scroll the list rightward to see hidden items.

<p>WPT: Each waypoint has a number.</p> <p>Name: You can name each waypoint.</p> <p>Latitude: WPTs latitude coordinate is displayed in WGS-84 datum.</p> <p>Longitude: WPTs longitude coordinate is displayed in WGS-84 datum.</p> <p>Leg/°: Bearing of leg</p> <p>Leg/NM: Length of leg (nm).</p> <p>Str Mode: Define steering mode for each leg - rhumb line or great circle. Click to select [Rhumbline] or [Greatcircle].</p> <p>RAD/NM: Define turning radius for each waypoint. To change a radius, put the cursor in this column to show up and down arrows. Click the arrows to set the radius.</p>	<p>Ch Limit/m: Define channel limit for each leg.</p> <p>Plan SPD: Define planned speed to use with a leg.</p> <p>SPD Max: Define maximum speed to use with a leg.</p> <p>Margin/m: Define extension for channel limits to be checked against chart alerts.</p> <p>PL 1/m, PL 2/m: One or two sets of parallel lines, colored orange, can be drawn on a route. Set the distance (in meters) to offset the lines from the route, from -99999 to 99999. Parallel lines allow the navigator to maintain a given distance away from hazards. See the illustration below.</p>
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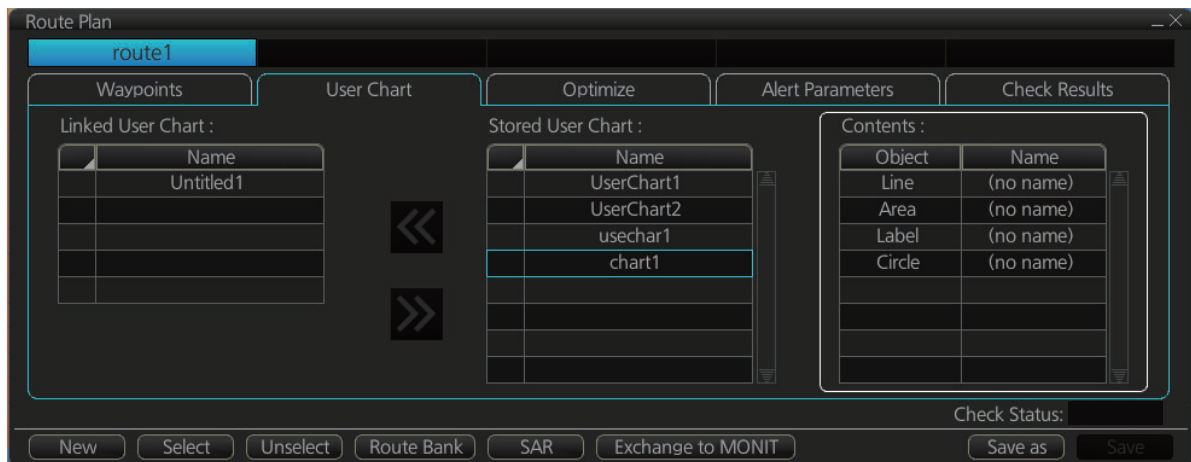


Note: You can select the route information data to display on the [Waypoints] page with the context-sensitive menu. Right click the “Edit Columns” to show the context-sensitive menu. Check or uncheck items as appropriate then click the [OK] button.



9.3.2 How to use the User Chart page

The [User Chart] page lets you link user charts to routes. To link a user chart, click the box to the left of the user chart name in the [Stored User Chart] list to show a checkmark. Click the << button to copy that name to the [Linked User Chart] list. To de-link a user chart, click the box to the left of the user chart name in the [Linked User Chart] list then click the >> button to erase the name. The contents of each user chart are shown in the [Contents] window.



Linked User Chart: List of user charts linked with selected route.

Stored User Chart: List of stored user charts.

<< button: Link a stored user chart. Check the chart in the [Stored user chart] list then click this button. The user chart name is then copied to the [Linked User Chart] list.

>> button: Click to remove selected (checkmarked) user chart from the [Linked User Chart] list.

Contents: Lists the objects saved to the user chart selected.

9.3.3 How to use the Optimize page

After all waypoints are inserted and you have made safe water calculation, you can optimize your route, on the [Optimize] page. If not chosen, then optimization will be done automatically with max. speed. If you want do optimization with a specific strategy, see section 9.7 for how to optimize a route.



Type: Select optimization strategy: maximum speed, time table, maximum profit, or minimum cost.

Set ETD: Set date, time and waypoint to start from.

Parameters: Set the parameters for optimization, speed limit and income (max profit).

Edit Cost Parameters button: Enter fuel consumption figures. See section 21.3.

Set ETA: For the type [Time table], set the date and time that you want to arrive at the waypoint selected.

Optimized Speed/ETA: The optimized speed for the date and time entered at [Set ETA] appears here, after clicking the [Calculate] button.

Clear All: Clear all ETD dates entered at [Set ETD].

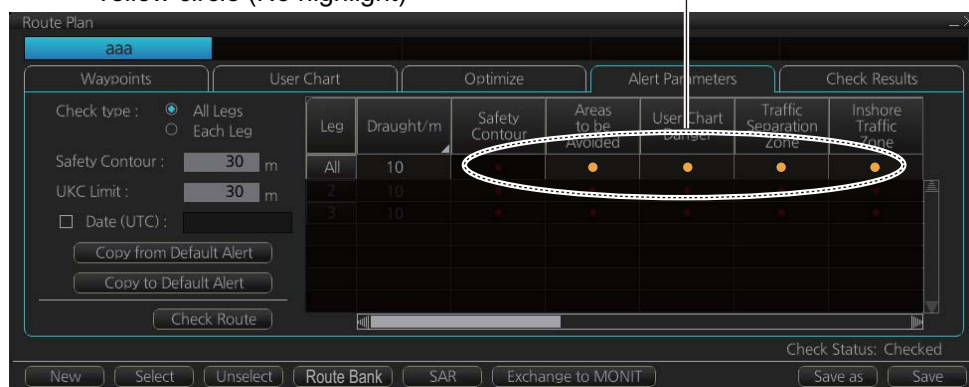
Calculate button: Click to calculate optimization.

9.3.4 How to use the Alert Parameters page

The [Alert Parameters] page sets the alert conditions to use when checking a route. Put an orange circle for an item to highlight on the chart. ([Safety Contour] is fixed to red.) If you do not require the highlight display for an item, put a yellow circle for that object. The relevant alerts (red, orange, yellow) are shown in the [Check Results] page.

You can select the safety contour and chart alerts used to check the safety of the route. This allows you to check the safety with conditions different from those chosen for system use. This is useful when making a route for different loading or sailing conditions.

- Click each box to show one of the following:
- Orange circle (Item highlighted in red on chart)
 - Yellow circle (No highlight)

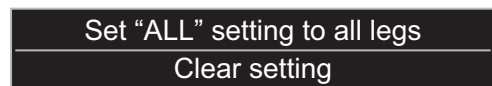


Radio buttons, input boxes		Alert items	
Item	Description	Item	Description
Check type	Check how to apply the alerts, to every leg or individual leg. (Only [Draught] can be applied to every leg.)	Draught/m	Ship's draught
Safety Contour	Set the safety contour (in meters).	Safety Contour	Safety contour
UKC Limit	Under keel clearance limit.	Areas to be Avoided	Areas to be avoided
Date (UTC)	A chart may have date-dependent features. Enter the actual data of embarkation to know date-dependent features.	User Chart Danger	User chart danger area
[Copy from Default Alert] button	Copy the default alert settings to this route.	Traffic Separation Zone	Traffic separation zone
[Copy to Default Alert] button	Copy the alert settings for this route as default alert settings.	Inshore Traffic Zone	Inshore traffic zone
[Check Route] button	Click to check route for safe navigation. The results appear on the [Check Results] page.	Restricted Area	Restricted area
Leg	Leg number	Caution Area	Caution area
		Offshore Production Area	Offshore production area

Radio buttons, input boxes		Alert items	
Item	Description	Item	Description
		Military Practice Area	Military practice area
		Seaplane Landing Area	Seaplane landing area
		Submarine Transit Lane	Submarine transit lane
		Anchorage Area	Anchorage area
		MarineFarm Aquaculture	Marine farm aquaculture
		PSSA Area	Particularly Sensitive Sea Area
		Non-official ENC	No official ENC data
		No Vector Chart	No vector chart for area.
		Not Up-to-date	Chart not up to date.
		Permit Expired	Permit for chart has expired.
		UKC Limit	Under keel clearance limit

Context sensitive menus

A context-sensitive menu for setting the draught is available on the [Alert Parameters] page. Right-click [Draught] to show the menu. [Set “ALL” setting to all legs] applies the draught value of [Check type: All Legs] to all legs. [Clear setting] restores default settings for each leg.



9.3.5 How to use the Check Results page

The [Check Results] page allows you to make safe water calculation for your route. Click the [Check Route] button to do the check. After the button is operated, the alert type and latitude and longitude position of the alert appear for applicable legs on the route.



Note 1: In order to display charts with correct updated situation, always use current date during your voyage. If your voyage lasts more than one week, set current date at least once per week during your voyage.

Note 2: A route check can take longer with C-Map or CM-ENC charts. Wait until the completion of the check.

9.4 How to Modify an Existing Route

9.4.1 How to change waypoint position

To change position of a waypoint you have the following choices:

- Enter latitude and longitude on the [Waypoints] page in the [Route Plan] dialog box.
- Drag and drop waypoint using the left button.

How to drag and drop waypoint to new position

1. Put the cursor on the route waypoint to move then push the right button to show the context-sensitive menu.
2. Select [Edit].
3. Press and hold down the left button while rolling the trackball to move the cursor to a desired position. Release the button when the cursor is at the desired position. Right-click the display area to show the context-sensitive menu then select [Finish].

How to change latitude and longitude from the Waypoints page

1. Show the [Waypoints] page.
2. Put the cursor on the digit to change in the Latitude or Longitude field.
3. Enter position from the Control Unit's keyboard, or spin the scrollwheel.

9.4.2 How to change other waypoint data

Other data of a waypoint, such as name, steering mode, turning radius, min/max speed, can be edited from the [Waypoints] page. Select the route to edit and open the [Waypoints] page. Put the cursor on a desired field and spin the scrollwheel to change data. (Push the left button to change steering mode.)

9.4.3 How to add a new waypoint at the end of a route

How to add a new waypoint at the end of a route from the electronic chart area

1. Put the cursor on the current last waypoint of the route.
2. Right-click the display area to show the context-sensitive menu then click [Edit].
3. Put the cursor on the new location for the last waypoint then push the left button.
4. Right click, then click [Finish].

How to add a new waypoint at the end of a route from the Waypoints page

Open the [Waypoints] page, right-click [WPT] then select [Add WPT]. A waypoint is added at the end of the list. Edit the Latitude, Longitude, etc. as necessary.

9.4.4 How insert a waypoint

How to insert a waypoint between waypoints from the electronic chart area

1. Put the cursor anywhere on the route where you want to insert a waypoint.
2. Right-click to show the context-sensitive menu then click [Edit].
3. Put the cursor on the leg where you want to insert a waypoint.
4. Right click then click [Insert WPT].
5. Right click then click [Finish].

How to insert a waypoint from the Waypoints page

Open the [Waypoints] page then right-click the waypoint to process. Select [Insert after] or [Insert before] as appropriate. A waypoint is added after or before the waypoint selected. Edit the Latitude, Longitude, etc. as necessary.

9.4.5 How to delete a waypoint

How to delete a waypoint from the electronic chart area

Put the cursor on the waypoint to delete. Push the right button to show the context-sensitive menu then select [Edit] followed by [Delete WPT].

How to delete a waypoint from the Waypoints page

Open the [Waypoints] page. Right-click the waypoint you want to delete then select [Delete WPT].

9.4.6 Geometry check of route

When you add a new waypoint, modify a waypoint or change other waypoint data, the message "Impossible turn at WPT" may appear (in red). It means that the geometry of route makes it impossible for the ship to sail along a certain leg. Typically it is enough if you do the following, on the [Waypoints] page.

- Decrease the radius of turn of the waypoint or one of its neighbors.
- Increase the radius of turn of the waypoint or one of its neighbors.
- Change lat/lon position of the waypoint or one of its neighbors.

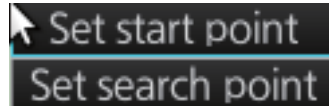
Note: If the above-mentioned remedies do not remove the "Impossible turn at WPT" indication, try changing the planned speed.

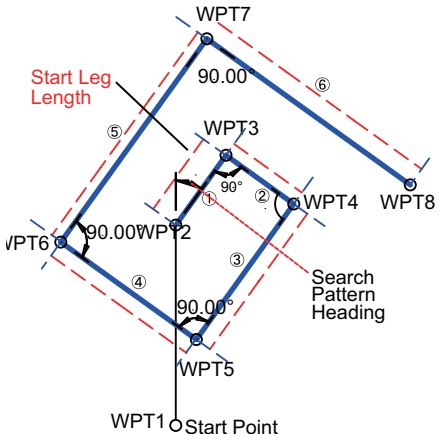
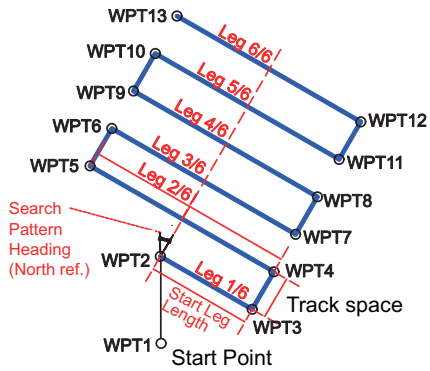
9.5 SAR Operations

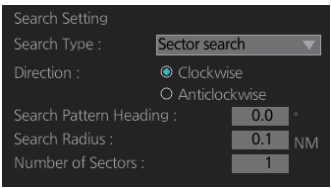
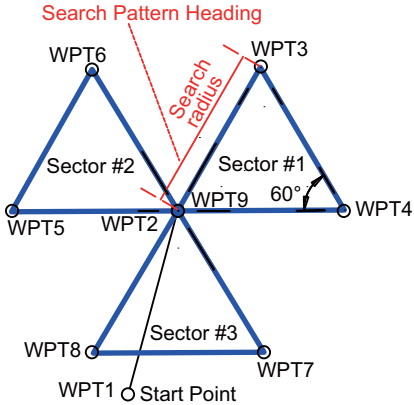
The SAR feature facilitates search and rescue and MOB operations.

To use the SAR feature, get into the Voyage planning mode then do the following:

1. Click the [Planning] and [Route] buttons on the InstantAccess bar to show the [Route Plan] dialog box then click the [SAR] button.

2. Enter your start point. To enter current position, click the [Ship Position] button. (The start point can also be entered directly on the screen. Put the cursor on the start point, right-click the chart to show the context-sensitive menu shown below then click [Set start point].)
 
3. Enter your ship's speed and turn radius, current UTC date and time.
4. At [Search Point], enter the estimated position of the object to search. (The search point can also be entered directly on the screen. Put the cursor on the search point, right-click the chart to show the context-sensitive menu shown at step 2 then click [Set search point].)
5. Enter drift speed, drift direction, and the UTC date and time of the estimated position.
6. At the [Search Setting] window, choose and set the search type, referring to the table on the next page.

Search type	Options	Sample pattern
Expanding square	<div data-bbox="550 273 879 448" style="border: 1px solid black; padding: 5px; background-color: #f0f0f0;"> <p>Search Setting</p> <p>Search Type : Expanding square</p> <p>Direction : <input checked="" type="radio"/> Clockwise <input type="radio"/> Anticlockwise</p> <p>Search Pattern Heading : 0.0 °</p> <p>Start Leg Length : 0.1 NM</p> <p>Number of Legs : 1 legs</p> </div> <p>Direction: Set the direction to start the search, Clockwise or Anticlockwise.</p> <p>Search Pattern Heading: See the right figure.</p> <p>Start Leg Length: Enter the start leg length.</p> <p>Number of Legs: Enter the number of legs to use.</p> <p>Starting at the probable location of the target, the search vessels expand outward in concentric squares.</p>	
Parallel tracks	<div data-bbox="544 918 888 1126" style="border: 1px solid black; padding: 5px; background-color: #f0f0f0;"> <p>Search Setting</p> <p>Search Type : Parallel tracks</p> <p>Direction : <input checked="" type="radio"/> Clockwise <input type="radio"/> Anticlockwise</p> <p>Search Pattern Heading : 0.0 °</p> <p>Start Leg Length : 0.1 NM</p> <p>Track Space : 0.1 NM</p> <p>Number of Legs : 1 legs</p> </div> <p>Direction: Select the direction to start the search, Clockwise or Anticlockwise.</p> <p>Search Pattern Heading: See the right figure.</p> <p>Start Leg Length: Enter the start leg length.</p> <p>Track Space: Enter the length of the short legs in the route.</p> <p>Number of Legs: Enter the number of legs to use.</p> <p>The parallel tracks pattern is usually the first pattern used in undertaking a search operation, since it assumes that the search object is in the vicinity of the track.</p>	

Search type	Options	Sample pattern
Sector search	 <p>Direction: Select the direction to start the search, Clockwise or Anticlockwise.</p> <p>Search Pattern Heading: See the right figure.</p> <p>Search Radius: Enter the search radius (in NM).</p> <p>Number of Sectors: Enter the number of sectors to use.</p> <p>The sector search is used when the position of the body is known accurately and the search has to be done over a small area. It is normally carried out in the area, where the casualty or the object has been sighted.</p>	

7. Click the [OK] button. The [Route Plan] dialog box appears and the system draws the search and rescue route on the screen according to the search and rescue settings.
8. To follow the route, click the [Exchange to MONIT] button.

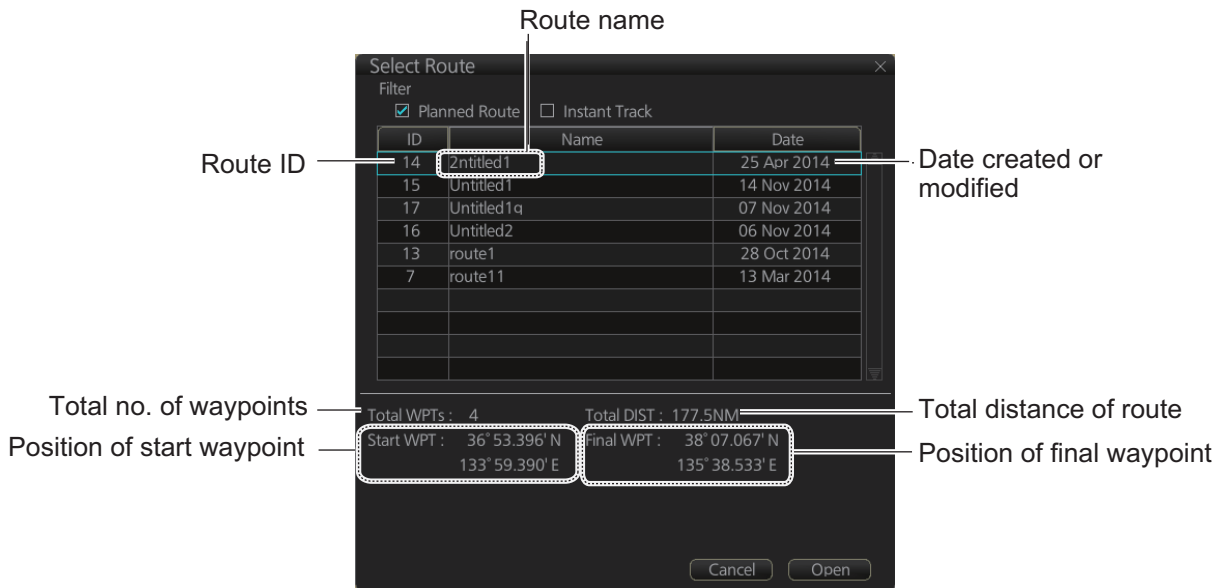
Note: To monitor the route the following conditions must be met:

 - The route must have at least two waypoints.
 - The route must have no impossible turns.
 - The route must have been checked.
9. To save the route, click the [Save] button and enter a name for the route, using the keyboard on the Control Unit or the software keyboard.

If necessary you can drag waypoints to new position, like with an ordinary route.

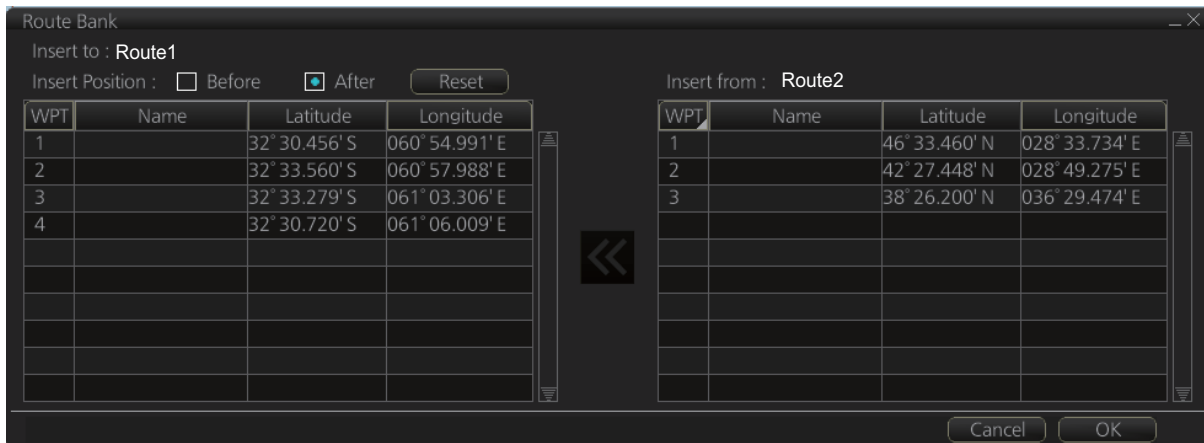
9.6 Route Bank

The route bank stores all the routes you have created. To show the route bank in the Voyage planning mode, select [Route], [Route Bank] in [Route Plan] dialog box:



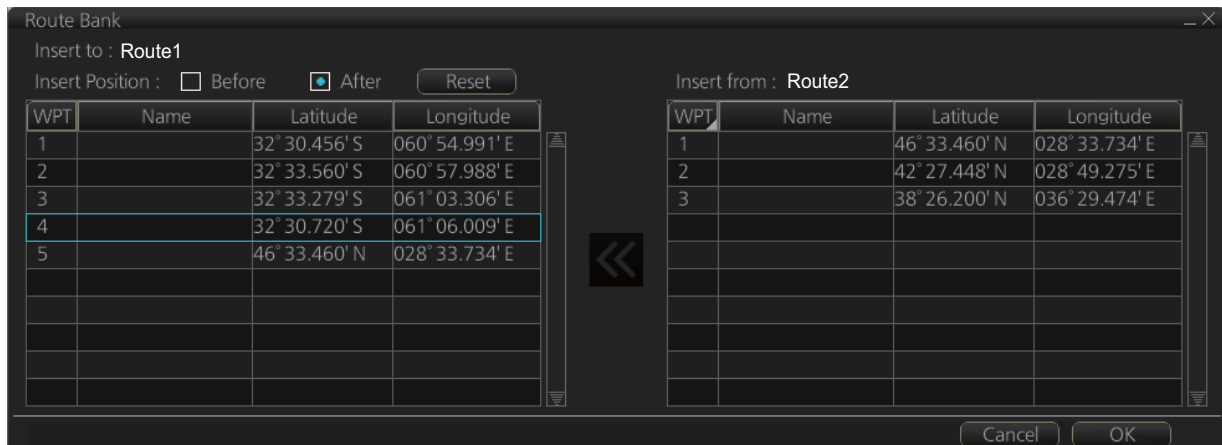
In the Voyage planning mode, the waypoints of a route can be inserted into the route currently selected.

1. Show the dialog box shown above.
2. Select the route for which you want to copy its waypoint(s) in the active route. For example, select Route2. Click the [Open] button.



3. At [Insert Position], select where you want to insert waypoints into the active route, [Before] or [After] the waypoint selected in the next step. The [Reset] button restores the route to the original condition.
4. In the left-hand column set the cursor on the waypoint where to insert waypoints from the inactive route.
5. At the right-hand column, select the waypoint(s) to add to the active route. A context-sensitive menu is available by right-clicking [WPT] in the inactive route. The options available are [Select All], [Deselect All] and [Reverse] (reverse the order of the waypoints in the inactive route).

6. Click the << button to insert the waypoint(s) from the inactive route to the active route. In the example below, WPT1 of the inactive route is inserted at the end of the active route, becoming its waypoint 5.



7. Click the [OK] button to finish.

9.7 Route Optimization

9.7.1 Available route optimization strategies

After all waypoints are inserted, the route is optimized from the [Optimize] page in the [Route Plan] dialog box. If no optimization strategy is chosen, the optimization is done with "max. speed," defined in ship parameters. Optimization calculates all parameters for route steering (course and distance between two waypoints, maneuvering start point, WOP, etc.). There are four methods for optimization:

Max speed: This calculation uses the maximum speed defined in the ship parameters and multiplies by all reduction factors (weather, ice, fouling, etc.) together with speed limits given for each waypoint to generate ETA. ETA may be entered, however it is calculated with user-entered ETD and speed limit.

Time table: Calculates the speed required in order to arrive at destination at required ETA. Maximum speed is never exceeded. The user enters ETD and ETA to calculate speed to use. If the user-entered ETA is earlier than that found with the Max. Speed calculation, the Max. speed-calculated ETA will be indicated below the Time Table ETA calculation figure. The calculated speed is shown on the [Route Information] box as [Plan Speed].

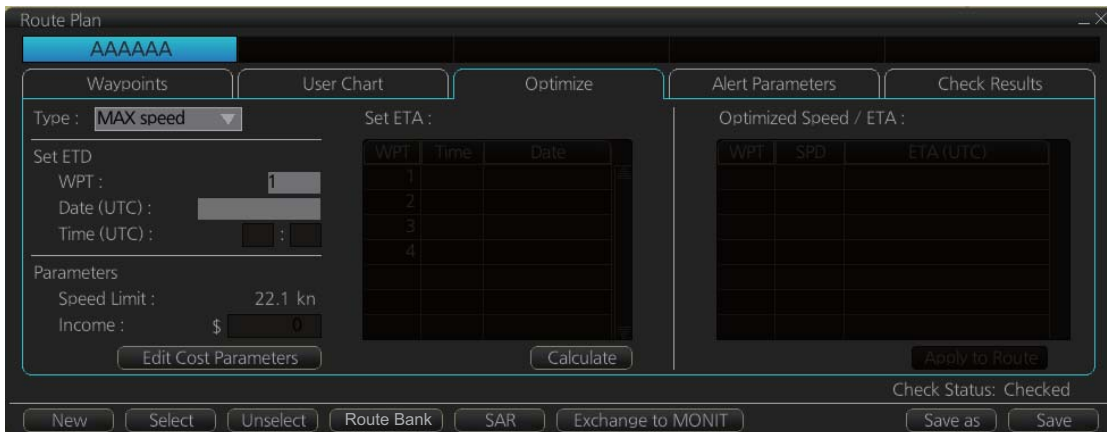
Max. profit: Based on ETD, this calculation takes in account the fuel cost and the fixed cost of the ship and calculates the most profitable speed (highest profit per time unit).

Min. cost: Based on ETD, this calculation takes in account the fuel cost and the fixed cost of the ship and calculates the speed that gives the minimum total cost. You need to set Cost parameters beforehand to use this feature.

9.7.2 How to optimize a route

You can define Estimated Time of Departure (ETD), desired number of waypoints and Estimated Time of Arrival (ETA) on the [Optimize] page in the [Route Plan] dialog box to optimize your route.

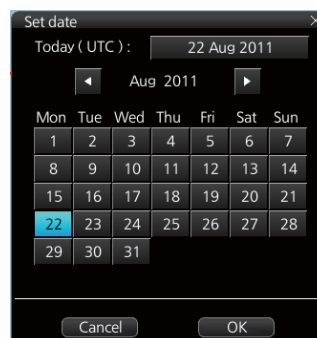
1. Click the [Optimize] tab to open the [Optimize] page.



2. At [Type], click the drop-down list to select desired optimization strategy, referring to section 9.7.1 Available route optimization strategies.

3. Do the following:

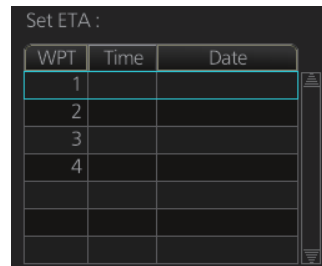
- 1) At the [Set ETD] window, enter starting WPT and date and time of departure. For entry of the date, the [Set date] window, shown right, appears. Click the applicable date in the calendar if you are going to depart during the current month, or click the applicable arrow on the month/year button to select a different date. Click the [OK] button to save the ETD and close the window.



- 2) At the [Waypoints] page in the [Route Plan] dialog box, enter the maximum speed to use. For the Type [MAX profit], enter [Income] value. If necessary, click the [Edit Cost Parameters] button to enter fuel consumption values.



- 3) For [Time table], the [Set ETA] window appears. Set the ETA to use for each waypoint. To enter the Time and Date, click the [Date] window to show the [Set date] window. Click the appropriate date. The date entered appears in the [Set ETA] window.



4. Click the [Calculate] button to calculate optimal route. The [Optimized Speed/ETA] dialog box shows the results of the calculation.

WPT	SPD	ETA (UTC)
2	15.0	22:17 11 Apr 2012
3	15.0	22:35 11 Apr 2012
4	15.0	22:47 11 Apr 2012

5. To apply the ETA results to the route, click the [Apply to Route] button.
6. To save all optimization settings, click the [Save] button.

Note that the ETA used in route reports is the first-entered ETA.

9.7.3 How to plan a speed profile


A speed profile is defined by general max. speed and optimization types. These values are given while planning a route. You can define speed limit and optimize type in the [Optimize] page of the [Route Plan] dialog box and in the [Waypoints] page you can give planned and max. speed for each leg. The table below demonstrate how different optimize types and speed limits influence speed.

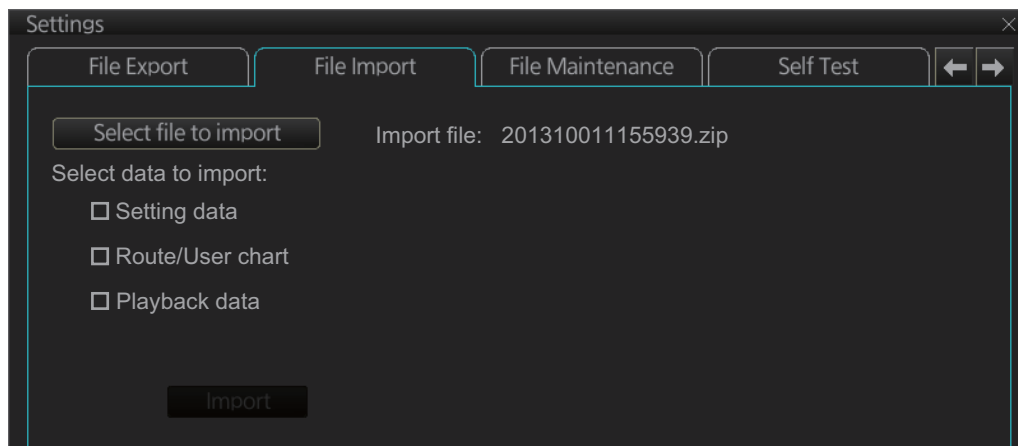
WPT	min. cost	max. profit	timetable	Max speed
1	4.8	10.9	10.0	10
2	4.8	12.9	15.0	15
3	4.8	12.9	16.2	20
4	4.8	12.9	16.2	20
5	6.0	12.9	15.0	15
6	6.0	12.9	16.2	20
7	4.8	12.9	16.2	20
8	4.8	12.9	16.2	20
9	6.0	12.9	16.2	17
10	4.8	8.0	8.0	8

9.8 How to Import Routes

9.8.1 How to import FMD-3xx0, FCR-2xx9 route data

You can import a route created on another FMD-3xx0, FCR-2xx9.

1. Set the USB flash memory that contains the route data to import in the USB port on the Control Unit.
2. Click the [] button on the Status bar and select [Settings]. Click the [OK] button then select [Settings].
3. Click the [File Import] tab.

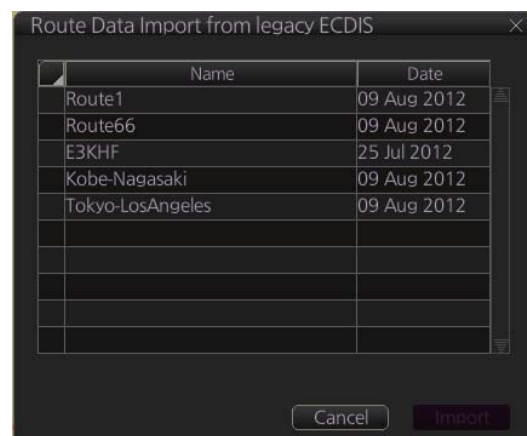


4. Click the [Select file to import] button to select the file to import.
5. Check the data to import, at [Select data to import].
6. Click the [Import] button.

9.8.2 How to import FEA-2x07 route data

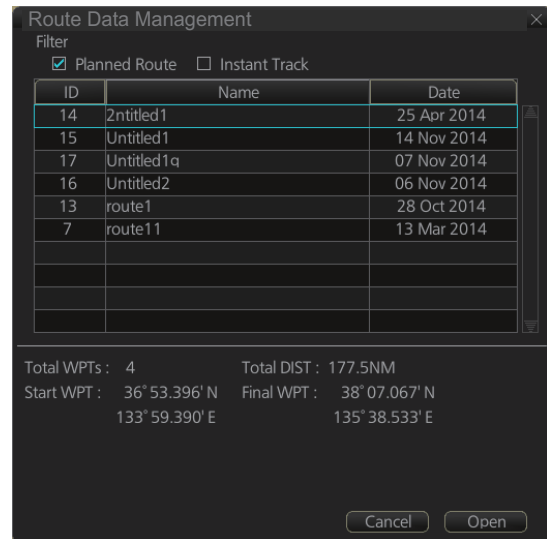
Routes created at an ECDIS FEA-2x07 can easily be imported to this ECDIS. Copy the routes to a folder in a USB flash memory then follow this procedure. Note that FEA-2x05-created routes cannot be imported.

1. Set the USB flash memory to the USB port on the Control Unit.
2. Activate the Voyage planning mode.
3. Click the [Manage Data], [Data Import] and [Route] buttons to show the [SELECT DIRECTORY] dialog box.
4. Select the folder that contains the route(s) to be imported then click the [OK] button.
5. Check the route(s) to import then click the [Import] button.



9.8.3 How to import csv, ASCII format route data


1. Set the USB flash memory to the USB port on the Control Unit.
2. Activate the Voyage planning mode.
3. On the InstantAccess bar, click the [Manage Data] and [Route] buttons to show the [Route Data Management] dialog box.
4. At the drop-down list, select the import format. The choices are
 [CSV Position]: waypoint position data, CSV format
 [ASCII WPT Name Position]: waypoint name, position order, ASCII format
 [ASCII Full]: all route data, ASCII format
 [CSV Route Sheet]: route data, CSV format
 [RTE Format]: route data, RTE format
Note: FEA-2x07 route data can also be imported through this procedure.
5. Click the [Import] button.
6. Select the file to import then click the [Open] button.

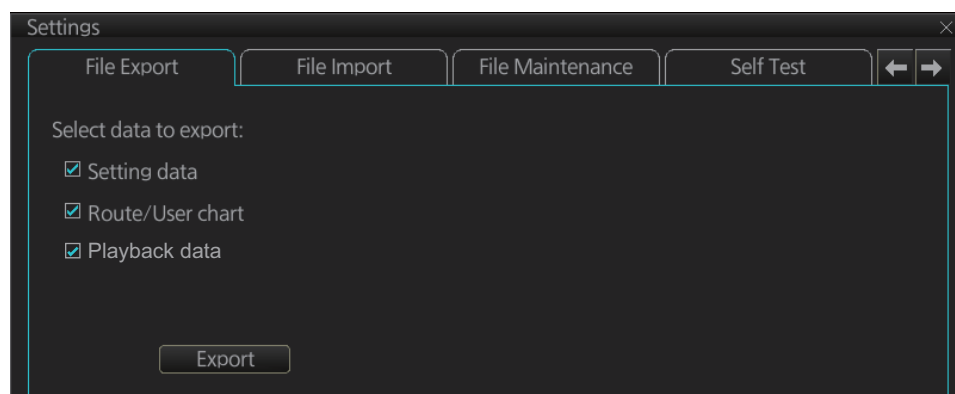


9.9 How to Export Route Data

9.9.1 How to export FMD-3xx0 route data

You can export route data to share the data with other FMD-3xx0 units.

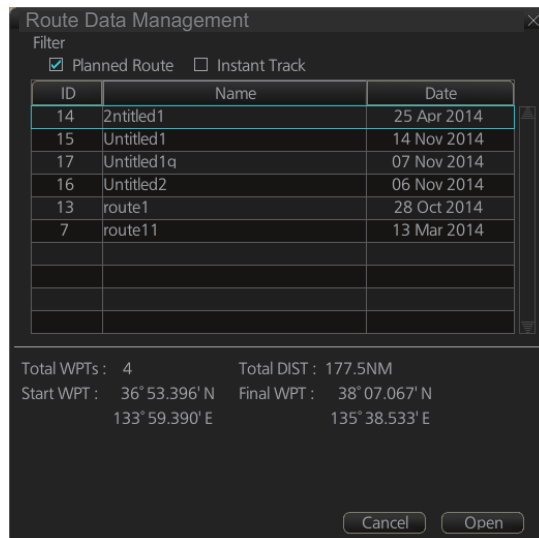
1. Set a USB flash memory in the USB port on the Control Unit.
2. Click the [] button on the Status bar and select [Settings]. Click the [OK] button then select [Settings].
3. Click the [File Export] tab.



4. At [Select data to export], check only [Route/User chart].
5. Click the [Export] button to save the data to the USB flash memory.

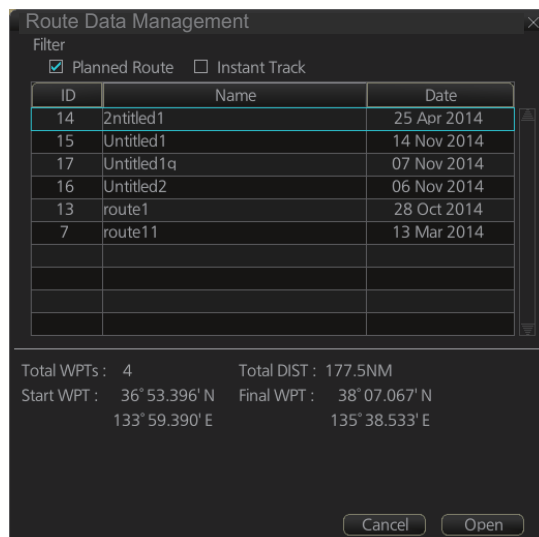
9.9.2 How to export route data in FEA-2x07, csv, ASCII format

1. Activate the Voyage planning mode then set a USB flash memory to the USB port on the Control Unit.
2. On the InstantAccess bar, click the [Route], [Route] and [Route Data Management] buttons to show the [Route Data Management] dialog box.
3. At the drop-down list, select the import format. The choices are
 [CSV Position]: waypoint position data, CSV format
 [ASCII WPT Name Position]: waypoint name, position order, ASCII format
 [ASCII Full]: all route data, ASCII format
 [CSV Route Sheet]: route data, CSV format
 [RTE Format]: route data, RTE format
4. Check the route(s) to export then click the [Export] button.
5. Click the [OK] button.



9.10 How to Delete Routes

1. Click the [PLAN] button on the Status bar to get into the Planning navigation mode.
2. Click the [Manage Data] button on the InstantAccess bar followed by the [Route] button.
3. Put a checkmark in the check box to the left of the route name.
4. Click the [Delete] button.
5. Click the [OK] button to delete the route(s) selected.



9.11 Reports

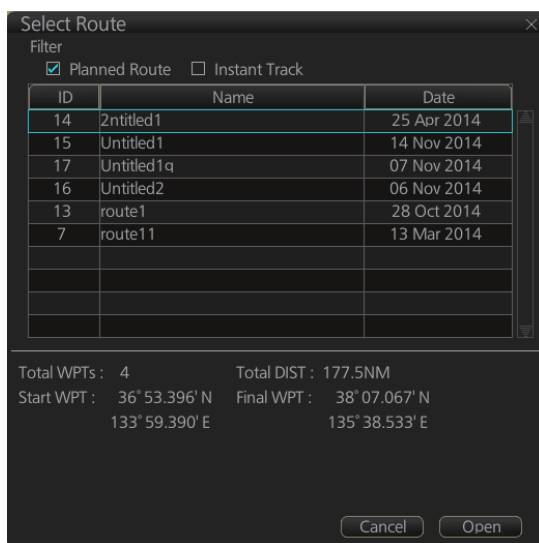
This ECDIS generates reports for waypoints in the selected route. If connected to a printer, reports can be printed by clicking the [Print Text] button. Text in reports can be searched with the [Find] button.

To generate a report, do the following:

1. Click the [PLAN] button to go to the Voyage planning mode.
2. Click the [Report] button followed by the [Route] button. Click applicable “report” button - [WPT], [Full WPT] or [Passage].



The following dialog box appears.



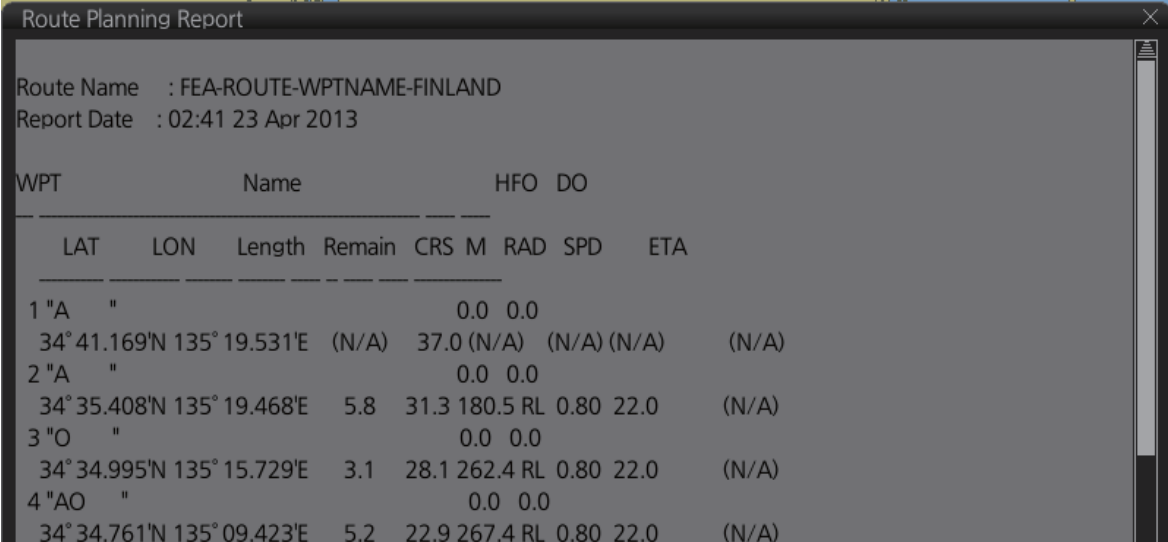
3. Select the appropriate route then click the [Open] button to show the selected report. See the next several pages for examples.

9. ROUTES

WPT report

The WPT report contains the following information for each waypoint in the route selected.

- Route name
- Date of report
- Waypoint no.
- Position in latitude and longitude
- Length of waypoint
- Distance remaining in route
- Planned courses and steering methods (RL (RhumbLine), GC (GreatCircle))
- Turning radius
- Planned speeds
- Estimated times of arrival (ETA)
- ETD from waypoint 1 (start point)
- ETA to waypoint "x" (final waypoint)
- Total length of route
- Estimated time required to run route using planned speeds and courses



Route Planning Report

Route Name : FEA-ROUTE-WPTNAME-FINLAND
Report Date : 02:41 23 Apr 2013

WPT	Name	HFO	DO							
LAT	LON	Length	Remain	CRS	M	RAD	SPD	ETA		
1 "A	"					0.0	0.0			
	34° 41.169'N 135° 19.531'E	(N/A)		37.0	(N/A)	(N/A)	(N/A)	(N/A)		
2 "A	"					0.0	0.0			
	34° 35.408'N 135° 19.468'E	5.8		31.3	180.5	RL	0.80	22.0		(N/A)
3 "O	"					0.0	0.0			
	34° 34.995'N 135° 15.729'E	3.1		28.1	262.4	RL	0.80	22.0		(N/A)
4 "AO	"					0.0	0.0			
	34° 34.761'N 135° 09.423'E	5.2		22.9	267.4	RL	0.80	22.0		(N/A)

Full WPT report

You can generate a full waypoint report for the route selected. The report includes the following for each waypoint

- Route name
- Date of report
- Waypoint no.
- Position in latitude and longitude
- Planned radius
- Channel limit
- Planned speed
- Planned course
- ETA
- Steering mode (rhumb line or great circle) to each waypoint
- ROT
- Margin for channel limit
- Speed Max
- Leg length
- Time used

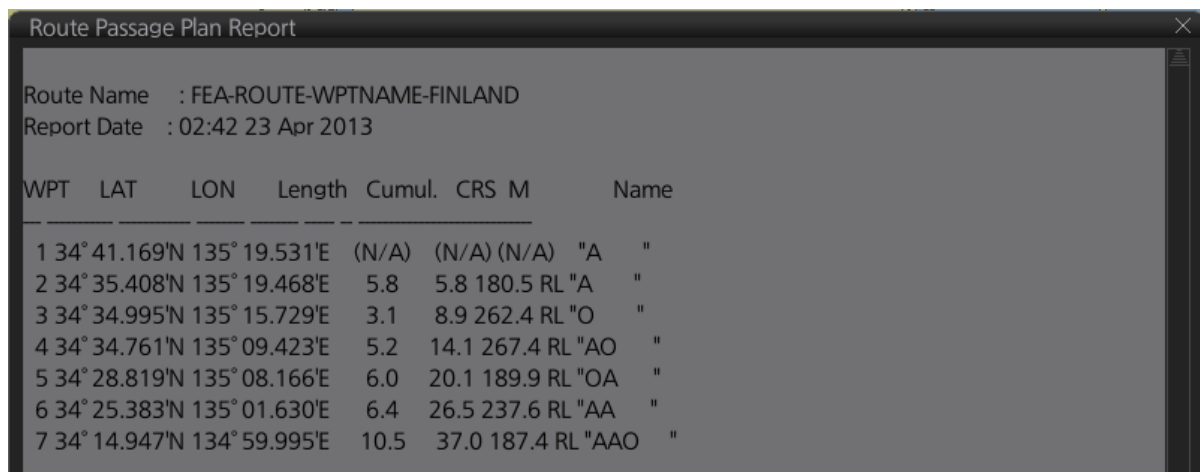


9. ROUTES

Passage plan report

The passage plan report generates waypoint information for each waypoint in the route selected.

- Route name
- Date of report
- Waypoint no.
- Position in latitude and longitude
- Length
- Cumulative length
- Planned course
- Steering method (RL or GC)
- Name of waypoint



The screenshot shows a window titled "Route Passage Plan Report" with the following information:

Route Name : FEA-ROUTE-WPTNAME-FINLAND
Report Date : 02:42 23 Apr 2013

WPT	LAT	LON	Length	Cumul.	CRS	M	Name
1	34° 41.169'N	135° 19.531'E	(N/A)	(N/A)	(N/A)	(N/A)	"A "
2	34° 35.408'N	135° 19.468'E	5.8	5.8	180.5	RL	"A "
3	34° 34.995'N	135° 15.729'E	3.1	8.9	262.4	RL	"O "
4	34° 34.761'N	135° 09.423'E	5.2	14.1	267.4	RL	"AO "
5	34° 28.819'N	135° 08.166'E	6.0	20.1	189.9	RL	"OA "
6	34° 25.383'N	135° 01.630'E	6.4	26.5	237.6	RL	"AA "
7	34° 14.947'N	134° 59.995'E	10.5	37.0	187.4	RL	"AAO "

10. USER CHARTS

10.1 Introduction

User charts are overlays that the user creates to indicate safety-related objects and areas. They can be displayed on both the radar overlay and the electronic chart. These charts are intended for pointing out safety-related items like position of important navigation marks, safe area for the ship, etc. User charts areas can be used to activate alerts and indications based on user-defined danger symbols, lines and areas. When route or own ship estimated position is going to cross a user chart symbol, line or area that is defined as a dangerous one, an alert or indication is generated by the system. See the chapter on chart alerts.

A user chart consists of various objects (points, lines, text, symbols, etc.). The maximum number of objects per user chart is 200. A route may have up to five user charts, for a max. of 1,000 user chart objects per route.

The user chart is displayed on the radar overlay and its position and shape is based on the ship's actual position. When own ship is moving in the area covered by the user chart, the elements of the user chart are superimposed on the radar, with a maximum of 80 of the nearest elements displayed.

10.1.1 Objects of user charts

Below is a description of the objects used in a user chart.

- **Tidal:** There are two types of tidals, current and predicted.
- **Line:** You can define four different types of lines. Lines can be used in chart alert calculation and/or display on the radar:
 - **Navigation lines:** Displayed on both the radar overlay and the ECDIS display. Navigation lines are reference lines for coast line.
 - **Coast line:** Displayed on both the ECDIS and radar overlays. Coastal line is usually a well-defined (by chart digitizer) multi-segment line showing the coastline. The user is able to create this type of line in case there is no suitable chart available over desired area in S57 format.
 - **Depth contour:** Displayed on both the ECDIS and radar overlay. Depth line shows the chosen depth levels. The user is able to create this type of line in case there is no suitable chart available over desired area in S57 format.
 - **Route line:** Displayed on both the radar overlay and the ECDIS display. Route lines are zones for anchoring, traffic separation lines, etc.
- **Clearing line:** A clearing line is used to define a line which a vessel can sail to avoid navigational hazards. A clearing line can be of the NMT (Not More Than) or NLT (Not Less Than) type. Displayed on the ECDIS display only.
- **Area:** The operator can define closed areas with a polygon. If route or estimated ship position is going to cross the area, the system generates a warning to the user. These areas can be used to specify safe areas as defined by the master or by the policy of the ship's owner. They are always available regardless of the type of chart material used.

10. USER CHARTS

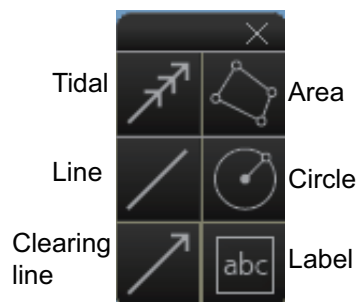
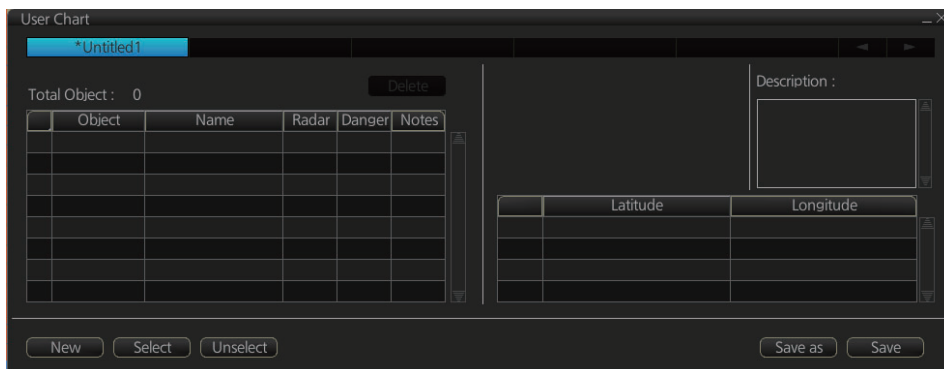
- **Circle:** The operator can define an area with a circle, which can define a location to avoid. If route or estimated ship position is going to cross the area, the system generates a warning to the user. These areas can be used to specify safe areas as defined by the master or by the policy of the ship's owner. They are always available regardless of the type of chart material used.
- **Labels:** There are two types of labels: point and label. A "point" (i) is mainly used to denote position of objects, such as buoys, light houses, fixed targets, wrecks, etc. Points can be used in chart alert calculation. A "label" provides user-entered text to show on the display.

10.2 How to Create a User Chart

You can create and modify a user chart in the Voyage planning mode.

To make a complete user chart, do the following:

1. Click the [PLAN] button on the Status bar to go to the Voyage planning mode.
2. Click the [Planning] and [User Chart] buttons on the InstantAccess bar to show the user chart palette and the [User Chart] dialog box.
3. Click the [New] button on the [User Chart] dialog box to create a new chart



4. Click the desired object (button) on the palette. The [Tidal], [Line], [Clearing line] and [Label] buttons have multiple choices. Right-click the respective button to show a context sensitive menu. The choices available for each object are shown below.

Tidal: Current, Predicted

Line: Coast, Nav, Route, Depth

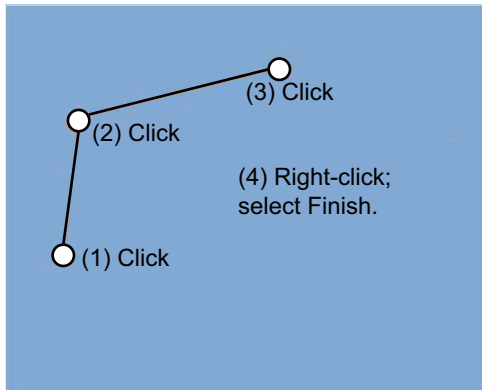
Clearing line: NMT (Not More Than), NLT (Not Less Than)

Label: Point, Label

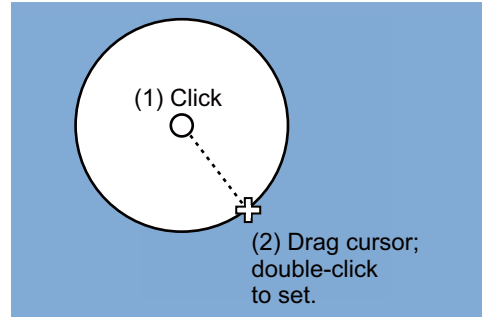
5. Put the cursor on the location to insert the object then push the left button. See the figure below for how to construct lines, areas and circles. For the "Tidal" ob-

ject, you can set Orientation, Strength and Time from the dialog box. With the "Label" object you can enter text and show that text on the screen.

Note: An object can also be put at the center of the screen. Do step 1-4 in this procedure. On the [User Chart] dialog box, right click the box to the left of [Object] then select [Add Object] from the pop-up menu.

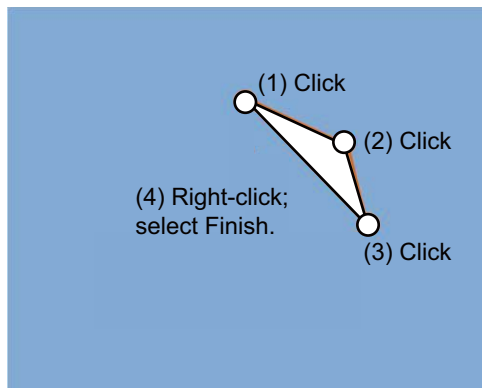


How to create a line



- 1) Put cursor where to locate center of circle then click.
- 2) Drag cursor to set radius; double-click to set.

How to create a circle



How to create an area

6. When you insert an object, the following is done in the [User Chart] dialog box:
 - Name of the object button appears in the [Object] window
 - Latitude and longitude position of the object is displayed
 - Total object count is updated
7. To enter a name for the object, click the appropriate location in the [Name] window then use the software keyboard or the Control Unit to enter a name.
8. To show the object on the radar overlay, click the corresponding box in the [Radar] window to show a checkmark in the box.

For the label, line, clearing line, area and circle, click the corresponding box in the [Danger] window to use or don't use the object in chart alert calculation. Show a red checkmark to use the object in chart alert calculation.

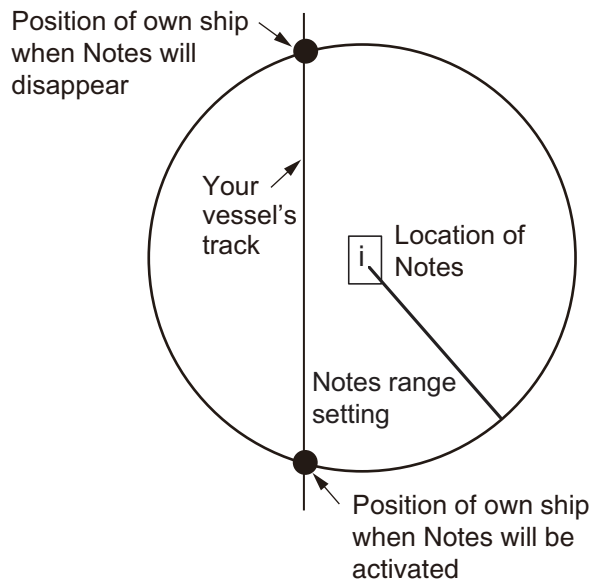
For an area, circle, line, you can add Notes as shown below. See the description and figure below for a description of Notes.

- 1) Enter the text for the Notes in the [Description] box.
- 2) Click the box in the [Notes] window of the [User Chart] dialog box to show a checkmark.
- 3) At the [Range of notes] input box, enter the distance from the line position at which to display the Notes. This is effective for lines only.

Note: You cannot select both Danger and Notes for these symbols; select either Danger or Notes.

What are Notes?

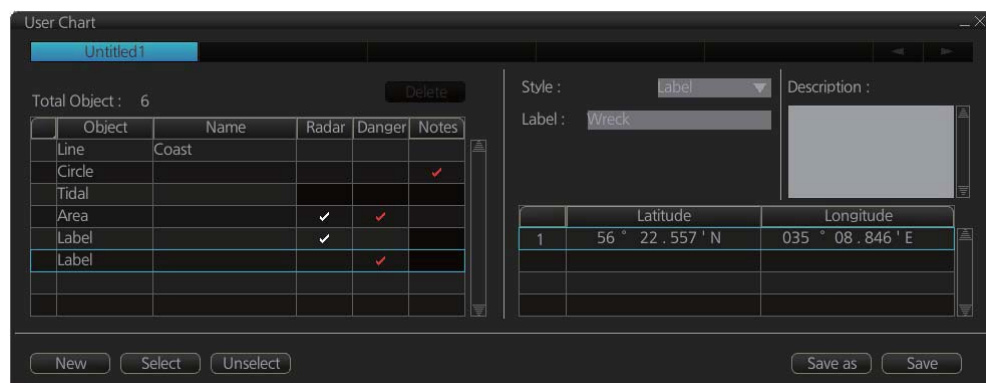
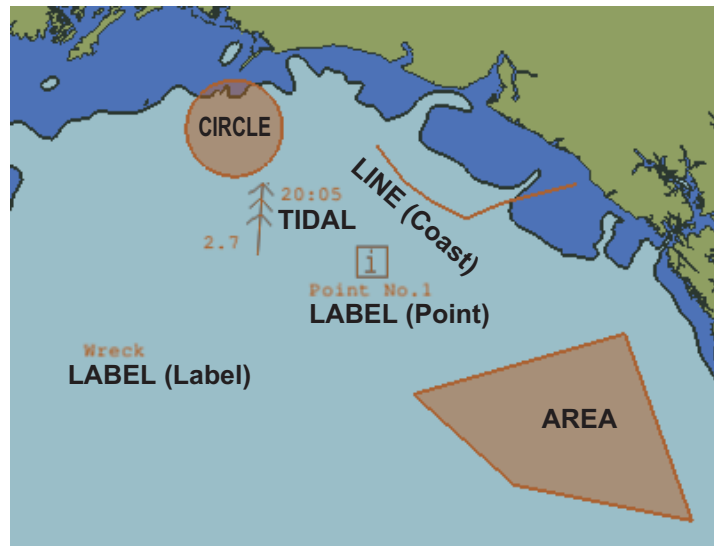
"Notes" provides messages for the operator relative to your vessel's position in the Voyage navigation mode. The ECDIS compares Notes position and when own ship is x miles from the Notes it generates a message.



9. To continue entering the same symbol, click a new location on the screen and do step 5. To enter a different symbol, do steps 4 and 5.
10. After you have entered all necessary objects, click the [Save] button.
Note: If the [Save] button is not shown, update the user chart to show the button.
11. The [Save as user chart window] appears. Enter a name for the user chart then click the [Save] button.

The figure on the next page shows a user chart and the corresponding entries in the [User Chart] dialog box.

- The Line with the name "Coast" is a coastline.
- The Circle has the Notes "Arrival No.1," which means the message "Arrival No.1" will be shown on the screen when the ship is 1 NM from the position of the center of the circle.
- The Tidal marks line marks a tidal (current).
- The Area has Radar and Danger checked. This means the area is shown on the radar overlay and is used in chart alert calculation.
- The Label with the name "Point No. 1" is a point label and is also shown on the radar overlay.
- The Label with the name "Wreck" is a common label and has Danger checked; it is used in chart alert calculation.



Note: The following combinations of object and display are not allowed:

- Tidal object with Radar, Danger, Notes
- Clearing line with Radar, Notes
- Label with Notes

How to use the Undo feature

The Undo feature, available when creating a route and a user chart, can be accessed from the [Undo] button on the InstantAccess bar, use double-click, or the context-sensitive menu. In user chart creation the feature is used with object and text input as follows:

Tidal, Circle, Current, Label: Delete last-entered object.

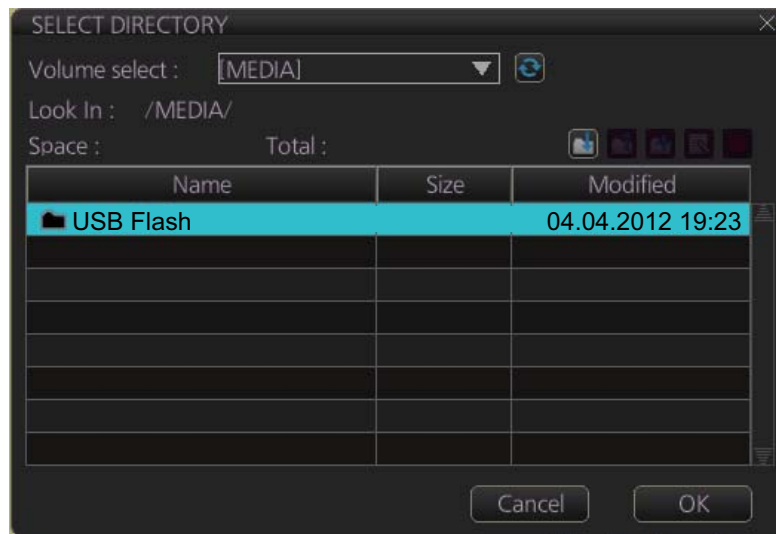
Area, Line: Erase last-entered point. For [Area], the area must have at least four points. And for a [Line], there must be at least three points.

Text input: Erase last-entered character or character string.

10.3 How to Import a User Chart Created with ECDIS FEA-2x07

User charts created at the ECDIS FEA-2x07 can easily be imported to this ECDIS. Copy the user charts to a folder (see chapter 17 in the operator's manual of the FEA-2x07) in a USB flash memory then do as follows. Note that FEA-2x05 created user charts cannot be imported.

1. Set the USB flash memory to the USB port on the Control Unit.
2. Activate the Voyage planning mode.
3. Click the [Manage Data], [Data Import] and [User Chart] buttons to show the [SELECT DIRECTORY] dialog box.



4. Select the folder that contains the user chart(s) to be imported then click the [OK] button.



5. Check the user chart(s) to import then click the [Import] button.

10.4 How to Edit Objects on a User Chart

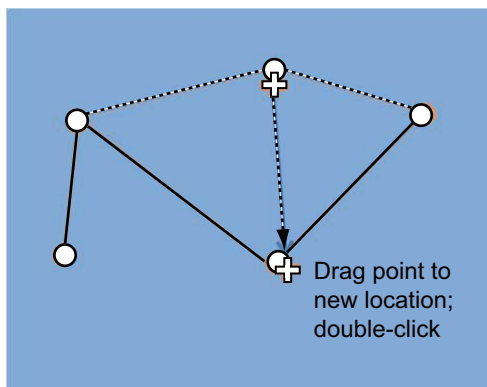
Do steps 1 and 2 in section 10.2 to show the [User Chart] dialog box then click the [Select] button. Select the user chart to edit then click the [Open] button. Follow the appropriate instructions below.

10.4.1 How to edit objects on the chart area

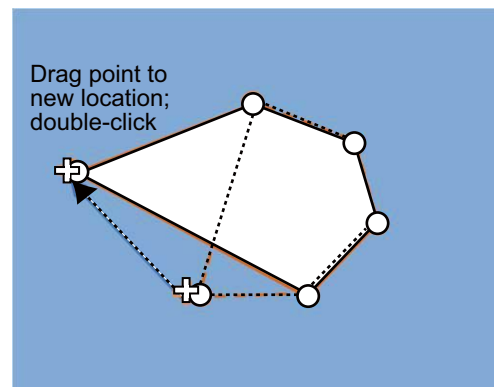
How to move objects

Drag and drop the object.

How to change corner points in lines and areas



How to change corner point on a line



How to change corner point in an area

How to insert a corner point on a line or area

Put the cursor on the location where to insert a corner point, right-click the display area to show the context-sensitive menu then select [Insert].

10.4.2 How to edit objects from the User Chart dialog box

The latitude and longitude position, object name and description of an object can be edited from the [User Chart] dialog box. Open the user chart as described in this section. Double click the item to edit and use the scrollwheel to edit.

10.5 How to Delete Objects from a User Chart

How to delete an object

Right-click the object to show the context-sensitive menu and select [Delete].

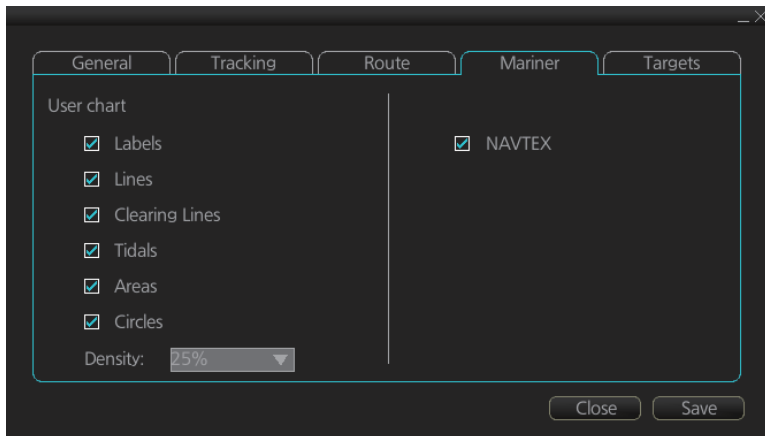
How to delete a point on a line

Put the cursor on the point to delete then right click to show the context-sensitive menu. Select [Delete Point]. The line is redrawn.

10.6 How to Select the User Chart Objects to Display

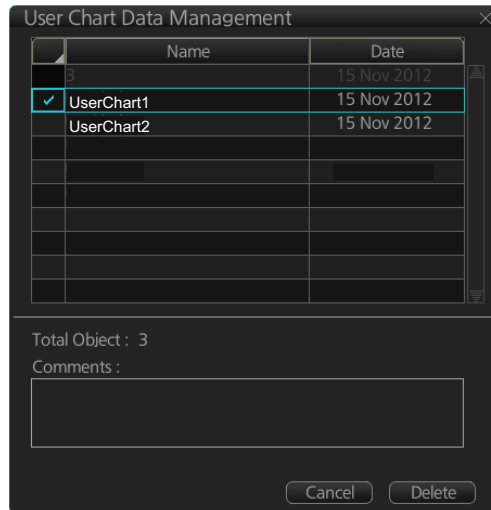
User charts can be displayed on the electronic chart. Open the [Mariner] page in the [Symbol Display] menu and check the user chart items to display. Choose the degree of transparency for the objects with [Density].

Note: Alpha blending technology is used for transparency effects.



10.7 How to Delete User Charts

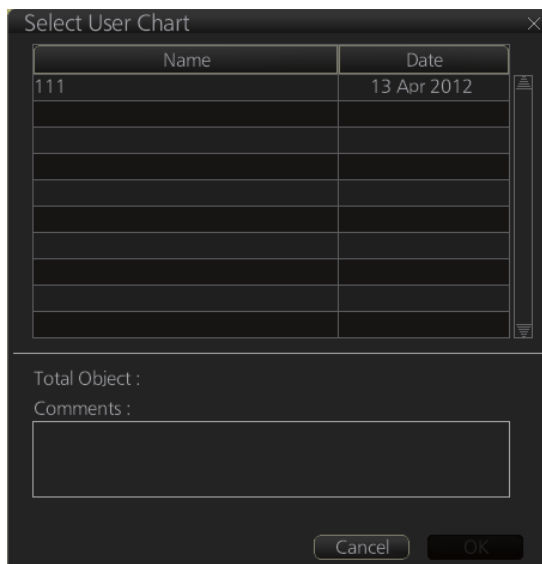
1. Click the [PLAN] button on the Status bar to get into the Planning navigation mode.
2. Click the [Manage Data] button on the InstantAccess bar followed by the [User Chart] button.



3. Check the user chart(s) to delete.
4. Click the [Delete] button then click the [OK] button.

10.8 User Chart Reports

1. Click the [Plan] button to go to the Voyage planning mode.
2. Click the [Report] button followed by the [User Chart] button to show the [Select User Chart] dialog box.



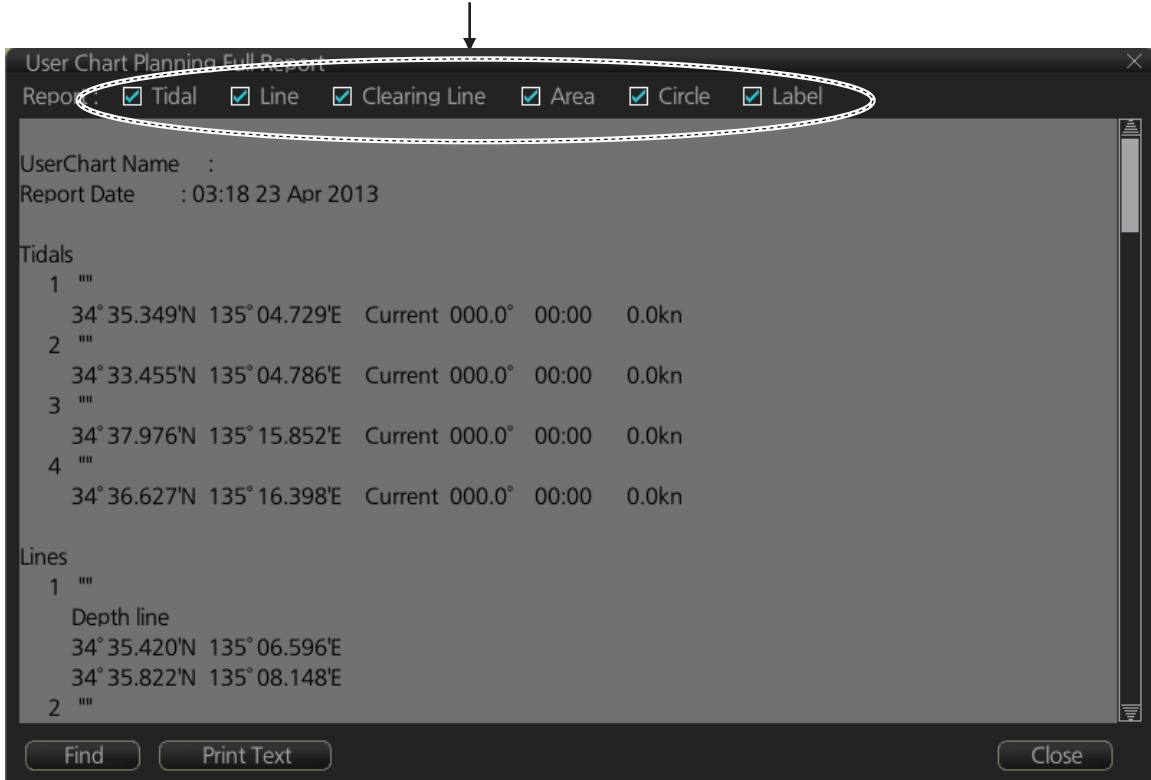
3. Select the appropriate user chart then click the [OK] button to show the selected report. See the next several pages for examples of reports.

10. USER CHARTS

Full report

The full report contains information about each tidal, line, clearing line, label, area and circle in the user chart selected. Check or uncheck the boxes at the top of the display to select the report(s) to display.

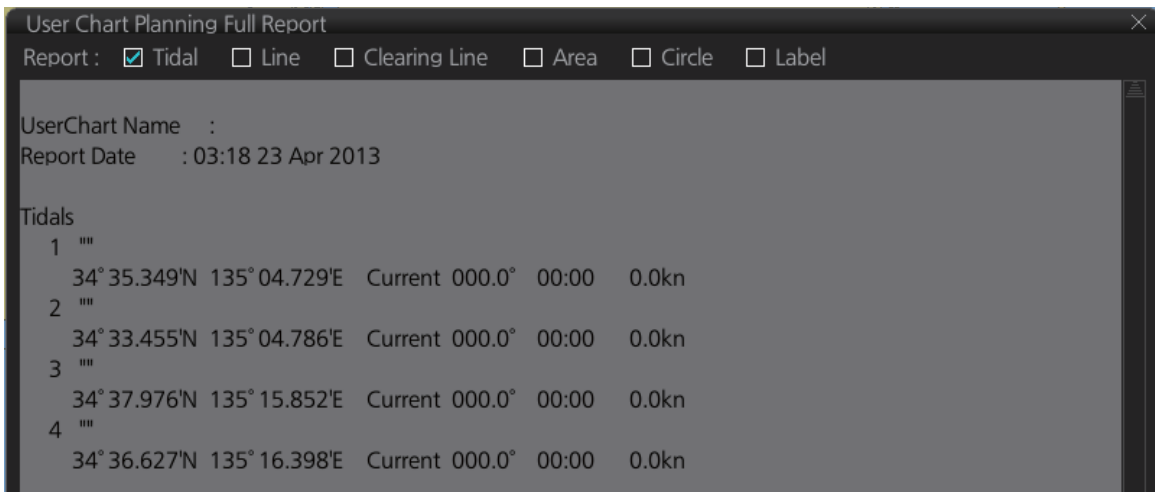
Check the report(s) to display.



Tidal report

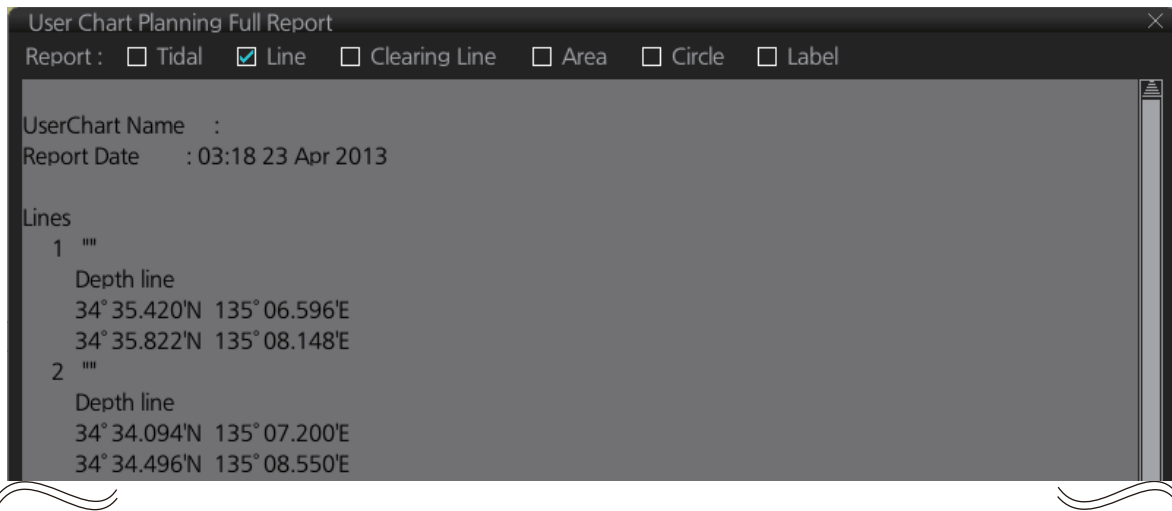
The tidal report provides

- Position of the tidal
- Type of tidal (current or predicted)
- Speed and direction of the tidal
- Time of the tidal



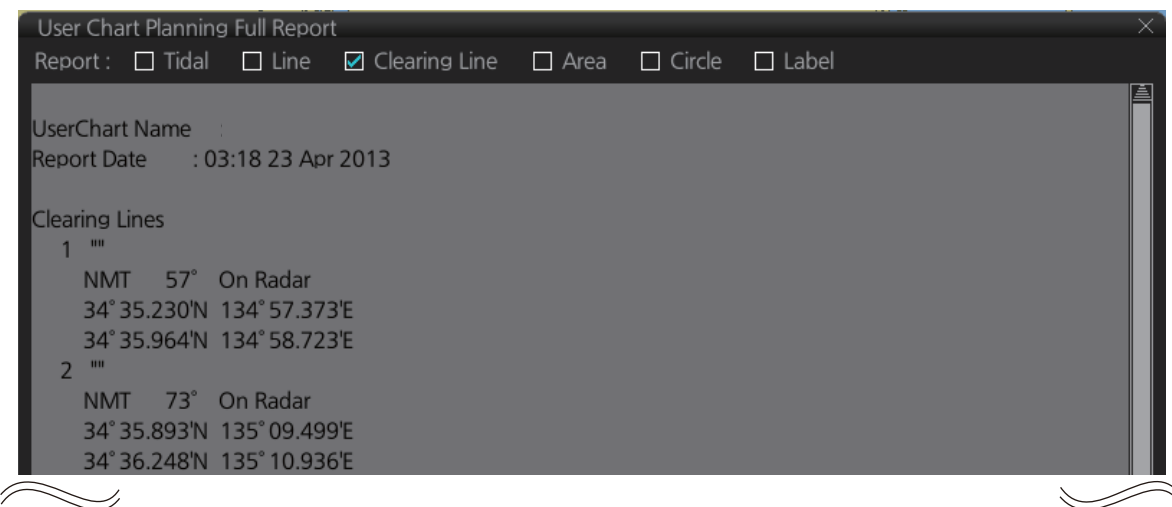
Line report

The Line report provides line name and latitude and longitude of each point on the line.



Clearing line

The Clearing line report shows the name and position of clearing lines entered on the user chart selected.

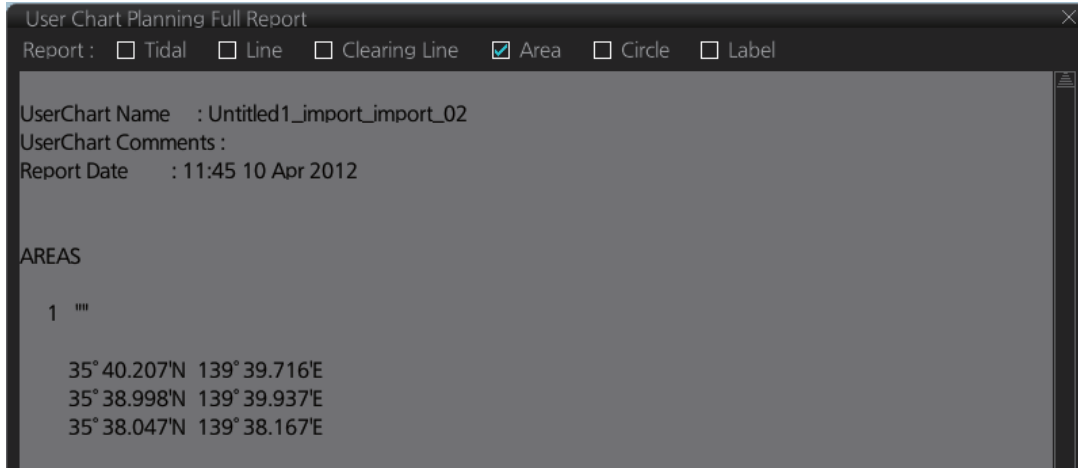


10. USER CHARTS

Area report

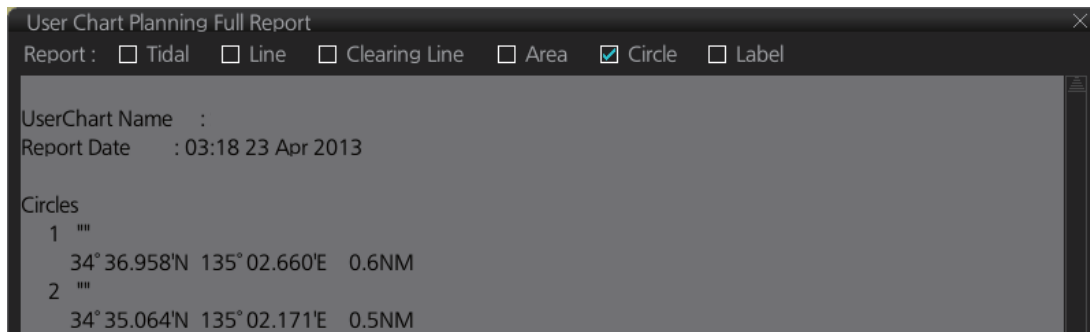
The area report provides

- Area no. and area name
- The latitude and longitude position of each point of the area
- The description of the area
- "On radar" is shown if the area is shown on the radar overlay.



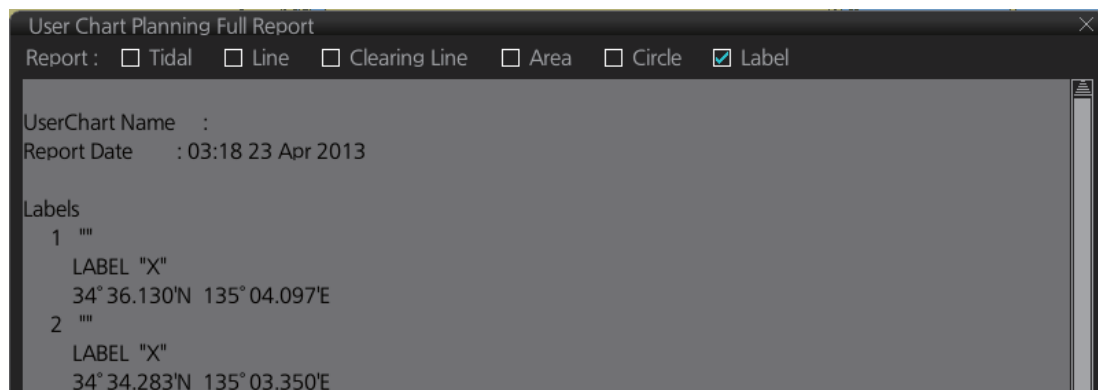
Circle report

The Circle report provides the position and radius of circles drawn on a user chart.



Label report

The Label report provides the latitude and longitude position of each label, the name of each label. On radar is shown if the label is shown on the radar overlay.



11. HOW TO MONITOR ROUTES

Route monitor is a means for permanent monitoring of the ship's behavior relative to the monitored route. The [Route Information] box displays the data on the ship's position relative to the monitored route. The monitored route consists of the following information, displayed in the electronic chart area:

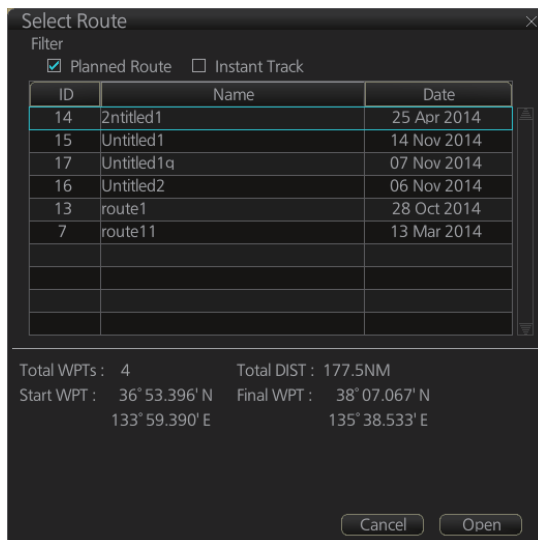
- The route is displayed with red dots.
- The limits of channels of each leg are displayed with solid red lines. These limits are used to detect chart alerts when you are monitoring the route. See chapter 8 for how set those limits.
- Each leg has information about planned speed, shown in the Route box.
- Each leg has information about planned course to steer.

Note: In order to display charts with correctly updated situation, always use current date as Approved until and Display date during your voyage. If your voyage lasts more than one week, set current date at least once per week during your voyage. See section 5.2 for how to set those dates.

11.1 How to Start Route Monitoring

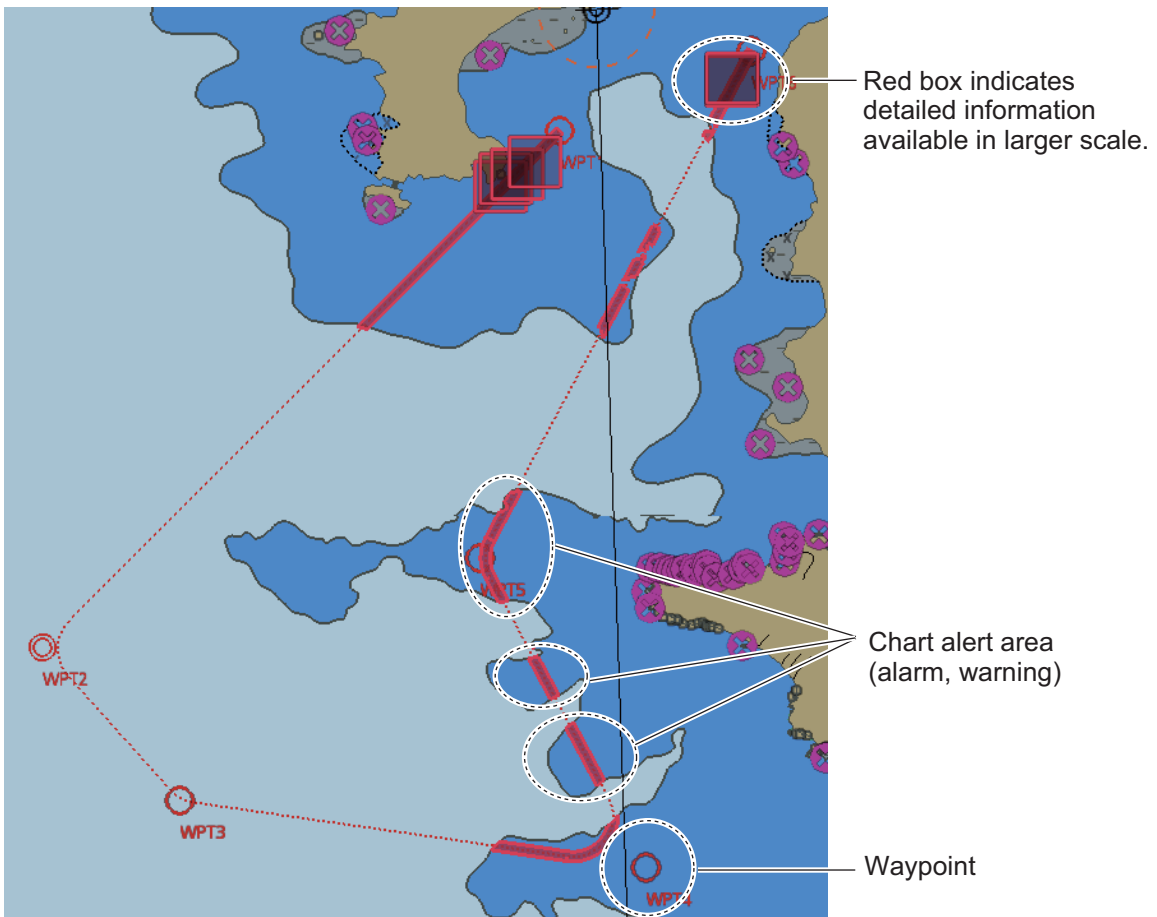
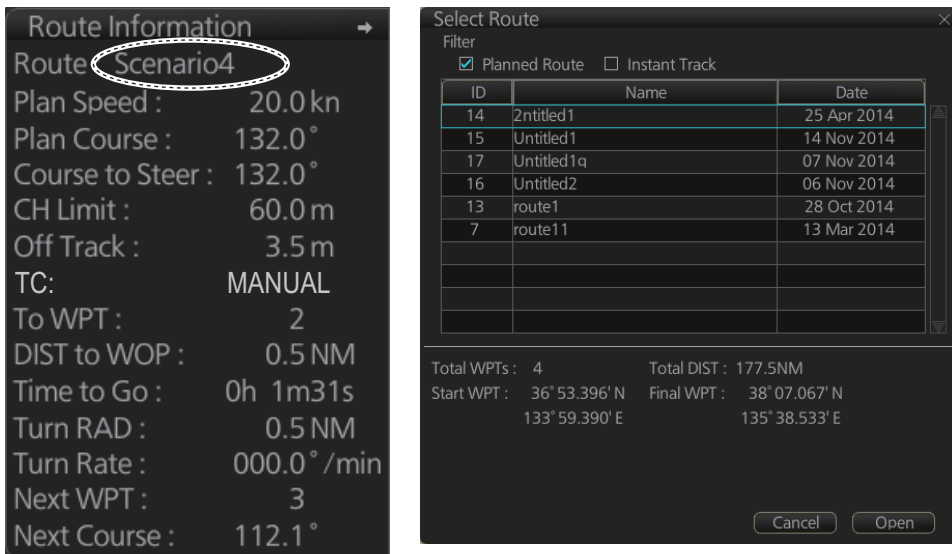
Method 1: InstantAccess bar

In the Voyage navigation mode, click the [Route] and [Select] buttons on the Instant-Access bar. Click a route then click the [Open] button.



Method 2: Selection from the Route information box

Right-click the route name location in the [Route Information] box then select [Select Route] to show the [Select Route] dialog box. Select a route then click the [Open] button.



About monitoring routes

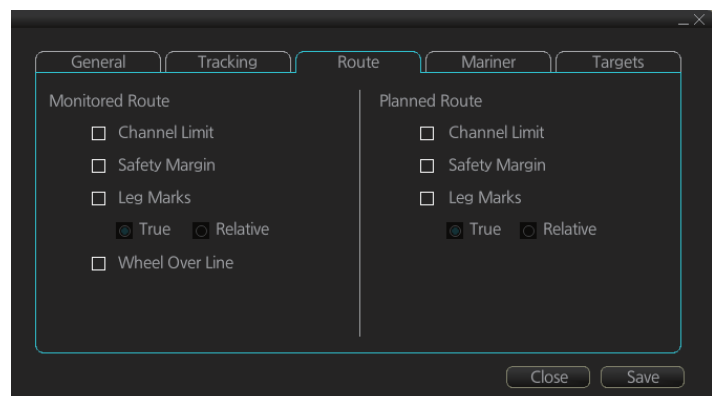
- When you choose a route for monitoring, the messages shown below appear, on the [Select Route] dialog box or in a message window, when a route cannot be opened for monitoring.
 - "Impossible turn at waypoint XX" (XX=waypoint no.). Geometry of the route makes it impossible for the ship to accomplish a turn. Modify the route to make the turn possible.
 - "Unchecked / Check condition differs". The route has not been checked. Check the route, on the [Alert Parameters] page.
 - "Monitored in the NAVI mode". The route is currently being monitored.
 - "More than one WPT needed". The route has only one waypoint. Add more waypoints to the route.
 - "Route monitoring cannot be started. Please check ship's position and conditions." Click the [OK] button to close the message. Check ship's position and conditions of the route.
- The route check which occurs after selecting a route can take longer with C-Map or CM-ENC charts. Wait until the completion of the check.
- If you have small-scale chart(s) on display that have the whole eastern/western (0-180°E/0-180°W) hemisphere and a part of the other hemisphere on display, there is a limitation to display a route. To avoid this, set chart center so that the whole eastern/western hemisphere is not on the screen.
- Route monitoring is temporarily stopped (route is greyed out) and an alert appears when position, speed or heading is lost. To restore route monitoring, change the sensor system from System to Local (from the Sensor Information box), manually enter the lost data, check [Set Drift], then switch to the DR mode.
- Route data is sent to the radar (ex. FAR-2xx7 series) at the start of route monitoring or when the ship transits a waypoint. If a route is not displayed on the radar, stop then restart monitoring at the ECDIS. A route is erased from the radar when route monitoring is stopped or the ECDIS is restarted. To redisplay the route, stop then restart monitoring at the ECDIS.

11.2 How to Stop Monitoring a Route (Manual, Automatic)

In the Voyage navigation mode, route monitoring can be stopped by clicking the [Route] and [Unselect] buttons. When alert 691, 692 or 693 occurs, route monitoring is automatically stopped. See "route monitoring is stopped" in the Troubleshooting table in section 24.5 for details.

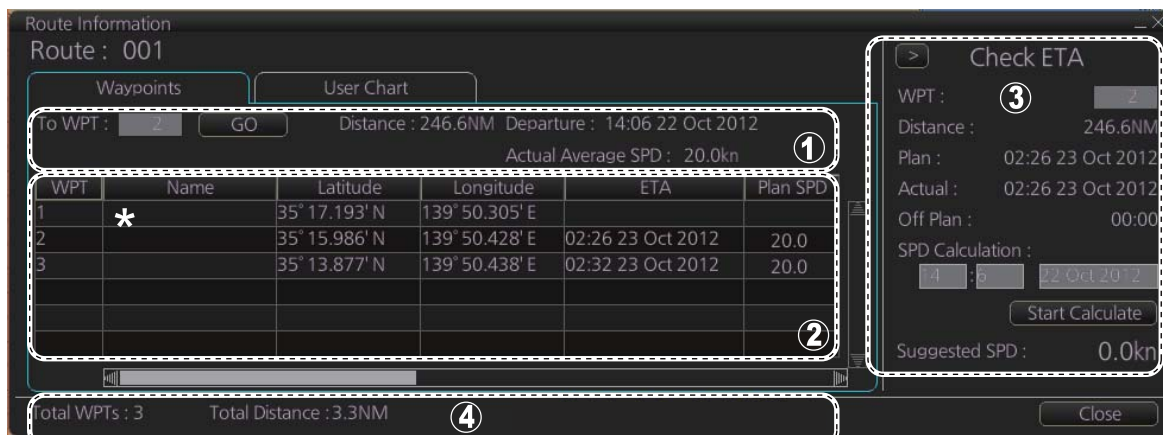
11.3 How to Select What Parts of a Route to Display

You can specify what parts of the monitored route to display. Click the [DISP], [SET] and [Symbol DISP] buttons on the InstantAccess bar. Click the [Route] tab.



11.4 How to View Waypoint Information

Click the [Route] and [Route INFO] buttons on the InstantAccess bar to show the [Route Information] dialog box. Click the [Waypoints] tab to show waypoint information.



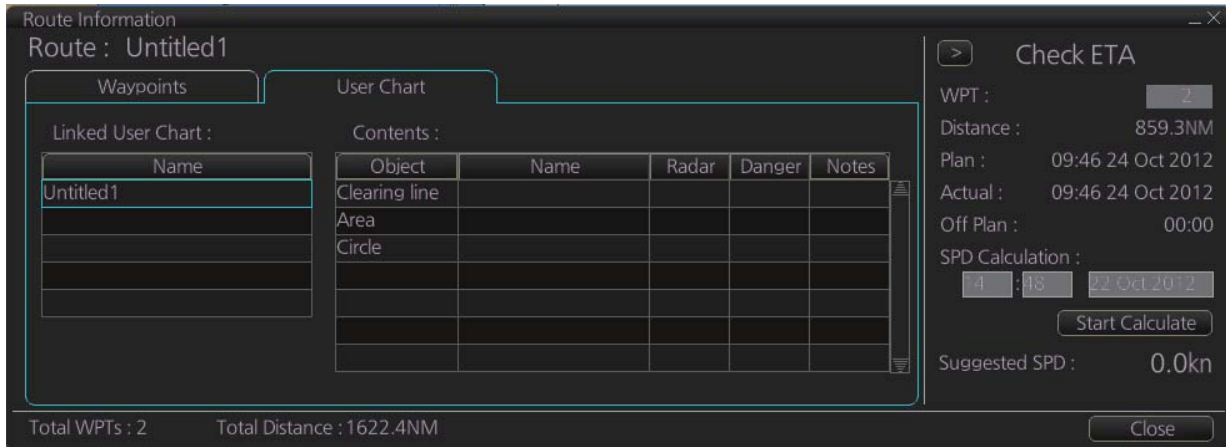
* Scroll list horizontally to view below items.

WPT	Leg/	Leg/NM	STR mode	RAD/NM	CH limit/m	SPD MAX	Margin/m
1							
2	154.0	3.6	Rhumbline	1.00	185	22.1	40
3	151.0	2.5	Rhumbline	1.00	185	22.1	40
4	161.1	3.0	Rhumbline	1.00	185	22.1	40
5	241.6	3.0	Rhumbline	1.00	185	22.1	40
6	321.5	5.2	Rhumbline	1.00	185	22.1	40

No.	Item	Description
1	To WPT, GO button	The system chooses a next waypoint automatically. Check that the To waypoint is the desired one. The system will automatically advance to a next waypoint when you pass the To waypoint. The default To WPT is WPT2. If you desire a different one, select it here and the click the [GO] button.
	Distance	Distance from current position to selected waypoint.
	Departure	The time the route was selected for monitoring.
	Actual Average SPD	Actual speed
2	Waypoint list	The waypoint list provides for each waypoint WPT no., name, latitude and longitude position, ETA, plan speed, bearing and distance to leg, steering mode (rhumb line or great circle), radius, channel limit, speed max, and margin.
3	Check ETA window	Parameters for checking ETA. The arrow to the left of [Check ETA] collapse or display the [Waypoints] and [User Chart] tabs.
	WPT, Distance	Select a WPT to find the distance to that waypoint from current position.
	Plan	The planned ETA to the selected waypoint.
	Actual	The actual ETA to the selected waypoint.
	Off Plan	The time difference between planned ETA and calculated ETA to final WPT, when different. The indication is prefixed with "-" if earlier than planned; "+" if later than planned.
	SPD Calculation	Enter ETA (time and date) to find the speed to use to arrive by the ETA.
	Suggested SPD	The system calculates suggested speed so that ETA to the WPT selected would be same as planned ETA if type of optimization was "Time table".
4	Total WPTs	The total number of waypoints in the route.
	Total Distance	The total distance of the route.

11.5 How to View User Chart Information

In the Voyage navigation mode, click the [Route] and [Select] buttons on the InstantAccess bar, select a route, click the [Open] button, then click the [User Chart] tab.



The [Linked User Chart] list shows all the user charts linked with the monitored route and their contents. Click a user chart name to show the contents of the chart in the [Contents] window. Items with a checkmark are activated. For the [Check ETA] window, see the preceding page.

11.6 How to Change Monitored Route to Planned Route

The monitored route can be transferred to the Voyage planning mode. This is useful when you don't need the route for monitoring but want to edit it. To transfer the monitored route, click the [Route] and [Move to Plan] buttons on the InstantAccess bar.

Up to five planned routes can be shown on the display. If you try to display another route, the route list appears. Deselect a route in order to transfer the monitored route to the Voyage planning mode.

Note: When the monitored route is changed to a planned route, using the [Move to Plan] function, the operating mode changes from the Navigation voyage mode to the Voyage planning mode. If this operation is tried directly after the ECDIS starts and the change does not occur, click the [NAVI] button on the Status bar then try again.

11.7 How to Use Instant Track to Return to or Deviate from Monitored Route

The instant track feature provides a temporary track, consisting of four waypoints, to return to or deviate from the monitored route. Correct data from navigation sensors is essential to this function.

There are two instant track modes: [Safe Off Track] and [Back to Track].

[Safe Off Track]: This mode provides a track from the monitored route to a safe location to avoid collision or the like.

[Back to Track]. This mode creates a track to follow to return to the monitored route when the vessel goes outside the channel limits.

The mode is automatically selected according to whether a monitored route is active or not and the amount of off course. Further, if a monitored route is active while following the instant track route, the instant track mode can be changed manually.

Condition	Mode	Manual mode switching
Neither monitored route nor instant track route active.*	Safe Off Track	No
<ul style="list-style-type: none"> Both monitored route and instant track route are active.* The absolute value of off track is within the channel limit setting. 	Safe Off Track	Yes
<ul style="list-style-type: none"> Both monitored route and instant track route active.* The absolute value of off track is outside the channel limit setting. 	Back to Track	Yes

* An additional instant track route can be joined to the instant track route related to a monitored route.

The parameters for the instant track (channel limit, turn radius, etc.) can be set on the [Instant Track] page. See section 21.4.

11.7.1 Safe off track mode

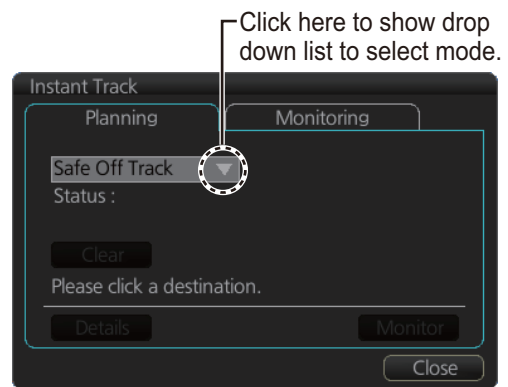
If it becomes necessary to deviate from the monitored route; for example, to avoid collision, use the [Safe Off Track] mode to create an instant track to a safe location.

1. With a monitored route active, click the [Instant Track] button on the InstantAccess bar to show the [Instant Track] dialog box. The message "Please click a destination." appears on the [Planning] page.

Note 1: If a monitored route is active, the [Back to Track] mode can also be selected.

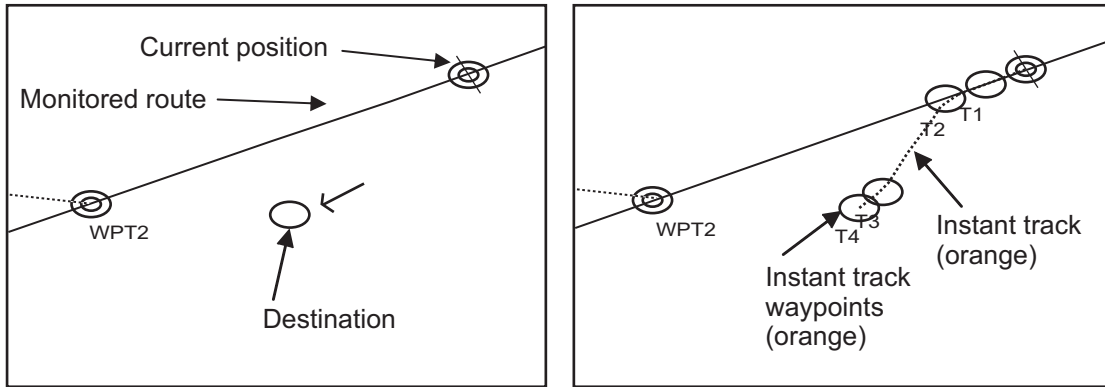
Note 2: If a monitored instant track route is already active, an instant track mode different from the currently active one can be selected.

2. Click a destination. The location is marked with an orange circle and arrow. The message "Please click a point to decide an angle." appears in the [Instant Track] dialog box. The location must be within 50 NM of current position.



When monitored route is active

- Roll the trackball to select the angle of approach to the destination then click.



① Click destination point. A circle and arrow appear.

② Click a location to set desired angle of approach. Instant track is drawn.

The system uses ship position, speed, angle of approach to create an instant track route. The track is also checked for hazardous objects and the like against the chart alerts.

During the calculation, the [Instant Track] dialog box window shows "Checking" in the [Status] field. If, after completion of the calculation, the track is suitable, the message "OK" replaces "Checking". The track and its waypoints, labeled [T1] - [T4], are colored orange. The track is saved to the database as "Instant Track_XXX" (XXX=001 - 400).

If there is a problem with the track, an error message appears and the track is erased from the screen. See section 11.7.3 for all the instant track messages and their meanings.

To return to the monitored route, click a waypoint on a leg of the route to create an instant track route to use to return to the monitored route.

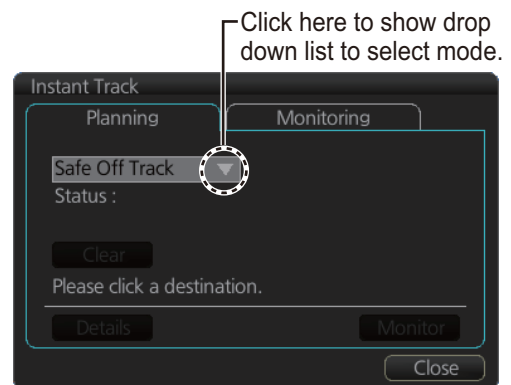
11.7.2 Back to track mode

When the vessel goes off track, the alert "172 Off Track Alarm" appears in the [Alert] box. To create an instant track to return to the monitored route, use the [Back to Track] mode as follows:

- With a monitored route active, click the [Instant Track] button on the InstantAccess bar. The message "Please click a WPT on Leg." appears on the [Planning] page.

Note 1: If a monitored route is active, the [Safe Off Track] mode can also be selected.

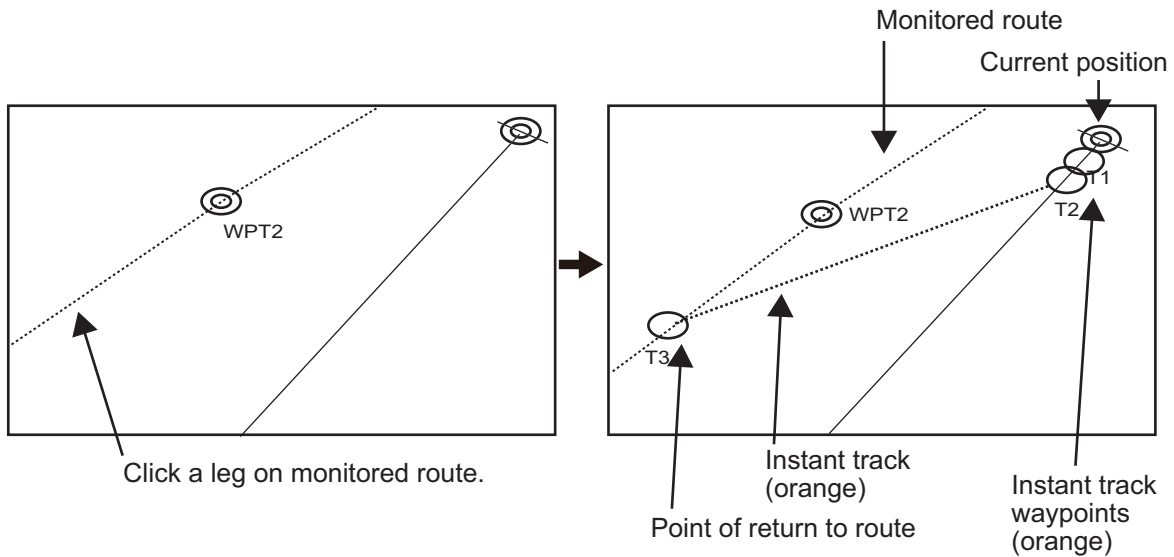
Note 2: If a monitored instant track route is already active, an instant track mode different from the currently active one can be selected. Further, a completely new instant track route to the original monitored route can be created.



When monitored route is active

11. HOW TO MONITOR ROUTES

2. Click a leg or a waypoint on the monitored route. The location must be within 50 NM of current position.



The system uses ship position, speed and final waypoint to create a track. The track is also checked for hazardous objects and the like against the chart alerts.

During the calculation, the [Instant Track] dialog box shows "Checking" in the [Status] field. If, after completion of the calculation, the track is suitable, the message "OK" replaces "Checking". The track and its waypoints, labeled [T1] - [T3], are colored orange. The track is saved to the database as "Instant Track_XXX" (XXX=001 - 400).

If there is a problem with the track, an error message appears and the track is erased from the screen. See section 11.7.3 for all the instant track messages and their meanings.

11.7.3 Instant track messages

The table below shows all the instant track messages and their meanings.

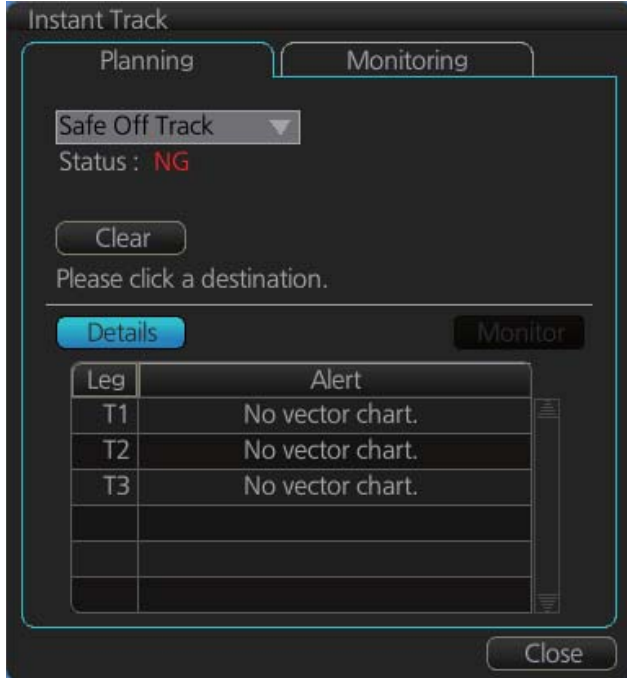


Message	Meaning	Color
(1) Instant Track mode		
"Back to Track"	Back to track mode	White
"Safe Off Track"	Safe off track mode	White
(2) Check result, error message		
"Could not create the Track."	The track could not be created.	Yellow
"Too far destination from own ship."	Selected destination is 50 NM or more from current position.	Yellow
"Checking"	Checking route.	Red
"OK"	Instant track checked and is suitable to follow.	Green
"NG"	Route check failed.	Red
"Check error"	Route check error.	Red
"Instant track is expired."	Route monitor timeout.	Red
"Too many WPTs in monitoring route."	More than 190 waypoints are in the monitored route. (Instant track cannot be created.)	Red
(3) User operation message		
"Please click a destination."	Select a destination in the [Safe Off Track] mode.	White
"Please click a point to decide an angle."	Set the angle of approach in the [Safe Off Track] mode.	White
"Please click a WPT on leg."	Click a waypoint on a leg in the [Back to Track] mode.	White
(4) Name of instant track route		
InstantTrack_XXX (XXX: 0001 - 400)	Name of monitored instant track route	White

11.7.4 Instant track details

You can see the location and alert type found in an instant track by clicking the [Details] button on the [Instant Track] dialog box.

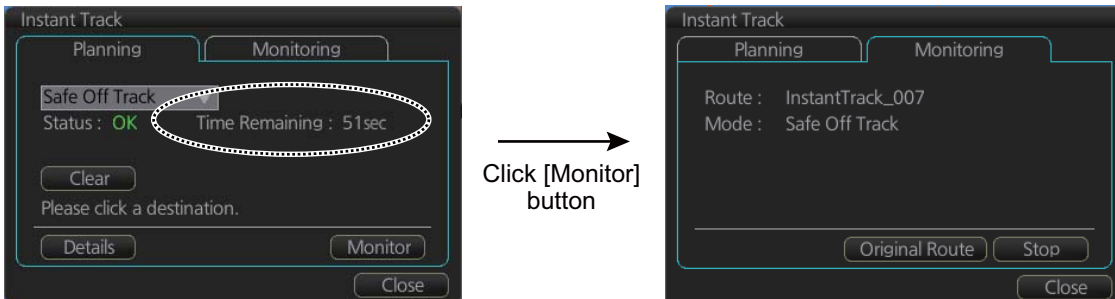
Note: If the Status is not [OK], an alert (alarm or warning priority, depending on setting) appears in the Alert box.



11.7.5 How to monitor, stop monitoring an instant track route

How to monitor an instant track route

If the route check results is "OK", click the [Monitor] button on the [Planning] page in the [Instant Track] dialog box to start monitoring the instant track route. Click the button before the time remaining counts to zero, otherwise the instant track will be cancelled, followed by the message "Instant track is expiration." After the [Monitor] button is clicked the [Monitoring] page is opened. The [Monitoring] page shows the name of the instant track and the instant track mode.



The vessel follows the instant track route in the same method as a monitored route, which is greyed out to indicate it is inactive. For the instant track route connected to a monitored route, the previous instant track route is also greyed out to show it is inactive. Any additional instant track routes are erased.

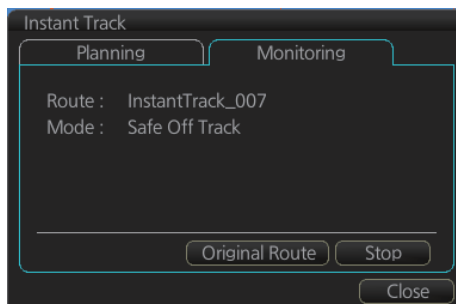
To close the [Instant Track] dialog box, click the [Close] button. (The system continues monitoring the instant track route.)

The following occurs when sensor data is lost while using the instant track function.

Monitoring condition	Result
Instant track route monitoring.	<ul style="list-style-type: none"> An instant track route under creation is deleted. No route can be created. The [Stop] button is pushed or the instant track route is followed until its completion. After the instant track route is completed, an error message appears and the [Instant Track] dialog box closes.
No monitored route	An instant track route under creation is deleted.
Monitored route active	After the route is completed, an error message appears and the [Instant Track] dialog box closes.

How to stop monitoring an instant track route

Click the [Stop] button on the [Monitoring] page in the [Instant Track] dialog box to stop monitoring the instant track route. The system returns to monitoring the monitored route and the [Planning] page of the [Instant Track] dialog box opens.

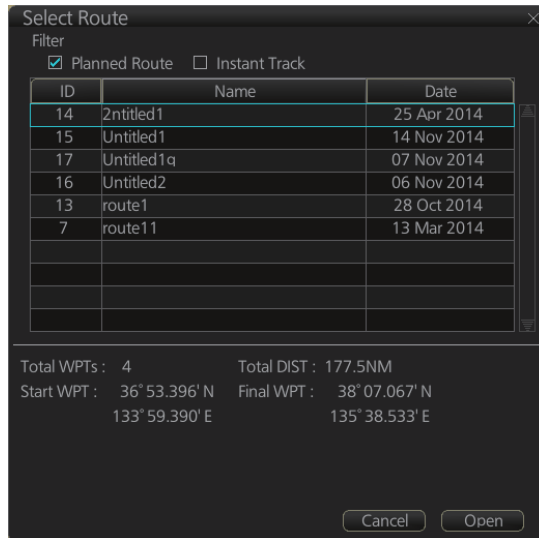


For the [Back to Track] mode, the instant track mode is canceled when the vessel returns to the monitored route. The instant track is greyed out to show that it is inactive.

11.7.6 How to return to a monitored route when following an instant track route (safe off track mode only)

Do the following to return to a monitored route while following an instant track route.

1. While monitoring an instant track route, click the [Original Route] dialog box and its [Monitoring] page in the [Instant Track] dialog box to show the [Select Route] dialog box. Check [Planned Route] to show a list of planned routes, or check [Instant Track] to show a list of instant track routes.

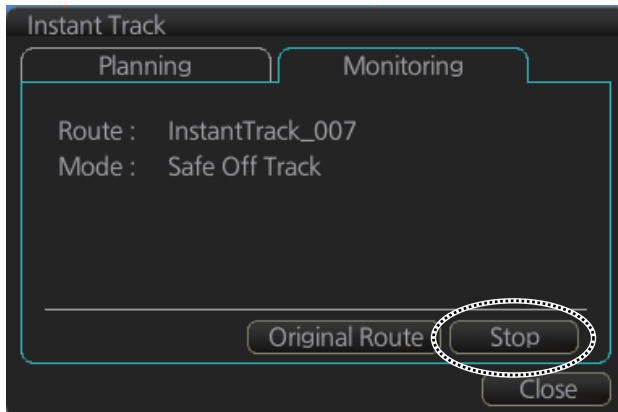


2. Select the route to use. The original route or the instant track route currently in use cannot be selected.
3. Click the [Open] button to close the dialog box. The vessel starts following the newly selected route.

When an instant track route is completed, the vessel starts following the route selected at step 2.

11.7.7 Button label and equipment state

The label on the button at the position circled in the figure below changes according to the state of the instant track.



Instant track state	TCS state	Button label
Creating	OFF	Monitoring
	ON	Execute (same function as Monitoring)
Monitoring	OFF	Stop
	ON*	Stop
Return to original route after back to track mode	OFF	Reset (Instant track is deleted; another instant track maybe created)
	ON	Reset

* Button inoperative.

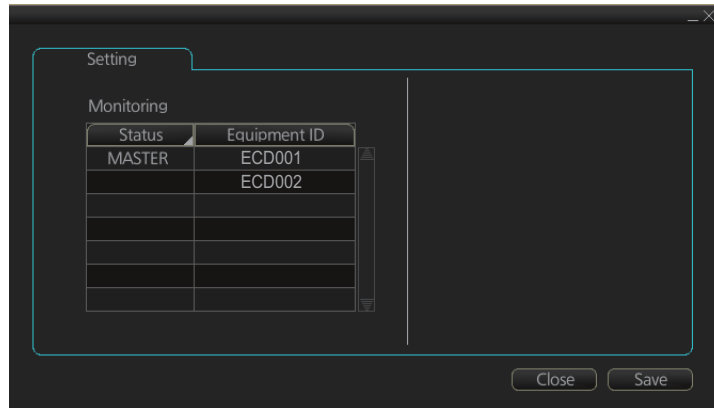
11.8 How to Share Route During Route Monitoring

With multiple FMD-3x00 units the backup setting works as follows:

- **Backup ON:** When route monitoring begins from the master unit (determined at installation), the backup units (other FMD-3xx0) display the route and monitor it.
- **Backup OFF:** When route monitoring begins from the master unit, the backup units display route information in the Route Information box.

Follow the procedure below to set master and backup units.

1. On the menu, select [Monitoring] from the [Shared] menu to show the [Setting] dialog box.



2. Right click the equipment ID of the unit to set to show the pop-up menu. Select [MASTER] or [BACKUP].
Only one unit can be a master unit. All other units are backup. One unit must be as master unit.
Note 1: To turn off the sharing the feature for a unit, select [CLEAR] from the pop-up menu.
Note 2: To restore the original setting for a unit, click the Status column, then select [Reset].
3. Click the [Save] button to save settings, then click the [Close] button to finish.

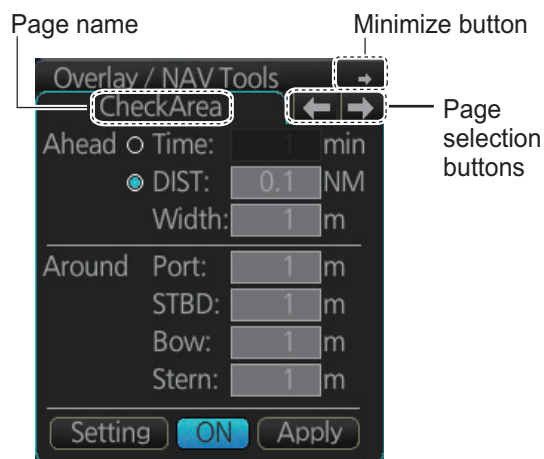
12. NAVIGATION TOOLS

This chapter presents the various navigation tools available with the system. With the exception of the divider, the tools listed below are in the [Overlay/NAV Tools] Box.

- TT/AIS (see chapters 13 and 14)
- Echo (see chapter 16)
- Parallel index lines
- Check area
- Range rings
- Predictor
- Anchor watch
- Under keel clearance
- Divider

12.1 How to Access the Nav Tools in the Overlay/NAV Tools Box

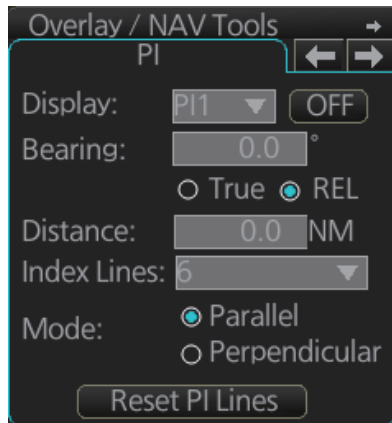
The [Overlay/NAV Tools] box is located at bottom-right position on the screen. Use the page selection buttons to select desired page.



Overlay/NAV Tools box (Check Area page)

12.2 Parallel Index (PI) Lines

The parallel index lines are useful for keeping a constant distance between own ship and a coastline or a partner ship when navigating. There are six sets of PI lines (PI-P6) and you can turn them on or off individually. Select the PI line to process with the [Display] pull-down list then click the [ON] or [OFF] button as appropriate. One, two, three or six lines can be shown - the actual number of lines shown depends on the line interval.



The bearing can be set two ways: with the scrollwheel or dragging the PI line on the screen.

12.2.1 How to activate, deactivate PI lines

Select the PI line set to activate or deactivate, with the [Display] drop-down list. Activate or deactivate the set selected with the [ON/OFF] button. A maximum of six sets can be shown.

12.2.2 PI line bearing reference

PI line bearing reference may be relative to own ship's heading (Relative) or referenced to North (True). Select [True] or [REL] as applicable.

12.2.3 Number of PI lines to display

The maximum number of PI lines to display may be selected from 1, 2, 3 or 6 lines as below. The actual number of lines visible may be less depending on line interval. Select the number of lines to display at [Index Lines].

12.2.4 PI line mode

The PI line mode can be set for parallel (0-degrees) or perpendicular (90-degrees). Select [Parallel] or [Perpendicular] at [Mode].

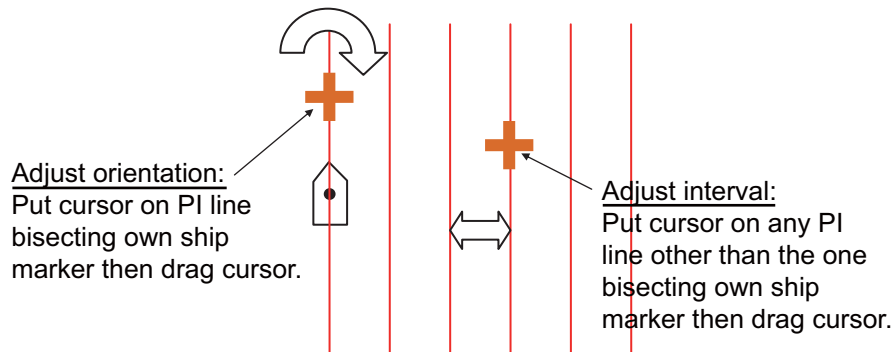
12.2.5 How to adjust PI line orientation, PI line interval

There are two ways to adjust PI line orientation and PI line interval: through the menu and on the screen.

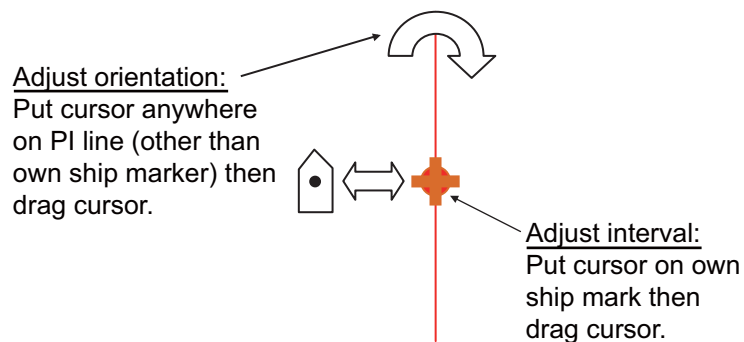
How to adjust PI line orientation, PI line interval from the menu

1. Set the orientation with [Bearing].
2. Set the line interval with [Distance].

How to adjust PI line orientation, PI line interval on the screen



How to adjust orientation and interval, multiple PI lines



How to adjust orientation and interval, single PI line

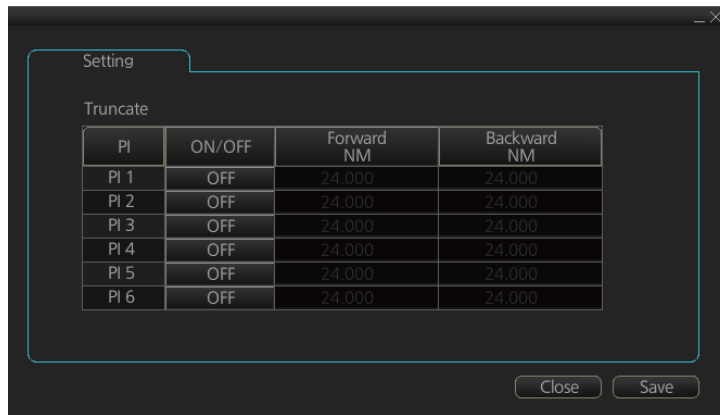
12.2.6 How to reset the PI lines

You can automatically return PI lines to default orientation, 0-degrees for parallel orientation, 90-degrees for perpendicular orientation. This is faster than doing it manually. Click the [Reset PI Lines] button to reset the parallel lines.

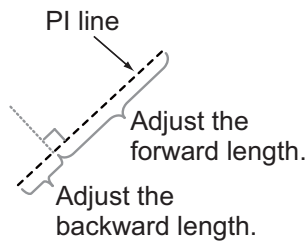
12.2.7 How to adjust PI line length

You can adjust the forward and backward lengths of a PI line when [Index Lines] is set to 1.

1. Open the main menu and select [NAV Tools], [PI Lines] and [Truncate].



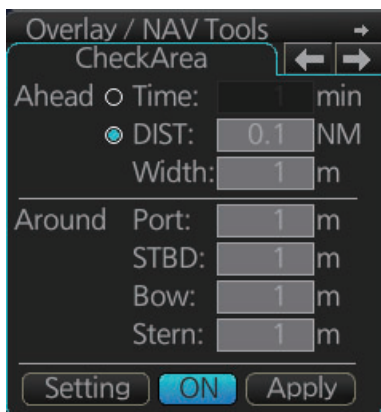
2. If not already displayed, click the ON/OFF button to display the PI line whose length you want to adjust.
3. Click the value in [Forward] and [Backward] columns to adjust their lengths, referring to the illustration below.



4. Click the [Save] button to finish.

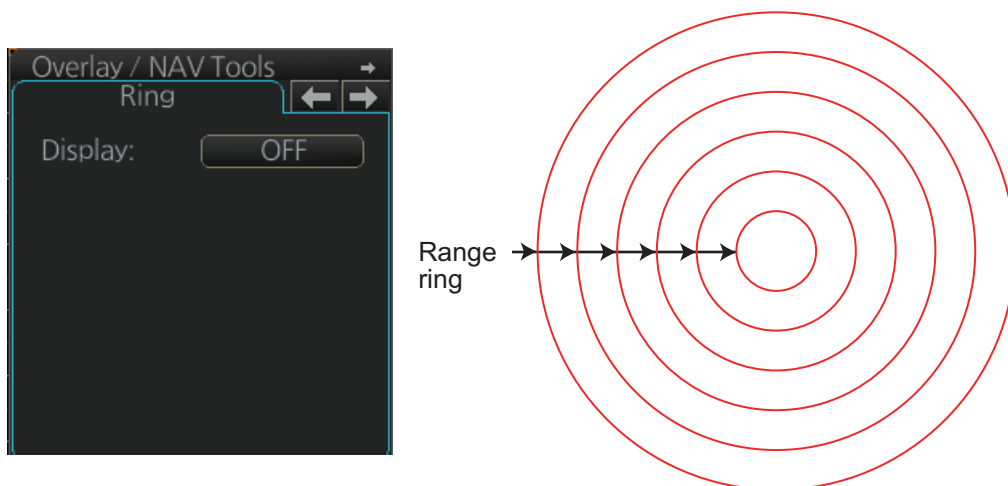
12.3 Check Area

Check area sets the area ahead and around own ship for which to check for safe navigation. See section 8.2 for how to activate own ship check.



12.4 Ring

The range rings are the concentric set of rings on the ECDIS display. They provide an estimation of the range to an object. You can turn them on or off from the [Ring] page.



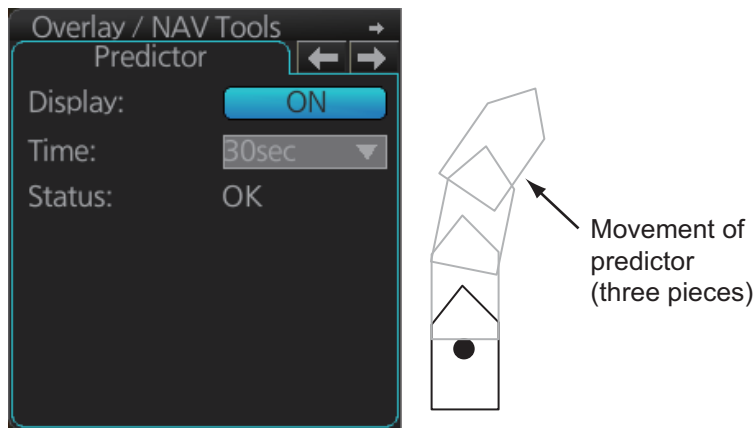
The interval between rings changes with the chart scale, as shown in the table below.

Chart scale	Ring interval (nm)	Chart scale	Ring interval (nm)
1:1,000	0.025	1:100,000	2.0
1:2,000	0.05	1:200,000	4.0
1:5,000	0.10	1:500,000	8.0
1:10,000	0.25	1:1,000,000	16.0
1:20,000	0.5	1:2,000,000	20.0
1:50,000	1.0		

12.5 Predictor

The predictor is a tool for estimating your ship's future positions and behavior. The on-screen predictor graphic consists of three pieces of your ship, drawn in true scale to successive future positions. The position of the third symbol will be your approximate position at the end of the time interval selected. The predictor is calculated using current speed and rate of turn. Docking speed components (transversal bow speed, transversal stern speed, transversal center speed and rate of turn) are assumed to be stable during the prediction period. The predictor can be used in every steering-state, including manual steering.

To activate and set the Predictor, show the [Predictor] page. Turn the display on or off with [Display]. Set the time (30, 60, 90, 120, 150, 180 seconds), with [Time].



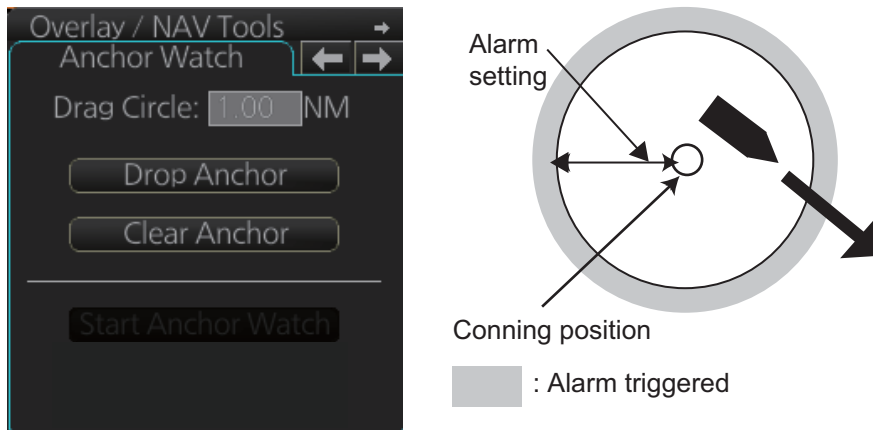
The Predictor is updated every three seconds internally and the status of the predictor is shown with [Status] as shown in the table below.

Indication	Status
OK	Speed is suitable (0.5 kn or higher).
Not Enough Speed	Speed is too low (under 0.5 kn) to use the Predictor.
Not Available. Reset Filter May Restore.	Predictor is not being received.

Note: The ship speed must be 0.5 kn or higher. The predictor may not be displayed or may not work properly if the speed is lower than that value.

12.6 Anchor Watch

The anchor watch feature checks to see if your ship is drifting when it should be at rest.



To set the anchor watch:

1. Select the [Anchor Watch] page.
2. Set the alarm radius (in nautical miles) with [Drag Circle].
3. Drop the anchor then click the [Drop Anchor] button.
4. Click the [Start Anchor Watch] button to start the anchor watch.

If your vessel travels from the CCRP more than the distance set here, the corresponding caution is generated.

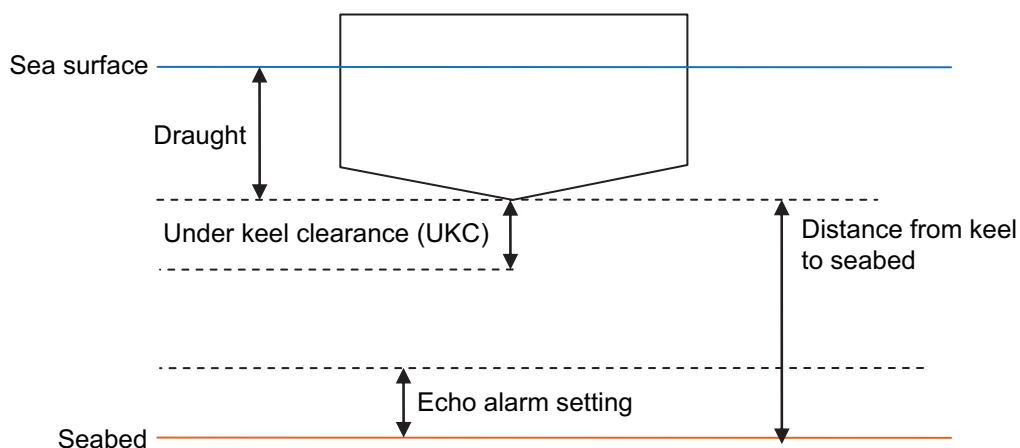
To continue to use the anchor watch, click the [Clear Anchor] button to set the alarm about your conning position. To stop the anchor watch, click the [Stop Anchor Watch] button. The caution is not generated even if your ship drifts more than the distance set with [Drag Circle].

If your ship drifts more than the anchor watch setting, the Alert 495 “Anchor Watch Setting” appears.

12.7 UKC (Under Keel Clearance)

12.7.1 UKC overview

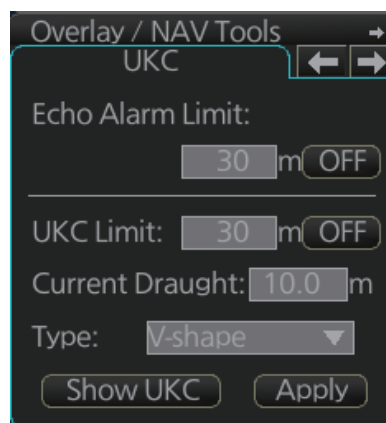
The UKC is the distance between the deepest point of the vessel's hull and the seabed. The UKC feature continuously checks ship's draught setting (UKC), and actual depth. When the depth gets shallower than the UKC, the Alert 634 "UKC Limit" is generated. And if the current depth is less than the echo alarm setting the echo alarm also is generated. Depth data is required to use the UKC function.



Note: The sensor value shown is the depth to the transducer. Convert the value to the distance to the keel.

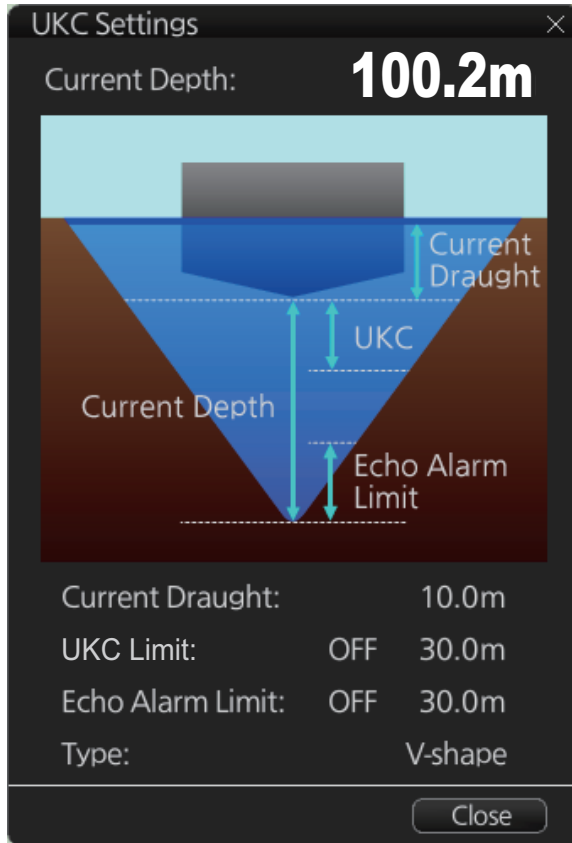
12.7.2 How to set UKC

1. Select the [UKC] page from the [Overlay/NAV Tools] box.
2. Use [Echo Alarm Limit] to set the distance for the echo alarm. To activate the alarm, click the [ON/OFF] button to show [ON].
3. At [UKC Limit], set ship's UKC limit. To activate the UKC feature, click the [ON/OFF] button to show [ON].
4. Use [Current Draught] to set your ship's draft. Be sure to change the setting whenever the draft changes.
5. Use [Type] to set how to show the seabed in the [UKC] window, [V-shape] or [Concave]. See the figure on the next page.
6. Click the [Apply] button to affect the changes.

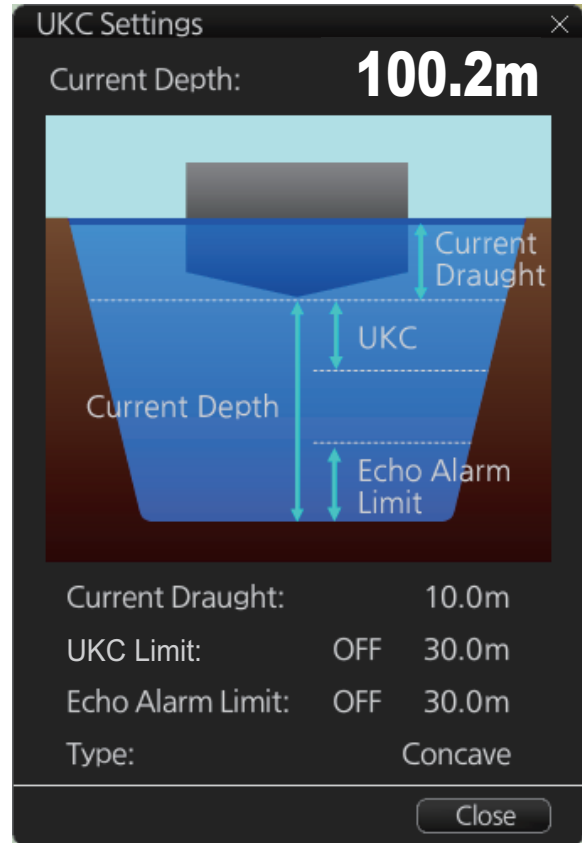


12.7.3 UKC window

The UKC window provides a visual graphic of the relationship between UKC, draft and current depth. The window can be shown or hidden as desired and located anywhere within the electronic chart area. To show the window, click [Show UKC] on the [UKC] page. To move the window, drag and drop.



V-shape seabed presentation



Concave seabed presentation

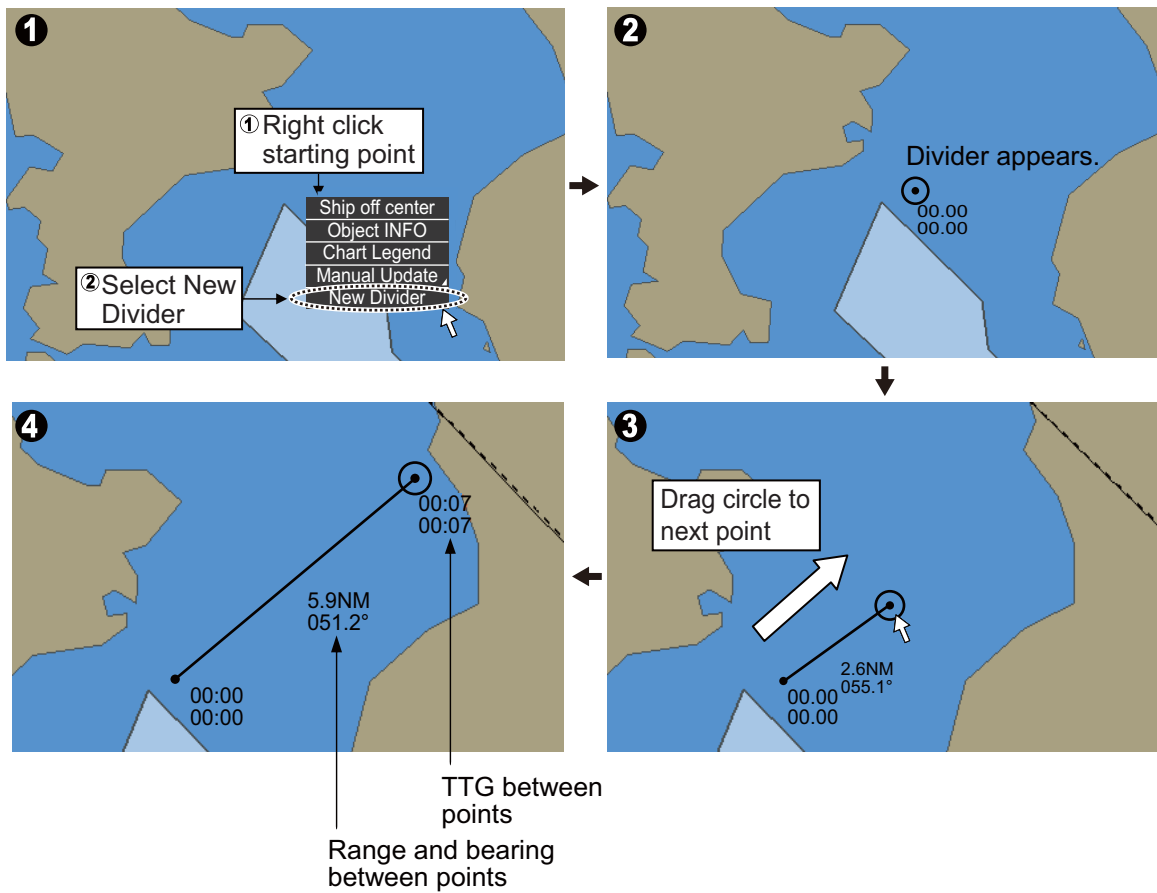
12.8 Divider

The divider, available in the Voyage navigation and Voyage planning modes with rhumb line navigation, measures the range, bearing and TTG (Time To Go) between points, like using a dividers on a paper chart.

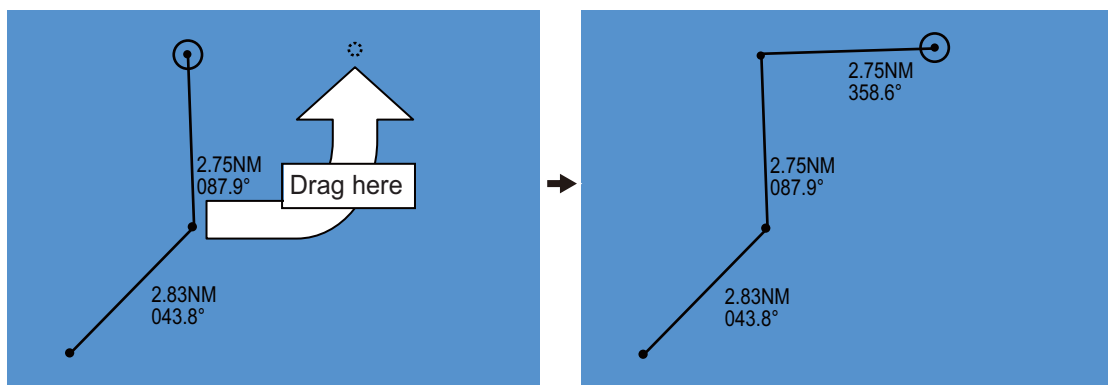
Only one divider can be displayed. The divider is neither saved nor shared among ECDIS units.

12.8.1 How to use the divider

Do as shown below to get the range, bearing and TTG between points.



You can also drag from an intermediate point to make another point.

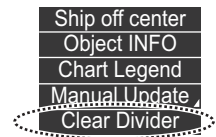


12.8.2 Usage characteristics, limitations

- The distance between points is shown to the hundredths decimal place up to 100 NM and to the tenths decimal place thereafter.
- A maximum of 50 points can be inserted, and the maximum measurable distance between two points is 240.0 NM.
- The TTG value is rounded to the nearest decimal place. Therefore, the displayed total TTG may not equal the sum of all the TTGs.
- The TTG is measurable to 99:00. If the TTG is higher, the TTG indication is ">99:00".
- The ship's speed must be at least 0.5 kn to calculate TTG.
- The divider cannot be used in latitude higher than 85°.
- In the split screen display, the divider is viewable on both the main and sub views, but is operable only on the main view.

12.8.3 How to deactivate and erase the divider

Get into the Voyage navigation or Voyage planning mode then right-click the screen to show the context-sensitive menu. Select [Clear Divider].



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13. TRACKED TARGET (TT) FUNCTIONS

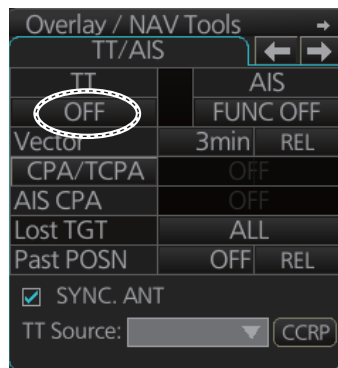
With connection to a radar, the movement of a maximum of 100 radar-tracked targets can be shown on the chart.

The data of received TT must have reference to ground. If the data does not meet that criteria, target vectors are not shown and the indications COG and SOG in the TT info data box show [missing].

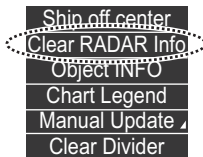
13.1 How to Show, Hide TT

Do the following to show or hide the TT.

1. Select the [TT/AIS] page from the [Overlay/NAV Tools] box.
2. Click the indication circled in the figure below to show [ON] or [OFF] as appropriate.










Note: The TT display, together with the AIS and radar displays, can also be hidden from the context-sensitive menu. Right-click the display area then select [Clear RADAR Info].



13.2 TT Symbols and TT Attributes

13.2.1 TT symbols

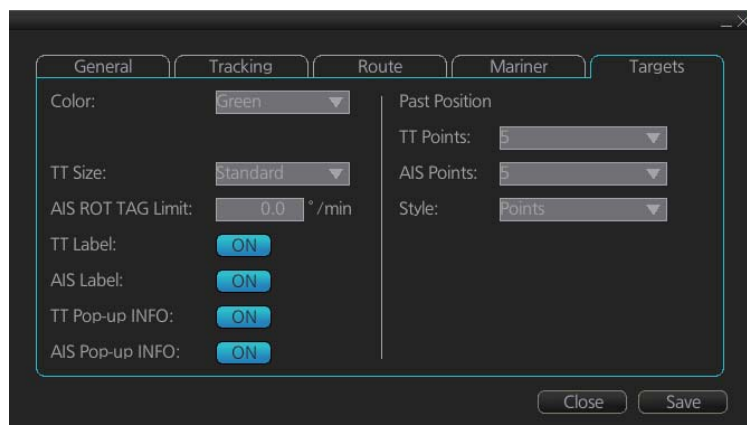
The symbols used in this equipment comply with IEC 62288.

Symbol	Default color	Name	Description
	Green	Past position point	Marks a past position of a TT.
	Green	Target under manual acquisition	A target acquired manually is initially indicated with a dashed circle.
	Green	Acquired target	Thick solid circle with vector indicating steady state tracking (within three minutes after acquisition).
	Red	Dangerous target	Dangerous TT (thick solid circle). The ECDIS has its own definition for dangerous target limits, thus a radar may show a target as dangerous while ECDIS shows it as safe and vice versa.
	Green	Reference target	Used to calculate own ship's over-the-ground speed (echo-referenced speed) for ground stabilization.
	Red	Lost target	Mark a lost TT.
	Green	Target selected	TT selected to show its data.

13.2.2 TT symbol color and size

The color and size of the TT symbol can be changed to your liking. Note that the color of the AIS symbol is also changed.

1. Click the [DISP], [SET] and [Symbol DISP] buttons on the InstantAccess bar to show the [Symbol Display] menu.
2. Click the [Targets] tab.



3. Select the color among, green, blue, black, magenta and brown, with the [Color] pull-down list.
4. Select the size from standard or small, with the [TT Size] pull-down list.

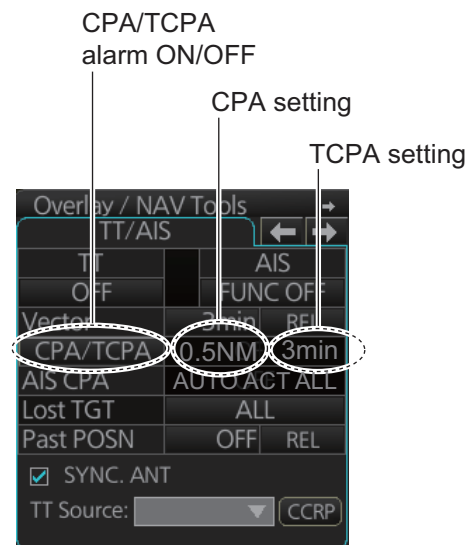
13.3 TT CPA/TCPA Alarm

A dangerous TT is one whose CPA and TCPA are within the range of the CPA and TCPA limits set on the [TT/AIS] page in the [Overlay/NAV Tools box]. A dangerous TT is displayed as a blinking target symbol in red until you acknowledge the "TT CPA/TCPA" alert. Then the target symbol is displayed in red color.

When a TT whose CPA or TCPA is within the limits set here the buzzer sounds and the Alert 526 "TT CPA/TCPA" appears in the [Alert] box.

13.3.1 How to set the CPA and TCPA limits, enable, disable the alarm

1. Select the [TT/AIS] page from the [Overlay/NAV Tools] box.
2. If the CPA and TCPA alarm is disabled, click [CPA/TCPA] to activate it.
3. Put the cursor on the CPA indication then use the scrollwheel or left button to set the CPA.
4. Put the cursor on the TCPA indication then use the scrollwheel or left button to set the TCPA.
5. Click the [CPA/TCPA] alarm indication to enable or disable the alarm. The alarm is disabled when the CPA and TCPA indications are greyed out.



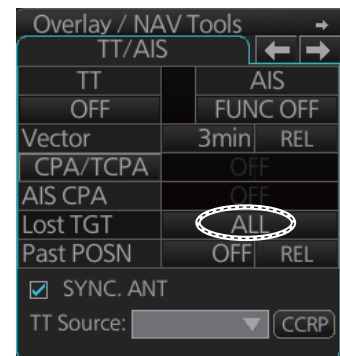
13.4 Lost TT Alarm

A lost TT is displayed on the ECDIS as a blinking target symbol in red. You can set how the lost TT alarm sounds against lost targets as shown below.

13.4.1 How to enable, disable the lost TT alarm

1. Select the [TT/AIS] page from the [Overlay/NAV Tools] box.
2. Put the cursor on the Lost TGT indication then push the left button to display [OFF], [FILT], or [ALL].
 - OFF:** Disable lost target alarm
 - FILT:** Alarm sounds against TT meeting a specific criteria.
 - ALL:** Alarms sounds against all lost TT.

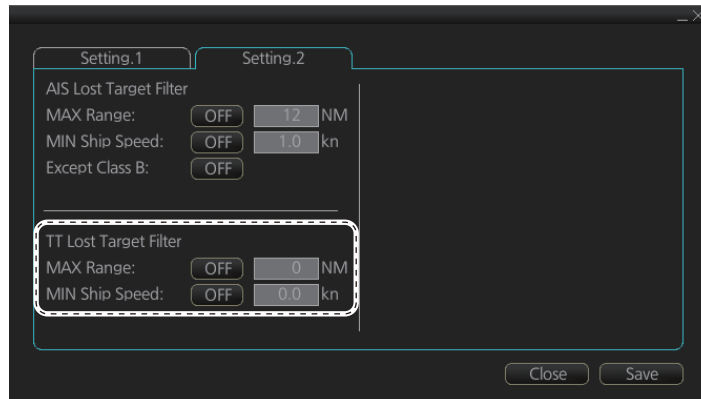
When a lost TT is within the limits set here the buzzer sounds and the Alert 527 "TT Lost" appears in the [Alert] box.



13.4.2 How to set the lost TT alarm filter

If you are in a congested area the lost TT alarm may sound against many TT. In this case, you can prevent the alarm from sounding against TT that are under a certain range and/or speed.

1. Right-click the setting of [Lost TGT] on the [TT/AIS] page in the [Overlay/NAV Tools] box, select [Setting] and open the [Setting.2] page.
(The [Setting.2] page can also be opened from the menu (MENU→[TT/AIS]→[Setting.1]→[Setting.2].)



2. In the [TT Lost Target Filter] window, set the maximum range to track a target and the minimum ship speed to track.
MAX Range: The maximum range at which to track a lost target. A TT not within this range is not tracked.
MIN Ship Speed: A TT whose speed is slower than set here does not trigger the lost target alarm.
3. Click the [ON/OFF] button to show ON or OFF as appropriate.

13.5 How to Set Vector Length and Vector Motion

Ground stabilization and sea stabilization

Target vectors can be ground stabilized or sea stabilized in the True Motion mode. To select speed over the ground or speed through the water data, open the [SPD] page from the [System Sensor Settings] or [Local System Settings] menu. Select [Bottom] for ground stabilization or [Water] for sea stabilization. The Vector mode indication shows the stabilization mode in the true motion as [True-G] or [True-S]

Sea stabilization is a mode where own ship and all targets are referenced to the sea using a compass heading and single-axis log water speed inputs in the true motion mode. Ground stabilization is a mode where own ship and all targets are referenced to the ground using the ground track or set and drift inputs. If the accuracy seems unsatisfactory, enter set and drift corrections.

True vector

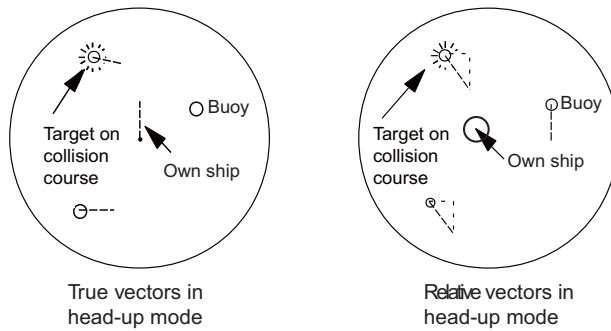
In the true motion mode, all fixed targets such as land, navigational marks and ships at anchor remain stationary on the radar overlay with vector length zero. But in the presence of wind and/or current, the vectors appear on fixed targets representing the reciprocal of set and drift affecting own ship unless set and drift values are properly entered.

In) the true vector mode, there are two types of stabilization: ground stabilization (True-G) and sea stabilization (True-S). The stabilization mode is automatically selected according to speed selection, as shown in the table below.

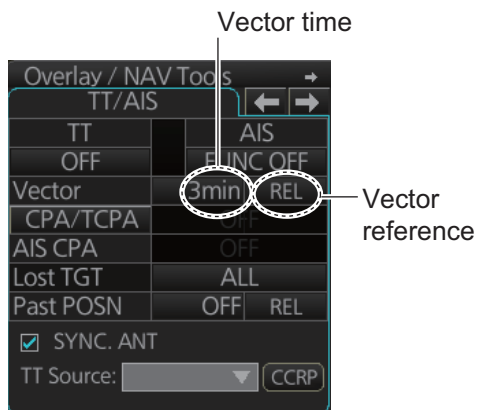
Speed selection	True vector mode
LOG(WT)	True-S
LOG(BT)	True-G
POSN	True-G
REF	True-G
MAN	True-S
MAN w/set & drift	True-G

Relative vector

Relative vectors on targets that are not moving over the ground such as land, navigational marks and ships at anchor will represent the reciprocal of own ship's ground track. A target whose vector passes through own ship is on a collision course. (Dotted lines in the figure are for explanation only.)



To set the vector, click the vector time and vector reference indications in the [TT/AIS] page to set them.



13.6 How to Display TT Data

13.6.1 How to display target data for individual TT

By Control Unit

Put the cursor on a TT then push the **TARGET DATA** key.

By trackball

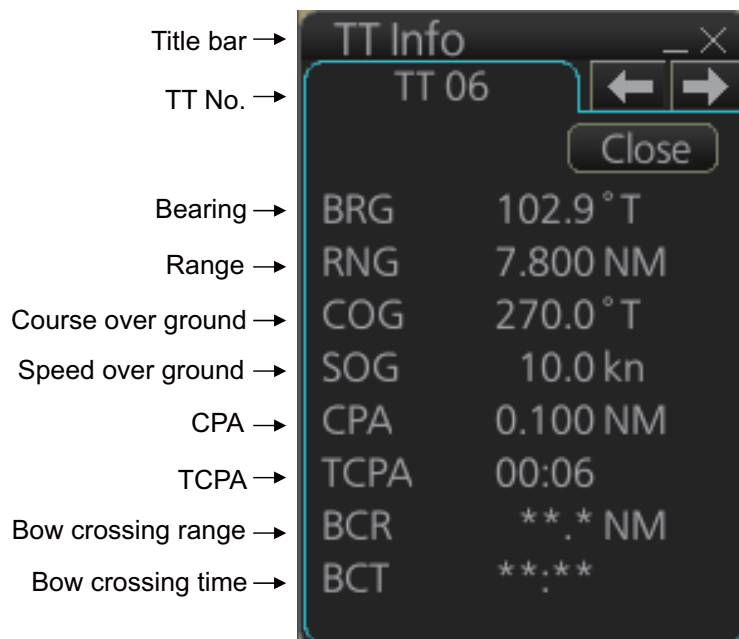
Click the target for which you want to show its data.

TT data

To erase TT data from a data box, click the appropriate close data button.

The basic TT data display shows the following information:

- Target's number. The same number as the matching target on the radar. When a target is erased the number will not be reused until the power is re-set or more than 100 targets are acquired.
- Bearing (BRG) and distance (RNG) of the target from own ship
- True speed (SOG) and true course (COG) of the target
- CPA and TCPA. A negative TCPA value means that you have already passed the closest point and the TT is going away from own ship.
- Bow Closest Range (BCR) and Bow Closest Time (BCT)



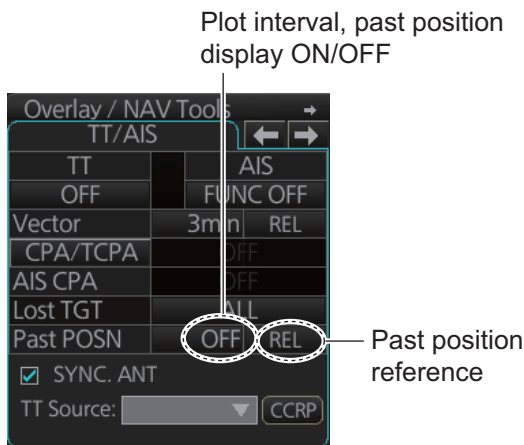
13.7 Displaying Past Positions of TT

The past position display shows equally time-spaced dots marking past positions of TT. A new dot is added at preset time intervals until the preset number is reached. If a TT changes its speed, the spacing will be uneven. If it changes course, its plotted course will not be a straight line.

You can set the plot interval and the presentation mode on the [TT/AIS] page in the [Overlay/NAV Tools] box, at the locations circled in the illustration below.

13.7.1 How to enable/disable the past position display, select past position reference

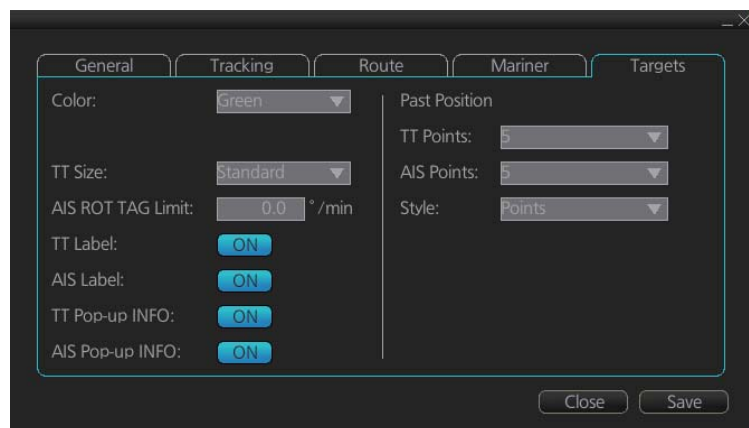
Select the [TT/AIS] page from the [Overlay/NAV Tools] box. Click the indications circled in the figure below to set the plot interval (or disable the display) and the past position reference (true or relative).



13.7.2 Past position point attributes

You can define past position point attributes for TT by points and style.

1. Click the [DISP], [SET] and [Symbol DISP] buttons on the InstantAccess bar to show the [Symbol Display] menu.
2. Click the [Targets] tab.

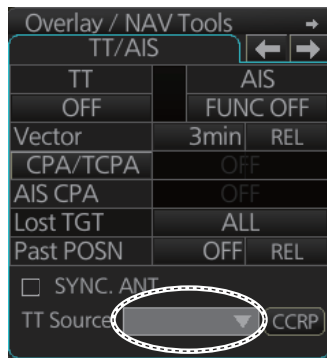


3. At [TT Points], select the number of points to show.
4. At [Style], select the style for the past position points. The choices are [Points] and [Points and Dots].

13.8 TT Source

The TT source can be either a radar antenna or the TTM sentence. Normally, select the radar antenna chosen to display radar echoes as the TT source.

To automatically select the radar currently displaying radar echoes as the TT source, check the [SYNC. ANT] box on the [TT/AIS] page in the [Overlay/NAV Tools] box.



The TT source is either antenna or TTM data



CCRP button

With SYNC. ANT checked, the antenna chosen to display radar echoes is automatically selected as the TT source.

TT source and usage characteristics

- Antenna (RAS001 to RAS010) or other sensor (OTR001 to OTR010) whose SFID (Service Flow ID) starts with [RA].
Antenna example: RAS001 is shown as [ANT_1], RAS002 is shown as [ANT_2].
Other sensor example: The SFID set at installation; for example, RA0201.
- With [SYNC. ANT] checked, the antenna selected on the [Echo] page in the [Overlay/NAV Tools] box is marked with an asterisk.
- With [SYNC. ANT] checked, the checkmark is removed when a selection is made the drop-down box.
- SYNC. ANT is inoperative if no antenna is registered.
- The reference position for the TTM sentence is the antenna position.
- The [CCRP/ANT] button in the TT/AIS page of the [Overlay/NAV Tools] box selects the reference position to use in the TTM sentence, either CCRP or antenna.

Note: When the radar picture from the FCR-2xx9 or FAR-3xx0 series radar (IEC 623388 Ed. 2 compliant) is fed via LAN, there may be a difference between the radar picture and the TT position. If this occurs, set the reference position as CCRP with the [CCRP/ANT] button in the TT/AIS page of the [Overlay/NAV Tools] box.

14. AIS TARGET FUNCTIONS

14.1 Introduction

An AIS transponder can be connected to the ECDIS to display AIS targets received from an AIS transponder. The ECDIS can store up to 2,000 AIS targets in its storage buffer. When this buffer becomes full of AIS targets, Alert 533 "AIS Target Capacity 100%" is generated to alert you that the storage buffer is full. The storage buffer contains automatic dead reckoning for all AIS targets, which is based on reported Speed Over Ground (SOG), Course Over Ground (COG), Rate Of Turn (ROT) and heading. The storage buffer also contains calculation of range, bearing, CPA, TCPA, etc. The CPA and TCPA limits set for dangerous targets are common for TT and AIS targets.

This radar can activate 500 AIS targets. The Alert 535 "AIS Target Activate 100%" appears when 500 AIS targets are activated.

The frequency for update of AIS transponder-sent data depends on speed and course of tracked AIS target. The table below shows the IMO standardized reporting rates for the AIS transponder. Based on the table below, the ECDIS defines which AIS targets are in tracking or lost. When you acknowledge the lost target alert, the AIS symbol is removed from the ECDIS display.

Type of Ship	IMO nominal reporting interval	Lost target indication reporting interval
Class A: Navigation status is "anchor" or "not under command" or "moored" or "aground", and SOG < 3 kn	3 min	10 min
Class A: Navigation status is "anchor" or "not under command" or "moored" or "aground", and SOG ≥ 3kn	10 s	50 s
Class A: 0kn ≤ SOG < 14kn	10 s	50 s
Class A: 14kn ≤ SOG ≤ 23kn	6 s	30 s
Class A: SOG > 23kn	2 s	10 s
Class B: "CS" SOG < 2kn	3 min	10 min
Class B: "CS" SOG ≥ 2kn	30 s	150 s
Class B: "SO" 0 kn ≤ SOG < 2kn	3 min	10 min
Class B: "SO" 2 kn ≤ SOG < 14kn	30 s	150 s
Class B: "SO" 14 kn ≤ SOG ≤ 23kn	15 s	75 s
Class B: "SO" SOG > 23kn	5 s	25 s
Class A and Class B: no SOG available	N/A	10 min
AIS SAR aircraft	10 s	50 s
AIS aid to navigation	3 min	10 min
AIS base station	10 s	50 s
AIS search and rescue transponder	N/A	10 min

An AIS transponder "sees" all ships fitted with an AIS transponder belonging to either Class A or Class B.

Additionally the AIS transponder receives messages other than messages from ships:

- AIS Base station
- AIS on airborne SAR craft
- AIS on ATON (AIS aid to navigation)

14. AIS TARGET FUNCTIONS






There can be several hundreds or several thousands AIS targets, and of those only a few will be significant for your ship. To remove unnecessary AIS targets from the ECDIS display, the feature "active and sleeping AIS targets" is available. Initially any new AIS target received by an AIS transponder is not-active (= "sleeping"). Such non-active targets are shown with a small triangle. The operator can pick any AIS target and change it from non-active to active. Active AIS targets are shown with a large triangle with speed vector, headline, rot indicator, etc. Further, the operator can pick active AIS targets and change their status to non-active.










An indication of AIS target display capacity limit is given well before it is reached. When 95% of the operator-set limit is reached for displayed AIS targets, the Alert 530 "AIS Target Display 95%" appears. When the operator-set limit is reached, the Alert 531 "AIS Target Display 100%" appears.

An indication of AIS target processing capacity limit is given well before it is reached. The Alert 532 "AIS Target Capacity 95%" is given when 95 percent of 2,000 targets are in the storage buffer and the Alert 533 "AIS Target Capacity 100%" is given when 2,000 targets or more are in the storage buffer. The system releases the AIS Alerts "536 CPA/TCPA" and 537 "AIS Lost". Only active AIS targets generate alerts. The operator can enable or disable AIS target alerts as desired. The feature "active and sleeping AIS targets" is very effective for focusing on only those AIS targets which need supervision. The ECDIS further eases the task of the operator by automatically changing non-active targets to active targets, if they meet the dangerous target limits set by CPA and TCPA.

14.2 AIS Symbols

Then the AIS is turned on, AIS targets are marked with appropriate AIS symbol as below.

Symbol	Default color	Name	Description
	Green	AIS tracked target past position point	Marks a past position of an AIS target.
	Green	Sleeping AIS target	Denote sleeping AIS symbol. (Lines are thinner than Active AIS symbol.)
	Green	Activated AIS target	Denote active AIS target, with vector. Lines are thicker than sleeping AIS symbol. Vessel name is shown (default setting).
	Green	Activated target, true scale symbol	Active AIS target with symbol shown in true scale.
	Red	Dangerous AIS target	Target's CPA and TCPA are within the CPA and TCPA settings. Vector shown.

Symbol	Default color	Name	Description
	Green	No heading/COG target	AIS symbols are shown in a broken lines in the following cases: <ul style="list-style-type: none"> No water or ground tracking speed of your ship, or there is no speed data. All AIS symbols are shown in broken lines. No speed data from AIS target. The symbol of the corresponding AIS target is shown in broken lines. A target with neither a reported heading nor COG is oriented toward the top of the operational display area.
	Green	Heading-turn indicator	Shows target's direction of turning.
	Green	AIS ATON	Aids to navigation
	Green	Virtual AIS ATON	Denote virtual AIS
	Green	SAR-AIRCRAFT	
	Green	AIS base station	
	Green	AIS SART	
	Green	AIS select symbol	Target selected to display its data.
	Red	AIS lost symbol	X is superimposed on the AIS target symbol and is flashing.

Note 1: The equipment continues to process AIS targets when the AIS feature is switched off. When the AIS is again turned on, symbols are immediately displayed.

Note 2: AIS symbols are momentarily erased after the screen is redrawn when the heading is changed from the Head-up mode.

Note 3: When no AIS data is received, the Alert 380 "AIS COM Error" appears in the [Alert] box. Check the AIS transponder.

Note 4: A target is declared a lost target if it is not detected in five consecutive reporting periods.

Note 5: The color of the AIS symbols can be changed. See section 13.2.2.

14.3 Voyage Data

Before you embark on a voyage, set your navigation status, ETA, destination, draught and crew, on the [Voyage Data] page in the [NAV Status] menu. The data entered here is reflected to the AIS transponder.

Note: [Persons], the total number of persons onboard, should be set at the AIS transponder. Some AIS transponders may not accept this input from the ECDIS.

1. Open the MENU then click both [NAV Status] in the [TT/AIS] menu and the [Voyage Data] tab.

2. Click the [Navigational Status] drop-down list then select your navigational status, from the list below.
 - Underway using engine
 - At anchor
 - Not under command
 - Restricted maneuverability
 - Constrained by her draught
 - Moored
 - Aground
 - Engaged in fishing
 - Under way sailing
 - Reserved for high speed craft
 - Reserved for wing in ground
 - Reserved for future use (x3)
 - AIS-SART (active)
 - Not defined
3. Enter ship's draught (0.0 - 25.5 (m)) at [MAX Draught].
4. Enter your ETA at [ETA], in UTC.
 - Day: two digits
 - Month: Three-character abbreviation
 - Year: Four digits
5. Enter your destination at [Destination], using a maximum of 20 characters.
6. Click the [Save] button to register the settings. The settings are sent to the AIS transponder.

14.4 How to Show, Hide AIS Targets

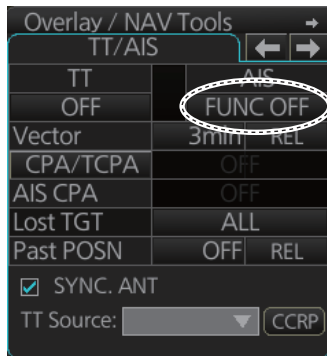
Targets that are being tracked by an AIS transponder can also be displayed on the ECDIS display. To show or hide AIS target, select the [TT/AIS] page from the [Overlay/NAV Tools] box. Click the indication circled in the figure below to display [DISP OFF], [DISP FILT], [DISP ALL] or [FUNC OFF].

DISP OFF: Turns off the AIS display. (Tracking continues internally.)

DISP FILT: Targets are shown according to the AIS DISP filter settings, on the [TT/AIS] menu.

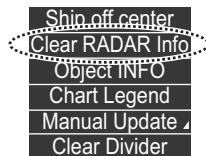
DISP ALL: Shows all AIS targets within the range set.

FUNC OFF: Deactivates the AIS function.



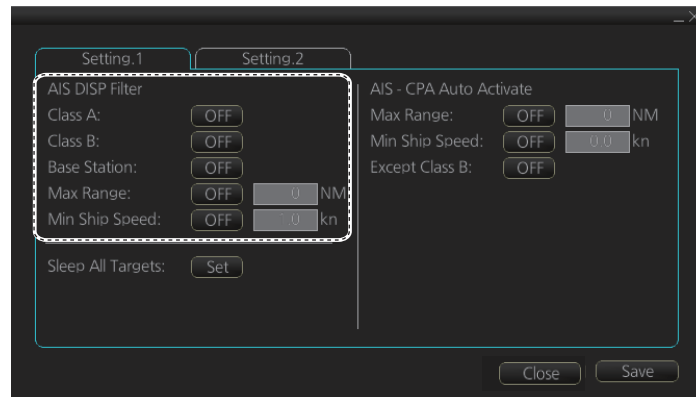
The maximum number of AIS targets on the ECDIS display is 1000. The number of AIS targets on display can be limited by filtering AIS targets (option DISP FIL), then the max. number of AIS target on display is user defined. See section 14.5.

Note: The TT display, together with the AIS and radar displays, can also be hidden from the context-sensitive menu. Right-click the display area then select [Clear RADAR Info].



14.5 How to Filter AIS Targets

1. Right-click [AIS] on the [TT/AIS] page in the [Overlay/NAV Tools box], select [Setting] and open the [Setting.1] page.
(The [Setting.1] page can also be opened from the menu (MENU→[TT/AIS]→[Setting]→[Setting.1].))



2. In the [AIS DISP Filter] window, set each item referring to the descriptions below.
 - Click the button of [Class A], [Class B] and [Base Station] to show [OFF] or [ON] to hide or show those targets.
 - Set the maximum range with [Max Range]. Any target beyond the range set here will not be displayed.
 - Set the ship speed for AIS targets, with [Min Ship Speed]. Any AIS target whose speed is lower than that set here will not be displayed.
3. Click the [Save] button to save settings. Click the [Close] button to close the dialog box.

Note: AIS and tracked target viewing limitations are as follows:

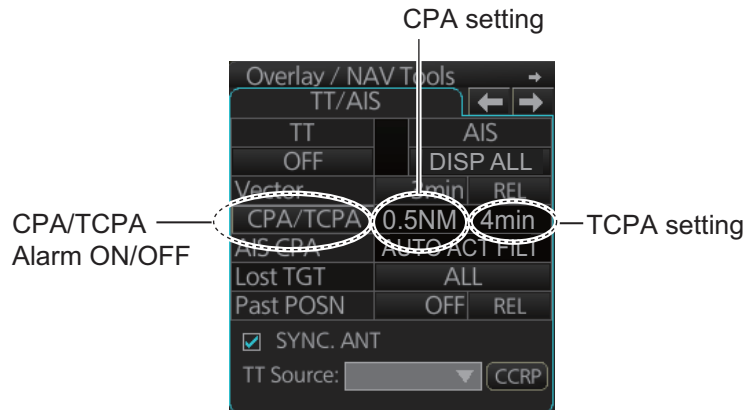
- AIS and tracked targets are displayed on top of chart 1:1,000,001 for S57 charts.
- AIS and tracked targets are displayed on top of chart 1:1,900,001 for ARCS charts. This allows display of AIS and tracked targets on top of the largest scale ocean charts (original scale 1:3,500,000) when they are zoomed to "overscale".

14.6 AIS CPA/TCPA Alarm

A dangerous AIS target is one whose CPA and TCPA are within the range of the CPA and TCPA limits set in the information area. A dangerous AIS target is displayed as a blinking target symbol in red as long as you acknowledge the "AIS CPA/TCPA" alert. Then the target symbol is displayed in red color.

When a target whose CPA or TCPA is within the limits set here the buzzer sounds and the Alert 536 "AIS CPA/TCPA" appears in the [Alert] box.

1. Select the [TT/AIS] page from the [Overlay/NAV Tools] box.



2. If the CPA and TCPA values are blank, click [CPA/TCPA] to show them.
3. Put the cursor on the CPA indication then use the scrollwheel or left button to set the CPA.
4. Put the cursor on the TCPA indication then use the scrollwheel or left button to set the TCPA.
5. Click the [CPA/TCPA] alarm indication to enable or disable the alarm. The alarm is disabled when the CPA and TCPA indications are greyed out.

14.7 Automatic Activation of Sleeping Targets

14.7.1 Enabling, disabling automatic activation of sleeping targets

Enable or disable the automatic activation of sleeping targets from the [TT/AIS] page of the [Overlay/NAV Tools] box. Click the indication below to enable or disable automatic activation. The CPA/TCPA alarm must be active to get automatic activation of AIS targets.



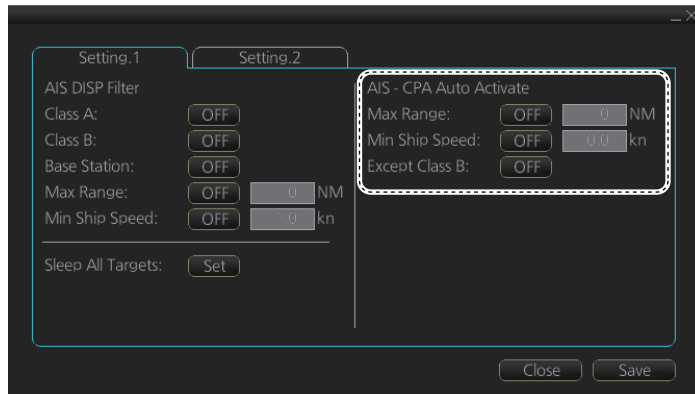
OFF: Turn off automatic activation.

AUTO ACT FILT: Activate the sleeping targets that meet the criteria set in section 14.7.2.

AUTO ACT ALL: Activate all sleeping targets.

14.7.2 Conditions for automatic activation of sleeping targets

You can get automatic activation of sleeping AIS targets. Open the [TT/AIS] menu, select [Setting] then click the [Setting.1] tab.



Max Range: Set the max. range at which to get automatic activation.

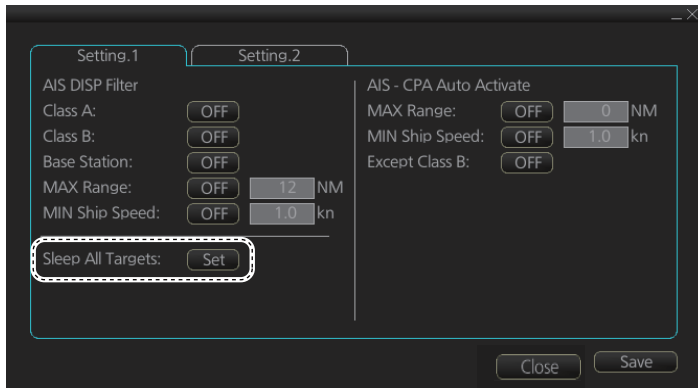
Min Ship Speed: Set the minimum ship speed to get automatic activation.

Except Class B: Exclude class B AIS targets from automatic activation.

Be sure the label of the [OFF/ON] button shows [ON] for the items to use automatic activation.

14.8 How to Sleep All Activated Targets

You can sleep all activated targets. Open the [TT/AIS] menu, select [Setting] and then click the [Setting.1] tab. Click the [Sleep All Targets] button to sleep all activated targets.

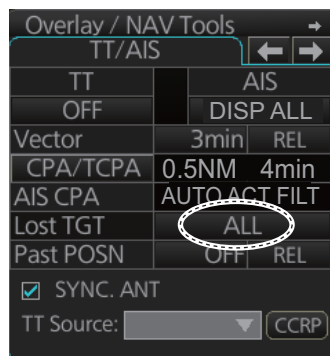


14.9 AIS Lost Target Alarm

If AIS data is not received from a vessel within a certain interval, the corresponding target becomes a lost target. The target is marked with the lost target symbol, which is red and flashing. The buzzer sounds and the Alert 537 "AIS Lost" appears in the Alert box. After the target is acknowledged, the lost target is erased from the screen. If Alert 537 is not acknowledged, lost AIS target symbol will be automatically removed from display. In case of a sleeping AIS target, the buzzer does not sound.

14.9.1 How to enable, disable the AIS lost target alarm

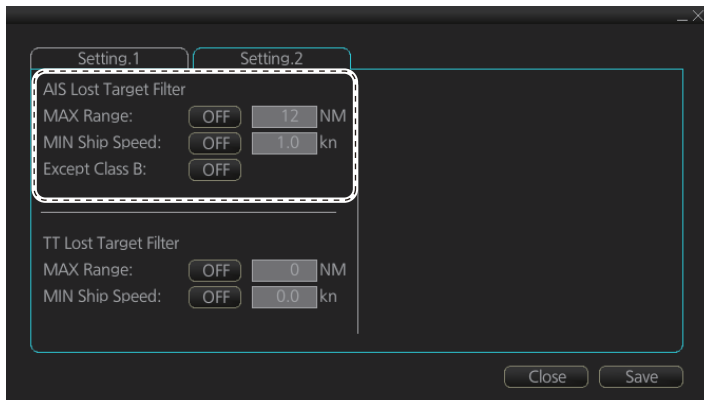
1. Select the [TT/AIS] page from the [Overlay/NAV Tools] box.



2. Put the cursor on the Lost TGT indication then push the left button to display [OFF], [FILT], or [ALL].
 - OFF:** Disable lost target alarm
 - FILT:** Alarm sounds against targets meeting a specific criteria.
 - ALL:** Alarms sounds against all lost targets.

14.9.2 How to set the AIS lost target alarm filter

You can select what AIS targets to exclude from the lost target alarm, on the [Setting. 2] page in the [TT/AIS] menu.



Max Range: Set the max. range at which a target must be to be declared a lost target.

Min Ship Speed: Set the minimum ship speed a target must obtain to be declared a lost target.

Except Class B: Exclude class B AIS targets from the AIS lost target alarm.

14.10 Vector Length, Vector Stabilization in True Motion Mode

Ground stabilization and sea stabilization

Target vectors can be ground stabilized or sea stabilized in the True Motion mode. To select speed over the ground or speed through the water data, open the [SPD] page from the [System Sensor Settings] or [Local System Settings] menu. Select [Bottom] for ground stabilization or [Water] for sea stabilization. The Vector mode indication shows the stabilization mode in the true motion as [True-G] or [True-S].

Sea stabilization is a mode where own ship and all targets are referenced to the sea using a compass heading and single-axis log water speed inputs in the true motion mode. Ground stabilization is a mode where own ship and all targets are referenced to the ground using the ground track or set and drift inputs. If the accuracy seems unsatisfactory, enter set and drift corrections..

True vector

In the true motion mode, all fixed targets such as land, navigational marks and ships at anchor remain stationary on the radar overlay with vector length zero. But in the presence of wind and/or current, the vectors appear on fixed targets representing the reciprocal of set and drift affecting own ship unless set and drift values are properly entered.

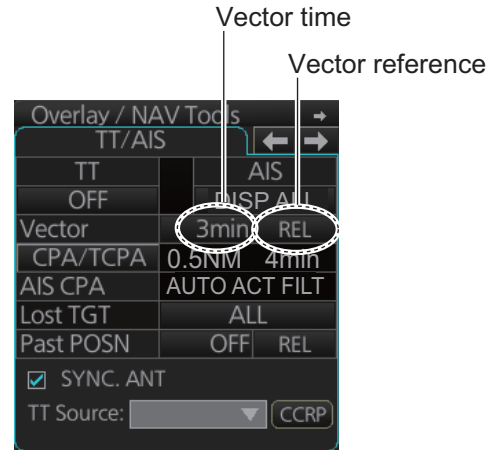
In the true vector mode, there are two types of stabilization: ground stabilization (True-G) and sea stabilization (True-S). The stabilization mode is automatically selected according to speed selection, as shown in the table on the next page. Manual selection is available with [Stabilization Mode] in the [SPD] page: [Bottom], [True-G], [Water], [True-S].

Speed selection	True vector mode
LOG (WT)	True-S
LOG (BT)	True-G
POSN	True-G
REF	True-G
MAN	True-S
MAN w/set & drift	True-G

Relative vector

Relative vectors on targets that are not moving over the ground such as land, navigational marks and ships at anchor will represent the reciprocal of own ship's ground track. A target whose vector passes through own ship is on a collision course.

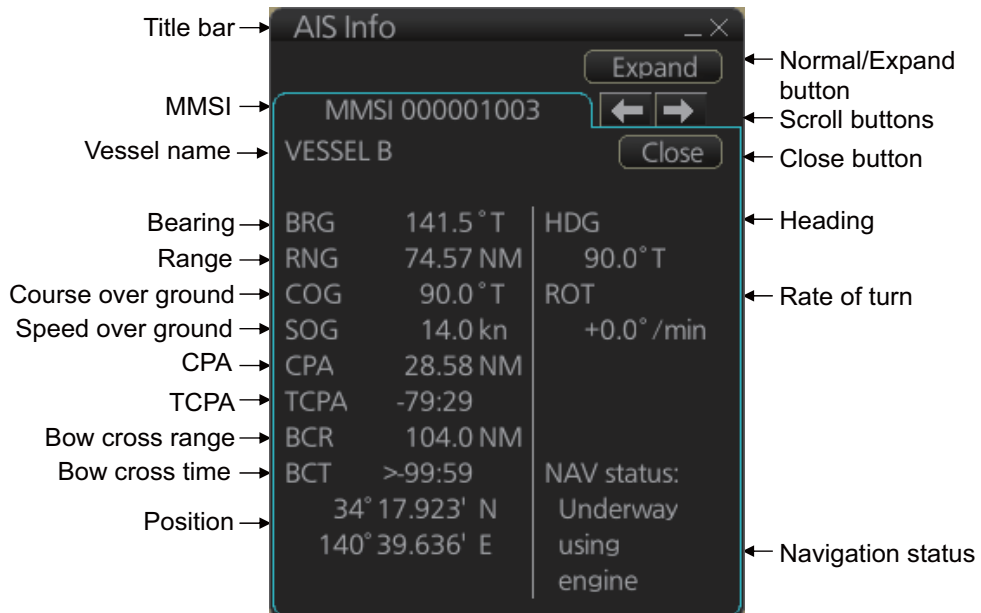
Vector time and vector reference can be set from the [TT/AIS] page in the [Overlay/NAV Tools] box. Click the vector length and vector reference indications to set them.



14.11 How to Display AIS Target Data

Standard data

Put the cursor on a desired AIS target then push the left button.



Expanded data

Put the cursor on a desired AIS target then push the left button. Click the [Expand] button on the [AIS Info] box to show expanded AIS data.

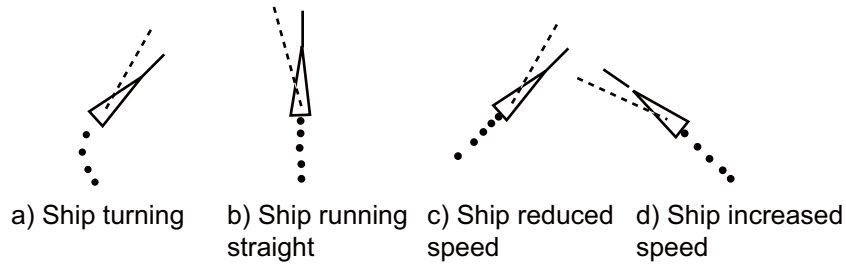
The screenshot shows the 'AIS Info' window with the following data and UI elements:

- Title bar:** AIS Info
- MMSI:** MMSI 000001003
- Vessel name:** VESSEL B
- Navigation Data:**
 - Bearing: BRG 141.6° T
 - Range: RNG 74.82 NM
 - Course over ground: COG 90.0° T
 - Speed over ground: SOG 14.0 kn
 - CPA: CPA 33.86 NM
 - TCPA: TCPA -78:41
 - Bow cross range: BCR 121.1 NM
 - Bow cross time: BCT >99:59
 - Position: 34° 17.922' N, 140° 39.777' E
 - NAV status: Underway using engine
- Identification Data:**
 - Position sensor: POS sensor: GPS
 - Position sensor accuracy (HIGH, LOW): POS ACC.: HIGH
 - Call sign: Call sign: CALL2
 - IMO No.: IMO No.: IMO2222222
 - Length: Length: 300m
 - Width: Width: 11m
 - Draught: Ship draught: 12.2m
 - Destination: Destination: DESTINATION2
 - ETA: ETA: 31/DEC 23:59
 - AIS version no.: AIS version: 1
 - Ship & Cargo type: Ship & Cargo type: Reserved for future use, Carrying DG, HS, or MP, IMO hazard or pollutant category Y
- UI Elements:**
 - Normal/Expand button (Normal)
 - Scroll buttons (Left and Right arrows)
 - Close button (Close)

14.12 How to Display AIS Target Past Positions

The past position display shows equally time-spaced dots marking past positions of activated AIS targets. A new dot is added at preset time intervals until the preset number is reached. If a target changes its speed, the spacing will be uneven. If it changes course, its plotted course will not be a straight line.

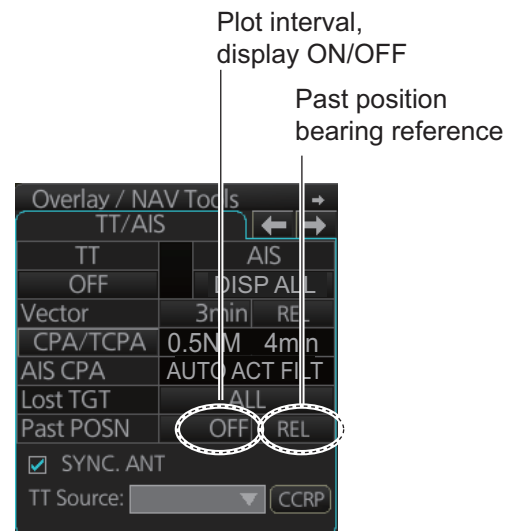
Past Positions (or the length of trace) and presentation mode can be set on the information area, as shown in the next section.



14.12.1 How to enable/disable the past position display, set past position reference

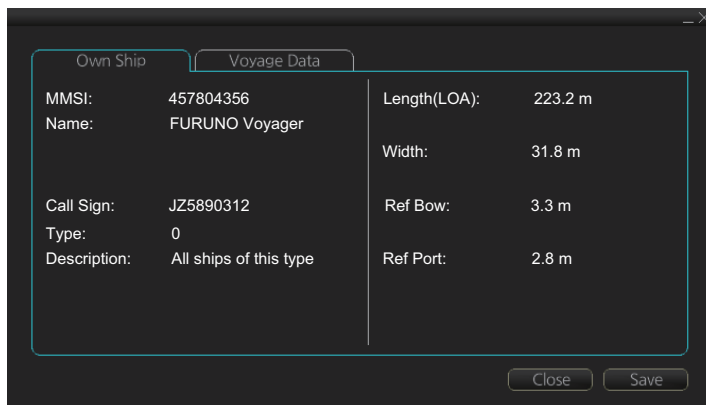
Select the [TT/AIS] page from the [Overlay/NAV Tools] box. Click the indications circled in the figure at right to set the plot interval (or disable the display) and the past position bearing reference (true or relative).

Note: The number of past position points and points style can be selected on the [Targets] page. See section 13.7.2.



14.13 How to Display Own Ship Data

You can see own ship's data on the [Own Ship] page in the [NAV Status] menu. Open the menu then click both [NAV Status] in the [TT/AIS] menu and the [Own Ship] tab.



14. AIS TARGET FUNCTIONS


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15. AIS SAFETY, NAVTEX MESSAGES

15.1 AIS Safety Messages

You can send and receive messages via the VHF link, to a specified destination (MMSI) or all AIS-equipped ships within communication range of your ship. Messages can be sent to warn of safety of navigation, for example, an iceberg sighted. Routine messages are also permitted. Short safety-related messages are only an additional means to broadcast safety information. They do not remove the requirements of the GMDSS.

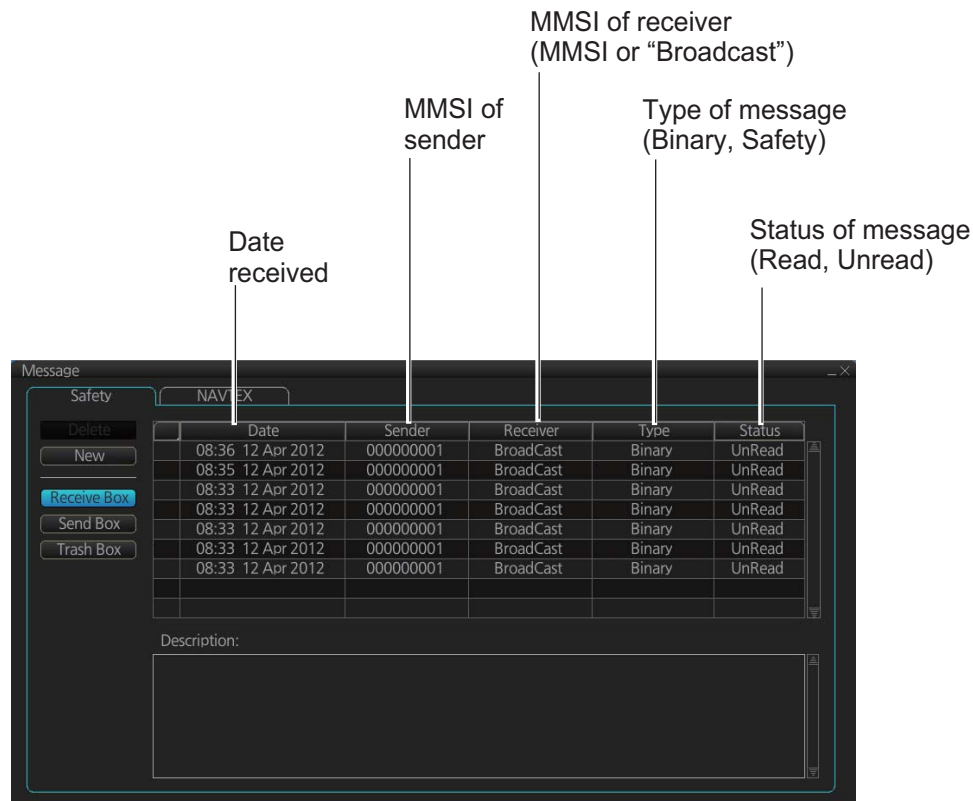
15.1.1 How to send an AIS safety message

Note: If you are using the Trackball Control Unit RCU-026, display the software keyboard ([DISP] button, [], [ON] on the InstantAccess bar) before starting this procedure.

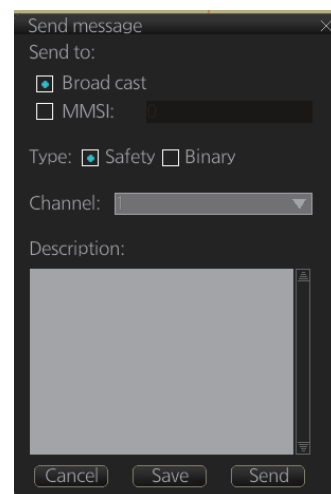


15. AIS SAFETY, NAVTEX MESSAGES

1. In the Voyage navigation mode, click the [MSG] and [Safety MSG] buttons on the InstantAccess bar to show the [Message] dialog box.



2. Click the [New] button.
3. At [Send to], select where to send the message. Select [Broadcast] to send the message to all AIS-equipped ships within communication range, or select [MMSI] and enter the MMSI of the ship where to send the message.
4. At [Type], select the type of message, [Safety] or [Binary] (routine).
5. At [Channel], select the channel to use to send the message.
6. At [Description], enter the text of your message. The no. of characters available depends on the type of message.



Safety message broadcast: 161 characters
 Binary message broadcast: 156 characters
 Safety message addressed to MMSI: 156 characters
 Binary message addressed to MMSI: 151 characters

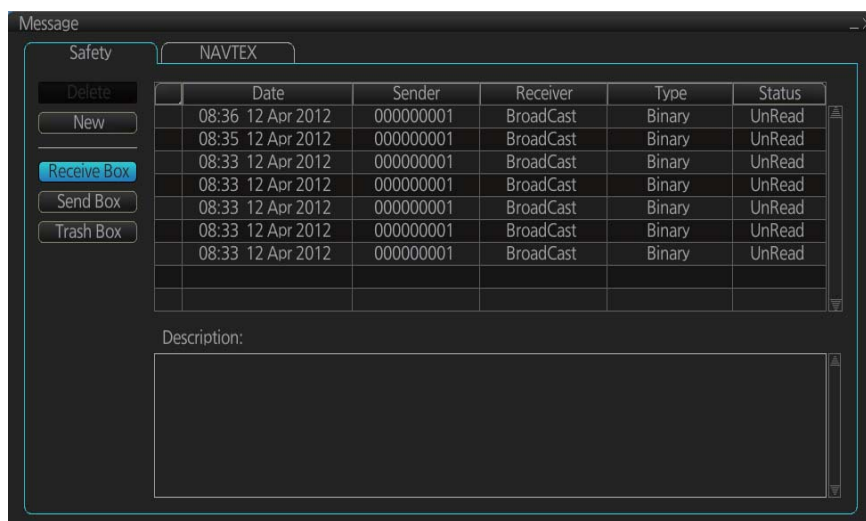
7. Click the [Send] button to send the message.

15.1.2 How to manage received and sent AIS safety messages

When an AIS message is received, the alert 539 "AIS Message Received" appears. Do the following to view the message.

How to display the Message dialog box, view a message

Click the [MSG] and [Safety MSG] buttons on the InstantAccess bar. Click the [Receive Box] or [Send Box] button as appropriate. Click a message to view its contents.

**How to delete a received or sent message**

1. Click the [Receive Box] or [Send Box] as appropriate.
2. Click the box that is before the date to show a checkmark. (All messages can be checked or unchecked with the context-sensitive menu. Right-click the box to the left of [Date] then select [Select All] or [Deselect All] as applicable.)
3. Click the [Delete] button.

Note: A large amount of messages may take some time to delete.

How to delete received, sent messages permanently

1. Click the [Trash Box] button.
2. Click the box that is before the date to show a checkmark. (All messages can be checked or unchecked with the context-sensitive menu. Right-click the box to the left of [Date] then select [Select All] or [Deselect All] as applicable.)
3. Click the [Delete] button.

15.2 Navtex Messages

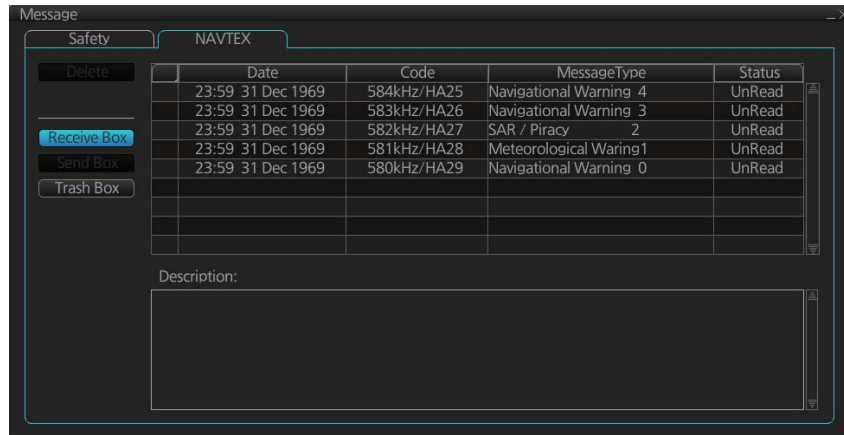
Navtex (Navigational Telex) is an international automated medium frequency direct-printing service for delivery of navigational and meteorological warnings and forecasts, as well as urgent marine safety information to ships.

Navtex messages can be received and read in the Voyage navigation mode.

15.2.1 How to receive Navtex messages

Do the following to display a NAVTEX message:

1. Click the [MSG] and [NAVTEX MSG] buttons on the InstantAccess bar.



2. Click the message to view. The text of the message appears in the [Description] box.

15.2.2 How to manage received Navtex messages

How to delete received Navtex messages

1. Click the [MSG] and [NAVTEX MSG] buttons on the InstantAccess bar.
2. Click the [Trash Box] button.
3. Click the box that is before the date to show a checkmark in the box. (All messages can be checked or unchecked with the context-sensitive menu. Right-click the box to the left of [Date] then select [Select All] or [Deselect All] as applicable.)
4. Click the [Delete] button.

Note: A large amount of messages may take some time to delete.

How to deleted received Navtex messages permanently

1. Click the [MSG] and [NAVTEX MSG] buttons on the InstantAccess bar.
2. Click the box that is before the date to show a checkmark in the box. (All messages can be checked or unchecked with the context-sensitive menu. Right-click the box to the left of [Date] then select [Select All] or [Deselect All] as applicable.)
3. Click the [Delete] button.

15. AIS SAFETY, NAVTEX MESSAGES

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16. RADAR OVERLAY

16.1 Introduction

The radar overlay has the radar echo image overlaid on the ECDIS chart display, in the Voyage navigation mode. The radar overlay video is received over LAN from the FAR-2xx7 or FCR-2xx9 series radar.



This ECDIS has many features to support exact match in scale and orientation of the chart and radar echo image. Exact match of the radar echo image and chart is an essential security feature. If the radar echo image and the chart display match, then the mariner can rely on what he sees and the mariner also gets a very good confirmation that his navigation sensors (such as gyro and position receivers) operate properly and accurately. However, if the mariner is unable to achieve exact match, it is a very strong indication that something is wrong and he should not rely on what he sees.

If a radar echo and a chart object occupy the same geographical position, the one selected as having priority (with [Priority] on the [Echo] page in the [Overlay/NAV Tools] box) is displayed.

Selected scale of displayed chart also defines scale of radar overlay. When you change the chart scale, the scale of the radar overlay is automatically changed. The table below shows the standard scale and equivalent radar range.

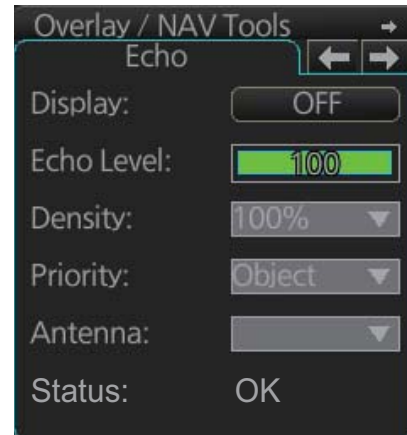
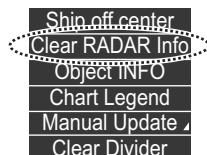
Radar range (nm)	Standard scale	Radar range (nm)	Standard scale
0.25	1:4,000	6	1:90,000
0.5	1:8,000	12	1:180,000
0.75	1:12,000	24	1:350,000
1.5	1:22,000	48	1:700,000
3	1:45,000	96	1:1,500,000

16.2 How to Setup the Radar Overlay

Radar echoes can be output to the ECDIS and shown on its display. Like details on S57 charts, the radar overlay can be displayed or removed from the chart display. The transparency of the echo display can be set from the [Echo] page in the [Overlay/NAV Tools] box. To activate and setup the radar overlay, do the following:

1. Select the [Echo] page from the [Overlay/NAV Tools] box.
2. Click the [ON/OFF] button at [Display] to show [ON] (radar overlay ON) to activate the overlay. "Status: OK" appears under [Antenna] if the radar signal is being received. "Status: No Data" is displayed if there is no radar signal.

Note: The TT display, together with the AIS and radar displays, can also be hidden from the context-sensitive menu. Right-click the display area then select [Clear RADAR Info].



3. [Echo Level] adjusts the sensitivity of the radar picture. To adjust, put the cursor on the slider bar and roll the scrollwheel.
4. [Density] controls the "see through" behavior of the radar overlay. [100%] overlays the radar echo on the chart without modification. "25%" displays radar echoes somewhat faintly, and "75%" displays radar echoes very faintly. It is recommended to use 25% or 50% when navigating narrow channels, so as not to conceal landmasses.
5. [Priority] sets the priority between chart object and radar echo when an object and an echo share the same position. Select the one that is to have priority.
6. Click the [Antenna] drop-down list to select the radar that is to feed radar echoes.

16.3 Error Between Radar Echo Image and Chart

There are several reasons why the radar echo image and chart display do not match exactly. The mismatch is a combination of several reasons and removing one reason doesn't solve the mismatch perfectly. There is a fundamental difference between the radar echo image and corresponding chart feature. The radar echo is a reflection from the real life target and the actual position of the real life target is the front edge of the radar echo. Therefore, the radar echo should start from the chart feature and exist as far as the radar pulse length goes.

How to compensate for bearing error

Bearing error occurs in the following instances:

- Gyro error
- Inaccurate chart
- Improper installation parameters (radar overlay bearing offset)

How to compensate for position error

Position is caused by the following:

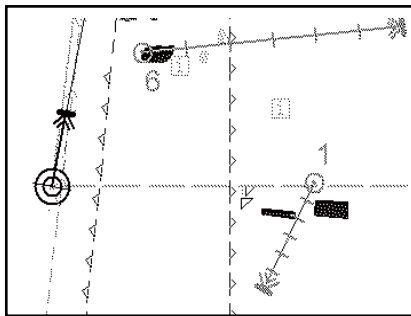
- Inaccurate position
- Position offset
- Inaccurate chart
- Improper installation parameters (conning position offset, position receiver antenna offset, radar overlay range offset)

16.4 Error Sources for Radar Echo Image and TT Mismatch

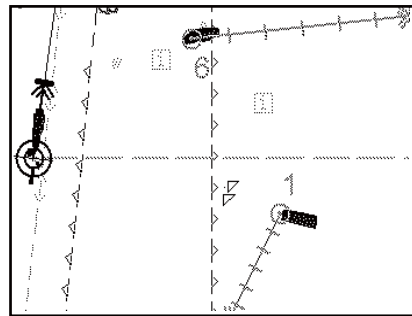
There are several reasons why the radar echo image and tracked target symbols do not match exactly.

1. Different gyro value at radar overlay and at ECDIS.
2. Improper installation parameters (radar overlay bearing offset, radar overlay range offset, conning position offset).

The example below shows how different gyro value set at radar overlay and at ECDIS affect the display of the ECDIS.



Different gyro value at radar and ECDIS



Equal gyro value at radar and ECDIS

17. WEATHER OVERLAY

17.1 What is the Weather Overlay?

The weather overlay, available in the Voyage navigation and Voyage planning modes, provides an animated display of weather information over time for the area selected. The information may include wave, ocean current, wind, temperature, cloud coverage, and precipitation rate. Spot weather information, which provides cursor-picked weather reports, is also provided.

The weather overlay is driven by GRIB (Gridded Information in Binary) data files. (This equipment supports GRB2 (2nd edition) files.) GRIB is the format used by the world's meteorological institutes to transport and process global weather data. (GRB2 files are output direct from Numerical Weather Prediction programs, which is usually the US GFS (General Forecast System). Other models are used, however no one model is more reliable or accurate than another.

GRIB files are sent without review, thus there is no assurance that the data are accurate or correct. They are intended as an aid to weather forecasting - use them in conjunction with other weather data such as GMDSS forecasts and Navtex broadcasts.

GRIB forecasts are useful for short term planning. The US GFS mathematical model, for example, is run four times a day, and produces forecasts for up to 16 days in advance, but with decreasing reliability over time. The model calculates on a 3-D grid with horizontal spacing of approx. 27 km on a 1/2 degree grid - namely approx. 30 mile spacing.

Global forecasts (GRIB files) are available through a wide variety of sources; for example, e-mail, FTP, and web browser, and most are free to the user.

17.2 How to Activate, Deactivate the Weather Overlay

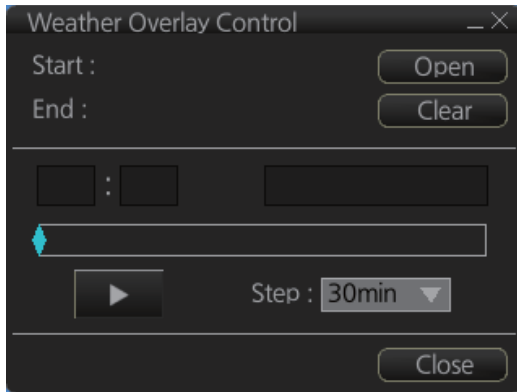
To activate the weather overlay, get into the Voyage navigation mode then click the Weather overlay button on the InstantAccess bar. The overlay is active when the background color of the button is light blue.

Note: The weather overlay and manual update mode (if active) are activated or deactivated reciprocally.

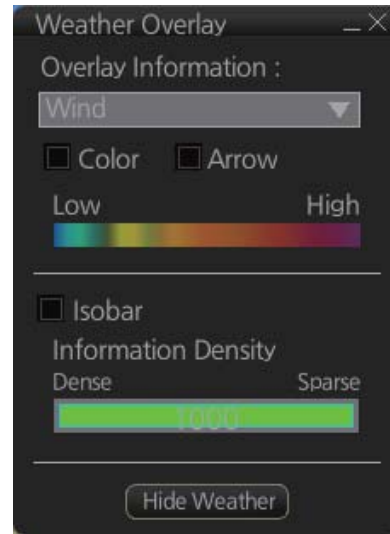


17. WEATHER OVERLAY

When the weather overlay is made active, two weather overlay dialog boxes appear, [Weather Overlay Control] and [Weather Overlay]. The [Weather Overlay Control] dialog box selects and plays back weather data files. The [Weather Overlay] dialog box controls what weather information to display and how to display it.



Weather Overlay Control dialog box

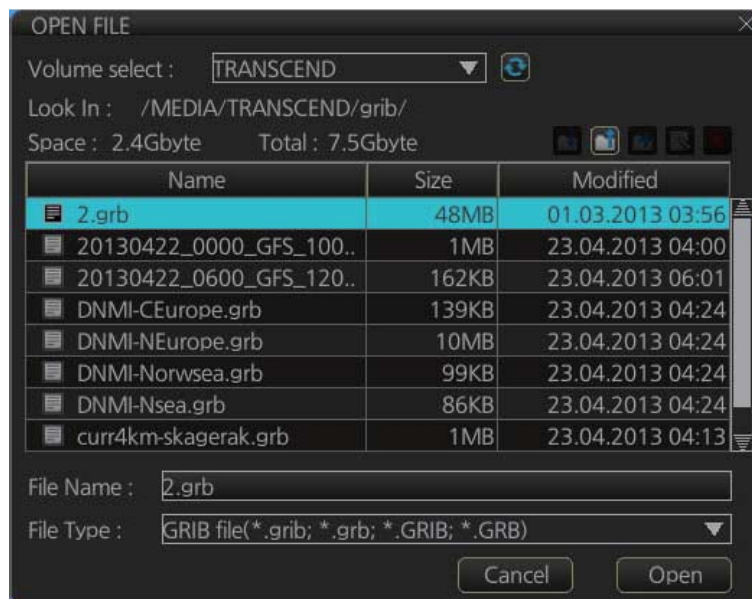


Weather Overlay dialog box

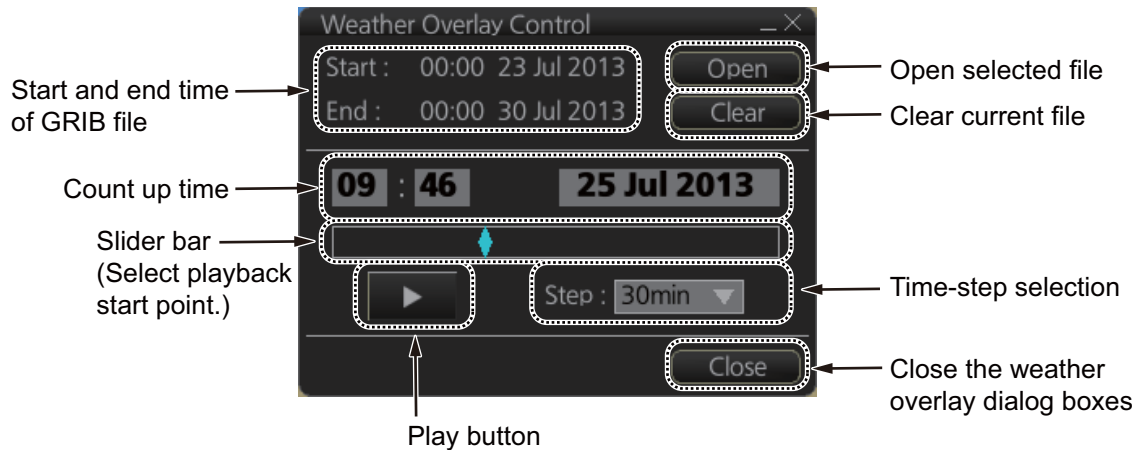
To deactivate the weather overlay, click the [Clear] button on the [Weather Overlay Control] dialog box to remove the weather overlay display then click the Weather overlay button on the InstantAccess bar.

17.3 How to Select, Playback a Weather Data File

1. Copy the weather data file (.grb extension) to a USB flash memory and insert the drive into a USB port on the PCU.
2. Activate the weather overlay then click the [Open] button on the [Weather Overlay Control] dialog box to show the [OPEN FILE] window. Click the [Volume select] drop-down list to select the USB flash memory.



3. Select the weather data file then click the [Open] button.
The message "Now Preparing..." appears while the file is being read, and "Now unmounting the media" appears when the reading is completed. The [Weather Overlay Control] dialog box shows the start and end times of the file. If the file is too large, the message "An error occurred. The file size is too large." appears. Select a smaller file - the maximum file size is 100 MB. If there is a problem with the file, the message "An error occurred while reading weather data file." appears. Select another file.

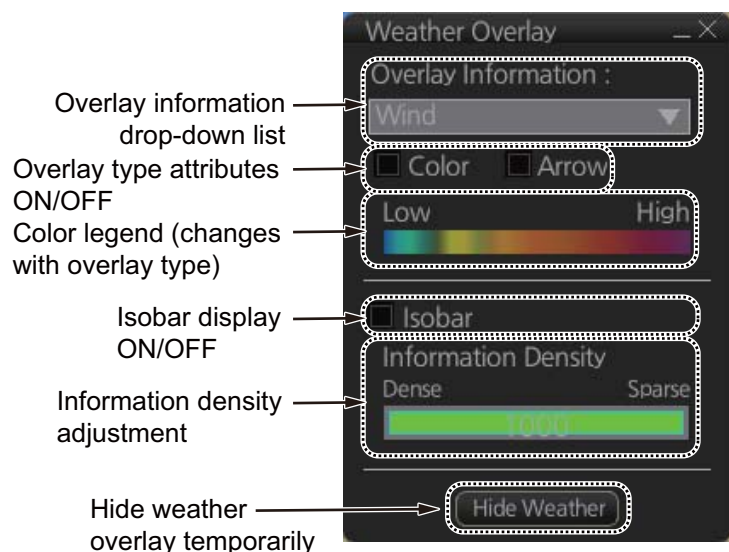


4. To select a specific start time, drag the slider bar to show that time on the Count up time indication. (The time and date can also be entered manually. Use the software keyboard to enter the time. Click the date to show the [Set date] dialog box to select the date.)
5. Use the [Step] drop-down list to select the time step interval, which defines how often to refresh (non-real time) the weather display. The choices are 30 minutes, 1 hour, 2 hours, 4 hours, and 6 hours.
6. To play or pause the playback, click the Play (▶) button.
7. To close both weather overlay dialog boxes, click the [Close] button. (The weather overlay remains active.) To redisplay them, click the Weather overlay button.

17.4 How to Set up the Weather Overlay

The weather overlay is set up from the [Weather Overlay] dialog box, in the Voyage planning mode or the Navigation planning mode (overlay must be active).

1. Select a display from the [Overlay Informa-

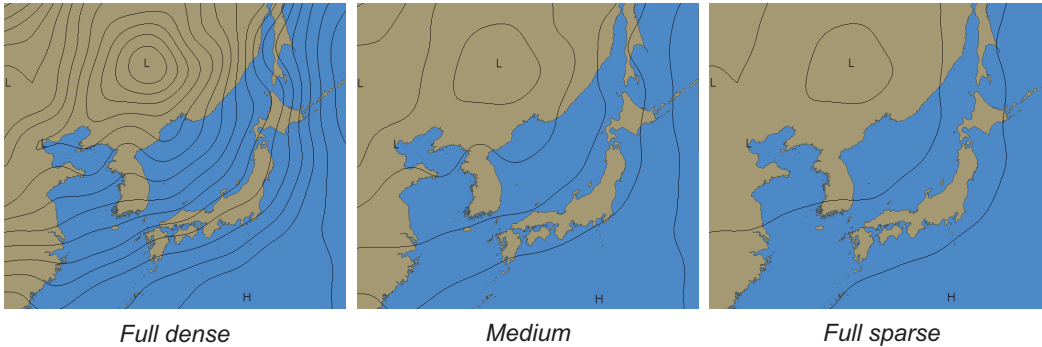
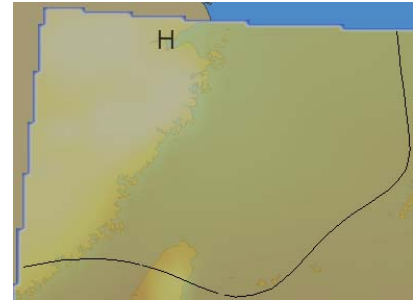


17. WEATHER OVERLAY

tion] drop-down list. The choices are [Wind], [Temperature], [Cloud Coverage], [Precipitation Rate], [Wave], and [Ocean Current].

(The weather data file must contain the data selected in order to display it.)

2. The [Color] checkbox, when checked, provides a color presentation of the weather item selected. (Unchecking the checkbox erases the color presentation.)
3. The [Wind], [Wave] and [Ocean Current] displays can show windbarbs (wind) or arrows (waves, ocean currents) to indicate the direction of respective item. Check [Arrow] to show the windbarbs or arrows.
4. For any display, show or hide the isobar with [Isobar]. The isobar is the black curved line in the right figure and it connects points of equal atmospheric pressure. "H" appears in the case of high atmospheric pressure; "L" for low atmospheric pressure.
5. Set the information density with the [Information Density] bar. Drag the bar to required setting. The figure below shows several information density settings and the resulting displays.

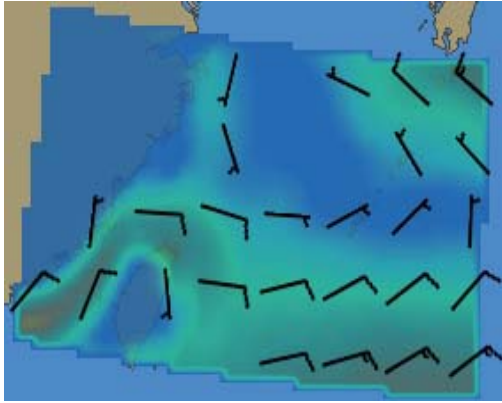


6. To hide the weather overlay temporarily, click and hold down the [Hide Weather] button. Release the button to redisplay the overlay.

17.5 Weather Overlay Examples

17.5.1 Wind display

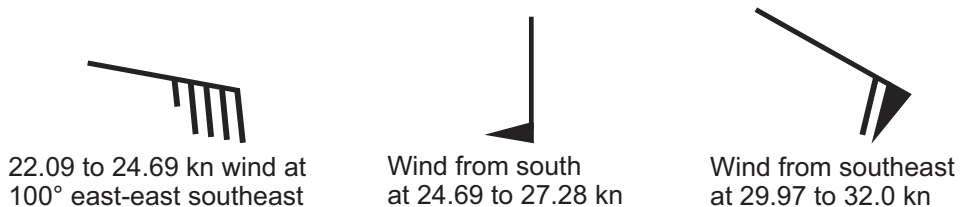
The wind display provides wind speed and direction. Windbarbs show both wind speed and direction. The relative wind speed is shown in colors, from blue (low) to magenta (high).



How to read the windbarbs

Windbarbs represent both wind speed and direction. The windbarbs point in the direction from which the wind is blowing. Lines and filled pennants on the windbarbs indicate speed.

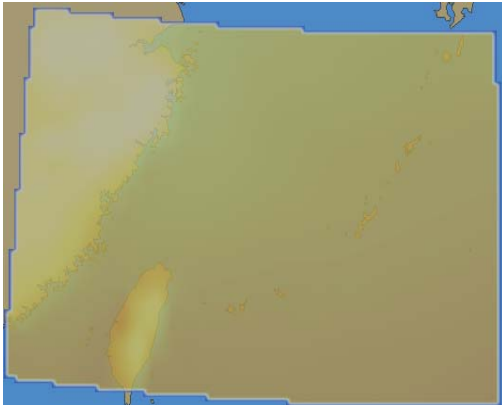
- A half line represents speed from 1.49 to 4.08 kn
- A full line represents speed from 4.09 to 6.68 kn
- A filled pennant represents speed from 24.69 to 27.28 kn



Example windbarbs

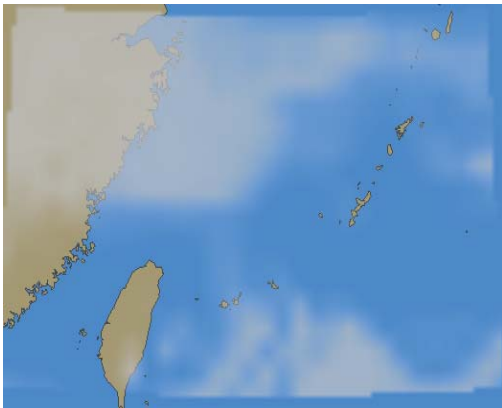
17.5.2 Temperature display

The temperature display provides air temperature information, in colors from blue (low) to red (high). The entire area in the figure below has moderately high temperatures.



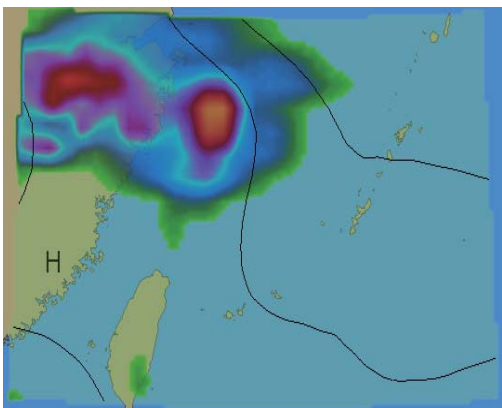
17.5.3 Cloud coverage display

The cloud coverage display shows areas obscured by clouds, in transparent (low) to light gray (high). In the figure below, clouds are covering the landmass and body of water at the top left corner.



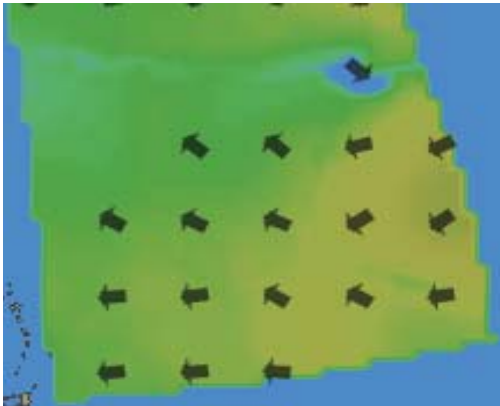
17.5.4 Precipitation rate display

The precipitation rate display shows accumulated precipitation over an hour, in colors from blue (low precipitation) to red (high precipitation). In the figure below light-to-heavy rain is present at the top left corner.








17.5.5 Waves display

The waves display shows the average height of the highest waves, in colors from green (low) to red (high). The length of an arrow indicates wave height. The arrow points in the direction of the main swell.

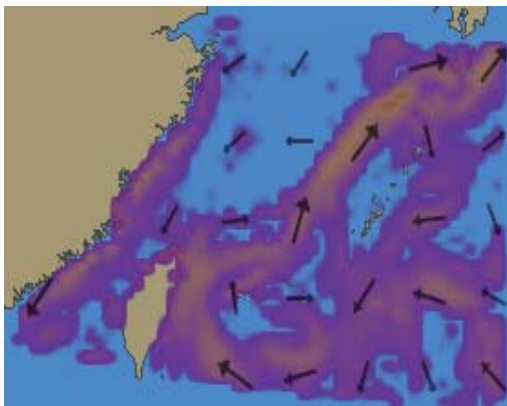


Arrow length and wave height (m)











Less than 1	Less than 3	Less than 5
(No arrow)		
Less than 7	Less than 9	Higher than 9
		

17.5.6 Ocean current display

The ocean current display provides ocean current direction and speed information. The arrows show both direction and speed. Speed is also shown with colors, from transparent (low) to red (high). The color of the currents in the figure below indicate that their speed is low.



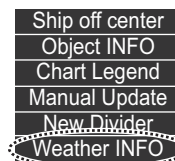
Arrow length and current speed (kn)

Less than 0.06	Less than 0.25	Less than 0.97	Less than 1.45
(No arrow)			
Less than 1.94	Less than 2.43	Less than 2.91	Less than 3.4
			
Less than 3.88	Less than 4.37	More than 4.37	
			

17.6 Weather Spot Information

You can get various weather information for any area with the weather spot information feature, in the Voyage navigation and Voyage planning modes. The weather overlay must be active and position data available.

1. Right-click the location for which you want to know its weather to show the context-sensitive menu.
2. Click [Weather INFO] to show the [Weather Spot Information] window. The window shows [N/A] where there is no data for the corresponding weather item.



Weather Spot Information	Item	Description
Time : 14:00	Time	Time and date of weather forecast.
06 Dec 2013	POSN	L/L position of weather forecast.
POSN : 26° 09.704' N	Wind	Wind speed (kn) and direction (degree).
126° 15.132' E	Temperature	Temperature, in °C.
Wind : 7.4kn 19.4°	Cloud Coverage	The fraction of the sky obscured by clouds, expressed in percentage.
Temperature : 20.8° C	Precipitation Rate	The amount of precipitation (rain, snow, etc.) in millimeters to fall in one hour.
Cloud Coverage : 8.9%	Wave	Wave height, in meters.
Precipitation Rate : 0.0mm/h	Ocean Current	Current velocity (kn) and direction (degree).
Wave : 1.9m	Pressure	Atmospheric pressure, expressed in hPa.
Ocean Current : 0.1kn 327.8°		
Pressure : 1018.7hPa		

3. To erase the window, click the Close button at the top right corner of the window.

17.7 Summary of Weather Overlay Viewability, Operability and Operating Mode

The table below summarizes the operability and viewability of the weather overlay according to the operating mode.

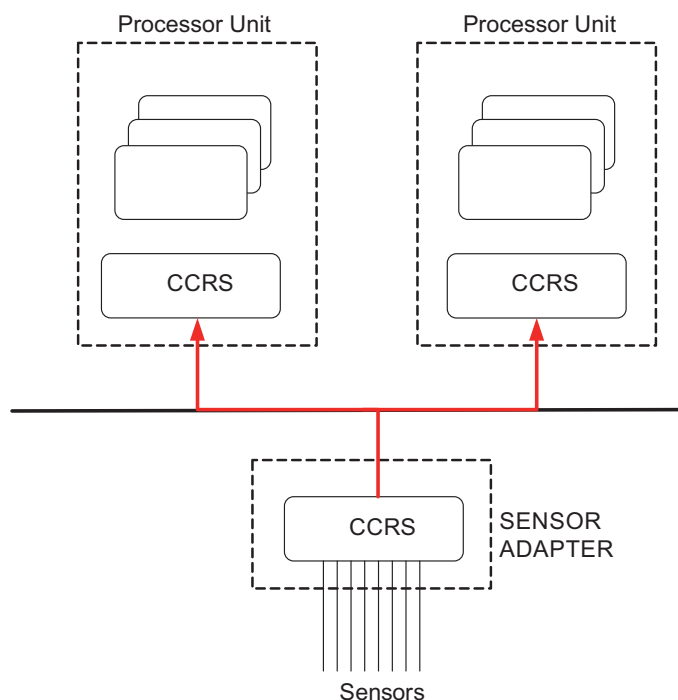
Item	Operating mode	
	NAVI	PLAN
Activate weather overlay	Yes	No
View weather overlay	Yes	Yes
Select weather data file	Yes	Yes*
Operate weather overlay related dialog boxes	Yes	Yes
Deactivate weather overlay	Yes	Yes
Restore weather overlay when switching from chart mode or playback mode	Yes*	Yes*
Weather spot information window	Yes	Yes

*Weather display previously active

18. NAVIGATION SENSORS

18.1 CCRS

This ECDIS employs a Consistent Common Reference System (CCRS) for the acquisition, processing, storage and distribution of sensor information. The CCRS ensures that all parts of the system uses the same source and values, e.g., speed through water, heading, etc. The illustration below shows the CCRS diagram.



The CCRS processes IEC 61162-1 and IEC 61162-2 data sentences. No other types of data (video signals, etc.) are processed.

Check for validity, legitimacy

The system checks received sentences for validity and legitimacy.

Validity check: A sentence's checksum, status (A/V), Mode indicator and setting values are checked. (If checksum error is found, the sentence is dis-affirmed.)

Legitimacy check: The range and accuracy of a sentence is checked.

If the check for both is OK a valid flag results. If either is invalid, the invalid flag is given.

Types of CCRS

There are two types of CCRS: System and Local. The System CCRS integrates all navigation devices. In the Local CCRS each navigation device operates independently.

Representative sensors

If the system has multiple like sensors, the CCRS selects the representative sensor. Generally, the system uses common representative sensors; however, independent representative sensors (local representative sensors) can also be used.

18.2 How to Select Navigation Sensors

The operator can choose navigation sensors to use for navigation and view their current values on the applicable page in the [System Sensor Settings] and [Local Sensor Settings] menus. To access these menus, right-click the [Sensor information] box then click [Open MENU].

18.2.1 Sensors menu description

HDG page



Local sensor HDG page

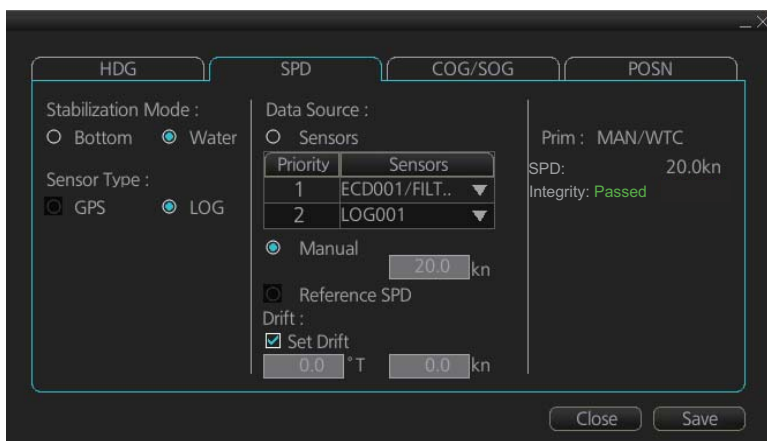
Sensors: Select the heading sensor to use.

Analog Gyro: No use.

Manual: Set heading manually when there is no heading sensor available.

Gyro Correction: Check to enable gyro correction. Enter correction value in box. Not shown in system sensor [HDG] page. Valid for sensor activated on database.

SPD page



Local sensor SPD page

Stabilization Mode: Select the water stabilization mode: Select [Bottom] for ground stabilization, or select [Water] for sea stabilization.

Sensor Type: Select [GPS] in case of a GPS navigator, or [LOG] for speed log.

Data Source: Check [Sensors] to use a sensor in the [Sensors] list, or click [Manual] to enter speed manually. Use [Manual] when no speed source is available.

Reference SPD: If checked, radar is used as the source for speed and course. Checkmark is valid when the speed measurement method is “ground”. Not available with system sensor.

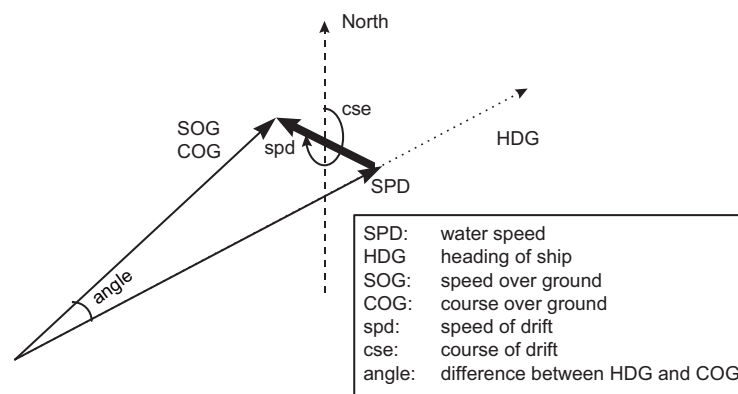
Set and drift: Check the [Set Drift] checkbox to manually set speed and course of drift. Note that you can select manual drift only if you deactivate the AIS function. Checkmark is valid when the speed measurement method is “water”. Not available with system sensor.

Angle = Difference between heading and COG

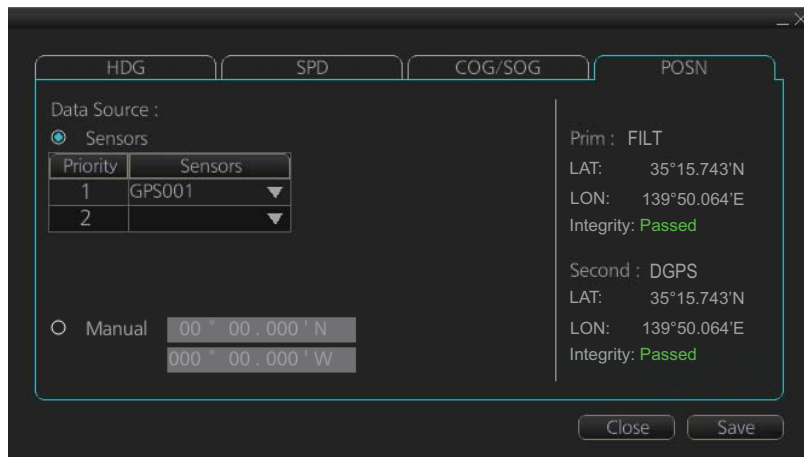
Spd = Speed component of the drift vector

Cse = Course component of the drift vector

Vector defined by (SOG and COG) is equal to vector sum of vectors defined by (SPD and HDG) and (set and drift).



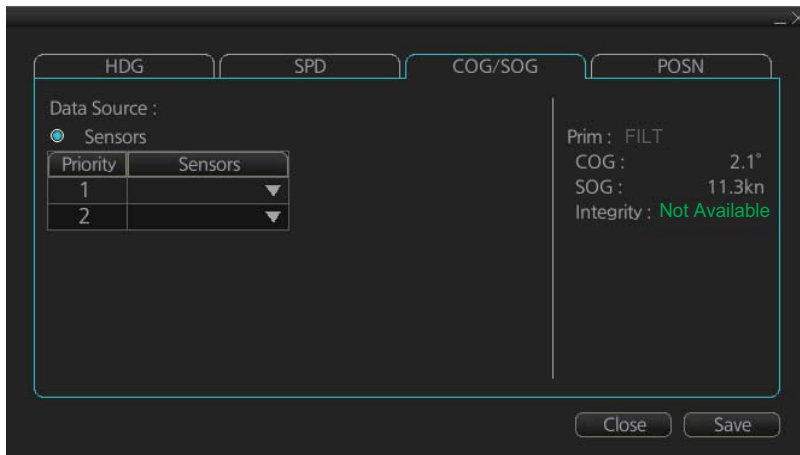
POSN (Position) page



The sensor label (here GPS001) indicates the name of the sensor. A status indication, Prim or Second, denotes the priority of the sensor. Latitude and longitude values will appear in red for position sensor error. Position sensors have priority, which is indicated as Prim or Second. Only one sensor can be primary while the others can be secondary or off. If a position sensor is changed from secondary to primary state and another position sensor was chosen as primary, then that sensor previously selected to primary state is then automatically selected to secondary state. When the position source is changed based on priorities and signal validity to another position source, then you get the Alert 472 "Position Source Change".

COG/SOG page

Select the source (GPS receiver) for speed over the ground and course over the ground.

**Other sensors page**

To show the [Other Sensors] page, open the menu and select [Other Sensor Settings].



Wind: Wind speed (kn or m/s) and direction ([Apparent], [North] (True wind, reference to North), or [Theoretical] (True wind, reference to heading)) are displayed. See section 18.9. Data source can be selected among, True, Relative, Theoretical, and Theoretical (T) and Relative.

Depth Below Trans: Depth from hull at bow and aft to bottom. A depth alert value may be entered to alert you when the depth is within the value set.

Temperature: Water surface temperature.

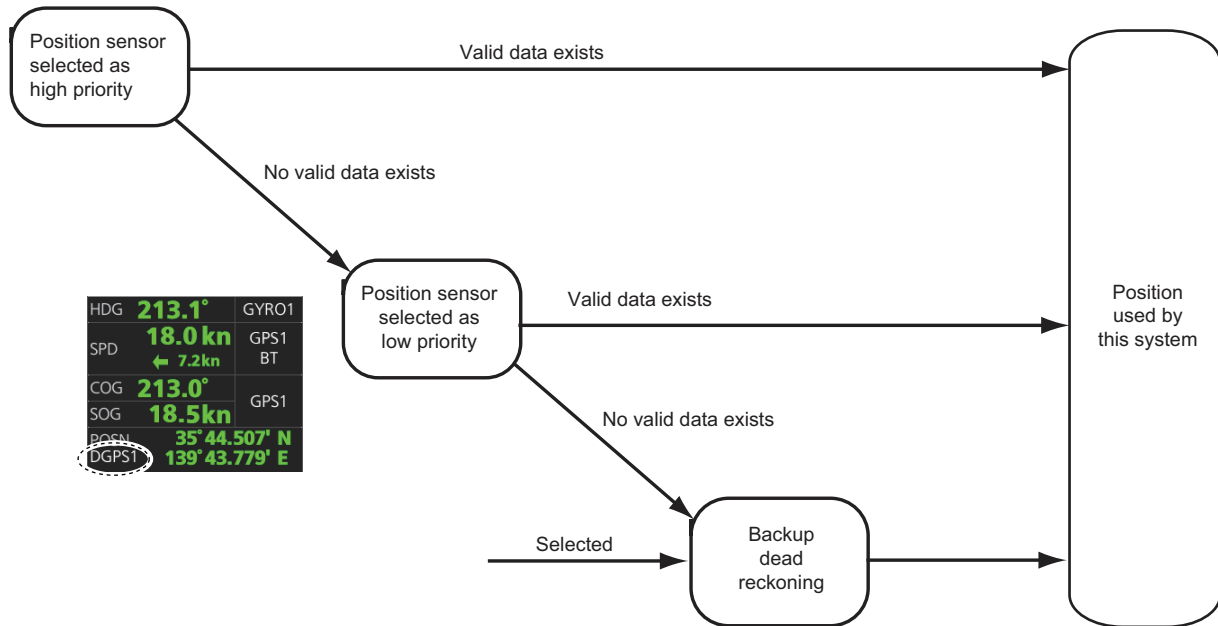
Water Current: Tide at own ship's position.

18.3 Source of Position

The figure below shows how source for position is chosen. The position sensors have either primary or secondary as input for their calculation. DGPS position sensors are considered more accurate than other position sensors.

The latitude and longitude position is shown at the top-right position on the chart display, and in the example below the position source is DGPS. Other indications that may be displayed in the position area are as follows:

- **DR:** Shown in yellow when position source is dead reckoning.
- **DGPS, GPS:** Name of position source.



If the system changes the source of position because of lost sensor data, the system immediately generates the Alert 472 "Position Source Change".

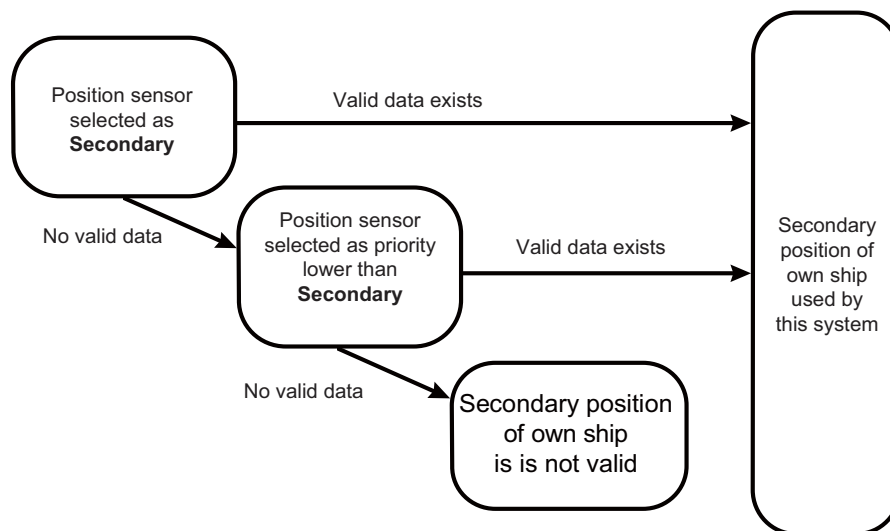
18.4 CCRP, Primary, Secondary and Pivot Positions of Own Ship

This system displays position in one of four methods

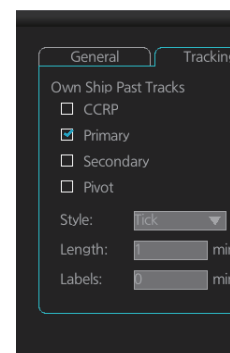
- **CCRP position:** CCRP
- **Primary position:** Position generated by position source chosen as highest priority.
- **Secondary position:** Position generated by position source chosen as 2nd highest priority.
- **Pivot position:** Ship's pivot point position.

The position source for primary position of own ship is chosen as Primary on the [POSN] page of the [Sensor] menu.

The position source for secondary position of own ship is chosen as Secondary on the [POSN] page of the [Sensor] menu. Secondary position of own ship is not available as latitude/longitude value for the user.



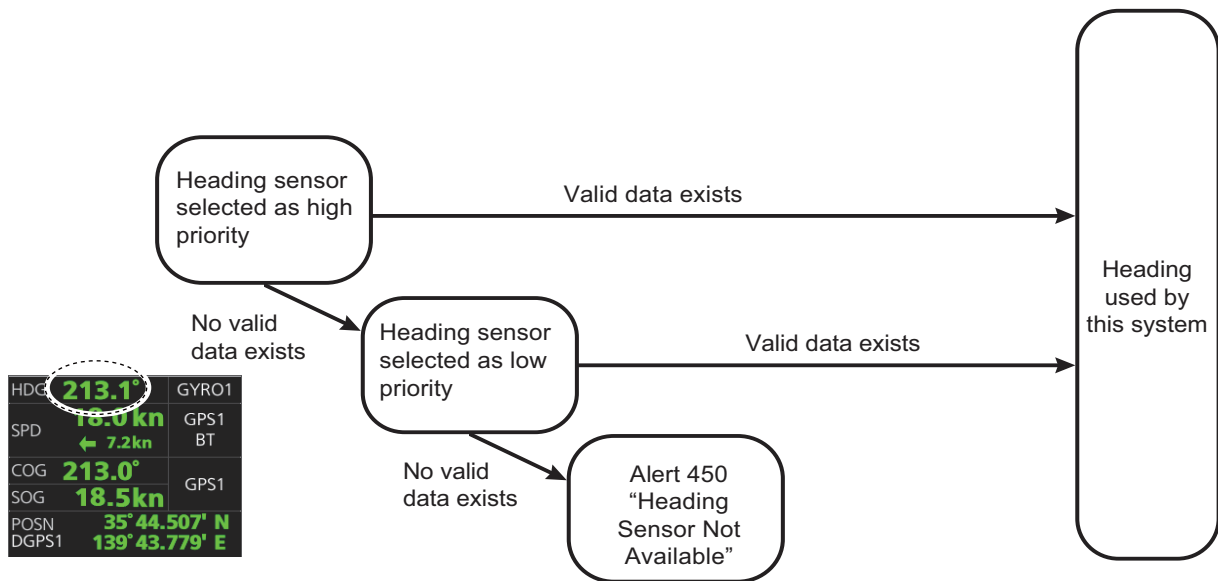
Past ship's track can be plotted on the chart with reference to CCRP, Primary, Secondary or Pivot position. You can control their visibility of the tracks, etc. from the [Tracking] page of the [Symbol Display] menu, shown in the right figure. In this example, past tracks are plotted using the primary position-fixing equipment.



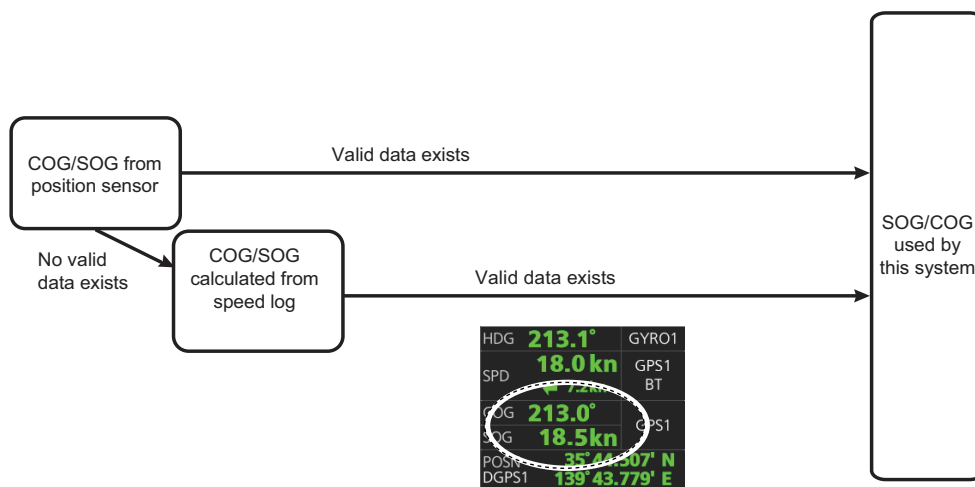
18.5 Source of Navigation Data

The figure below shows how various sources of navigation data are chosen. "SOG, COG" is speed over the ground and course over the ground, respectively. "SPD" is speed through the water. "Drift" is the difference between speed through the water and speed over ground.

Heading used by the system is shown at the top-right position on the chart display. In the example shown below, heading is received from a gyrocompass and it is shown without additional text, meaning the value is referenced to true North. Additional gyro-related text that may appear is "(GYRO-A)" if the value is referenced to magnetic North.

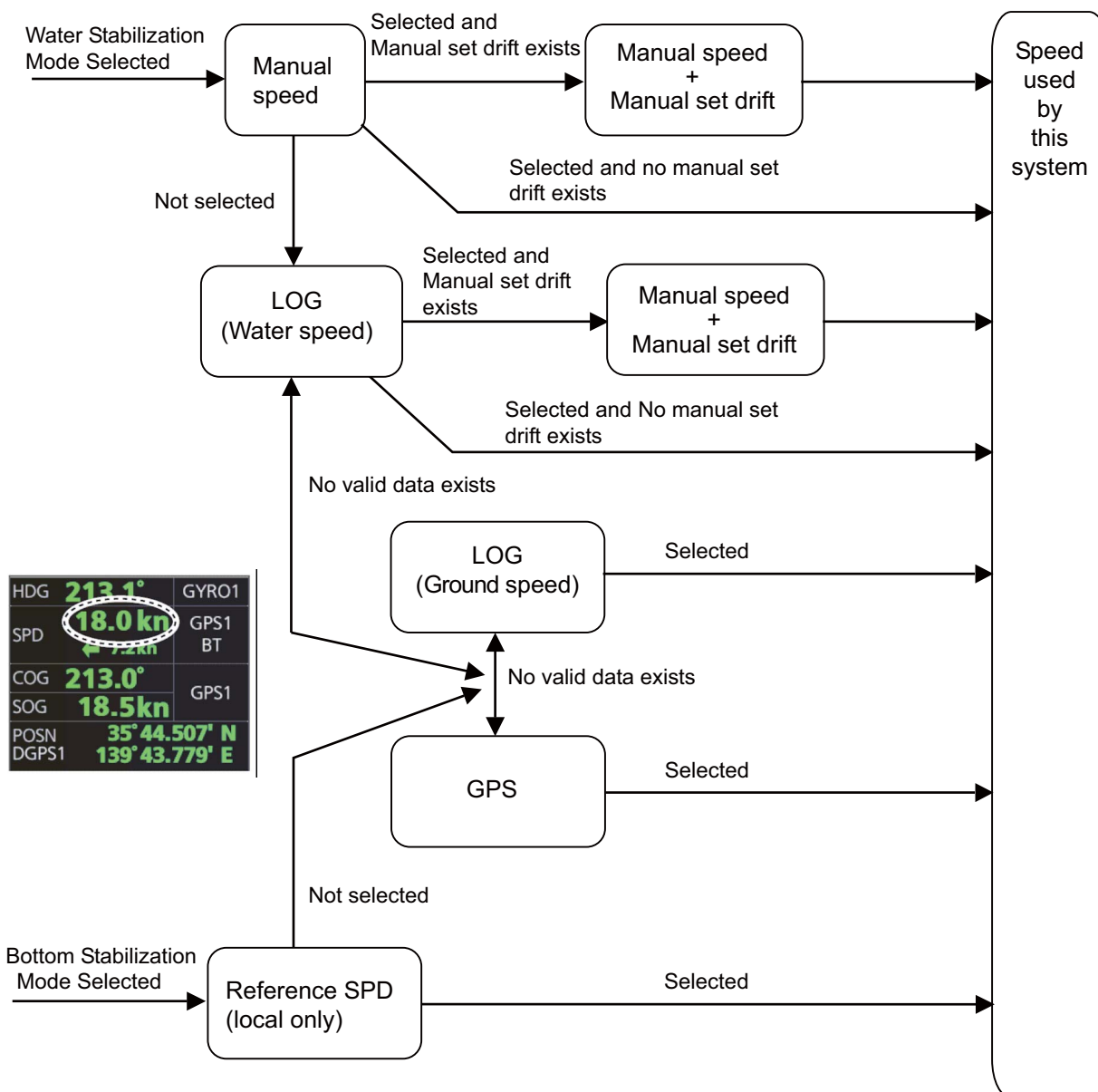


SOG/COG used by the system is shown at the top-right position on the chart display. In the example below, COG and SOG are from chosen position sensors and this is indicated with the text "GPS*" or "LOG*" (* is the number of sensors).



18. NAVIGATION SENSORS

Speed used by the system is shown at the top-right position on the chart display. The figure below shows the source of water speed is used for drift calculation.



Alert related to SOG, COG, speed and heading components

It is possible that the operator has not chosen any speed or heading sensors, or that the chosen sensors do not have any valid values. This kind of a situation is critical for the system, because it cannot even perform dead reckoning.

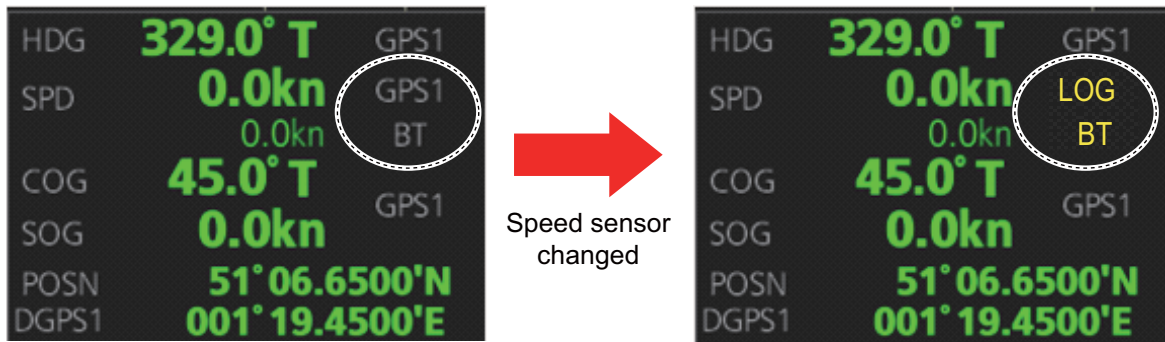
When no heading source is available, the system generates the Alert 450 "Heading Sensor Not Available."

When no speed source is available, the system generates the Alert 453 "SDME Sensor Not Available."

When no COG/SOG data is available, the system generates the Alert 279 "COG/SOG Not Available."

18.6 Switching of Sensor and Indication

When a sensor cannot be used because of some problem, the system automatically switches the sensor. When this occurs the name of the newly selected sensor appears in yellow.



18.7 Filter Status

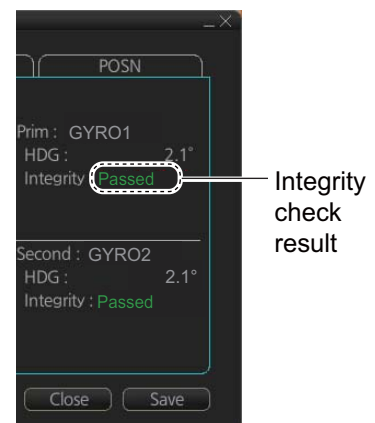
The ECDIS incorporates a filter that receives raw sensor data, checks sensor integrity and processes multiple sensor data to produce a continuous estimate of ship's position and motion.

By default, the filtering uses data from all available sensors for filtering and integrity monitoring. The exception is heading data; only the selected heading device affects the filter output, but other heading sensors (including magnetic compasses) are used for integrity monitoring.

Sensors may be excluded manually or automatically. An excluded sensor participates in neither integrity monitoring or filtering. The filter automatically excludes a sensor from use if the sensor fails the first level of integrity check (for example, if a sudden jump is detected). If the actual integrity check fails for some reason and the filter is able to identify the faulty sensor, the faulty sensor is automatically excluded.

Sensor integrity is determined by: (1) monitoring the statistical accuracy of each sensor independently and analyzing the input values and using the information of the type of sensor, and (2) monitoring the difference between pairs of sensors. The system checks heading, rate of turn, position, COG/SOG and CTW/STW data for integrity, in accordance with INS regulations (IEC-61924-2). The result is either [Passed], [Failed] or [Doubtful]. The integrity check result appears in the following locations:

- [Local Sensor Setting] and [System Sensor Setting] menus. The right figure shows the result for the heading sensor GYRO1.
- [Filter Status] page in the [Other Sensor Setting] menu. See the next page.



Passed (green): Data is available for comparison and data is normal.

Doubtful (yellow): Data is not available for comparison, but data is normal.

Failed (red): Data may or may not be available for comparison, and data is abnormal.

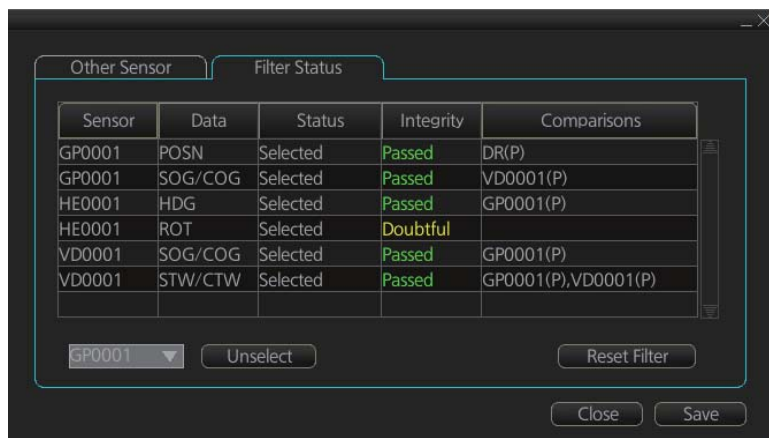
18. NAVIGATION SENSORS

For heading data, If there is only one gyro, the judgement is "Doubtful" when the ship is stopped because there is no COG for comparison. When the ship begins to move, the judgement is changed to "Passed" because there is COG for comparison.

The methods of integrity monitoring are outlined in the table below.

Sensor	Comparison
Position	<ul style="list-style-type: none"> • Comparison with other position sensors. • Comparison with dead reckoning position.
Heading	<ul style="list-style-type: none"> • Comparison with other heading sensors. • Comparison with a COG sensor (used only if other heading sensors are not available and if COG is high enough).
Speed over the ground	<ul style="list-style-type: none"> • Comparison with other SOG sensors. • Comparison with water speed sensors is a secondary option (used only if other SOG sensors are not available).
Speed through the water	<ul style="list-style-type: none"> • Comparison with other STW sensors. • Comparison with SOG sensors is a secondary option (used only if other STW sensors are not available).
Rate of turn	<ul style="list-style-type: none"> • Comparison with other rate of turn sensors.

The status and integrity of all sensors can be monitored from the [Filter Status] page in the [Other Sensor Settings] menu. Sensors can also be unselected and the filter re-set from this page.



The [Status] column indicates sensor status as follows:

- [Selected] (sensor selected for use in filter)
- [Unselected] (sensor not used in filter)
- [Not Available] (no sensor information)
- [Excluded] (automatically excluded sensor)

The [Integrity] column indicates sensor integrity as either [Passed] (green characters) or [Failed] (red characters). The integrity evaluation is [Doubtful] (yellow characters) when there are no other sensors to compare with.

The [Comparisons] column shows the sensors compared and the integrity evaluation of compared sensors in parentheses. Using the illustration above as an example, SOG/COG data fed from GP0002 is compared with the sensors GP0001 and VD0001. The integrity evaluation for the compared sensors is [Passed].

To unselect a sensor manually, select the sensor from the drop-down list at the bottom left corner of the page, click the [Unselect] button then click the [Save] button. [Unselected] appears in the [Status] column. To reselect an unselected sensor, select the sensor from the drop-down list, click the [Select] button. [Selected] appears in the [Status] column.

The [Reset Filter] button functions to recover from sensor failure. When the button is operated:

- Automatically excluded sensors are re-included.
- All data history is erased.
- Output values are re-estimated using new data.
- Integrity monitoring is restarted using new data.

Note: The filter can also be reset from the context-sensitive menu. Right-click anywhere in the [Own ship information] box then click [Sensor Information], [Reset Filter], [Filter Reset].

18.8 Position Alignment

The position alignment feature functions to fine tune ship's position by using radar, radar echo target and ECDIS chart material.

If position alignment is in use, the Alert 640 "Chart Align: Over 30 Min." is generated every 30 minutes to remind the user to align position. The alert is automatically erased in 10 seconds.

Note: This feature is effective with the ECDIS unit whose data source for FILT is assigned the highest priority.

18.8.1 How to align position

If the radar echo targets' symbols are not positioned correctly on the chart, there is either position error or gyro error or some combination of these errors.

Position may be aligned on the ECDIS display by moving own ship position or by moving radar target position. To align position, get into the Voyage navigation mode, click the [Offset] button at the top-right position on the screen, put the cursor on the correct position then click. The amount of offset, in bearing and range, appears to the right the [Offset] button. The maximum offset in distance is 10.0 NM.



The latitude and longitude position indication is shown in yellow characters when the position align feature is active.

18.8.2 How to cancel position alignment

Click the [Offset] button to cancel the position offset.

18.9 Wind Sensor

ECDIS can display and output wind data in the following three formats:

Apparent: Windmeter-measured wind speed and direction.

Wind angle reference: Heading

North: True wind angle, true wind speed, referenced to North

Wind angle reference: True North

Theoretical: True wind angle, true wind speed, referenced to heading

Wind angle reference: Heading

The illustration below shows wind speed and direction with given ship data.

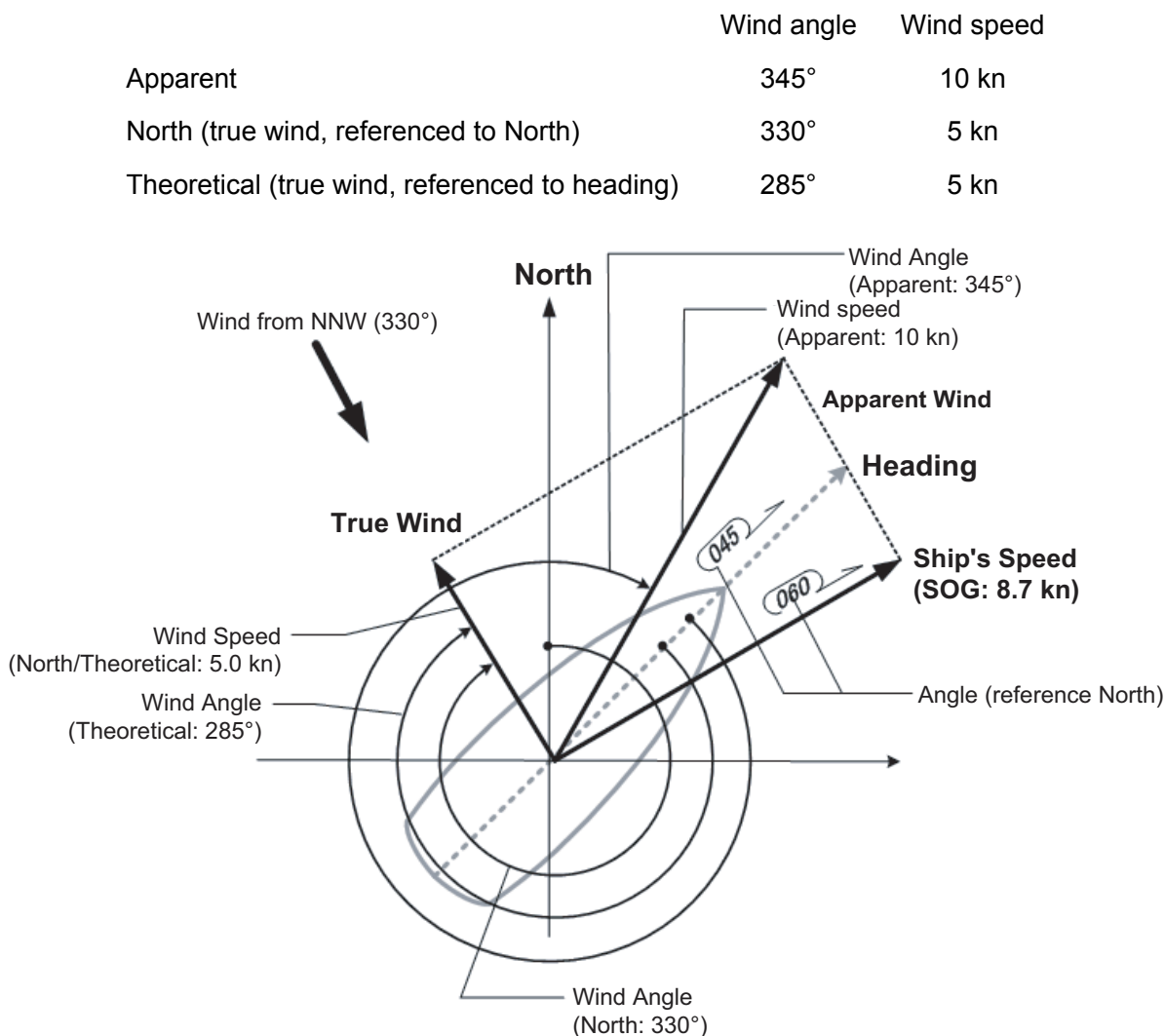
The wind values are as shown below.

Ship information:

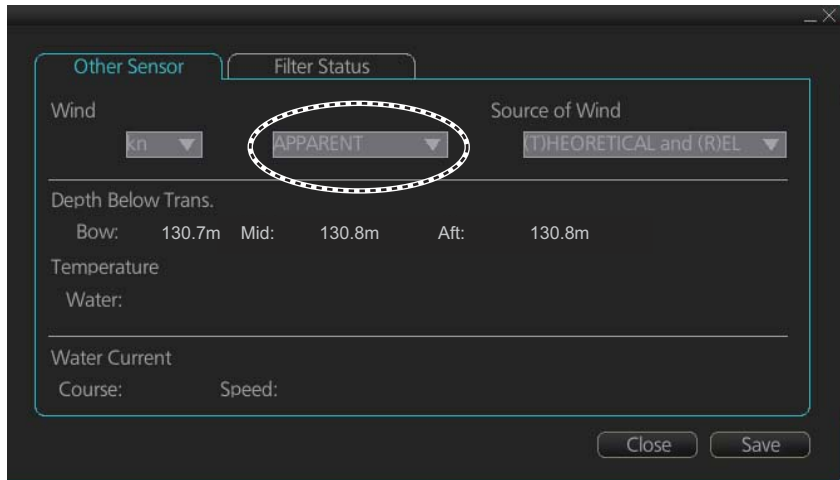
COG: 60°

SOG: 8.7 kn

Heading: 45°



Apparent, North (true wind referenced to North), Theoretical (true wind referenced to heading) may be selected from the [Other Sensor Settings] menu. If the wind indication is not accurate; for example, the wind is blowing from the North but the wind direction displays otherwise, check if the format is Theoretical. If it is, switch to another format.

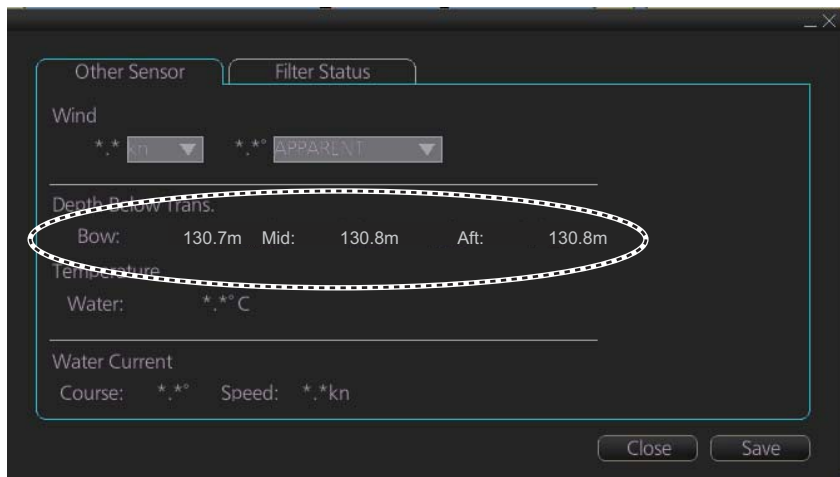


18.10 Depth Sensor

The depth output from a depth sensor (for example, echo sounder) is shown on the [Other Sensor] page in the [Other Sensor Settings] menu.

The content of the [Other Sensor] page depends on sensors connected.

In this example there are three transducers (bow, mid and aft) installed.



The system displays depth value as depth below the transducer. If required, you can get an alert when the measured depth is less than the "Echo Alarm Limit" setting at the [UKC] page in the [Overlay/NAV Tools] box. The system generates the Alert 485 "Depth Limit".

This page is intentionally left blank.

19. RECORDING, PLAYBACK FUNCTIONS

The ECDIS records various items during a voyage, like movement and position of your ship and dangerous radar targets (from the radar). These items are recorded in the following logs:

- Event log:** Records user events and position events.
- NAV log:** Records entire voyage (i.e., a sailing of a route from first point to the last, also MOB data), details (position, speed and course every minute), chart usage (information on charts used for display).
- Target log:** Records dangerous TT, AIS.
- Alert log:** Records alerts generated by the system.
- Chart log:** Records the install and update history for the ENC, ARCS and C-MAP charts.

19.1 How to Record User, Position Events

19.1.1 User events

A user event is a comment about an event (weather, etc.). You can show user events on the chart area. Open the [Tracking] page of the [Symbol Display] menu show or hide the events.

To record a user event:

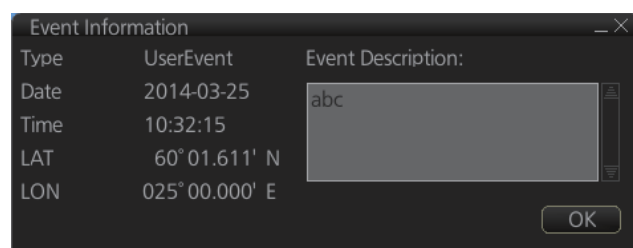
1. Get into the Voyage planning mode then click the [Record], [Event Log] and [User Event] buttons on the InstantAccess bar to show the [Record User Event] window.
2. Enter a comment. Click the [OK] button to finish and close the text box.



An event marker (☑) (orange) appears at your position and the event is recorded to the [Voyage] log.

To view the comment entered for an event, put the cursor on the event then left click to show the [Event Information] window. The window shows the name of the event ([UserEvent]), time and date of entry, latitude and longitude position of the event and comment. Note that the comment can be edited from this window.

Edit the comment then click the [OK] button to save.

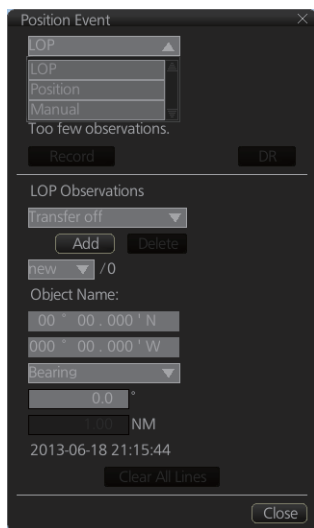


19.1.2 Position events

The purpose of a position event is to record current position data to the [Voyage] log. Position events can be shown in the chart area by checking [Positions] on the [Tracking] page of the [Symbol Display] menu. Do as shown below to record position events.

How to record position events

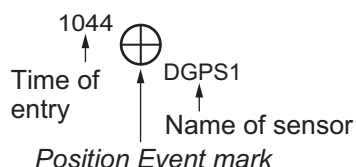
1. Get into the Voyage planning mode.
2. Click the [Record], [Event Log] and [POSN Event] buttons on the InstantAccess bar to show the [Position Event] dialog box.



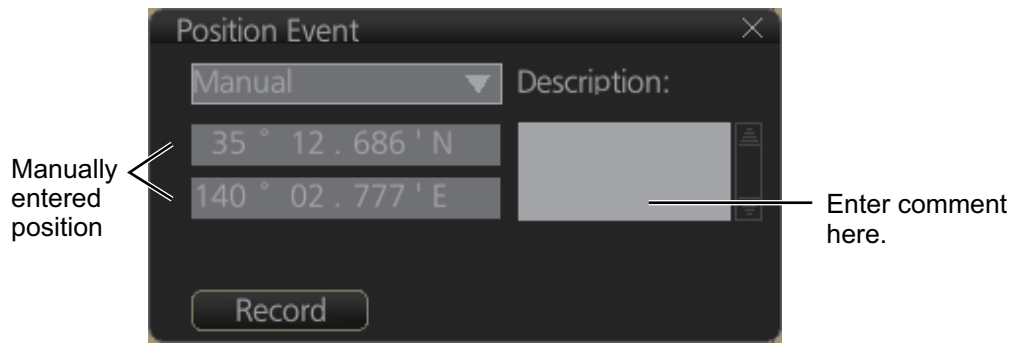
3. At the list box at the top of the dialog box, select position type.
[LOP]: Latitude and longitude position of a fixed object at ship's position.
[Position]: Ship's position fed from navigator selected.
[Manual]: Manual entry of position.
4. If you selected [Position] at step 3, click the [Record] button.



The [Position Event] window shows the position at the moment the [Record] button is clicked. The position is recorded to the [Voyage] log.



5. If you selected [Manual] at step 3, enter latitude and longitude position and comment (optional), then click the [Record] button.



The [Position Event] window shows the position at the moment the [Record] button is clicked. The position is recorded to the [Voyage] log.

6. For [LOP], see the description below.

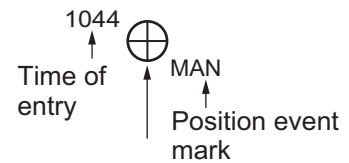
A plotted line on which a vessel is located, determined by observation or measurement of the range or bearing to an aid to navigation or other charted element. Two or more simultaneous observations can be combined to produce an estimate of the ship's current position. If the position is based on only two observations, it is an "estimated position" (EP); otherwise it is called a fix. A maximum of 6 observations can be entered to obtain a fix.

Basic operation: Coordinates of the aid to navigation can be entered into dialog boxes or they can be selected graphically on the chart:

- S57: Click on a charted object (beacon, light, buoy etc.) or any location. Description of the object appears above coordinate boxes.
- ARCS: Click anywhere in the chart.

Default values for bearing and range are approximated from ship's current position information. The time of observation is stopped when the object is selected (or when the [Add] button is clicked). Click the [Add] box to include the observation in the fix computation. The counter shows "new/1", at the input of the second observation. The word "new" indicates that the observation currently displayed is not yet included in the fix computation, and it appears as a dashed line or ring on the chart. The added observations can be edited or deleted after selecting them at the counter. When at least two measurements are entered, the EP or fix is computed and the coordinates are shown in the top part of the dialog. To show a position symbol on the chart, click the [Record] button. In the case of an EP, the letters EP are shown on the right side of the coordinates. If a valid position estimate cannot be obtained, a message is displayed under the coordinates. This may happen, for example, if the lines / circles have multiple crossings that are far apart, or if two lines are nearly parallel or don't intersect at all. The accuracy limit (estimated standard error) is 1.0 NM. If the estimate is valid, the [Record] box can be clicked to record the current position estimate in the [Voyage] log. Discrepancy between LOP result and ship position is also recorded in the log (this information may be viewed by Info query on the position event symbol on the chart - which is displayed if position event display is on in chart display settings).

Time transfer: If the observations are not simultaneous, they should be transferred to a common time. Transferring is based on dead reckoning of ship movement. If a position line (or ring) is transferred, the letters TPL are shown beside its



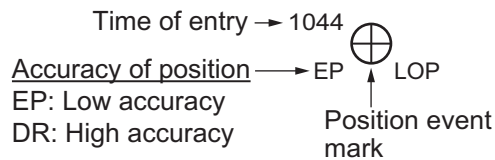
19. RECORDING, PLAYBACK FUNCTIONS

timestamp on the chart. The method of transfer may be selected in the bottom of the dialog. **Transfer to latest** transfers the measurements as if they were all made at the time of the newest measurement. **Continuous transfer** transfers all measurements to real time. **Transfer off** can be used to check where the measurement origins are. The position estimate and the record function follow the same logic, which means that Transfer off shows a position that has no relevance and Transfer to latest sends an old position to the [Voyage] log (timestamp in the log does not match the position).

If you are satisfied with the position shown in the latitude and longitude fields, then click the [Record] button to save the position observation to the Voyage log. If you wish you can also enter latitude and longitude values manually.

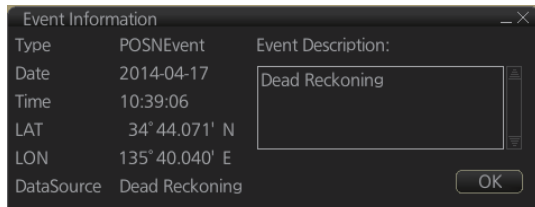
Timeouts: The observations cannot be used long after they were made because dead reckoning is inaccurate.

Click the [Record] button to put a position event at the LOP-calculated position. The position is recorded to the [Voyage] log.

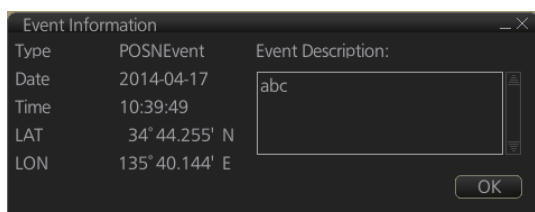


How to find position event information

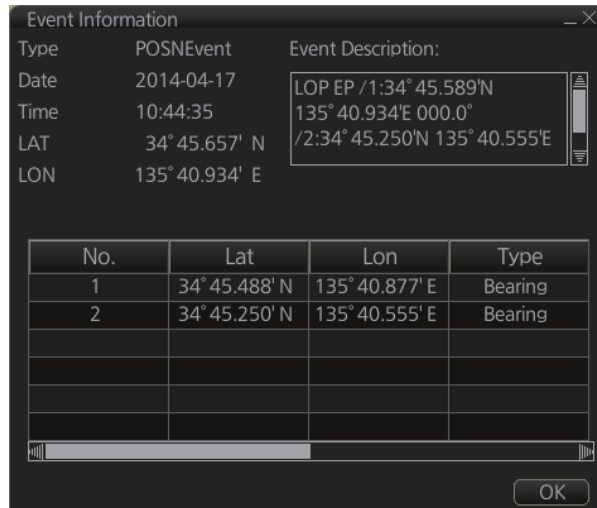
You can find information about a position event by putting the cursor on the event mark then left click. The [Event Position] window shows event type (position event), time of entry, event position, name of sensor ([Position] only), comment (automatic for [LOP] and [Position]; user-entered comment* for [Manual]), and position line data ([LOP] only). *Comment cannot be changed from this window.



Position event: Position



Position event: Manual



Position event: LOP

19.2 Details Log

The [Details] log contains various voyage information, recorded once per minute.

- Date of entry
- Time of entry
- Source: No. of unit which generated log
- Type: Type of position data
 - Auto: Automatic input of position
- Latitude, Longitude: Position as output by selected sensor
- Align/NM, Align/°T: Range, bearing offset, if used
- SOG/kn: Speed over the ground
- COG/°T: Course over the ground
- HDG/°T: Heading
- CORR/°T: Gyro correction value, if used.

How to view the Details log

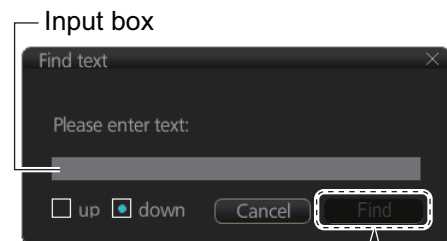
To open the [Details] log, lick the [Record], [NAV Log] and [Detail] buttons on the InstantAccess bar.

Date	Time	Source	Type	Latitude	Longitude	Align/NM	Align/°T	SOG/kn	COG/°T	HDG/°T
30.05.2013	16:33:16	ECD001	Auto	47° 21.226'N	065° 51.174'W	N/A	N/A	20.0	235.5	235.5
30.05.2013	16:33:04	ECD002	Auto	47° 21.266'N	065° 51.090'W	N/A	N/A	20.1	235.5	235.5

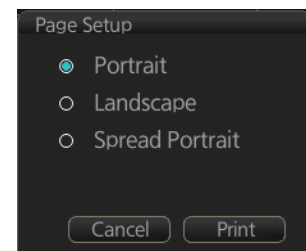
Period Covered (UTC) : 29 May 2013 19 : 38 to 29 May 2013 19 : 38 Set Period Clear Period

Refresh Find Print Text Export File Show Track Close

- **To show the logs of a specific period**, enter the period to show with [Period Covered (UTC)] then click the [Set Period] button. Use the [Clear Period] button to display all logs.
- **To refresh the log**, click the [Refresh] button.
- **To search the log**, do as follows:
 - 1) Click the [Find] button to show the [Find text] box.
 - 2) Click the input box then enter the text to search.
 - 3) Select the search direction with the up or down radio button.
 - 4) Click the [Find] button. The first matching text is highlighted in yellow at the top of the screen.
 - 5) To continue the search click the [Find] button. To cancel the search, click the [Cancel] button.
- **To print the log**, click the [Print Text] button. Select printing format then click the [Print] button. [Spread Portrait] prints two pages of data on one page.
- **To show track for the period selected**, click the [Show Track] button. Use the [Hide Track] button to erase the track.
- **To export the log**, click the [Export File] button. The file is named DetailsLogYYYYMMDDhhmmss.csv.



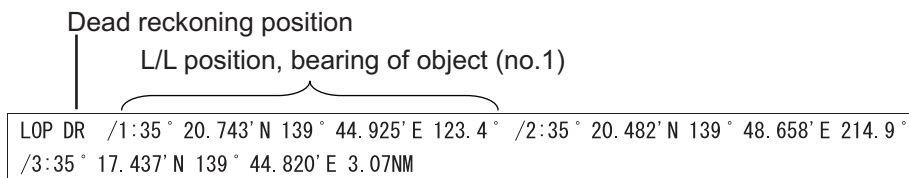
Input text in box and [Find] button appears.



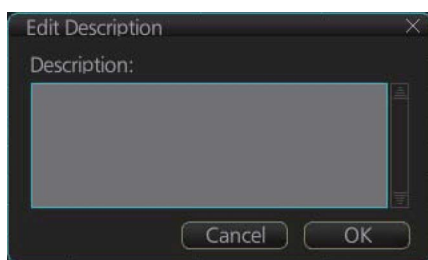
19.3 Voyage Log

The [Voyage] log records all voyage-related data of the past three months. Recorded events are:

- Date: Date of entry
- Time: Time of entry
- Type: Log entry types
 - Auto: Automatic entry of ship position, in 1 to 4 hr intervals, set by operator.
 - Ship: Logged if the amount of change in speed or course equals or is greater than the set values.
 - MOB: MOB position, entered with [MOB] button.
 - User: Operator-entered position. The information entered in the [Description] box is logged.
 - Posdev: Record user-entered position event. The [Description] window shows automatically entered data (Position, LOP) or manually entered comment (Manual).
Automatically entered data (Position: data source, LOP: see below).
 The latitude and longitude position and bearing (or distance) of a maximum of three objects are automatically recorded to each log entry. An object whose position accuracy is low is not recorded. If an object has both a bearing and distance, separate entries are made.



- Latitude and Longitude: Latitude and longitude position
- SOG/kn, COG/°T, HDG/°T: Speed over the ground, course over the ground, heading.
- CORR/°T: Offset bearing, if used
- Wind/kn Wind/°T: Wind speed and angle
- Dist/NM: Navigation distance
- Depth/m: Depth in meters
- Description: Show recorded contents, for [User], [PosDev] above.
 If desired items other than [Posdev] can be edited. Click an item to show the [Edit Description] box. Edit the description as required then click the [OK] button.



How to view the Voyage log

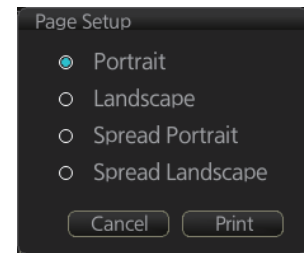
Click the [Record], [NAV Log] and [Voyage] buttons on the InstantAccess bar.

Date	Time	Source	Type	Latitude	Longitude	SOG/kn	COG/°T	HDG/°T	CORR/°T
30.05.2013	15:38:18	ECD001	Auto	47° 30.529'N	065° 27.930'W	19.9	243.3	243.2	N/A
30.05.2013	13:29:08	ECD002	Auto	47° 43.856'N	064° 27.605'W	20.0	260.4	260.4	N/A

Period Covered (UTC) : 29 May 2013 19 : 38 to 29 May 2013 19 : 38 Set Period Clear Period

Refresh Find Print Text Export File Show Track Close

- **To show the logs of a specific period**, enter the period to show with [Period Covered (UTC)] then click the [Set Period] button. Use the [Clear Period] button to display all logs.
- **To refresh the log**, click the [Refresh] button.
- **To search the log**, do as follows:
 - 1) Click the [Find] button to show the [Find text] box.
 - 2) Click the input box then enter the text to search.
 - 3) Select the search direction with the up or down radio button.
 - 4) Click the [Find] button. The first matching text is highlighted in yellow at the top of the screen.
 - 5) To continue the search click the [Find] button. To cancel the search, click the [Cancel] button.
- **To print the log**, click the [Print Text] button. Select printing format then click the [Print] button. [Spread Portrait] and [Spread Landscape] print two pages of data on one page.
- **To show track for the period selected**, click the [Show Track] button. Use the [Hide Track] button to erase the track.
- **To export the log**, click the [Export File] button. The file is named VoyageLogYYYYMMDDhhmmss.csv.



19.3.1 How to set conditions for voyage logging

The operator can set the conditions for automatic voyage logging. When your speed or course equals the amount set here, an entry is made in the [Voyage] log.

- Define the amount of course and speed change which creates a log entry.
- Set the interval of logging, regardless of speed and course change.

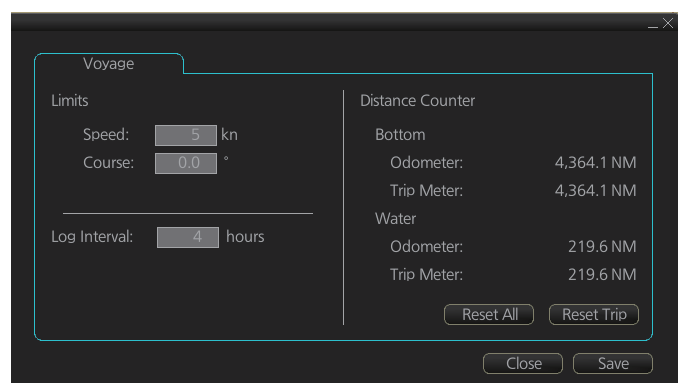
To set the conditions of logging, do as follows:

1. Open the menu and select the [Voyage] menu from the [NAVI Log] menu.
2. Set desired limits for speed and course, and log interval.

Speed: 1 - 10 kn, 1 kn increment

Course: 0 - 30°, 0.1° increment

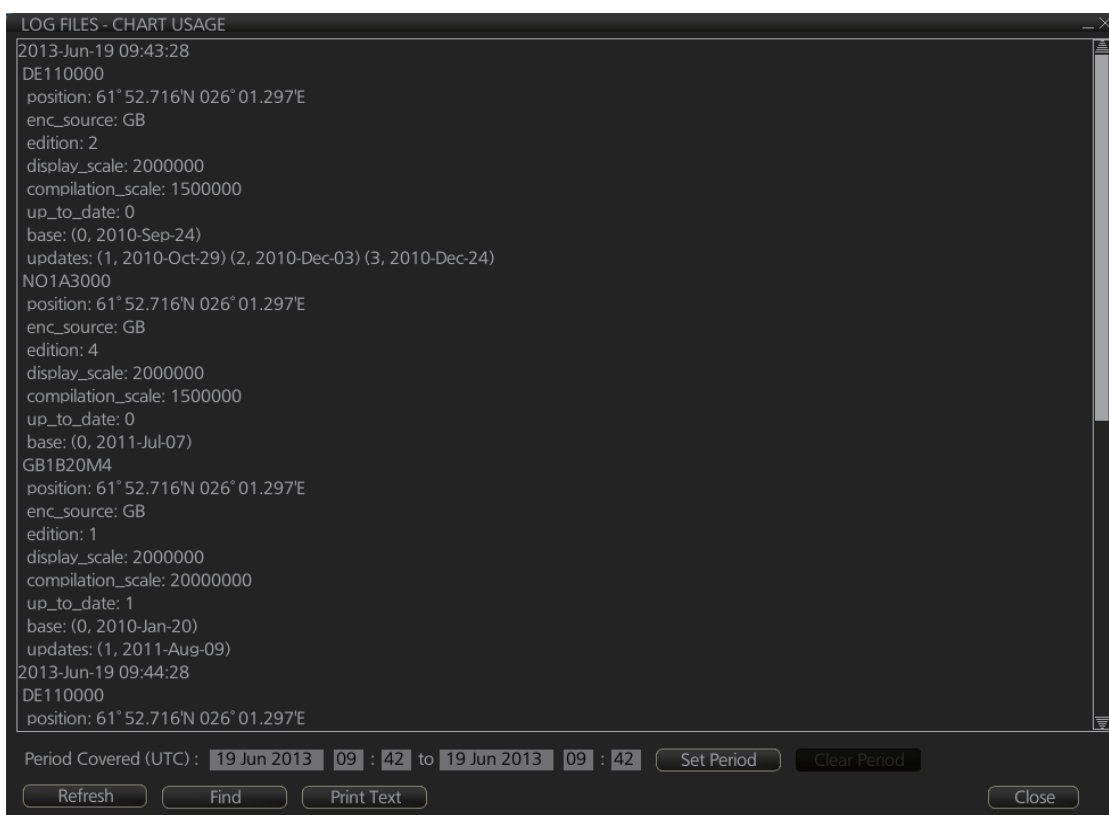
Log Interval: 1 - 4 hr, 1 hr interval



19.4 Chart Usage Log

The [Chart Usage] log stores which charts were used on the ECDIS display. To open the log, click [Record], [NAV Log] and [Chart Usage] on the InstantAccess bar. The following information is recorded in the chart usage log:

- Date and time chart was displayed
- Chart ID
- Center position of display (Lat, Lon)
- Chart source
- Chart edition
- Display scale
- Compilation scale
- The latest update included to chart
- Chart base



- **To show the logs of a specific period**, enter the period to show with [Period Covered (UTC)] then click the [Set Period] button. Use the [Clear Period] button to display all logs.
- **To refresh the log**, click the [Refresh] button.
- **To search the log**, do as follows:
 - 1) Click the [Find] button to show the [Find text] box.
 - 2) Click the input box then enter the text to search.
 - 3) Select the search direction with the up or down radio button.
 - 4) Click the [Find] button. The first matching text is highlighted in yellow at the top of the screen.
 - 5) To continue the search click the [Find] button. To cancel the search, click the [Cancel] button.
- **To print the log**, click the [Print Text] button.

19.5 Danger Targets Log

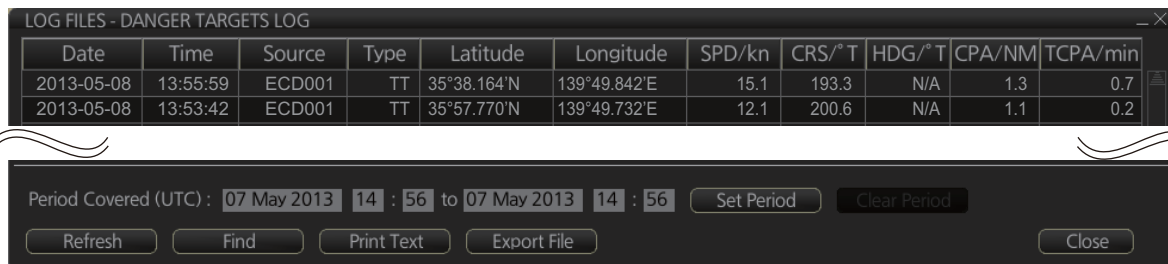
The [Danger Targets] log stores information about dangerous targets that are received from a radar (TTs) and/or targets that are received from an AIS transponder (AIS targets).

If a TT or AIS target is within the set CPA (Closest Point of Approach) and TCPA (Time to CPA), information of all TTs (including non-dangerous targets) are recorded into the danger target log. This data is as follows:

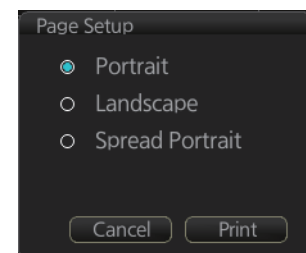
- Date: Date of entry
- Time: Time of entry
- Source: Unit which generated log
- Type: Type of dangerous target
- Latitude and Longitude: Latitude and longitude position of dangerous target
- SPD/kn: Speed of dangerous target
- CRS/°T: Course of dangerous target
- HDG/°T: Heading of dangerous target
- CPA/NM, TCPA/min: CPA and TCPA of dangerous target
- Index: Radar target no. (TT), MMSI (AIS)

How to view the danger targets log

To open the [Danger Targets] log, click the [Record], [Target Log] and [Danger Target] buttons on the InstantAccess bar.



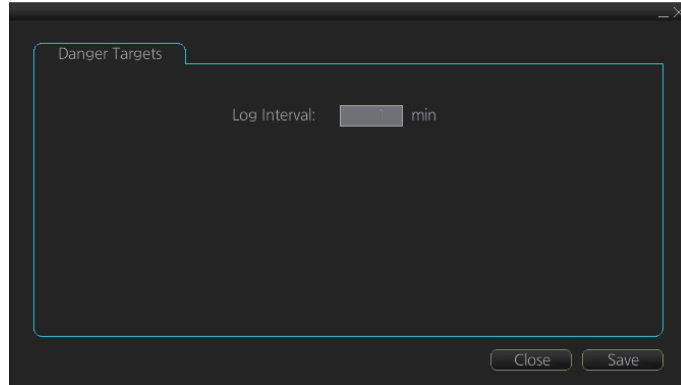
- **To show the logs of a specific period**, enter the period to show with [Period Covered (UTC)] then click the [Set Period] button. Use the [Clear Period] button to display all logs.
- **To refresh the log**, click the [Refresh] button.
- **To search the log**, do as follows:
 - 1) Click the [Find] button to show the [Find text] box.
 - 2) Click the input box then enter the text to search.
 - 3) Select the search direction with the up or down radio button.
 - 4) Click the [Find] button. Matching text is highlighted in yellow at the top of the screen.
 - 5) To continue the search click the [Find] button. To cancel the search, click the [Cancel] button.
- **To print the log**, click the [Print Text] button. Select printing format then click the [Print] button. [Spread Portrait] prints two pages of data on one page.
- **To export the log**, click the [Export File] button. The file is named DangerTargetLogYYYYMMDDhhmmss.csv.



19.5.1 How to set the conditions for logging danger targets

The operator may set Closest Point of Approach (CPA), Time to CPA (TCPA) and Log interval for viewing dangerous TT and AIS targets on the ECDIS display.

1. Open the menu and select the [Danger Targets] page from the [Danger Target] menu.

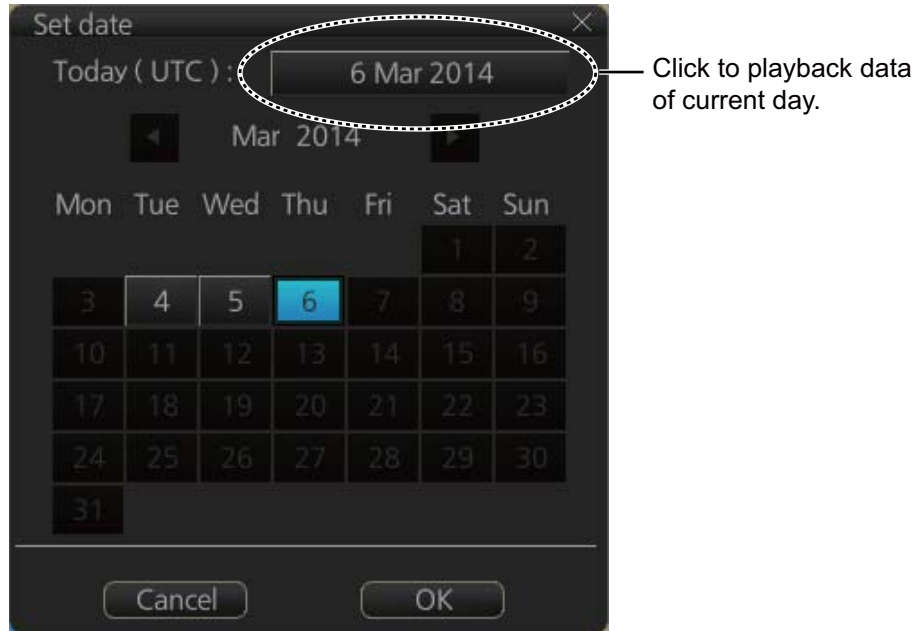


2. Set how often to record dangerous TTs and AIS target with [Log interval]. The setting range is 1 to 100 (min.).

19.6 How to Playback the Log

The log can be played back to check ship's movements within a given time frame. If an AMS is connected, deactivate it to enable playback.

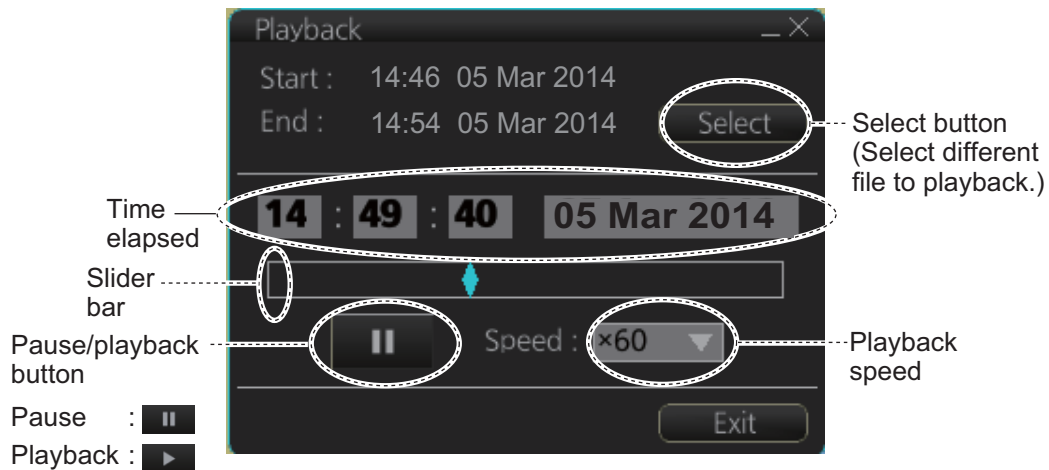
1. On the Status bar, click the [OTHERS] and [Playback] buttons. The message "If you use playback function, you cannot use other function before ECDIS restarts." appears. Click the [OK] button to proceed. The window shown below appears.



2. Select the date to playback. Log data is stored by the day. To play back data in the current month, click a day in the calendar. For other dates, click the [◀] or [▶] button to select the month and then click a day in the calendar. To playback the current day, click the button at the top of the screen.
3. Click the [OK] button, and the dialog box shown on the next page appears. This box has controls for
 - Start and End times
 - Time elapsed
 - Slider bar (drag the bar to change start time)
 - Playback speed list box (change the playback speed). The choices are x1, x2, x4, x10 and x60.

19. RECORDING, PLAYBACK FUNCTIONS

- The [Select] button selects a file. Playback is stopped and a message asks if you are sure to select a different file.



All your ship's movements and chart-related operations during the time period selected are plotted on the screen and the screen shows the message "PLAYBACK". To stop playback and return to the normal display, click the [Exit] button. The message "Please Restart ECDIS for using other functions without playback." appears. Click the [Restart] button to restart ECDIS.

20. ALERTS

20.1 What is an Alert?

"Alert" is a generic name for a notice to any unusual or potentially dangerous situation generated within the system.

Alerts are classified according to priority and category.

Alert priority

There are four alert priorities: emergency*, alarm, warning and caution.

* Generated when this ECDIS is connected to an AMS.

Emergency: Immediate danger to human life or to the ship and its machinery exists and that immediate action must be taken. **Emergency alerts are handled the same as an alarm.**

Alarm: Situations or conditions which require immediate attention, decision and (if necessary) action by the bridge team to avoid any kind of hazardous situation and to maintain the safe navigation of the ship.

Warning: Conditions or situations which require immediate attention for precautionary reasons, to make the bridge team aware of conditions which are not immediately hazardous, but may become so.

Caution: Awareness of a condition which continues to require attention out of the ordinary consideration of the situation or of given information.

Alert category

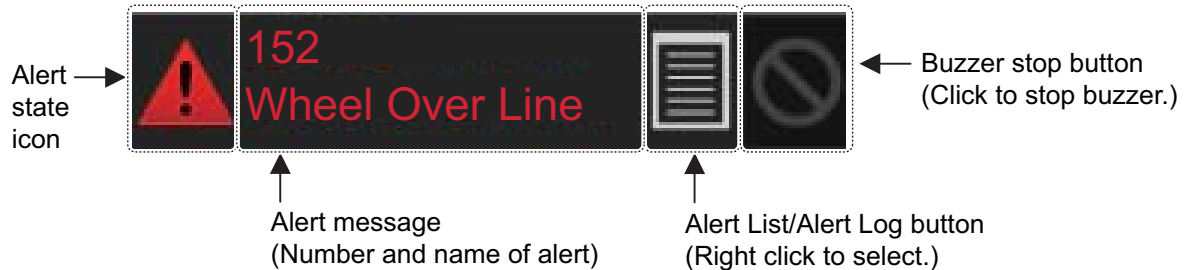
An alert is further classified by category, A, B or C, according to its degree of severity or source.

Category	Description
A	Category A alerts include alerts indicating <ul style="list-style-type: none">• Danger of collision• Danger of grounding
B	Category B alerts are alerts where no additional information for decision support is necessary. Category B alerts are all alerts not falling under category A.
C	IAS (Integrated Automation System) generated engine alert

20.2 Alert Box

When an alert is generated, the related alert message and alert state icon appear in the [Alert] box, which is at the bottom right corner on the screen. An audible alarm is additionally generated for emergencies, alarms and warnings.

In addition to the alert message and alert state icon, the [Alert] box has the buzzer stop button and provides access to the [Alert List] and [Alert Log].



Alert state icon: The state of an alert is shown with an icon. See page 20-4.



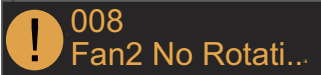


Alert message: The name and number of all active alerts appear in the message area, with the alert of the highest priority on top always. The color of both the message and the background change according to alert priority and alert state. See the table on the next page.

An alert can be acknowledged from the [Alert] box or [Alert List]. An alert remains in the [Alert] box and [Alert List] until it is acknowledged and rectified. See section 20.4.

Alert List/Alert Log button: Right click to select the [Alert List] or [Alert Log]. The background color of the button is light blue when the log or list is open. See sections 20.5 and 20.6 for a description of the list and log.










Buzzer stop button: Click to temporarily silence the buzzer, which sounds against alarms, emergency, and warnings. See page 20-4.

Alert message display format

Alert indication	Priority of alert	Alert state	Display state
  	Emergency, Alarm	- Not acknowledged, Not rectified. OR - Not acknowledged, Rectified.	Black characters on red background, flashes every 0.5 s. Red characters on gray background.
 	Warning	- Not acknowledged, Not rectified. OR - Not acknowledged, Rectified.	Black characters on yellow-orange background, flashes every 0.5 s. Yellow-orange characters on gray background.
	Warning	Acknowledged, Not rectified.	Yellow-orange characters on gray background.
	Caution	Not rectified.	Yellow characters on gray background.
	Emergency, Alarm, Warning	Acknowledged, Rectified.	No display.
	Caution	Rectified.	No display.




Alert state icons

The table shows the icons used to indicate the different alert states for the emergency, alarm, warning and caution alerts.

Icon	Alert state	Icon description
Alert priority: Emergency, Alarm		
	Not acknowledged, Not rectified	Red triangle with black loudspeaker in center of triangle. Flashing every 0.5 s.
	Not acknowledged, Not rectified Buzzer temporarily silenced.	Red triangle with crossed out black loudspeaker in center of triangle. Flashing every 0.5 s.
	Acknowledged, Not rectified	Red triangle with black exclamation point in center of triangle.
	Not acknowledged, Rectified	Red triangle with black check mark in center of triangle. Lights 3 s, off 1 s, repeat.
Alert priority: Warning		
	Not acknowledged, Not rectified	Yellow-orange circle with black loudspeaker in center of circle. Flashing every 0.5 s.
	Not acknowledged, Not rectified Buzzer temporarily silenced	Yellow-orange circle with crossed out black loudspeaker in center of circle. Flashing every 0.5 s.
	Acknowledged, Not rectified	Yellow-orange circle with black exclamation point in center of circle.
	Not acknowledged, Rectified	Yellow-orange circle with black check mark in center of circle. Lights 3 s, off 1 s, repeat.
Alert priority: Caution		
	Caution	Steadily displayed yellow square with black exclamation point in center of square.

Buzzer stop button

The color of both the background and the icon change according to alert state.

Button state	Description
	No alert generated. The background is grey and the icon is greyed out.
	An emergency, alarm or warning is being acknowledged. The background is grey and the icon is white.
	Button clicked to silence buzzer temporarily. The background is light-blue and the icon is black.

20.3 How to Temporarily Silence the Buzzer for an Alarm or Warning

When the buzzer for an alarm or warning sounds, you can temporarily silence it by doing one of the following:

- Click the buzzer stop button in the [Alert] box.
- In the [Alert List], click the [Silence] button.

The buzzer stops and the appearance of the alert state icon changes. An alert message remains in the [Alert] box and [Alert] list until acknowledged and rectified. The alert for the alarm or warning sounds again if not acknowledged within 30 seconds.

20.4 How to Acknowledge an Alarm or Warning

When an alarm or warning is generated, the buzzer sounds and the name of the alert appears and flashes in the [Alert] box and [Alert List]. To acknowledge the alert, do one of the following:

- Operate the **ALARM ACK** key on a Control Unit.
- In the [Alert] box or [Alert List], click the alert name.

When acknowledged, the buzzer stops and the flashing of the alert name stops. The state of the alert changes and the alert priority changes as shown below

Priority no.	Priority of alert	Alert state	
High ↑ ↓ Low	1	Emergency, Alarm	Not acknowledged, Not rectified
	2	Warning	Not acknowledged, Not rectified
	3	Emergency, Alarm	Not acknowledged, Rectified
	4	Warning	Not acknowledged, Rectified
	5	Emergency, Alarm	Acknowledged, Not rectified
	6	Warning	Acknowledged, Not rectified
	7	Caution	Not rectified

Unacknowledged warning alerts

If the Warning alert 150 "Early Course Change Indication" or 151 "Actual Course Change Indication") is not acknowledged within 30 seconds, then the priority changes to Alarm. If a Warning (other than Alert 150 and 151) is not acknowledged within 60seconds, the warning is generated again.

Category of alert and place of alert acknowledgement

The place of alert acknowledgement depends on the category of the alert.

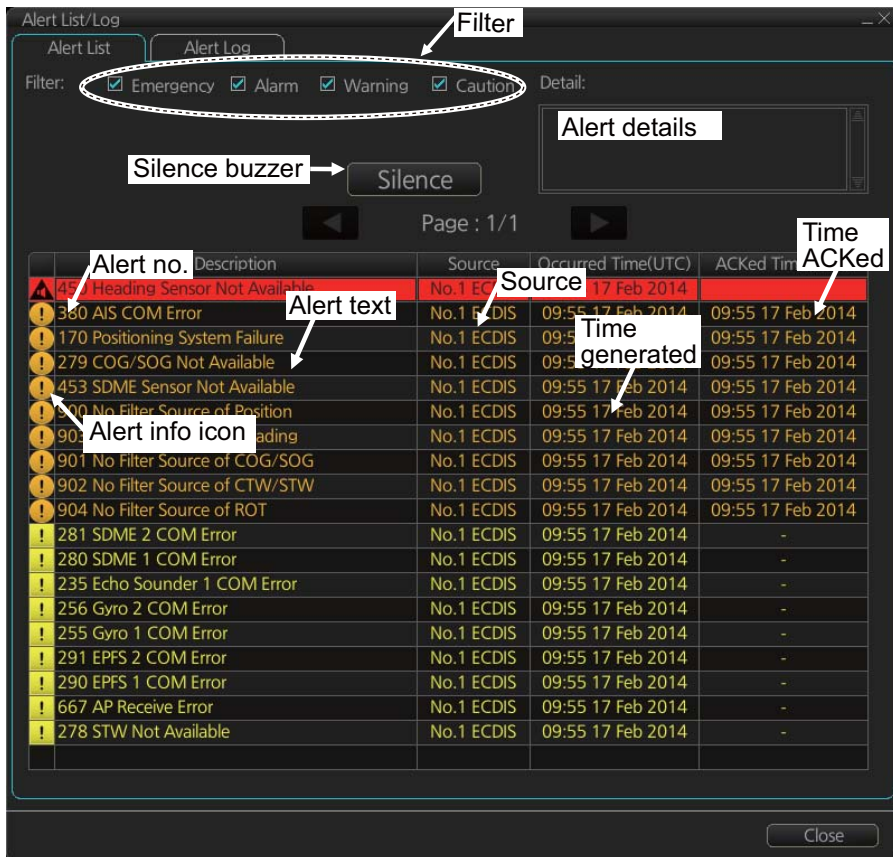
Category	Where the alert is generated	Place of alert acknowledgement
A	Equipment that generated the alert.	Equipment that generated the alert.
B	Equipment and AMS* (Alert Management System) *No use	Equipment that generated the alert or AMS.
C	IAS (Integrated Automation System) generated engine alert	–

20.5 Alert List

The [Alert List] displays all active alerts, with unacknowledged alerts at the top, in priority order. To display the list, right-click the [Alert List/Alert Log] button in the [Alert] box then select [Alert List Window]. The ZDA sentence is required to display the time in the list.

The list shows

- Alert no.
- Alert text
- Source of alert
- Time (UTC) alert was generated
- Time (UTC) alert was acknowledged
- Details about the alert selected



The background color of an unacknowledged emergency or alarm is red and flashing and unacknowledged warning is yellow-orange and flashing. An acknowledged alert is displayed steadily, in red for emergency or alarm and yellow-orange for warning. A caution is displayed steadily in yellow always.

The [Filter] checkboxes at the top of the window let you select what alerts to view. Check or uncheck the boxes to show or hide the corresponding alerts.

To find details about an alert, click the applicable alert info icon at the left side of the window to show the details in the [Detail] box at the top of the window. The box shows the reason for the alert, how to handle the alert, etc.

An individual emergency, alarm or warning can be acknowledged by clicking it.

The [Silence] button silences the buzzer.

How the alert list is updated after acknowledgement, rectification

When you acknowledge an alert, its display method on the [Alert] list changes according to alert category and alert state. Acknowledged and rectified alerts are immediately removed from the list.

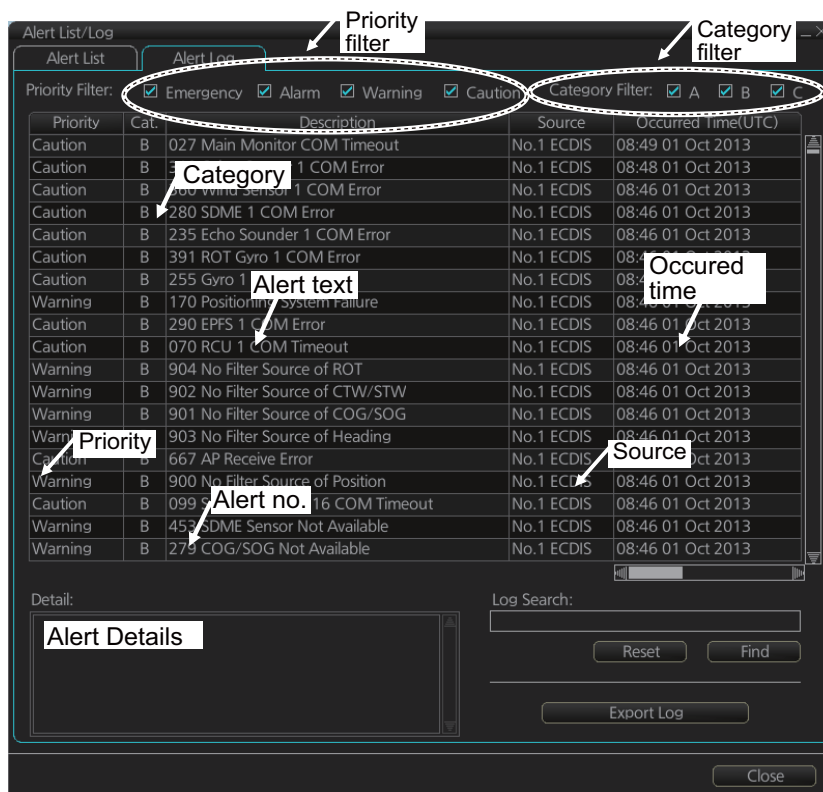
No.	Alert priority	Alert state	Display after acknowledgement	Display after rectifying
1	Emergency, Alarm	Not acknowledged, Not rectified	5	2
2		Not acknowledged, Rectified	8	–
3	Warning	Not acknowledged, Not rectified	6	4
4		Not acknowledged, Rectified	9	–
5	Emergency, Alarm	Acknowledged, Not rectified	–	8
6	Warning	Acknowledged, Not rectified	–	9
7	Caution	Not rectified	–	10
8	Emergency, Alarm	Acknowledged, Rectified	–	–
9		Acknowledged, Rectified	–	–
10	Caution	Rectified	–	–

20.6 Alert Log

The [Alert Log] stores and displays the latest 10,000 alerts. To display the log, right-click the [Alert List/Alert Log] button then select [Alert Log Window]. The log shows the following information for each alert:

- Priority of alert (Emergency, Alarm, Warning, Caution)
- Category of alert (A, B or C)
- Alert description (alert no., alert text)
- Source of alert
- Occurred Time (UTC)
- ACKed Time (UTC)
- Rectified Time (UTC)
- Alert details

You can select what priority and category of alerts to display with the [Priority] and [Category] filters at the top of the list. The list can be sorted by [Priority], [Cat.], [Description] or Time (Occurred, Rectified, ACKed). Click the corresponding column title to sort accordingly. To find information about an alert, select it to show the information in the [Detail] box. To search the log, enter text in the [Log Search] box then click the [Find] button. You can save the contents of the log to a USB flash memory, in .dat format, by clicking the [Export Log] button.



20.7 Alert Reception from Connected Sensors

An "ALR receive and ACK transmit" communication is available for every serial line input. The ALR message from the sensor includes information about alerts from the sensor, and is presented through the normal alert system. When you acknowledge an alert, an ACK message is sent to the sensor to do remote acknowledge.

This interface is based on IEC 61162-1 and IEC 80/520/INF.

20.8 List of Alerts

Below is a list of all available alerts and their default priorities. The priority of Alerts 620 to 638 can be switched between Caution and Warning on the [Chart Alert] page. See section 8.1.2.

No.	Text	Default priority
001	Fan1 Rotation Speed Lowering	Caution
002	Fan2 Rotation Speed Lowering	Caution
003	Fan3 Rotation Speed Lowering	Caution
004	Fan4 Rotation Speed Lowering	Caution
005	LCD Unit Lifetime Over	Warning
006	High Temperature Inside Monitor	Warning
007	Fan1 No Rotation	Warning
008	Fan2 No Rotation	Warning
009	Fan3 No Rotation	Warning
010	Fan4 No Rotation	Warning
011	RS485 Communication Timeout	Caution
012	No Signal	Caution
013	Sentence Syntax Error	Caution
014	Fan1 Rotation Speed Lowering	Caution
015	Fan2 Rotation Speed Lowering	Caution
016	Fan3 Rotation Speed Lowering	Caution
017	Fan4 Rotation Speed Lowering	Caution
018	LCD Unit Lifetime Over	Warning
019	High Temperature Inside Monitor	Warning
020	Fan1 No Rotation	Warning
021	Fan2 No Rotation	Warning
022	Fan3 No Rotation	Warning
023	Fan4 No Rotation	Warning
024	RS485 Communication Timeout	Caution
025	No Signal	Caution
026	Sentence Syntax Error	Caution
027	Main Monitor COM Timeout	Caution
028	Sub Monitor COM Timeout	Caution
030	Sensor Adapter 1 COM Timeout	Caution
031	Sensor Adapter 2 COM Timeout	Caution
032	Sensor Adapter 3 COM Timeout	Caution
033	Sensor Adapter 4 COM Timeout	Caution
034	Sensor Adapter 5 COM Timeout	Caution
035	Sensor Adapter 6 COM Timeout	Caution
036	Sensor Adapter 7 COM Timeout	Caution
037	Sensor Adapter 8 COM Timeout	Caution
038	Sensor Adapter 9 COM Timeout	Caution
039	Sensor Adapter 10 COM Timeout	Caution
070	RCU 1 COM Timeout	Caution
071	RCU 2 COM Timeout	Caution
072	RCU 3 COM Timeout	Caution
073	EC-3000 CPU Temp High	Caution
074	EC-3000 GPU Temp High	Caution

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No.	Text	Default priority
075	EC-3000 CPU Board Temp High	Caution
076	EC-3000 Remote 1 Temp High	Caution
077	EC-3000 Remote 2 Temp High	Caution
078	EC-3000 CPU Fan Rotation Speed Lowering	Caution
079	EC-3000 Fan1 Rotation Speed Lowering	Caution
080	EC-3000 Fan2 Rotation Speed Lowering	Caution
082	EC-3000 CPU Fan No Rotation	Warning
083	EC-3000 CPU Fan1 No Rotation	Warning
084	EC-3000 CPU Fan2 No Rotation	Warning
086	EC-3000 CPUboard 5V Power Error	Warning
087	EC-3000 CPUboard 3.3V Power Error	Warning
088	EC-3000 CPUboard 12V Power Error	Warning
089	EC-3000 CPUboard Battery Power Error	Caution
090	EC-3000 CPUboard Core Power Error	Caution
094	Sensor Adapter 11 COM Timeout	Caution
095	Sensor Adapter 12 COM Timeout	Caution
096	Sensor Adapter 13 COM Timeout	Caution
097	Sensor Adapter 14 COM Timeout	Caution
098	Sensor Adapter 15 COM Timeout	Caution
099	Sensor Adapter 16 COM Timeout	Caution
150	Early Course Change Indication	Warning
151	Actual Course Change Indication	Warning
152	Wheel Over Line	Alarm
153	Track Control Stop	Alarm
154	Position Monitor	Warning
156	Sensor Failure	Alarm
158	Course Difference	Warning
159	Low Speed Alarm	Alarm
170	Positioning System Failure	Warning
171	Crossing Safety Contour	Alarm
172	Off Track Alarm	Alarm
235	Echo Sounder 1 COM Error	Caution
236	Echo Sounder 2 COM Error	Caution
237	Echo Sounder 3 COM Error	Caution
255	Gyro 1 COM Error	Caution
256	Gyro 2 COM Error	Caution
257	Gyro 3 COM Error	Caution
258	Gyro 4 COM Error	Caution
259	Gyro 5 COM Error	Caution
260	Backup Navigator	Alarm
272	UTC Time Not Available	Warning
273	Depth(Bow) Not Available	Caution
274	Depth(Midship) Not Available	Caution
275	Depth(Stern) Not Available	Caution
277	Wind Speed/Direction Not Available	Warning
278	STW Not Available	Caution
279	COG/SOG Not Available	Warning
280	SDME 1 COM Error	Caution

No.	Text	Default priority
281	SDME 2 COM Error	Caution
282	SDME 3 COM Error	Caution
285	Heading Magnetic Not Available	Caution
290	EPFS 1 COM Error	Caution
291	EPFS 2 COM Error	Caution
292	EPFS 3 COM Error	Caution
293	EPFS 4 COM Error	Caution
294	EPFS 5 COM Error	Caution
295	EPFS 6 COM Error	Caution
296	EPFS 7 COM Error	Caution
297	EPFS 8 COM Error	Caution
298	EPFS 9 COM Error	Caution
299	EPFS 10 COM Error	Caution
300	Rudder 1 COM Error	Caution
301	Rudder 2 COM Error	Caution
302	Rudder 3 COM Error	Caution
303	HCS 1 COM Error	Caution
304	HCS 2 COM Error	Caution
305	VDR COM Error	Caution
306	BNWAS COM Error	Caution
310	Other Sensor 1 COM Error	Caution
311	Other Sensor 2 COM Error	Caution
312	Other Sensor 3 COM Error	Caution
313	Other Sensor 4 COM Error	Caution
314	Other Sensor 5 COM Error	Caution
315	Other Sensor 6 COM Error	Caution
316	Other Sensor 7 COM Error	Caution
317	Other Sensor 8 COM Error	Caution
318	Other Sensor 9 COM Error	Caution
319	Other Sensor 10 COM Error	Caution
320	EC-3000 Ch.01 COM Timeout	Caution
321	EC-3000 Ch.02 COM Timeout	Caution
322	EC-3000 Ch.03 COM Timeout	Caution
323	EC-3000 Ch.04 COM Timeout	Caution
324	EC-3000 Ch.05 COM Timeout	Caution
325	EC-3000 Ch.06 COM Timeout	Caution
326	EC-3000 Ch.07 COM Timeout	Caution
327	EC-3000 Ch.08 COM Timeout	Caution
330	Double Gyro Status Conflict	Warning
331	Select Gyro Status Missing	Warning
360	Wind Sensor 1 COM Error	Caution
361	Wind Sensor 2 COM Error	Caution
362	Wind Sensor 3 COM Error	Caution
370	Water Current COM Error	Caution
371	Water Temp COM Error	Caution
380	AIS COM Error	Warning
390	NAVTEX COM Error	Caution
391	ROT Gyro 1 COM Error	Caution

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No.	Text	Default priority
392	ROT Gyro 2 COM Error	Caution
393	ROT Gyro 3 COM Error	Caution
400	Network Printer Not Available	Caution
401	Local Printer Not Available	Caution
411	Other Sensor 11 COM Error	Caution
412	Other Sensor 12 COM Error	Caution
413	Other Sensor 13 COM Error	Caution
414	Other Sensor 14 COM Error	Caution
415	Other Sensor 15 COM Error	Caution
416	Other Sensor 16 COM Error	Caution
417	Other Sensor 17 COM Error	Caution
418	Other Sensor 18 COM Error	Caution
419	Other Sensor 19 COM Error	Caution
420	Other Sensor 20 COM Error	Caution
421	Other Sensor 21 COM Error	Caution
422	Other Sensor 22 COM Error	Caution
423	Other Sensor 23 COM Error	Caution
424	Other Sensor 24 COM Error	Caution
425	Other Sensor 25 COM Error	Caution
426	Other Sensor 26 COM Error	Caution
427	Other Sensor 27 COM Error	Caution
428	Other Sensor 28 COM Error	Caution
429	Other Sensor 29 COM Error	Caution
430	Other Sensor 30 COM Error	Caution
450	Heading Sensor Not Available	Warning
451	Gyro CORR. Source Change	Caution
453	SDME Sensor Not Available	Warning
469	WGS84 Not Used	Warning
470	Datum Change	Caution
472	Position Source Change	Warning
473	Heading Source Change	Warning
474	COG/SOG Source Change	Warning
475	CTW/STW Source Change	Warning
485	Depth Limit	Alarm
495	Anchor Watch Error	Warning
526	TT CPA/TCPA	Alarm
527	TT Lost	Warning
528	REF Target Lost	Warning
529	AIS New Target	Warning
530	AIS Target Display 95%	Caution
531	AIS Target Display 100%	Warning
532	AIS Target Capacity 95%	Caution
533	AIS Target Capacity 100%	Warning
534	AIS Target Activate 95%	Caution
535	AIS Target Activate 100%	Warning
536	AIS CPA/TCPA	Alarm
537	AIS Lost	Warning
539	AIS Message Received	Caution

No.	Text	Default priority
541	AIS Message Transmit Error	Caution
542	AIS Transmitting	Caution
543	No CPA/TCPA for AIS	Warning
620	User Chart Danger Area	Warning
621	Traffic Separation Zone	Warning
622	Inshore Traffic Zone	Warning
623	Restricted Area	Warning
624	Caution Area	Warning
625	Offshore Production Area	Warning
626	Military Practice Area	Warning
627	Seaplane Landing Area	Warning
628	Submarine Transit Lane	Warning
629	Anchorage Area	Warning
630	Marine Farm / Aquaculture	Warning
631	PSSA Area	Warning
632	Areas to be Avoided	Warning
633	Buoy	Warning
634	UKC Limit	Warning
635	Non-official ENC	Warning
636	No Vector Chart	Warning
637	Not Up-to-date	Warning
638	Permit Expired	Warning
640	Chart align: Over 30 min	Caution
652	Last WPT Approach	Alarm
665	Autopilot Mode Conflict	Alarm
667	AP Receive Error	Caution
675	Use MAN Steering	Warning
690	TC Start Timeout	Alarm
691	RM Stop - Exceed Max XTE	Alarm
692	RM Stop - Disconnect Sensors	Alarm
693	RM Stop - Other Causes	Alarm
820	NAVTEX Message Received	Caution
851	EPFS 1 Sensor Banned	Caution
852	EPFS 2 Sensor Banned	Caution
853	EPFS 3 Sensor Banned	Caution
854	EPFS 4 Sensor Banned	Caution
855	EPFS 5 Sensor Banned	Caution
856	EPFS 6 Sensor Banned	Caution
857	EPFS 7 Sensor Banned	Caution
858	EPFS 8 Sensor Banned	Caution
859	EPFS 9 Sensor Banned	Caution
860	EPFS 10 Sensor Banned	Caution
861	SDME 1 Sensor Banned	Caution
862	SDME 2 Sensor Banned	Caution
863	SDME 3 Sensor Banned	Caution
871	Gyro 1 Sensor Banned	Caution
872	Gyro 2 Sensor Banned	Caution
873	Gyro 3 Sensor Banned	Caution

20. ALERTS

No.	Text	Default priority
874	Gyro 4 Sensor Banned	Caution
875	Gyro 5 Sensor Banned	Caution
881	ROT Gyro 1 Sensor Banned	Caution
882	ROT Gyro 2 Sensor Banned	Caution
883	ROT Gyro 3 Sensor Banned	Caution
891	Water Current Sensor Banned	Caution
900	No Filter Source of Position	Warning
901	No Filter Source of COG/SOG	Warning
902	No Filter Source of CTW/STW	Warning
903	No Filter Source of Heading	Warning
904	No Filter Source of ROT	Warning

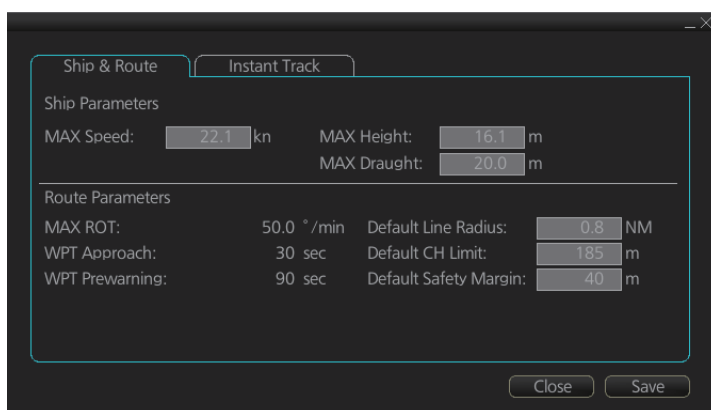
Note: The priority of alerts 620 to 638 can be switched between Warning and Caution. See the installation manual for details.

21. PARAMETERS

21.1 Ship and Route Parameters

The purpose of the ship and route parameters is set the basic parameters for the ship. These parameters are relative to ship steering and they are very important to get correct function of the integrated navigation system. They must be maintained carefully. Modification requires a good knowledge of the parameters' importance.

Open the menu and select [Ship & Route Parameters] from the [General] menu to show the [Ship & Route] page. Set each item referring to the description below.



Ship Parameters description

[MAX Speed]: Maximum speed the ship can do.

[MAX Height]: Maximum height of ship above sea level.

[MAX Draught]: Maximum draught of ship.

Route Parameters description

[MAX ROT]*: The maximum rate of turn of the ship. Set at installation.

[WPT Approach]*: The alert time before reaching the wheel over point.

[WPT Prewarning]*: The alert time before reaching the wheel over point.

[Default Line Radius]: Define the default value of radius between waypoints during automatic route steering.

[Default CH Limit]: Define the default value of channel limit.

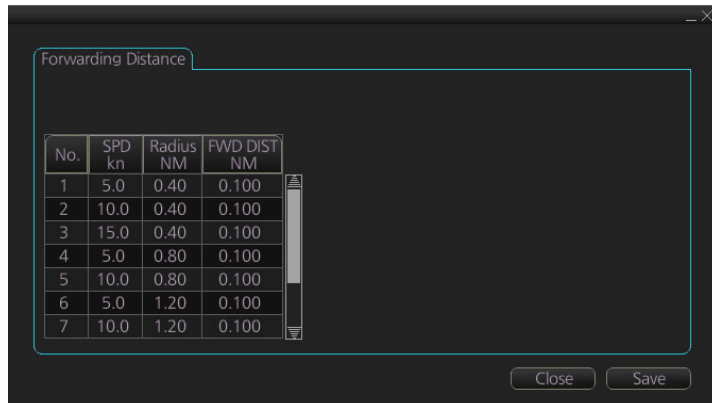
[Default Safety Margin]: Define the default value of extension for channel limits to be checked against chart alerts.

* Set at installation and cannot be changed by the operator.

21.2 Forwarding Distances

The forwarding distances are the distances the ship travels straight after the steering command is given to the autopilot. These distances change according to the radius of turn.

The forwarding distances are entered at installation and cannot be changed by the operator. However, the operator can view the forwarding distances settings on the [Forwarding Distance] display ([MENU]→[General]→[Navigation Parameter]).



The screenshot shows a window titled "Forwarding Distance" with a table of settings. The table has four columns: No., SPD kn, Radius NM, and FWD DIST NM. There are seven rows of data. Below the table are "Close" and "Save" buttons.

No.	SPD kn	Radius NM	FWD DIST NM
1	5.0	0.40	0.100
2	10.0	0.40	0.100
3	15.0	0.40	0.100
4	5.0	0.80	0.100
5	10.0	0.80	0.100
6	5.0	1.20	0.100
7	10.0	1.20	0.100

Note: These are the port side values. Starboard side values can also be shown. Contact a FURUNO dealer for details.

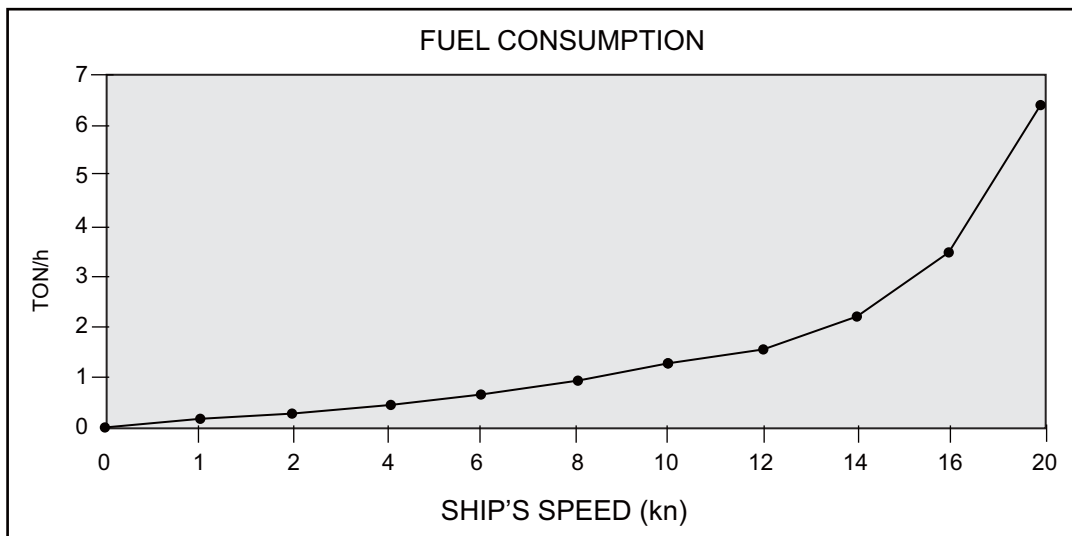
21.3 Cost Parameters

The cost parameters are used in the optimization calculation. Therefore define these parameters before doing the calculation.

Open the menu and select [Cost Parameters] from the [General] menu to show the [Cost Parameters] page. Set each item according to ship's plan, etc.

Speed kn	Heavy Fuel Oil ton/h	Diesel Oil ton/h
0.0	0.000	0.000
0.0	0.000	0.000
0.0	0.000	0.000
0.0	0.000	0.000
0.0	0.000	0.000
0.0	0.000	0.000
0.0	0.000	0.000
0.0	0.000	0.000
0.0	0.000	0.000
0.0	0.000	0.000
0.0	0.000	0.000
0.0	0.000	0.000

At the [Cost] window, enter the cost/hour and cost/ton for heavy fuel oil and diesel oil. At the [Fuel Consumption] window, define the fuel consumption figures for up to 12 different speeds. Before entering the data, plot the data on a graph, like the one shown below. Use a second graph if, for example, diesel oil consumption is different from that of heavy fuel oil. Reset the power to effect the settings.



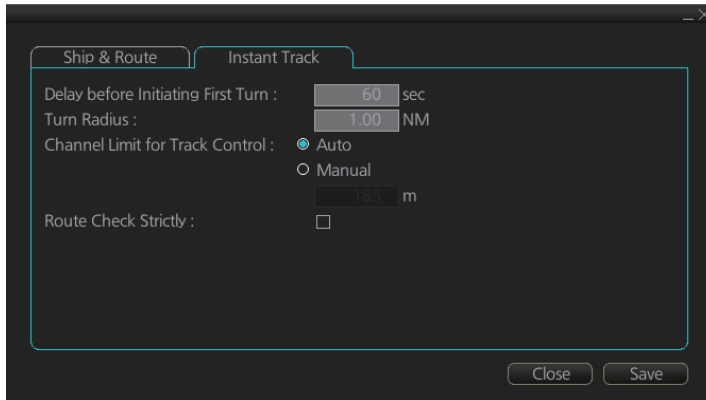
21.4 Instant Track Parameters

The instant track feature can create, in route monitoring, a simple route in the following situations:

- Return to the monitored route when the vessel goes outside the channel limits.
- Temporarily deviate from the monitored route (avoid collision, etc.).

How to set instant track parameters

Set the parameters for the instant track ([MENU]→[General]→[Ship & Route Parameters]→[Instant Track] tab).



[Delay before Initiating First Turn]: Set the number of seconds (30 - 600 seconds) to wait before initiating the first turn in the simple route.

[Turn Radius]: Set the turning radius (0.02 - 3.00 NM) to use between waypoints (four waypoints) in the simple route.

[Channel Limit for Track Control]: Set the channel limit (10 - 1852 m) for the instant track, automatically or manually. The [Auto] setting uses the channel limit set for the monitored route.

[Route Check Strictly]: Check to prevent monitoring of instant track when a chart alert (alarm or warning) is found through the route check. Uncheck to monitor instant track in spite of chart alert found through the route check.

22. CONNING AND MINI CONNING DISPLAYS

22.1 Conning Display

The conning display provides relevant sensor information data (including engine data) from external equipment, on one display to facilitate safe and efficient monitoring. The ECDIS accepts sensor information data in analog, serial and contact signal formats.

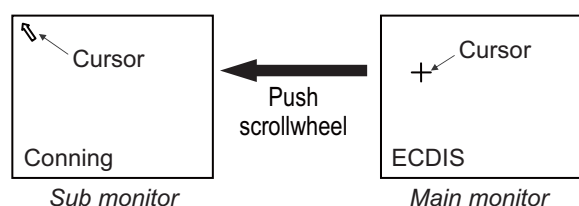
Six sets of conning displays are available, and they are arranged at installation. Consult with the installer of the equipment to decide the content and layout of each display.

To show the conning display, click the [Operating Mode] button on the Status bar to select [CONNING].

Note: Analog data is shown in the lowest value of the setting range when the data is not input.



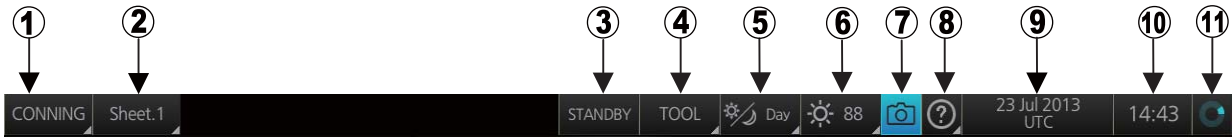
Note: The cursor can be moved between the main monitor and a sub



22. CONNING AND MINI CONNING DISPLAYS

monitor and vice versa if the sub monitor is configured to show the Conning display. Push the scrollwheel until the cursor moves to the other monitor.

Conning display Status bar

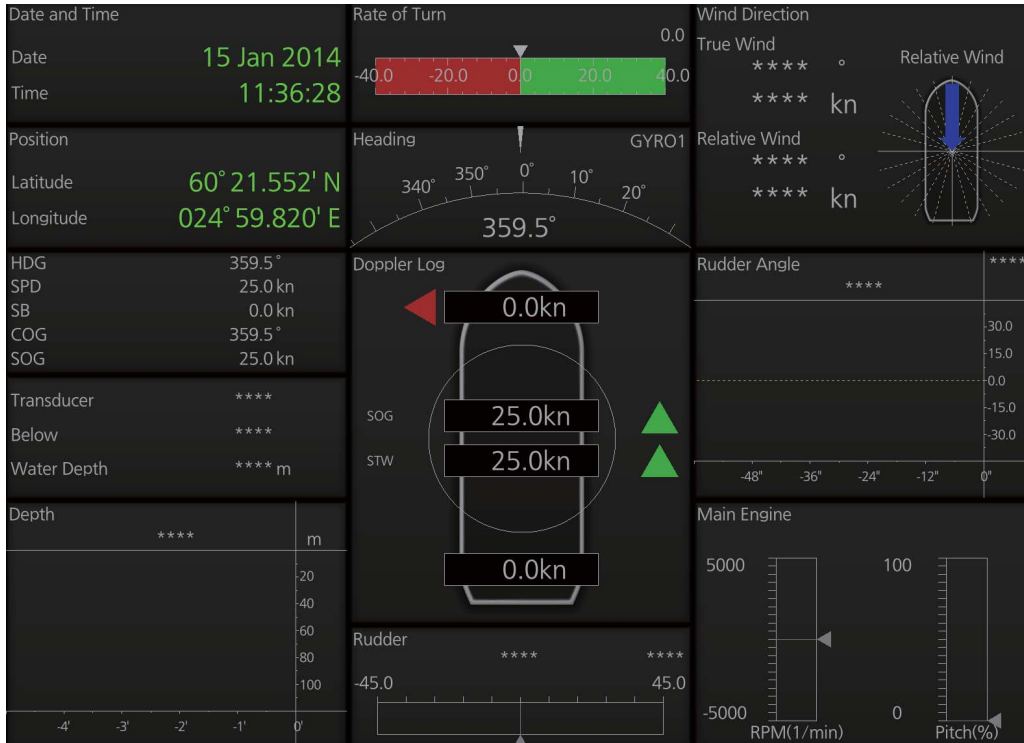


No.	Button	Description
1	Operating mode	Selects the operating mode, ECDIS or CONNING.
2	Conning display sheet	Selects the conning display sheet to use, Sheet.1 - Sheet.6. (Sheet name is decided at installation. "Sheet x" (x=sheet number) is the default sheet name.)
3	STANDBY	Goes to the Standby mode. See section 1.4.
4	TOOL	Shows, hides the software keyboard; adjusts the volume of the key beep and audio alert. <div style="text-align: center;"> <p>Shows, hides software keyboard Adjusts volume of key beep, audio alert</p> <p>To adjust a volume, put cursor in applicable box.</p> <p>Volume setting Click up arrow to raise volume; down arrow to lower volume.</p> </div>
5		Selects a display palette. See section 1.7.
6		Adjusts the brilliance of a FURUNO or Hatteland monitor. See section 1.8.
7		Takes a screenshot. See section 1.14.
8		Displays AMS and conning software version and system information. The information shown in the figure may differ from your own. For System and System 2 see section 1.17. <div style="text-align: center;"> <p>Version nos. subject to change.</p> </div>
9	Date	See section 1.13.
10	Time	See section 1.13.
11		Rotates clockwise if the system is working properly. See section 2.1.2.

Conning display examples

Six conning display sheets are available, and the content, layout and name of each sheet can be customized, by the service technician. Below are some examples conning display sheets.

Example 1 (General navigation)

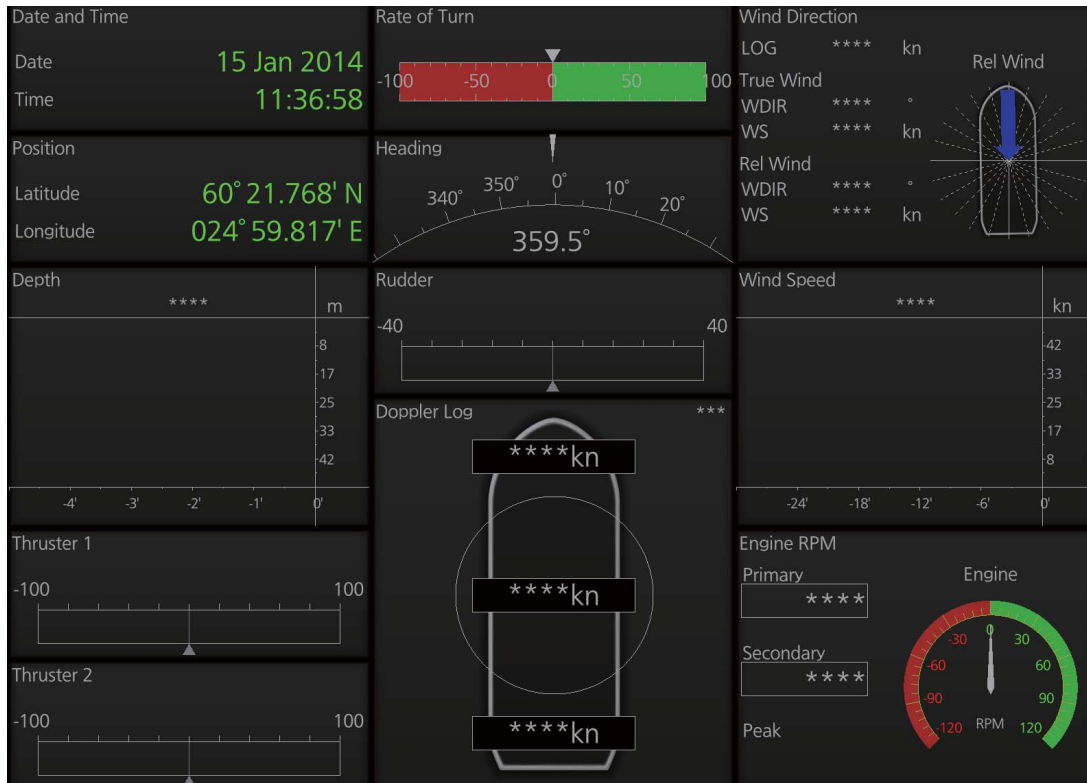


Example 2 (General navigation)



22. CONNING AND MINI CONNING DISPLAYS

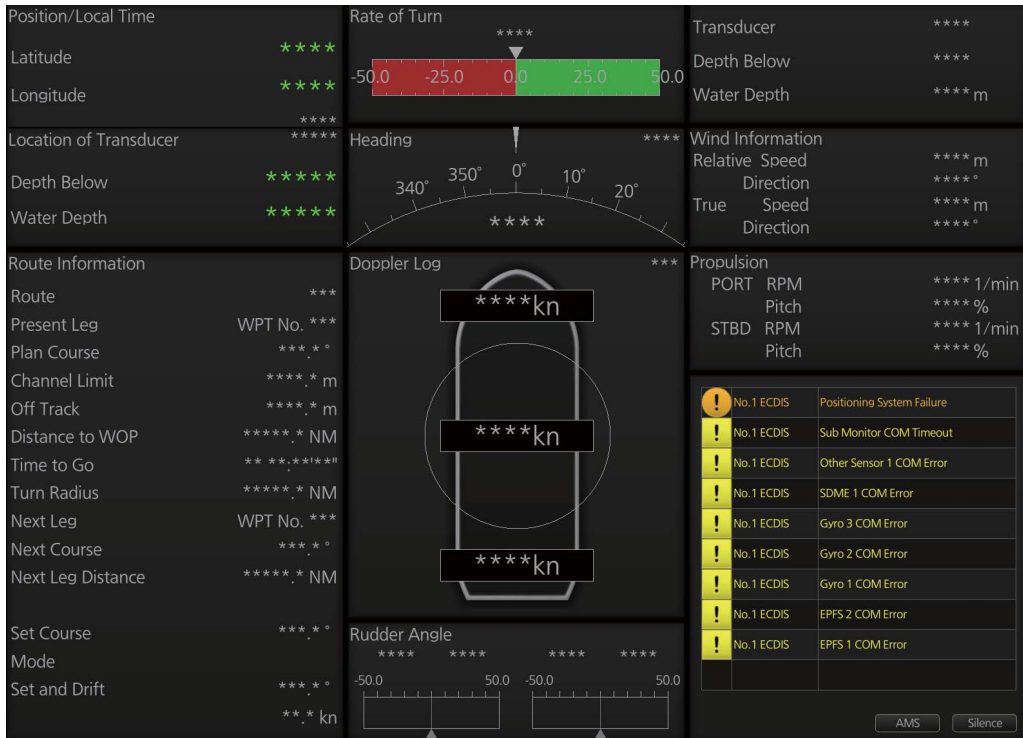
Example 3 (General navigation)



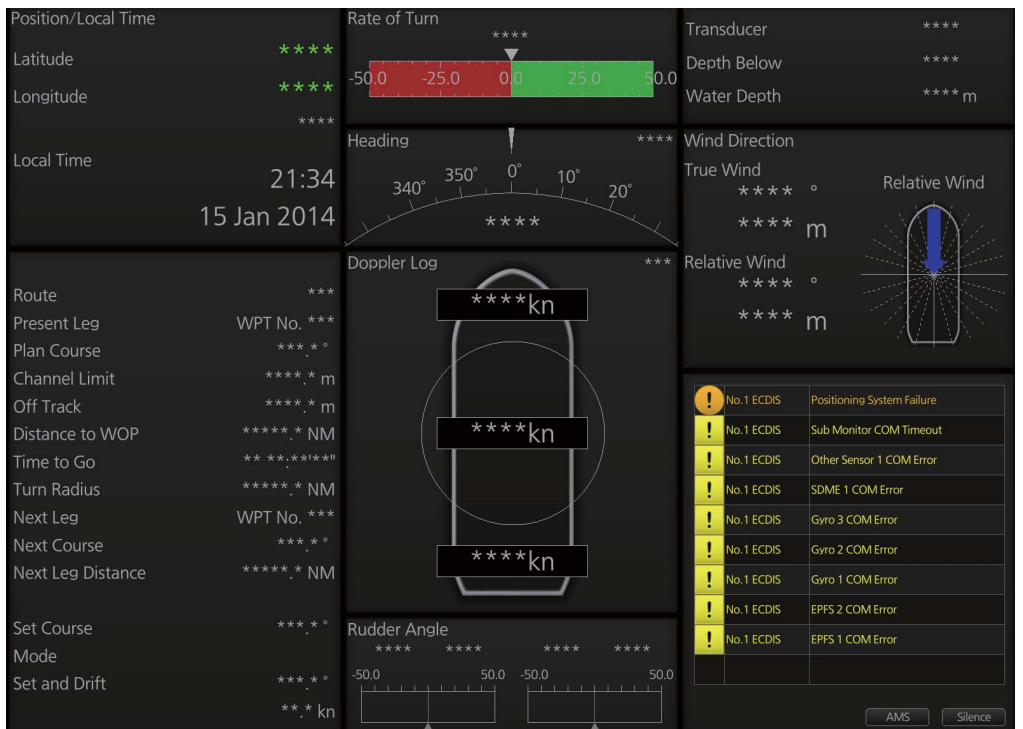
Example 4 (General Navigation)



Example 5 (All waters, navigation)

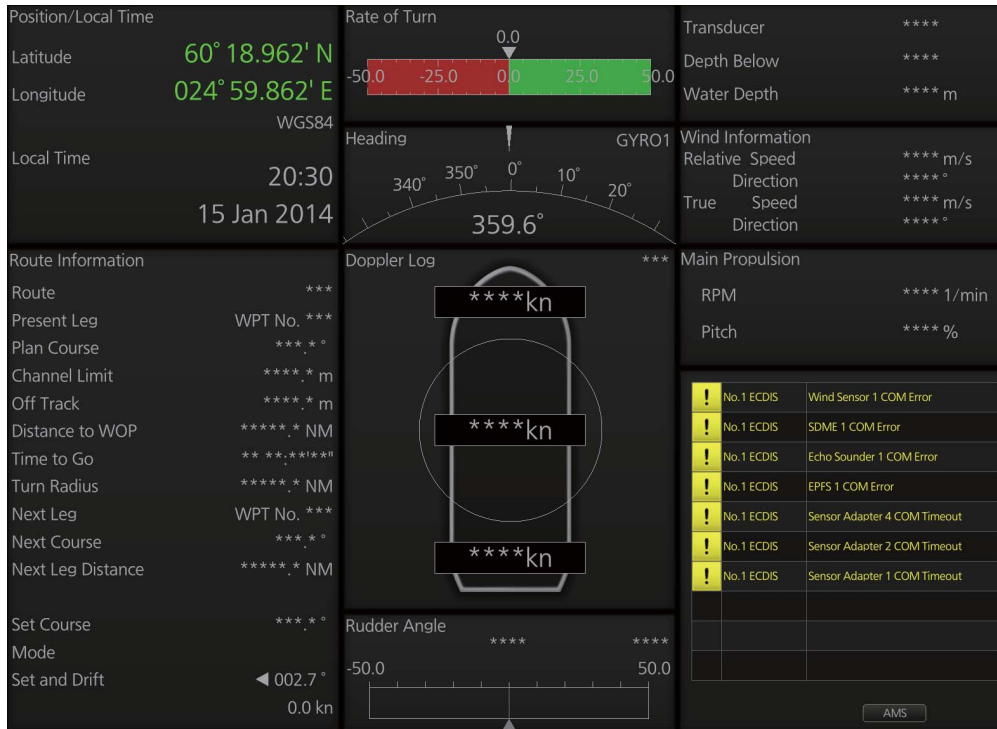


Example 6 (All waters, harbor)

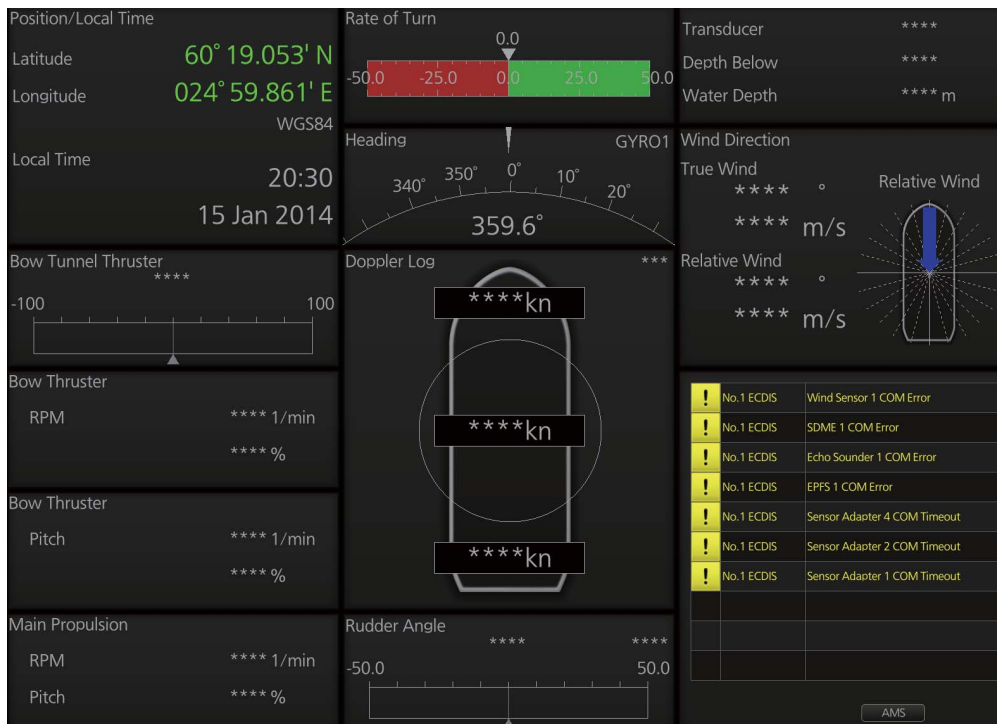


22. CONNING AND MINI CONNING DISPLAYS

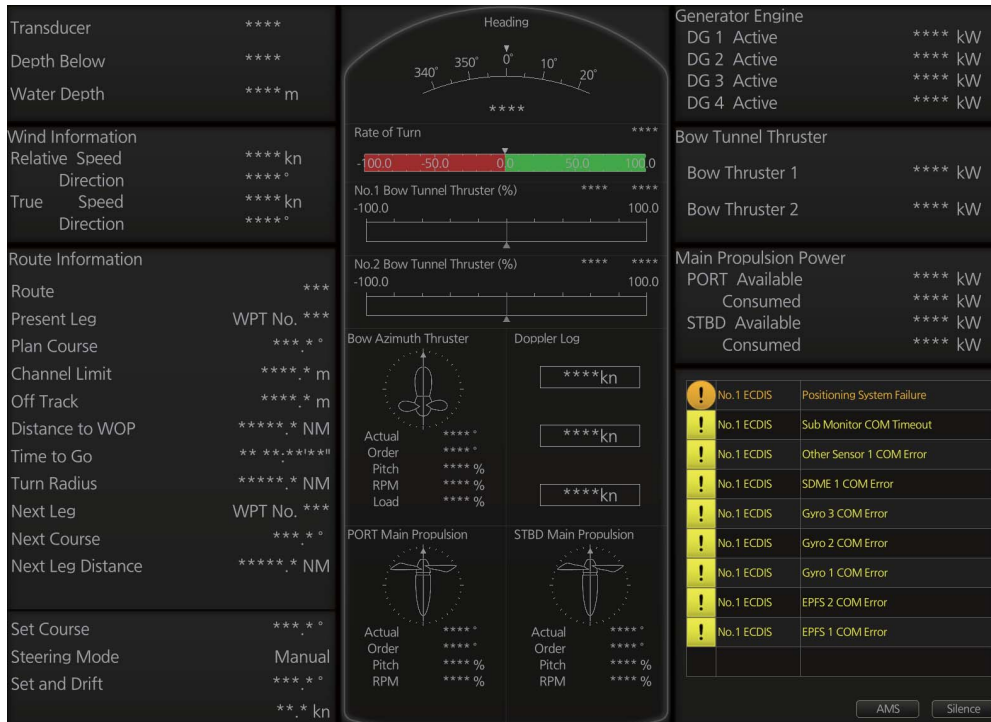
Example 7 (Ocean, navigation)



Example 8 (Ocean, harbor)



Example 9 (Offshore Service Vessel, Fore 1)

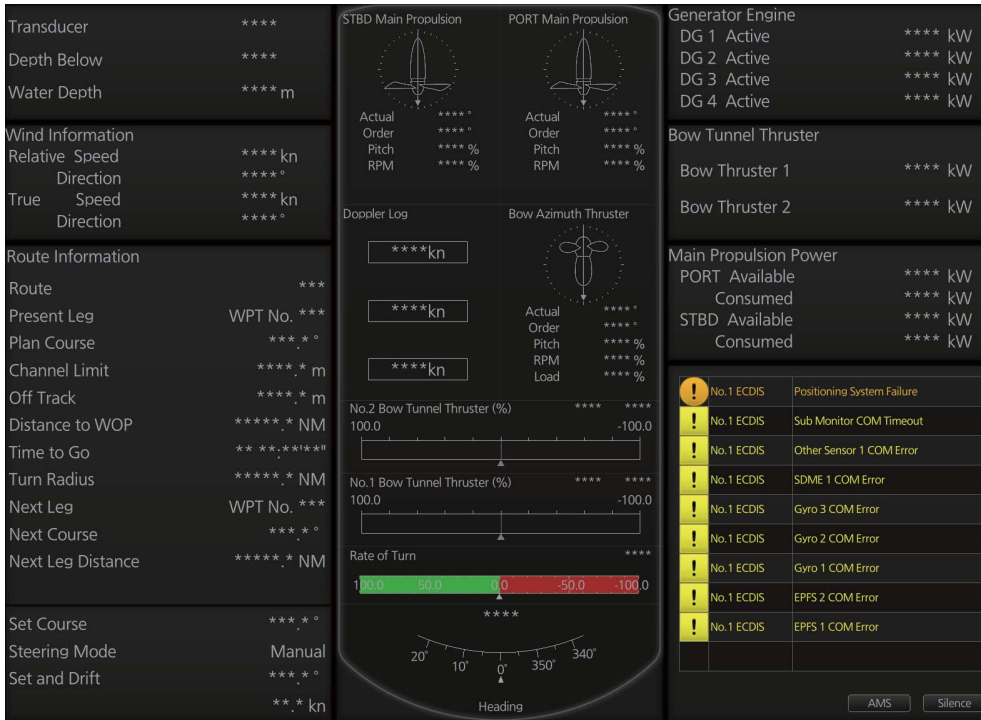


Example 10 (Offshore Service Vessel, Fore 2)



22. CONNING AND MINI CONNING DISPLAYS

Example 11 (Offshore Service Vessel, Aft1)

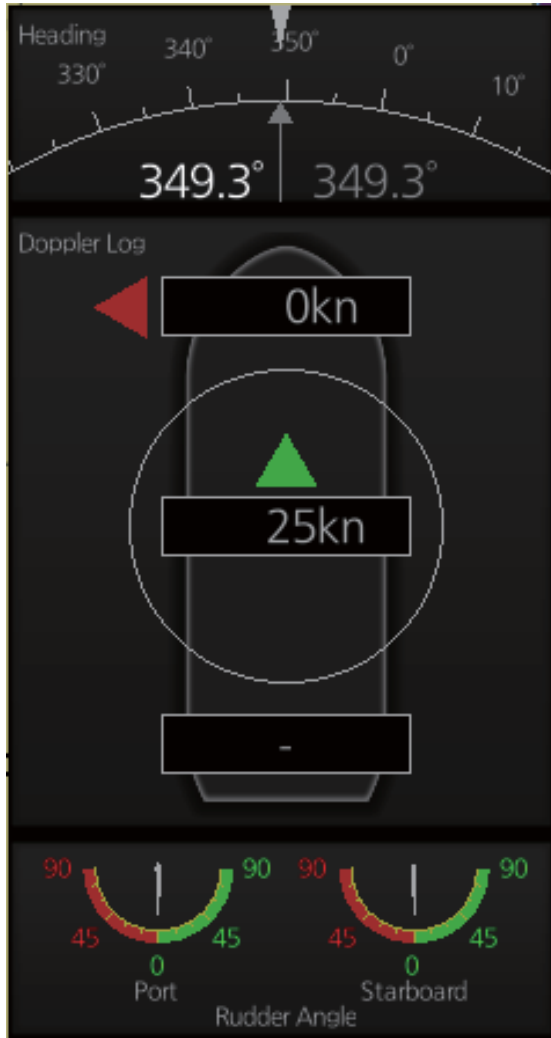


Example 12 (Offshore Service Vessel, Aft2)



22.2 Mini Conning Display

The mini conning display, available in the Voyage navigation mode, provides various navigation information and is set during the installation. The display example below shows heading, doppler log speed and rudder angle. To show or hide the mini conning display, click the [Mini Conning] button on the InstantAccess bar.



The location of the display can be changed. Right click the mini-conning display to show the context-sensitive menu. Click the location desired: [Left Top], [Left Middle], [Left Bottom], [Right Top], [Right Middle] or [Right Bottom].


22. CONNING AND MINI CONNING DISPLAYS

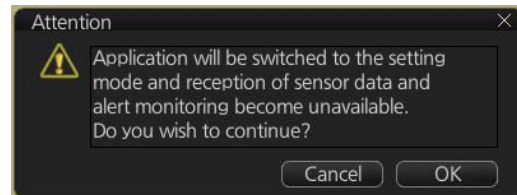
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23. SETTINGS MENU

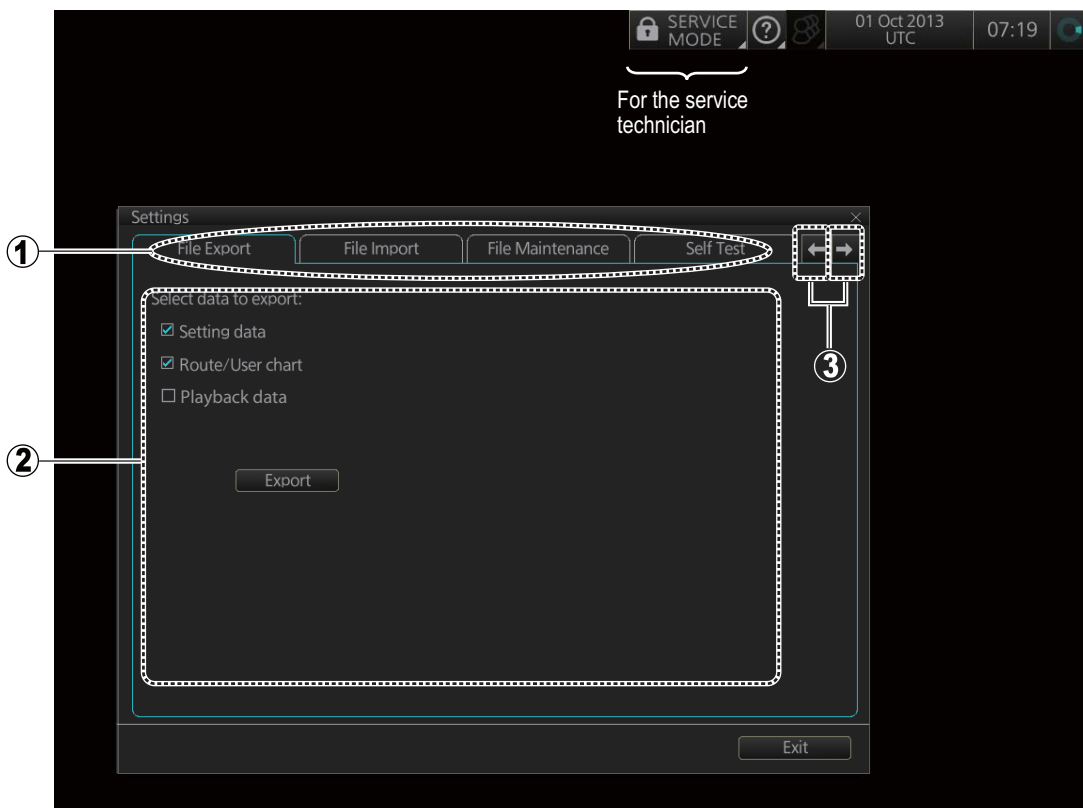
The [Settings] menu provides file import, export and maintenance, testing facilities (display, keyboard, self test), data sharing, customizing, screenshot processing, user default restoration, and CCRP selection.

23.1 How to Access the Settings Menu

Click the Settings button () on the Status bar then select [Settings]. The right message appears.



Click the [OK] button to show the [Settings] menu then click the [OK] button.



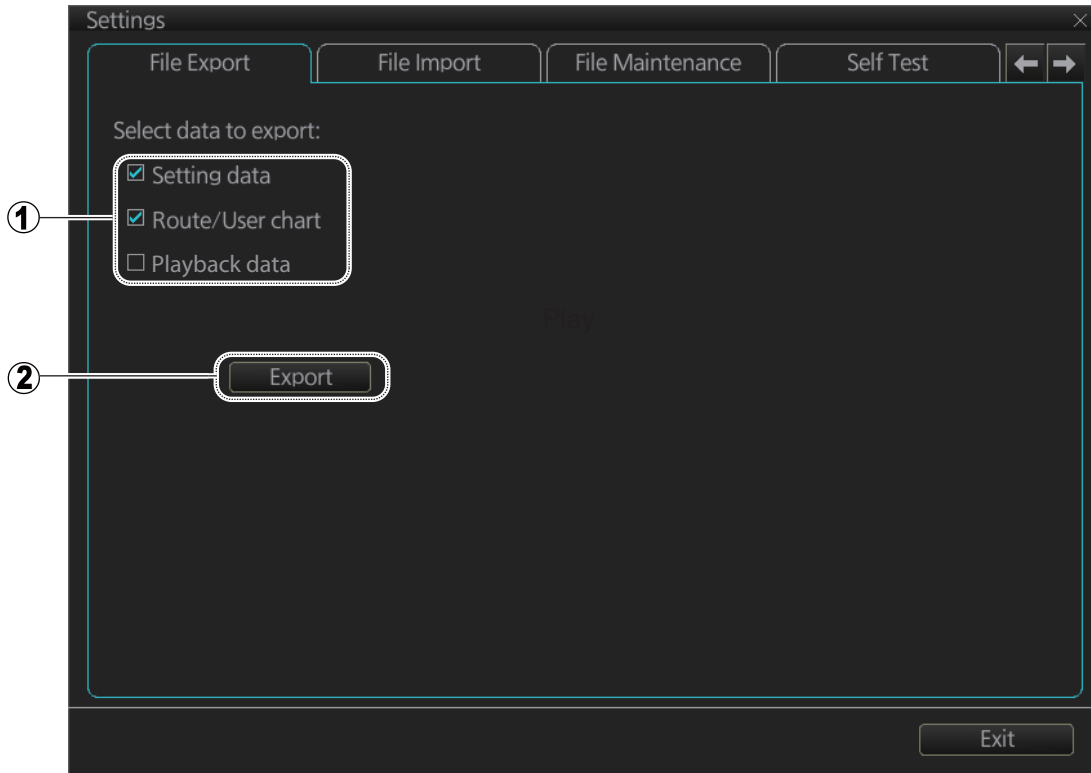
No.	Name	Description
1	Pages (menus)	A total of eleven menus. See the descriptions in this chapter.
2	Menu area	The menu for the selected page appears here.
3	Page selection buttons	Click to scroll the menus.

To open a page, use the page selection buttons to select a page then click the tab of the page required. The color of the border of the page selected is light blue.

23.2 File Export

The [File Export] page exports setting data, route/user charts, and playback data*, to a USB flash memory. Data is exported in .zip files.

* Disable AMS to enable export.



No.	Name	Description
1	Data selection	Check the data to export, setting data, route/user chart, and playback data. (The size of the log data is large, thus some time may be required to export the data.)
2	[Export] button	Click to export all items selected on this menu. The [SAVE FILE] dialog box appears. Select where to save the data, then click the [Save] button.

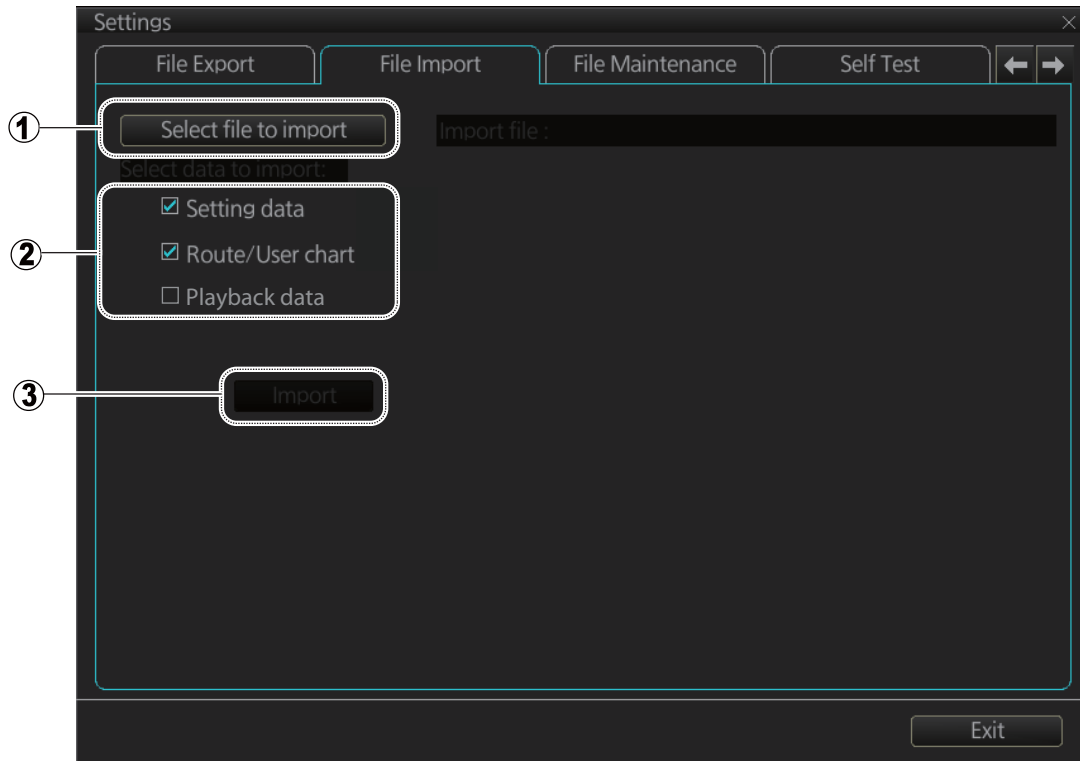
Note 1: The Export button does appear unless an item is checked.

Note 2: The message "Now processing" appears during the exporting, and "File export succeeded." appears upon completion. Click the [OK] button to finish.

23.3 File Import

The [File Import] page lets you import FMD-3xx0 series created setting data, routes/user charts, and playback data*, from a USB flash memory.

.*Disable AMS to enable import.



No.	Name	Description
1	Select file to import button	Click to show the [OPEN FILE] dialog box, where you can select the file to import.
2	Data selection	Check the data to import setting data, route/user chart, and playback data.
3	[Import] button	Click to import the objects selected. The message shown right appears. <div data-bbox="1023 1395 1417 1597" style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Attention</p> <p>Following data will be replaced with the imported data, and system will reboot automatically. Please export current data before import if needed.</p> <ul style="list-style-type: none"> - Setting data - Route/User chart <p>Do you wish to continue?</p> <p style="text-align: right;">No Yes</p> </div>

Note 1: Item 2 does not appear until after a file is selected. Item 3 appears after the data to import is selected.

Note 2: The message "Now processing" appears during the importing, and the message "File import finished." appears upon completion. Click the [OK] button.

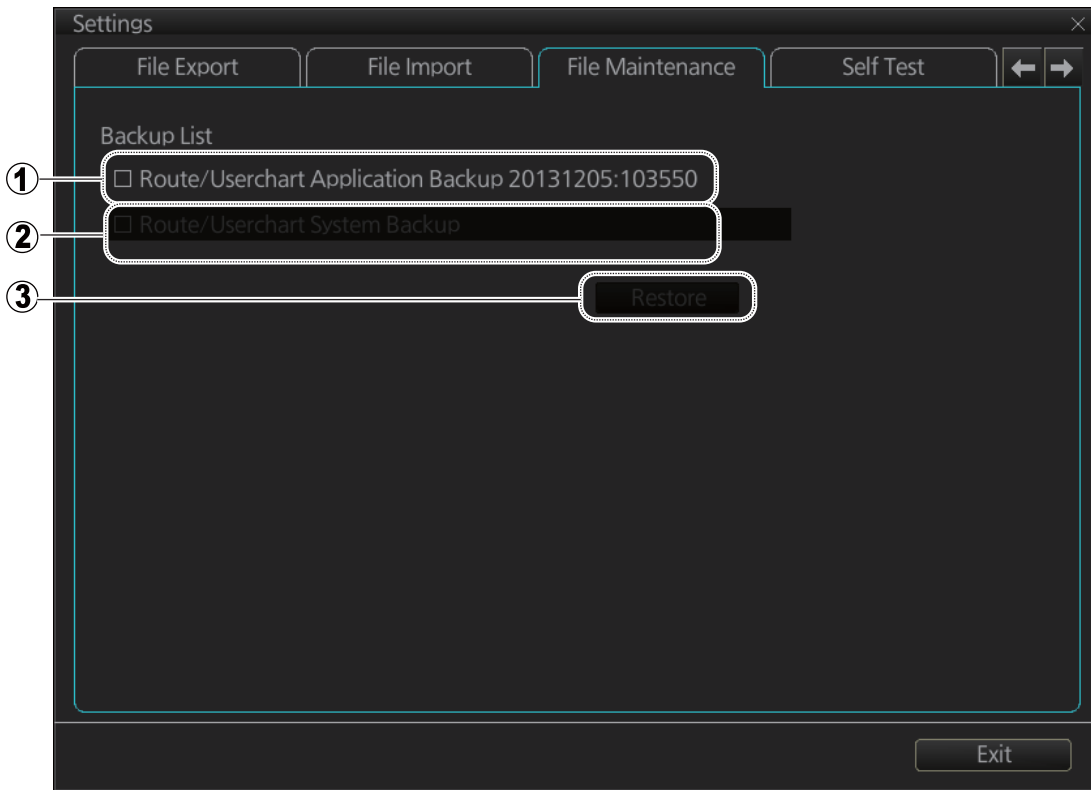
Note 3: The larger the file the more the time required to import the data.

Note 4: The system automatically restarts after setting data is imported.

Note 5: If importing could not be completed, first check if the USB flash memory is properly inserted. If inserted properly, try importing again.

23.4 File Maintenance

The [File Maintenance] page lets you restore the last-saved route/user chart application and Route/user chart system.

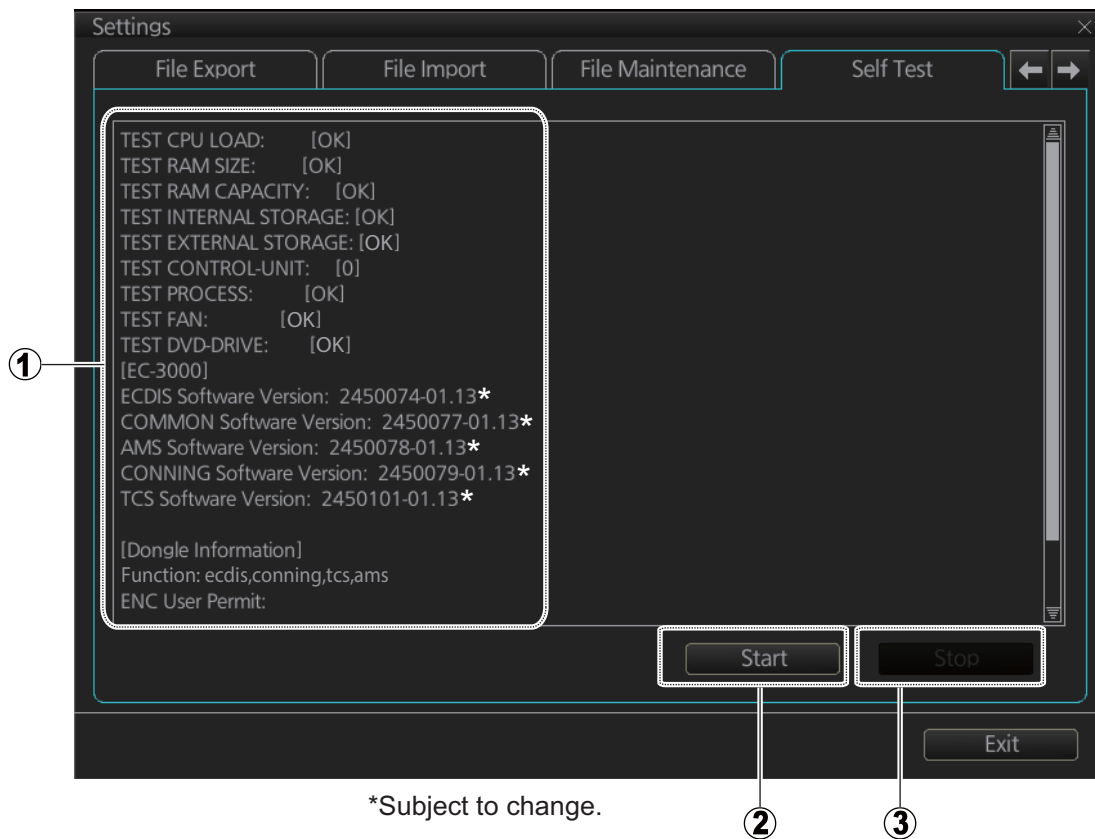


No.	Name	Description
1	Route/User chart Application backup	Check to restore last-saved route/user chart application.
2	Route/User chart System backup	Check to restore last-saved route/user chart system.
3	[Restore] button	Click to restore item selected.

Note: To restore the route data from the backup data, first check all route data then do the restore from the latest data.

23.5 Self Test

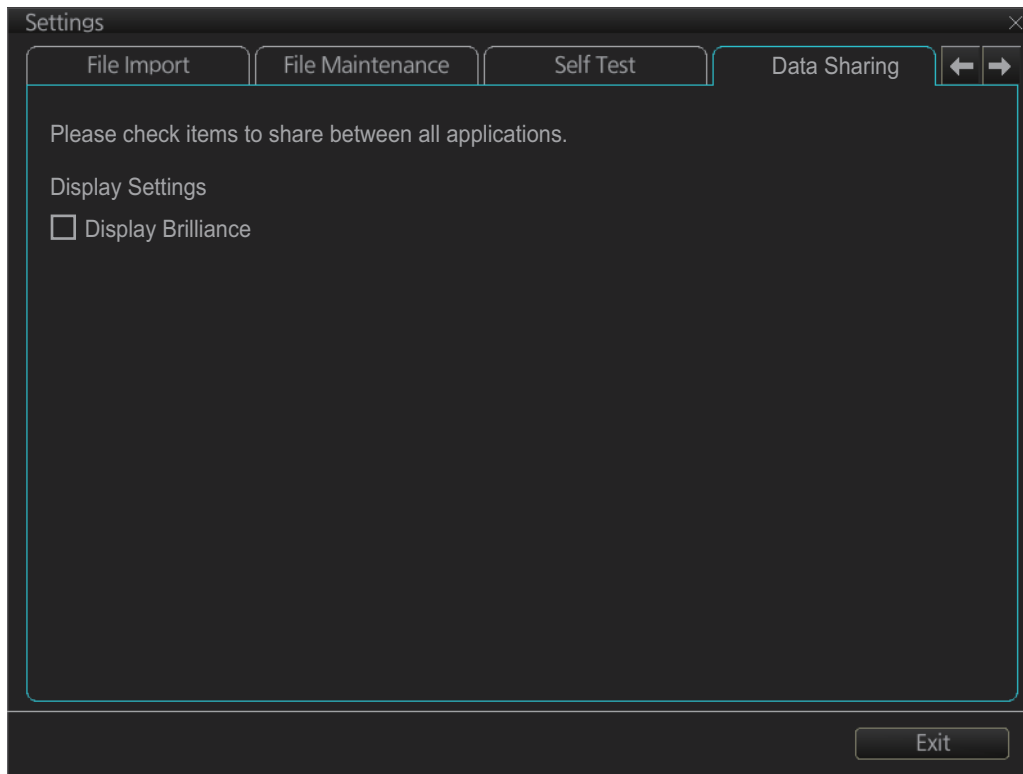
The [Self Test] page is mainly for use by the service technician to check the equipment. The ECDIS function is inoperative during the test.



No.	Name	Description
1	Test results, program numbers	The results of the self test and the program numbers.
2	[Start] button	Start the self test.
3	[Stop] button	Stop the self test. (Shown during test.)

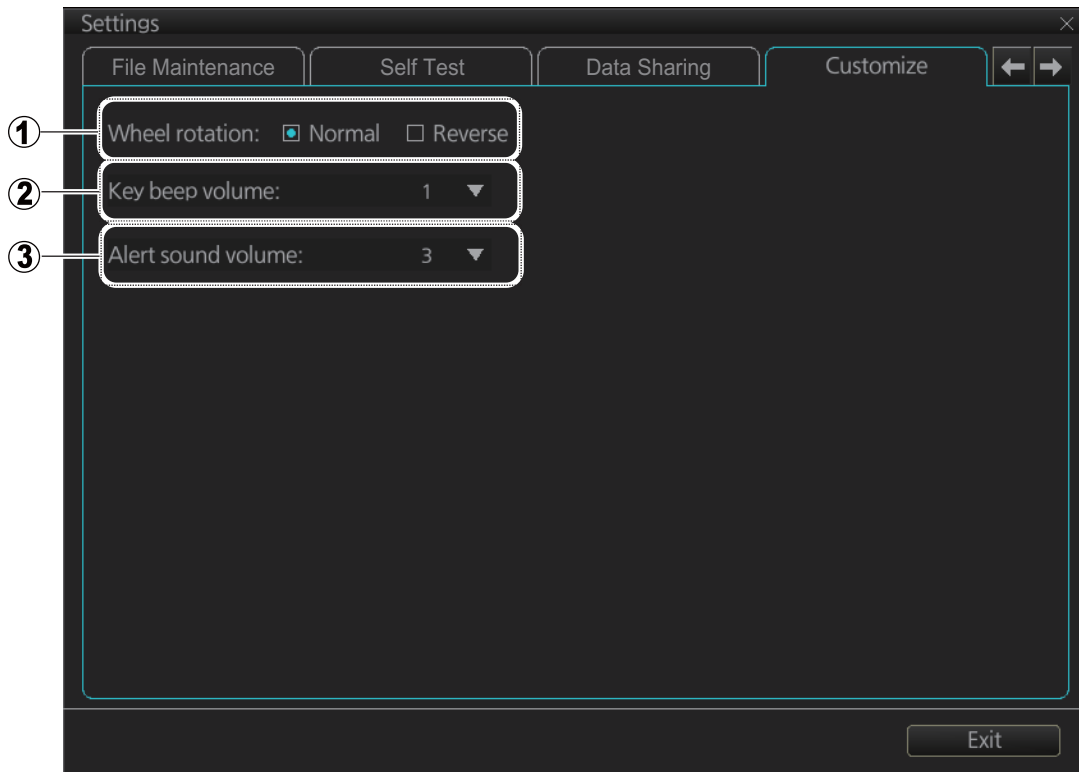
23.6 Data Sharing

The [Data Sharing] page shares the same brilliance setting between main and slave displays (ECDIS and conning applications).



23.7 Customize

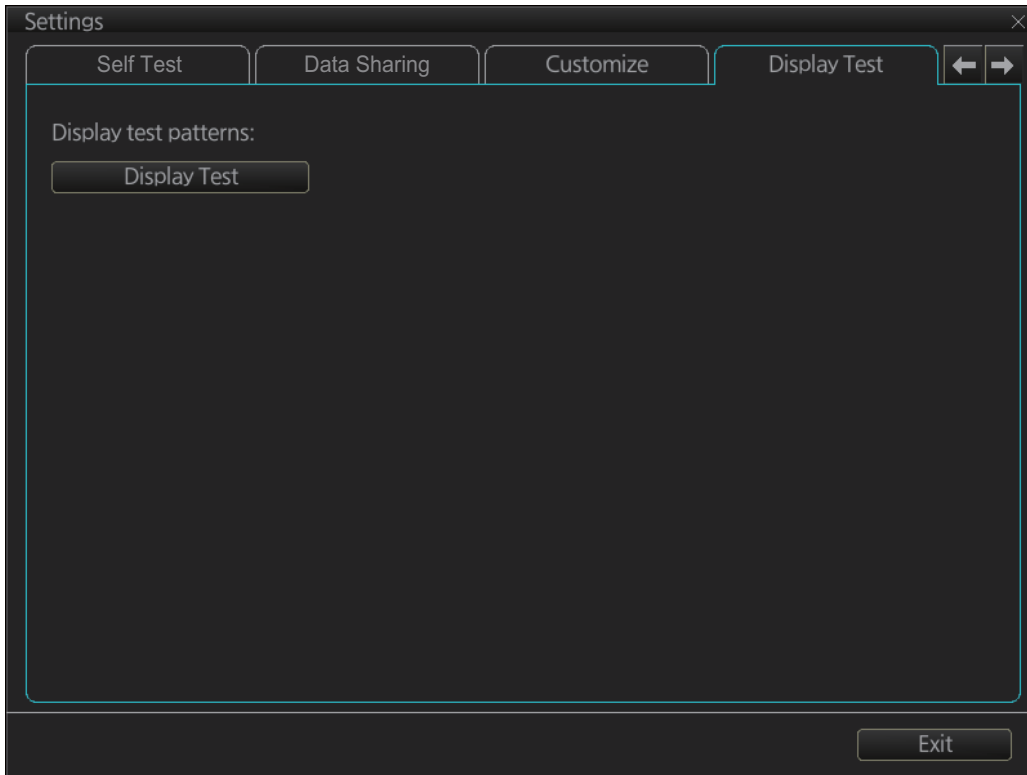
The [Customize] page lets you set buzzer volume, key beep volume, and scrollwheel rotation direction.



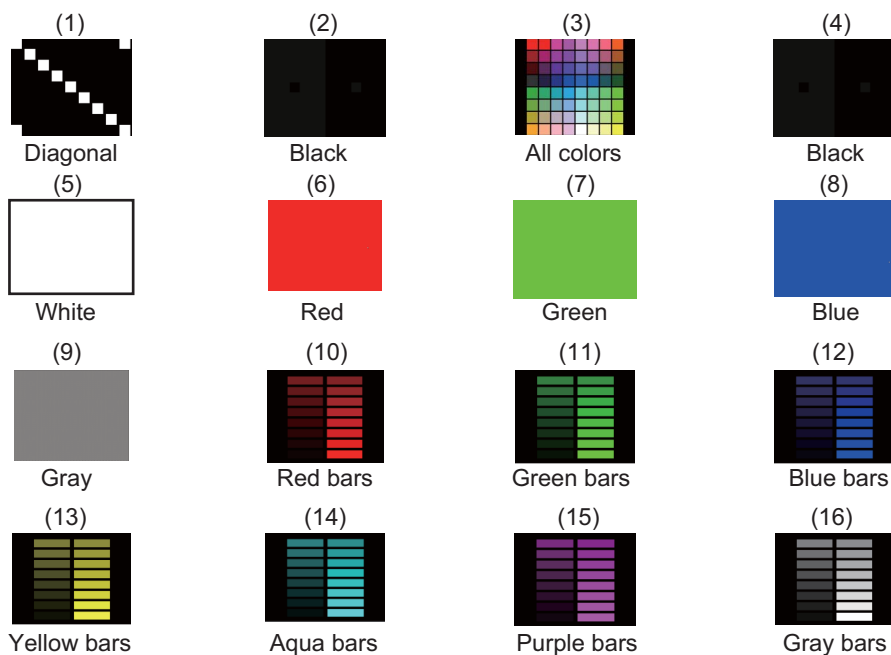
No.	Name	Description
1	Wheel rotation	Set the direction of scrollwheel rotation direction. Normal: Downward to increase value, upward to decrease value. Reverse: Reverse of "Normal".
2	Key beep volume	Set the volume of the key beep that sounds for correct key or mouse button operation. 0, no beep; 1, LOW; 2, MID; 3, HIGH
3	Alert sound volume	Set the loudness of the alert buzzer. 1, LOW; 2, MID; 3, HIGH

23.8 Display Test

The [Display Test] page displays various test patterns to check the FURUNO-supplied monitor for proper display of colors. Click the [Display Test] button to start the test. The buzzer sounds at the start of the test.



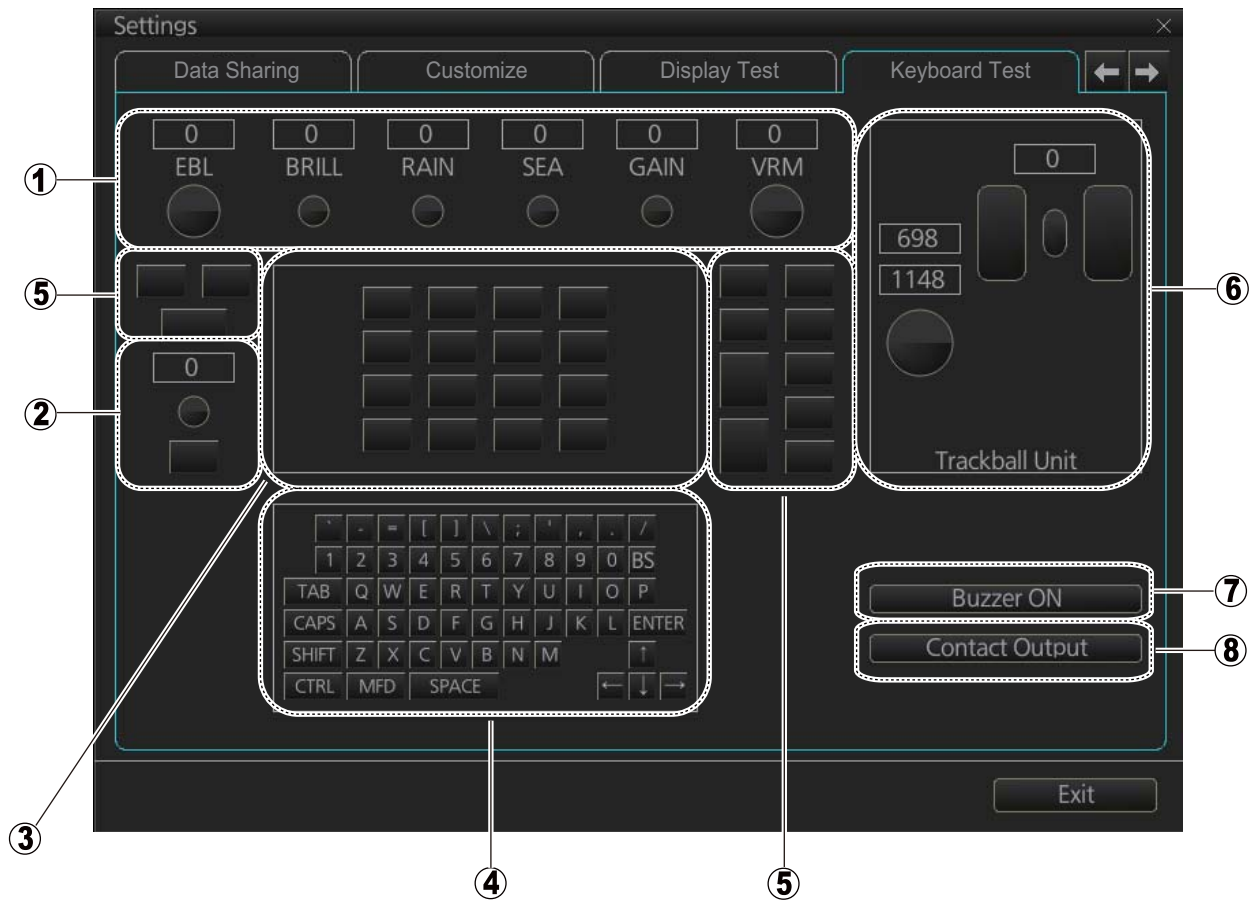
Left-click to proceed in the numerical order shown below; right click to proceed in reverse order.



To quit the display test and close the [Settings] menu, press the **ESC** key on the applicable Control Unit, or click the Exit button on the [Display Test] menu.

23.9 Keyboard Test

The [Keyboard Test] page checks the controls and keys on the ECDIS Control Unit and the trackball module on the ECDIS Control Unit and Trackball Control Unit.



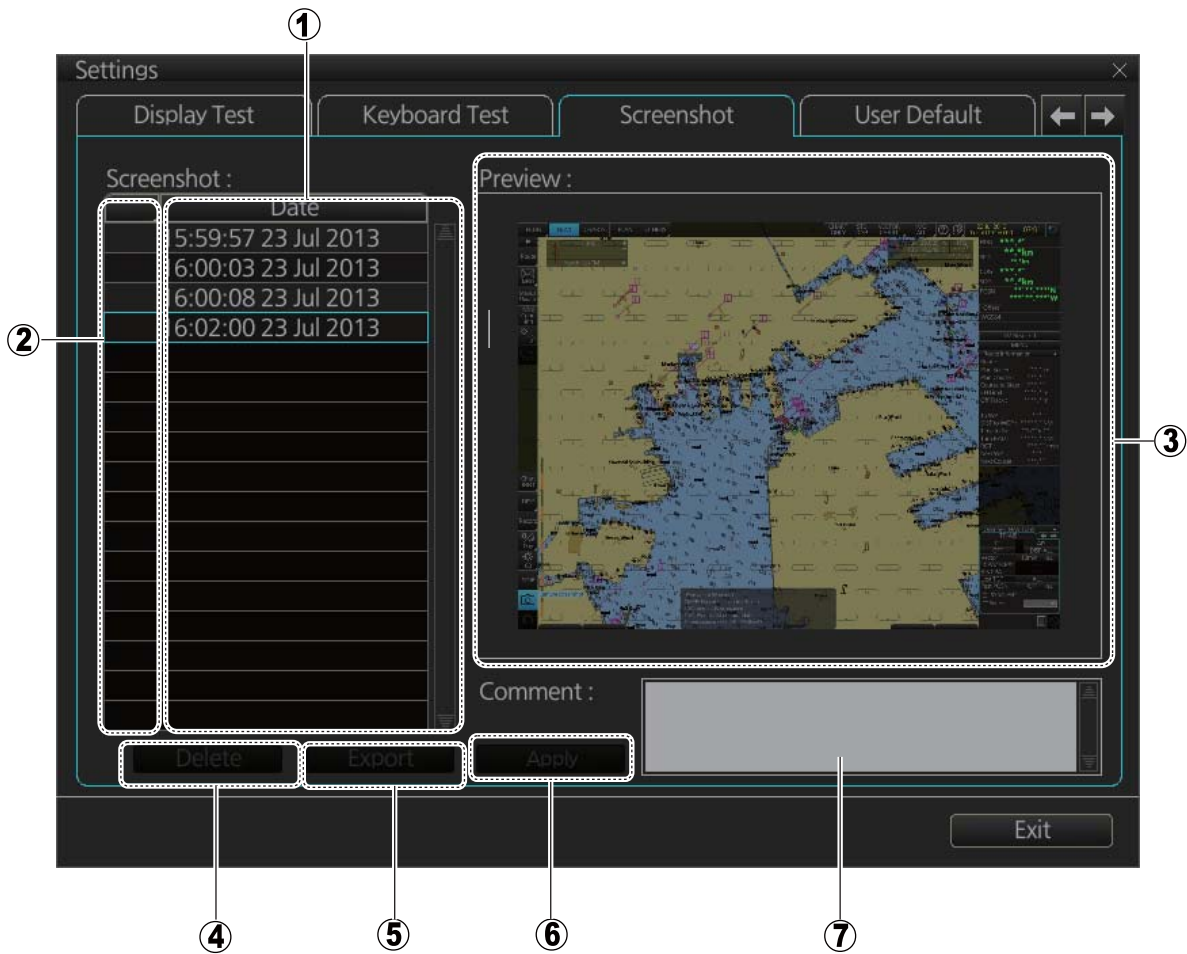
No.	Name	Description
1	EBL, BRILL, GAIN and VRM	Operate the related controls on the ECDIS Control Unit. Rotate a control and the window above the control shows the setting value. Push a control and the equivalent location on screen lights in light blue. (The RAIN and SEA control have no function and the EBL and VRM controls do not have a push function.)
2	InstantAccess knob/key	Check the InstantAccess knob and key. 1) Rotate the knob and the setting value appears in the window. 2) Push the knob and the knob lights in light blue. 3) Push the key and the key lights in light blue.
3	No use	
4	Keyboard of the ECDIS Control Unit	Operate each key. The pressed key lights in light blue.
5	Keys of the ECDIS Control Unit	Operate each key. The pressed key lights in light-blue.

23. SETTINGS MENU

No.	Name	Description
6	Trackball module	<p>Check the trackball module of a Control Unit:</p> <ol style="list-style-type: none"> 1) Spin the scrollwheel and rotate the trackball. The indication above the operated control shows the setting value. 2) Push each button. The window above a pushed button lights in light blue. 3) Push the scrollwheel. The window above the wheel lights in light blue.
7	[Buzzer ON] button	<p>Click the [Buzzer ON] button to sound the buzzer. The buzzer sounds and the button flashes (in red). Click the button again to cancel.</p>
8	[Contact Output] button	<p>Click the [Contact Output] button to output the System Failure contact signal from the Processor Unit. Click the button again to cancel.</p>

23.10 Screenshots

The [Screenshot] page processes screenshots saved to the SSD.



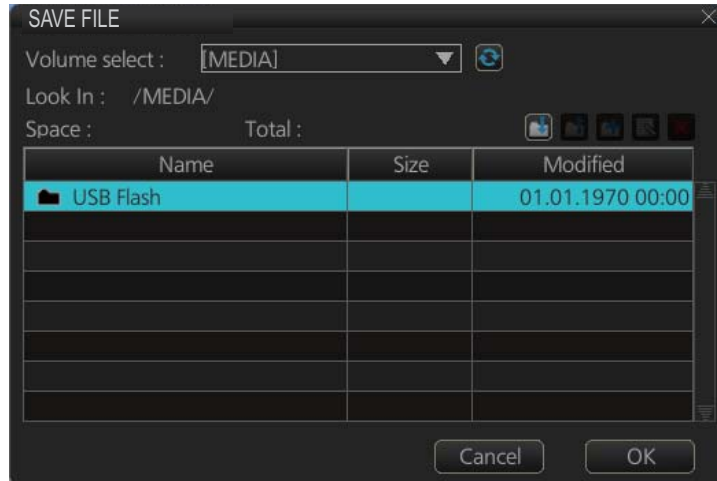
No.	Name	Description
1	List	List of screenshots taken. Screenshots are automatically assigned a file name consisting of the time and date the screenshot was taken.
2	Check boxes	Put a checkmark in the box of the screenshot to process.
3	Preview	Preview of the screenshot selected.
4	[Delete] button*	Delete the screenshot(s) selected.
5	[Export] button*	Export selected screenshot(s) to a USB flash memory.
6	[Apply] button*	Save comment.
7	Comment box	Enter comment for screenshot. Put a check in appropriate checkbox then enter comment.

* Button does not appear until related action is completed.

23.10.1 How to export screenshots

You can export screenshots to a USB flash memory as follows:

1. Insert a USB flash memory in the USB port on the Control Unit.
2. Open the [Screenshot] page.
3. Put a checkmark in the checkbox of the screenshot(s) to export.
4. Click the [Export] button.



5. Select the USB flash memory.
6. Click the [OK] button to export the screenshots selected.
7. If the exporting was successful, a window showing the number of files exported appears. Click the [OK] button to finish.

23.10.2 How to delete screenshots

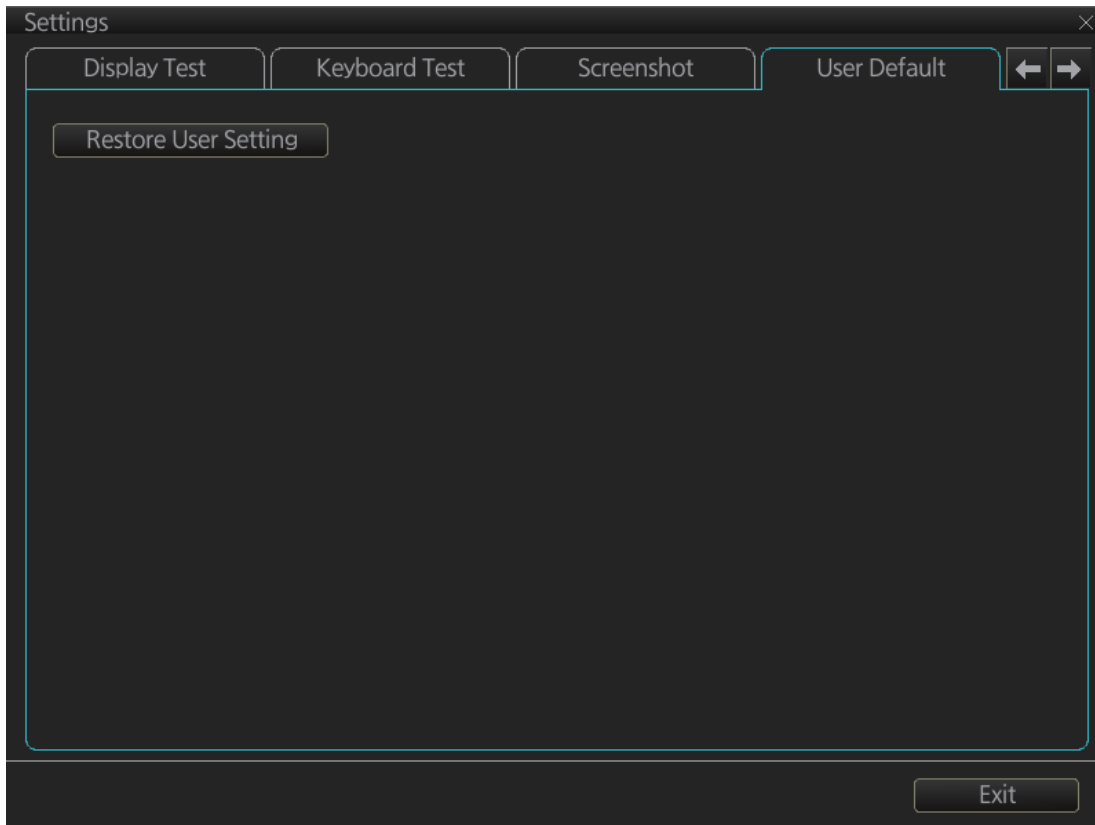
1. Select the [Screenshot] page.
2. Put a checkmark in the checkbox of the screenshot(s) to delete. To select all screenshots, right-click the box to the left of the [Date] column then select [Select all]. To clear all check marks, select [Clear all].
3. Click the [Delete] button. You are asked "Selected files will be deleted. Do you wish to continue?"
4. Click the [Yes] button to delete the screenshots selected. The message "File deletion succeeded." appears.
5. Click the [OK] button to finish.

23.11 User Default

The [User Default] page restores all default settings for the [Chart Display] and [Symbol Display]. Click the [Restore User Setting] button. You are asked "All setting data will be restored to the default. Do you wish to continue?" appears. Click the [Yes] button to restore default settings and reset the power.

If you require the settings shown below, copy them to a USB flash memory (using the file export feature), BEFORE restoring user defaults.

- Setting data
- Route/User chart



23.12 CCRP

The [CCRP] page provides for selection of CCRP (Consistent Common Reference Point) and shows the location of various sensors.



No.	Name	Description
1	CCRP	Select the CCRP to use in the case of multiple CCRPs.
2	Display Filter	Check the items to show on the ship's graphic.
3	Ship's graphic	Shows the location of the sensors selected at the [Display Filter].

24. MAINTENANCE AND TROUBLESHOOTING

Periodic checks and maintenance are important for proper operation of any electronic system. This chapter contains maintenance and troubleshooting instructions to keep optimum performance and the longest possible life of the equipment. Before attempting any maintenance or troubleshooting procedure please review the safety information below. If you cannot restore normal operation after following the troubleshooting procedures, do not attempt to check inside any unit; there are no operator-serviceable parts inside. Refer any repair work to a qualified technician.

WARNING

ELECTRICAL SHOCK HAZARD
Do not open the equipment.

Only qualified personnel can work inside the equipment.

IMPORTANT

Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts.

Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

24.1 Maintenance

Regular maintenance is essential to good performance. A regular maintenance program should be established and should at least include the items shown in the table below.

Interval	Check point	Check and measures	Remarks
When needed	Monitor unit and Processor Unit	Dust or dirt may be removed from a cabinet with a soft cloth. Water-diluted mild detergent may be used if desired. DO NOT use chemical cleaners to clean the display unit; they may remove paint and markings. To clean 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 a degreaser or an antifog solution, as they can strip the coating from the LCD.	Do not use chemical-based cleaners for cleaning. They can remove paint and markings.
	Filter inside Processor Unit	Have a technician clean the filter if it is dusty. See section 24.4.	
3 to 6 months	Cabling	Check that all cabling is firmly connected and is not damaged.	

24.2 How to Replace the Fuse

The fuse in the Processor Unit, Monitor Unit and Sensor Adapter protects those units from overvoltage (overcurrent) and internal fault. If a unit cannot be turned on, check if its fuse has blown. If a fuse has blown, find out the cause before replacing the fuse. If the fuse blows again after replacement, contact your dealer for advice.



WARNING

Use the proper fuse.

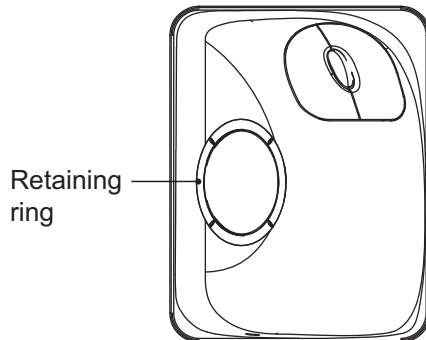
Use of a wrong fuse can damage the equipment or cause fire.

Unit	Power supply	Type	Code no.
Processor Unit EC-3000	100-115 VAC	FGMB 125V 10A PBF	000-157-470-10
	220-230 VAC	FGMB 250V 5A PBF	000-157-570-10
Monitor Unit MU-190	100-230 VAC	FGBO 250V 1A PBF	000-155-828-10
Monitor Unit MU-231	100-230 VAC	FGBO 250V 1.5A PBF	000-155-833-10
Sensor Adapter MC-3000S	24 VDC	FGMB 125V 3A PBF	000-157-481-10

24.3 Trackball Maintenance

If the cursor moves abnormally, dust or dirt may be on the trackball. Clean the trackball as shown below:

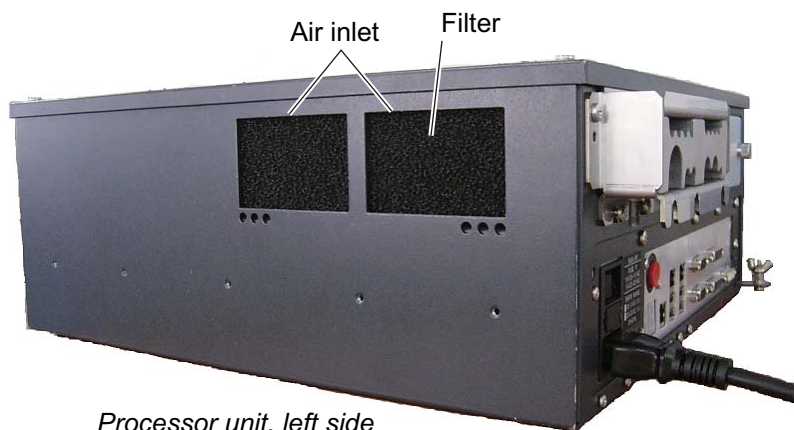
1. Turn the retaining ring on the trackball module counterclockwise 45° to unlock it.



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

24.4 How to Clean the Filter in the Processor Unit

Have a qualified technician clean the air inlet filter in the Processor Unit when it becomes dusty. Remove the filter and clean it with water and a mild detergent. Rinse the filter, allow the filter to dry then return it to the Processor Unit.



Processor unit, left side

Note 1: Be sure the air inlet is not blocked. A blocked inlet can cause the temperature to rise inside the cabinet, which can lead to malfunction.

Note 2: The right side of the Processor Unit has an exhaust vent. Remove dust from the vent as necessary.

24.5 Troubleshooting

The troubleshooting table below provides common faults and the remedies with which to restore normal operation.

Troubleshooting

If...	then...	Remedy
power cannot be turned on	<ul style="list-style-type: none"> power connector may have loosened. ship's mains is off. fuse has blown. 	<ul style="list-style-type: none"> Check connector. Check power supply. Replace fuse.
power can be turned on but nothing appears on the display	<ul style="list-style-type: none"> brilliance is too low. the ambient temperature is less than 0°C (32°F). 	<ul style="list-style-type: none"> Adjust brilliance. The heater is warming the Processor Unit. The display appears in approx. 2 minutes.
the picture freezes (display is not updated)	<ul style="list-style-type: none"> ECDIS internal error 	<ul style="list-style-type: none"> Press the power key on a Control Unit to turn off the power. If the power does not go off, hold down the key. Turn on the power again to restore normal operation.
message "There is no dongle or an error has occurred in the dongle. The system will automatically shut down." appears	<ul style="list-style-type: none"> dongle is not connected. data in the dongle is corrupted. 	<ul style="list-style-type: none"> Connect dongle. Contact FURUNO for assistance.
monitored route is not displayed	<ul style="list-style-type: none"> route has not been selected. monitor route has not been selected to be visible above the chart. 	<ul style="list-style-type: none"> Select route to monitor. Open the [Route] page of the [Symbol Display] menu and check the monitored route parts to show.
planned route is not displayed	<ul style="list-style-type: none"> route has not been selected. planned route has not been selected to be visible above the chart. 	<ul style="list-style-type: none"> Select route as "planned". Open [Route] page of [Symbol Display] menu and check the planned route parts to show.
symbol of user chart cannot be erased	<ul style="list-style-type: none"> two or more symbols may be superimposed on each other. 	<ul style="list-style-type: none"> Do the delete action several times.
position cannot be found	<ul style="list-style-type: none"> position sensor(s) is not selected on the [POSN] page. position sensor is turned off. sensor cable has loosened. 	<ul style="list-style-type: none"> Check position sensor selections. Turn on position sensor. Check cable.
ARCS chart cannot be displayed	<ul style="list-style-type: none"> no ARCS chart for area. dongle is not connected. license has expired. 	<ul style="list-style-type: none"> Open ARCS chart from the [Manage Charts] dialog box. Connect dongle. Renew ARCS license.
S57 chart cannot be displayed	<ul style="list-style-type: none"> no ENC chart for area. dongle is not connected. 	<ul style="list-style-type: none"> Open S57 chart from [Manage Charts] dialog box. Connect dongle.
past track is not displayed	<ul style="list-style-type: none"> past track is not selected to be visible. 	<ul style="list-style-type: none"> Open [Tracking] page of [Symbol Display] menu and select [Own Ship Past Tracks] to [CCRP], [Primary], [Secondary] or [Pivot] as appropriate.
monitored user chart is not displayed on ECDIS display	<ul style="list-style-type: none"> user chart is not selected to be visible. 	<ul style="list-style-type: none"> Open [Mariner] page of [Symbol Display] menu and select parts to show.

If...	then...	Remedy
route monitoring is stopped	<ul style="list-style-type: none"> • Alert 691: RM Stop - Exceed Max XTE. Own ship is too far away from the route. • Alert 692: No Valid Sensor Data. ECDIS internal error. • Alert 693: RM Stop - Other Causes. Required data (position, SOG/COG) not found. 	<ul style="list-style-type: none"> • Steer the ship back to the route then restart route monitoring. • Request service. • Check sensor connections.
user chart is not displayed on radar overlay	<ul style="list-style-type: none"> • user chart is not selected in Voyage navigation mode. 	<ul style="list-style-type: none"> • Select user chart in Voyage navigation mode.
message "Nearing memory usage limit. Click the Restart button to restart the system to prevent trouble." appears	<ul style="list-style-type: none"> • the memory usage limit for software is close to capacity. Performance may be affected. 	<ul style="list-style-type: none"> • If you need to save your work, click the [Later] button then reset the power. If you don't need to save your work, click the [Restart] button. Note that the notice does not appear in the Conning mode.
message "Nearing memory usage limit. If you will start monitoring, click the Restart button to restart the system to prevent trouble during route monitoring."	<ul style="list-style-type: none"> • the memory usage limit for software is close to capacity. Performance may be affected. 	<ul style="list-style-type: none"> • Click the [Restart] button.
message "Memory usage limit reached. Click the Restart button to restart the system to prevent trouble." appears.	<ul style="list-style-type: none"> • the memory usage limit for software is reached. Performance may be affected. 	<ul style="list-style-type: none"> • Click the [Restart] button to reset the power. No other operations are available other than restart. Note that the notice does not appear in the Conning mode.
both the operating mode buttons [ECDIS] and [CONNING] are yellow	<ul style="list-style-type: none"> • the memory usage limit for software is close to capacity. Performance may be affected. 	<ul style="list-style-type: none"> • Stop all operations and reset the power.

24.6 Consumable Parts

The table below lists the consumable parts in the Processor Unit, Sensor Adapters and Monitor Units. Replace the parts before their expected expirations.

Unit	Part	Type	Life
Processor Unit EC-3000	CPU Fan	109R0612G429	8.5 years
	Power Fan	109P0612H761	8.5 years
	Chassis Fan	109P0612H761	8.5 years
Sensor Adapter MC-3000S	MC-CS Board	24P0114	8.5 years
Sensor Adapter MC-3010A	MC-ANLG Board	24P0115	7.0 years
Monitor Unit	MU-190	BEZEL (19) & LCD ASSEMBLY	50,000 hours
	MU-231	BEZEL (23) & LCD ASSEMBLY	50,000 hours

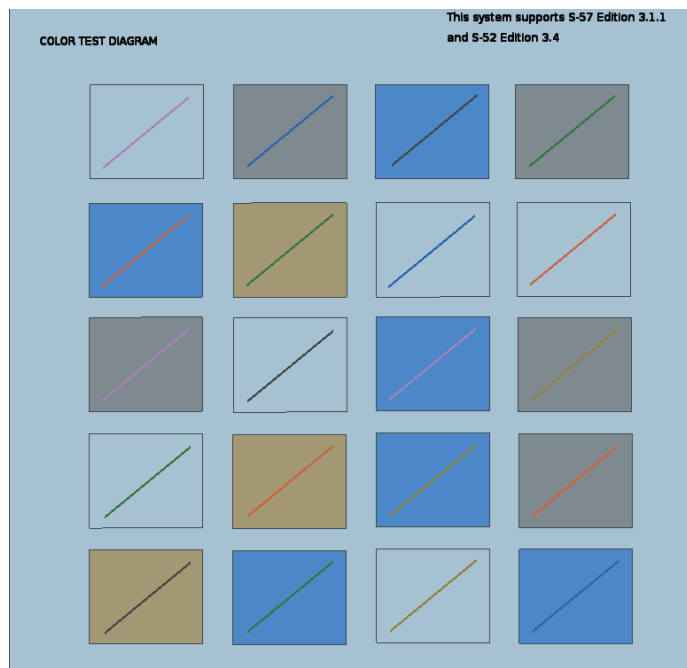
24.7 Color Differentiation Test for S57 Charts

The color differentiation checks if the ECDIS monitor can distinguish between the various color-coded areas, lines and symbols.

1. Click the [Chart INFO] and [Chart 1] buttons on the InstantAccess bar to show the [ECDIS Chart 1] menu.



2. Click [Color diagram] to show the color test diagram.



If the colors are correct, the diagonal line will be distinguishable from its surroundings, at any brilliance setting.

25. ALERT MANAGEMENT SYSTEM (option)

25.1 What is an Alert Management System (AMS)?

An AMS warns the navigator, with audio-visual indications, when safety parameters are violated or there is a failure of connected equipment. The AMS also transfers unacknowledged alerts to the BNWAS.

The main functions of the AMS are

- Organize and track alerts that occur on the vessel. The AMS displays the alerts on its HMI system and sounds a buzzer when an alert condition occurs.
- Acknowledge alerts.
- Transfer alerts not acknowledged within 30 seconds to the BNWAS. (The BNWAS then activates the Emergency Call to inform appropriate officers' quarters of unacknowledged alarms.)

25.2 System Configuration

Refer to the system configuration for the ECDIS - the AMS is an integral part of the ECDIS.

25.3 Alert Definition, Priority and Category of Alerts

“Alert” is a generic name for an emergency, alarm, warning or caution generated by an equipment connected to the AMS or the ECDIS.

Priority of alerts

Alerts have one of four priorities:

Priority of alert	Description
Emergency	Immediate danger to human life or to the ship and its machinery exists and that immediate action must be taken. Emergency alerts are handled the same as alarms.
Alarm	Alarms indicate situations or conditions which require immediate attention, decision and (if necessary) action by the bridge team to avoid any kind of hazardous situation and to maintain the safe navigation of the ship.
Warning	Conditions or situations which require immediate attention for precautionary reasons, to make the bridge team aware of conditions which are not immediately hazardous, but may become so.
Caution	Awareness of a condition which continues to require attention out of the ordinary consideration of the situation or of given information.

Category of alerts

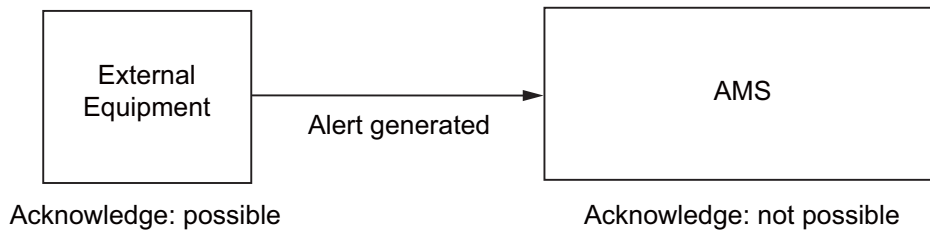
Each alert is further put into the category A or category B.

Category of alert	Description
Category A	Category A alerts include alerts indicating <ul style="list-style-type: none"> • Danger of collision • Danger of grounding
Category B	Category B alerts are alerts where no additional information for decision support is necessary besides the information that is shown at the central alert management HMI. Category B alerts are all alerts not falling under category A.

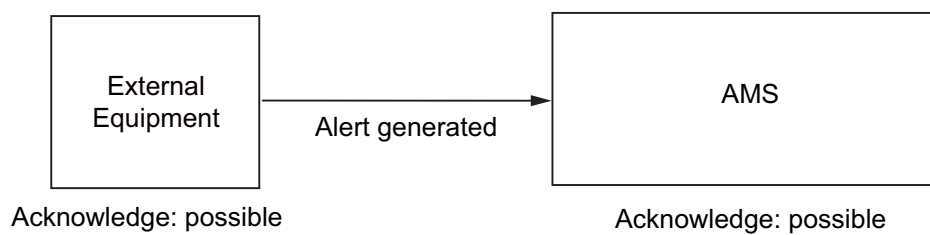
Category and location of alert acknowledgement

- A category A alert cannot be acknowledged at the AMS; it must be acknowledged at the equipment that generated the alert.
- A category B alert can be acknowledged at either the AMS or the equipment that generated the alert.
- All caution alerts are a part of category B. Caution alerts neither sound the buzzer nor require acknowledgement.

Category A alert:



Category B alert:



25.4 Alert Category and Alert acknowledgement From Connected Equipment, AMS

Category A alert

Acknowledged from the equipment that generated the alert: The alert is acknowledged at both the equipment and the AMS and their buzzers stop.

Acknowledged from the AMS: The alert is acknowledged at neither the equipment that generated the alert nor the AMS, however their buzzers stop. (The buzzer sounds again at both locations if the alert is not acknowledged within 30 seconds at the equipment that generated the alert.)

Category B alert

Acknowledged from the equipment that generated the alert or AMS: The alert is acknowledged at both the equipment and the AMS and their buzzers stop.

25.5 How to Acknowledge an Alert, Stop the Buzzer From the AMS

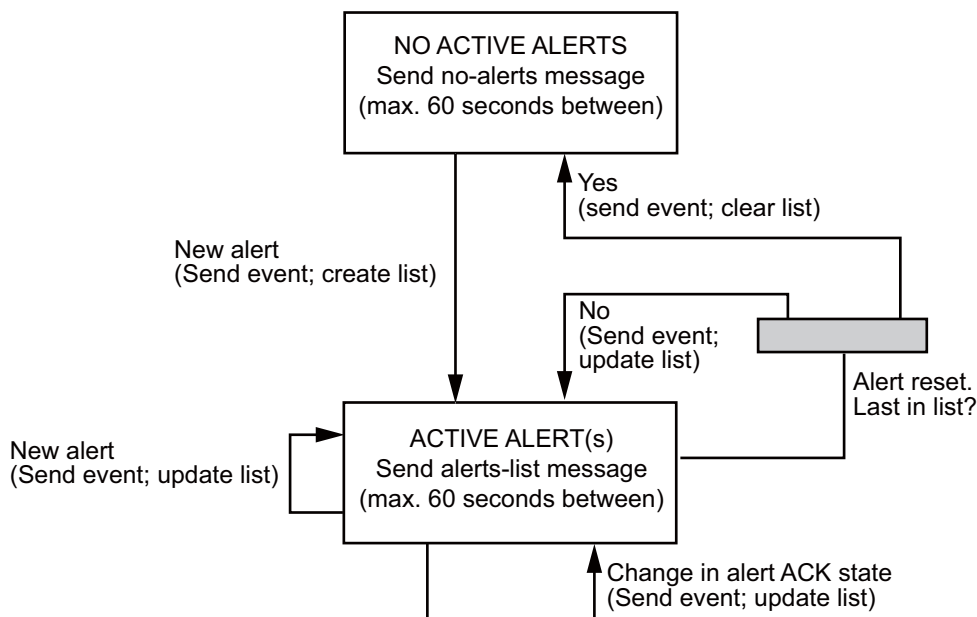
There are two methods to acknowledge an alert and/or stop the buzzer from the AMS:

- **Trackball:** Click the alert name on any window in the AMS.
- **ALARM ACK key:** Push the key on the connected Control Unit.

25.6 About the ALR and ACK Sentences

The function of the AMS is to coordinate exchange of alerts and acknowledgement of alerts between equipment connected to the AMS.

This AMS is designed according to the IEC's recommendations for Alert Handling (80/520/INF). The figure below shows the transition of the Alert status at the sensor.



Device states

A sensor has two main states, N and A.

State N: No active alerts. The device should send a "no-alerts" message with an interval of a maximum of 60 seconds. This message informs the AMS that the sensor has no active alerts.

State A: The device has one or more active alerts, of which zero or more may have been acknowledged and the rest (possibly zero) are unacknowledged. In this state, the device shall send all active alerts at an interval not greater than 60 seconds. When multiple alerts are active in the sensor, all active alerts are transmitted as a "list" of alerts (alert-list message). In response to the "list", applicable sensors output the ALR sentence, the content of which is defined in IEC 80/250/INF.

In addition to the periodic transmission mentioned, the sensor sends an Alert message (ALR) to the AMS when an alert is generated in the sensor in the following instances:

- A new alert is generated in the sensor.
- An existing alert is acknowledged in the sensor, either by the sensor itself or by remote acknowledgement by the AMS.
- An existing alert condition becomes non-active.

No-alerts message

The no-alerts message to informs the AMS that the sensor has no active alerts. It is sent at an interval not greater than 60 seconds, and may be used to clear the AMS alert list. This message is sent as an ALR message, without a time stamp and includes a "V" flag in the both the alert condition and acknowledgement field. The no-alerts message is as shown below.

```
$--ALR,,,V,V,*hh
```

The alert-list message

The alerts-list message periodically refreshes the alert list in order for personnel to have up-to-the-minute list of active alerts. The alert / alert list message is sent with an interval not greater than 60 seconds. The alert / alert list message consists of the same message(s) sent when the corresponding event occurred, but all active alerts shall be reported. An example of two alert-list messages are shown below.

```
$--ALR,123456,123,A,A,Battery power in use*hh<CR><LF>
```

```
$--ALR,130507,456,A,V,Self test failure*hh<CR><LF>
```

ACK sentence

The AMS sends the ACK sentence to all sensors to acknowledge alerts. The sentence format is as shown below, where xxx is the Alert no. generated by each sensor.

```
$--ACK,xxx*hh<CR><LF>
```

This AMS supports only the single alert acknowledgement as defined by IEC 80/520/INF. In this case, it is necessary to send an alarm acknowledge message, the format which is shown below, from the external from the AMS to the sensor. The message is sent at an interval not greater than 60 seconds.

```
$--ACK,*hh<CR><LF>
```

25.7 How an Alert is Transferred to the BNWAS

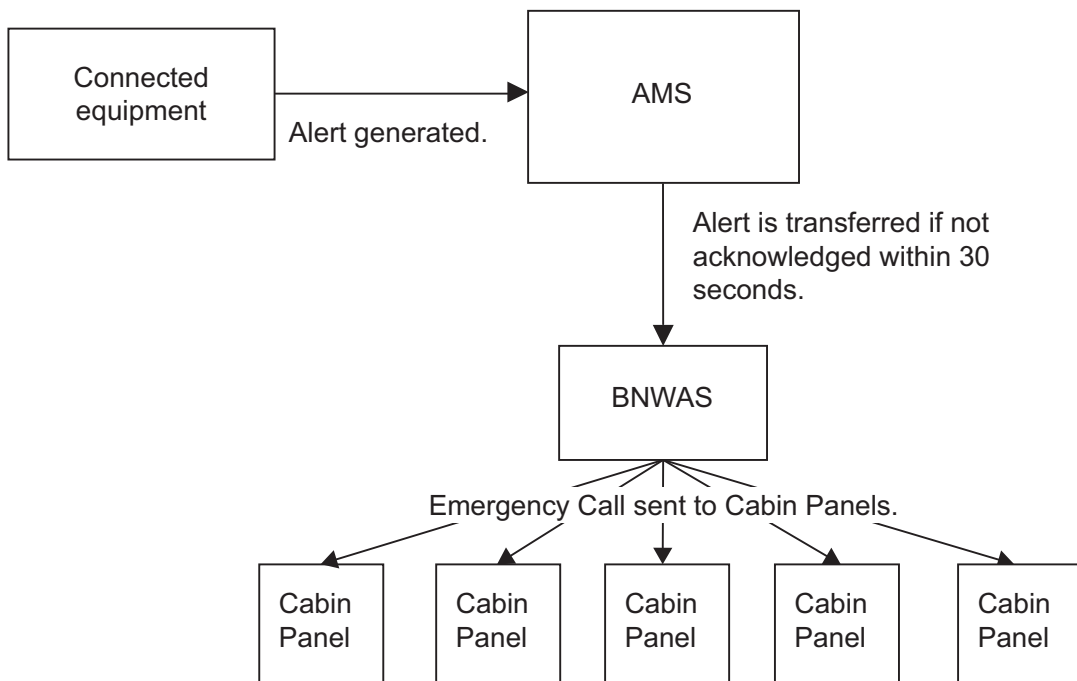
Alerts are transferred to the BNWAS in the following sequence.

Note: For a DNV class vessel, only category A alerts are transferred.

- 1) An alert generated by an equipment connected to the AMS is transferred to the BNWAS if it is not acknowledged within 30 seconds.
- 2) The BNWAS sends the Emergency Call to applicable Cabin Panels in living quarters and general quarters, to inform personnel of an unacknowledged alert.

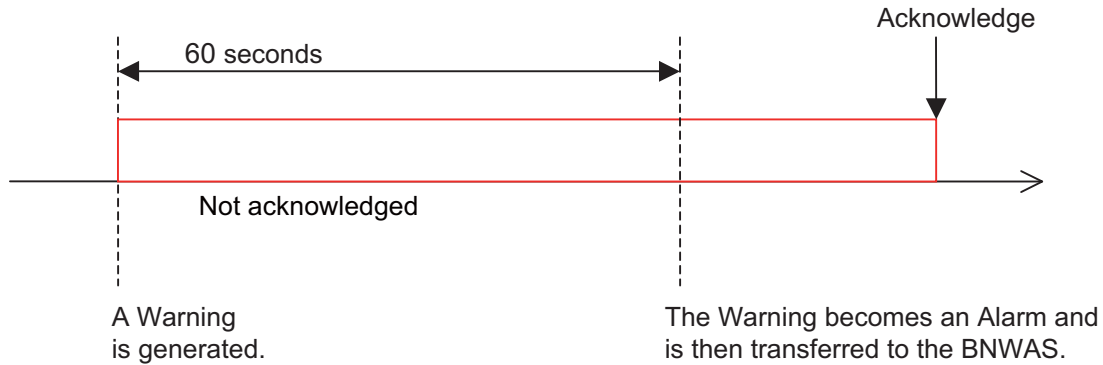
To stop both the Emergency Call and the transfer of the alert, do as follows:

- **Category A alert:** Acknowledge the alert at the equipment that generated the alert.
- **Category B alert:** Acknowledge the alert at the equipment that generated the alert or the AMS.



25.8 Change of Priority for Unacknowledged Warning

IMO MSC302(87) requires that a Warning be changed to an Alarm if it is not acknowledged within 60 seconds. The change of priority feature is enabled or disabled during the installation.



25.9 How to Temporarily Silence the Buzzer

The FMD-3xx0 series and the FCR-2xx9 series are compliant with IEC 61924-2, which has a provision to allow the temporary silencing of the buzzer for 30 seconds against any alert, from the equipment that generated the alert or from the AMS. The buzzer again sounds after 30 seconds if the alert is not acknowledged.

How category A alerts are treated at the AMS

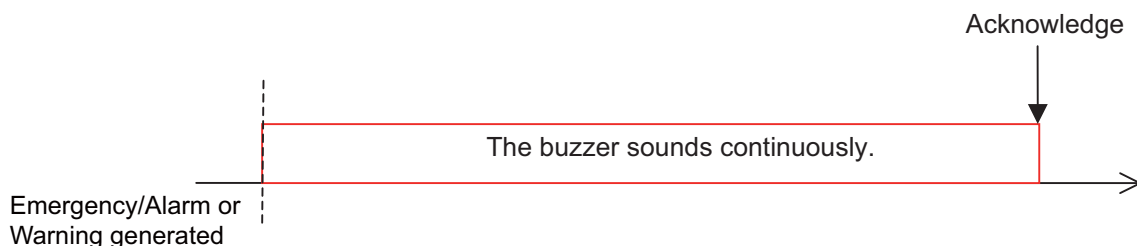
The buzzer given against a category A alert can be temporarily silenced at the AMS, by clicking the alert on any AMS mode window (see section 25.13.2) or pushing the **ALARM ACK** key on a Control Unit. However, the alert must be acknowledged from the equipment that generated the alert. The AMS indicates acknowledgement after the alert is acknowledged at the equipment.

25.10 Buzzer Patterns

The AMS has two buzzer patterns, legacy and IEC 61924-2, and one is chosen at installation.

Legacy buzzer pattern

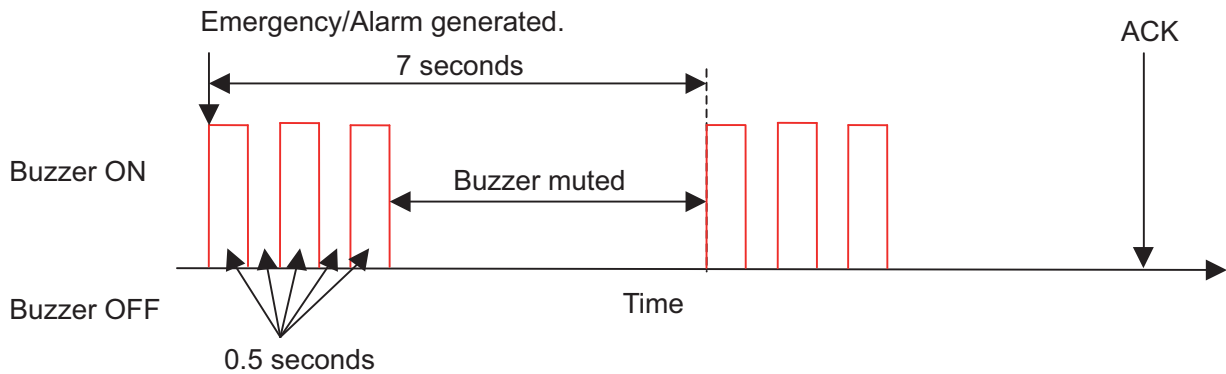
This buzzer sounds continuously until an emergency/alarm or warning is acknowledged.



IEC 61924-2 buzzer pattern

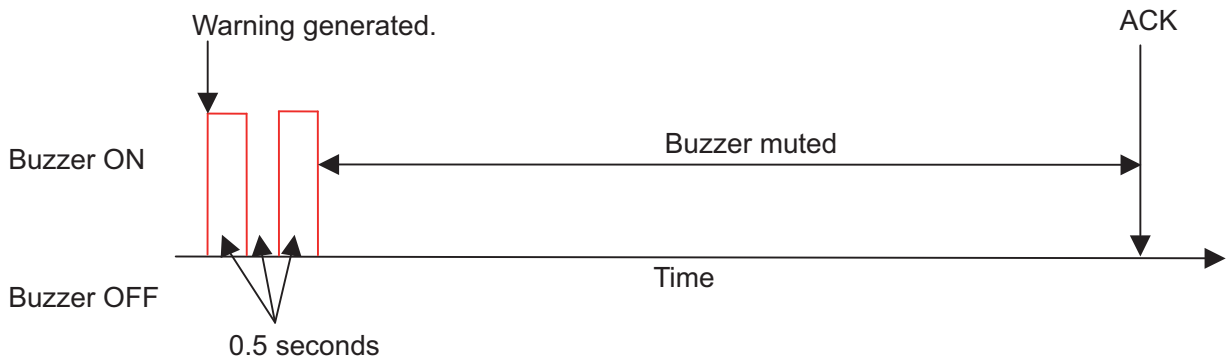
This buzzer complies with INS regulations. There are two types of buzzer patterns, Emergency/Alarm and Warning.

Emergency/Alarm: The buzzer sounds three times in 7-second intervals.



IEC 61924-2 mode, emergency/alarm priority buzzer

Warning: The buzzer sounds twice and is then muted.



IEC 61924-2 mode, warning priority buzzer












25.11 Alert Priority, Alert State

There are seven priority numbers according to the priority of the alert and alert state.

Priority no.	Priority of alert	Alert state	
<div style="display: flex; align-items: center; justify-content: center;"> High ↑ ↓ Low </div>	1	Emergency, Alarm	Not acknowledged, Not rectified
	2	Warning	Not acknowledged, Not rectified
	3	Emergency, Alarm	Not acknowledged, Rectified
	4	Warning	Not acknowledged, Rectified
	5	Emergency, Alarm	Acknowledged, Not rectified
	6	Warning	Acknowledged, Not rectified
	7	Caution	Not rectified

25.12 Alert Icons

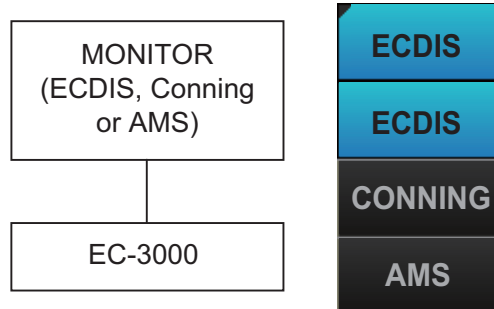
The alert icons show the state of all alerts.

Icon	Alert state	Icon description
Alert priority: Emergency, Alarm		
	Not acknowledged/Not rectified	Red triangle with black loudspeaker in center of triangle. Flashing every 0.5 s.
	Not acknowledged/Not rectified Buzzer temporarily silenced	Red triangle with crossed out black loudspeaker in center of triangle. Flashing every 0.5 s.
	Acknowledged/Not rectified	Red triangle with black exclamation point in center of triangle.
	Not acknowledged/Rectified	Red triangle with black check mark in center of triangle. Lights 3 s, off 1 s, repeat.
	Acknowledge not allowed for alarm	Red triangle with black cross in middle of triangle. Presented with first two icons above.
Alert priority: Warning		
	Not acknowledged/Not rectified	Yellow-orange circle with black loudspeaker in center of circle. Flashing every 0.5 s.
	Not acknowledged/Not rectified Buzzer temporarily silenced	Yellow-orange circle with crossed out black loudspeaker in center of circle. Flashing every 0.5 s.
	Acknowledged/Not rectified	Yellow-orange circle with black exclamation point in center of circle.
	Not acknowledged/Rectified	Yellow-orange circle with black check mark in center of circle. Lights 3 s, off 1 s, repeat.
	Acknowledge not allowed for warning	Yellow-orange circle with a cross in middle of circle. Presented with first two warning icons above.
Alert priority: Caution		
	Caution	Steadily displayed yellow square with black exclamation point in center of square.

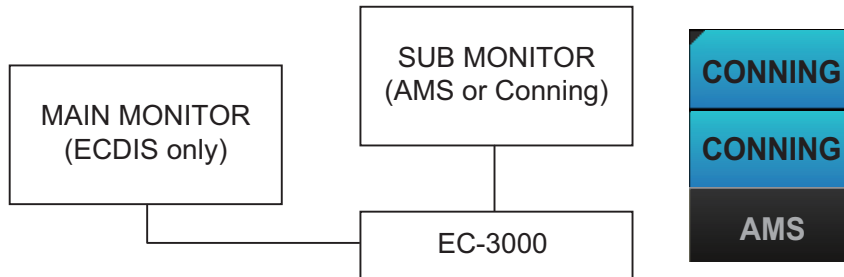
25.13 AMS Mode Operations

25.13.1 How to select the AMS mode

Select [AMS] with the operating mode button (the leftmost button on the Status bar) to activate the AMS mode. The configuration of the button depends on the monitor configuration.



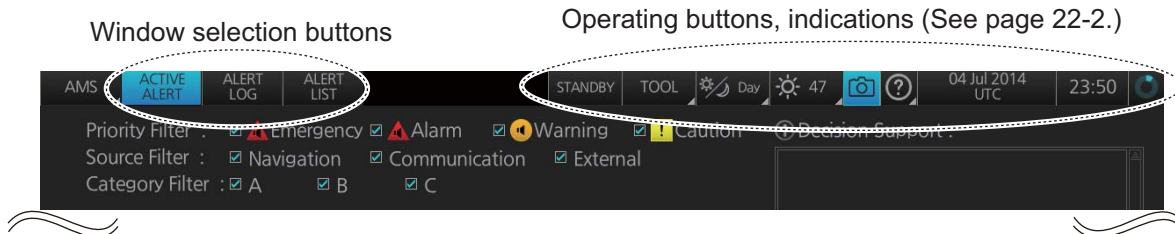
Single monitor configuration and operating mode button



Dual monitor configuration and operating mode button

25.13.2 AMS mode windows

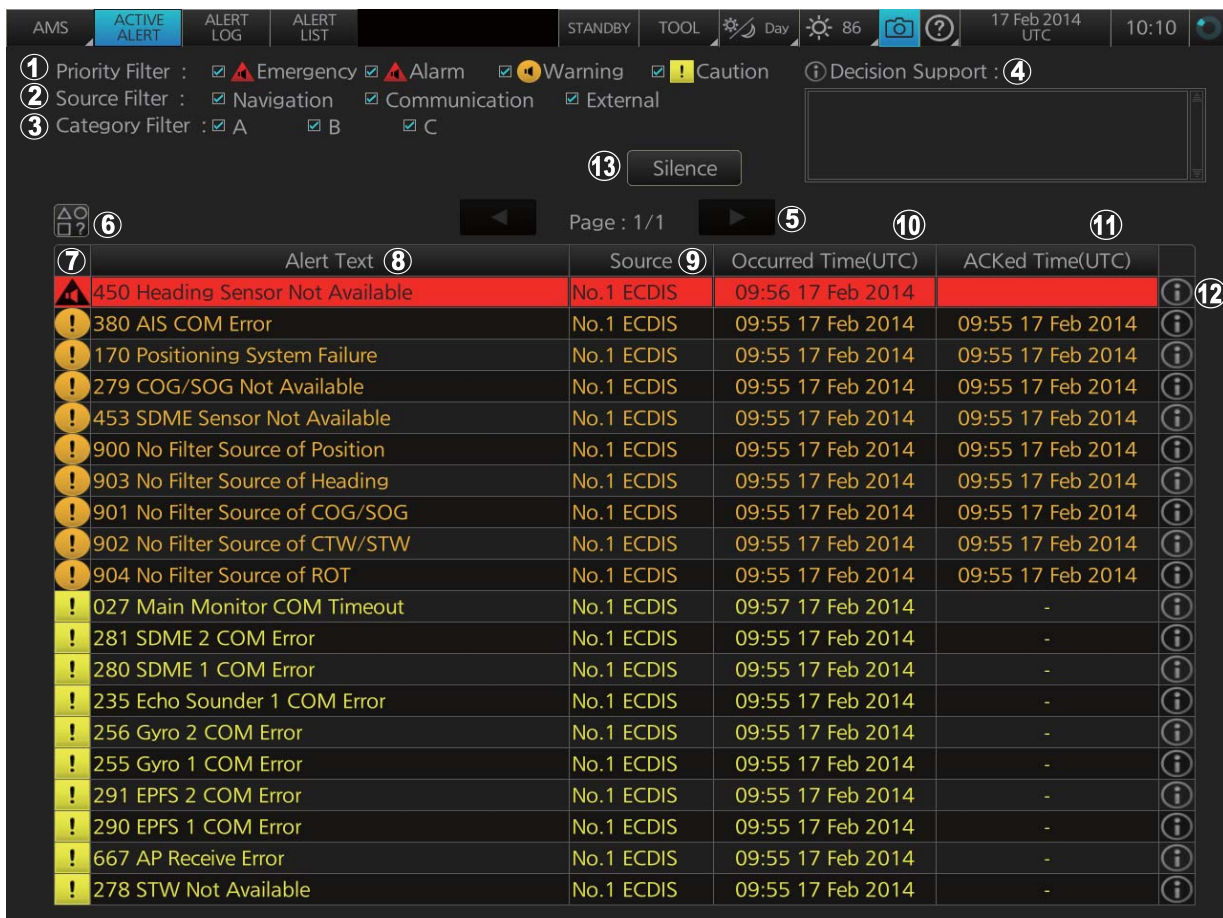
The AMS mode shows alert information in three windows: [ACTIVE ALERT], [ALERT LOG] and [ALERT LIST]. The windows can be selected with the corresponding buttons on the Status bar. Alerts can be acknowledged from any window, by clicking the alert.



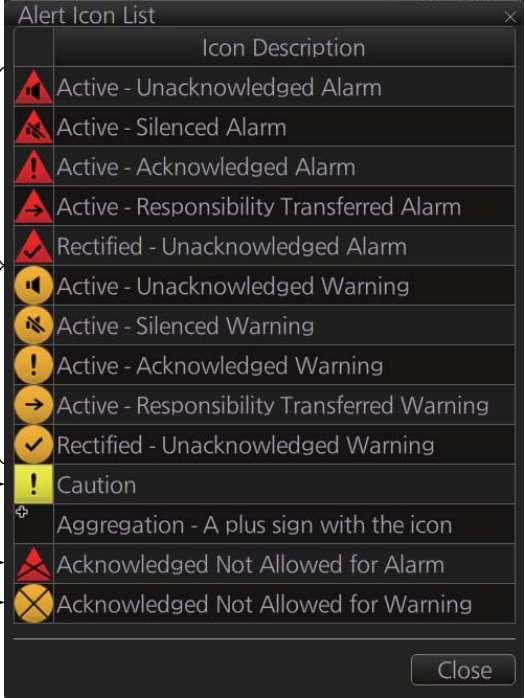
ACTIVE ALERT window

The [ACTIVE ALERT] window shows the status of all active alerts. A maximum of 20 alerts is shown per page. When there are more than 20 active alerts, a new page is created to hold the new alerts. You can move between pages with the arrow buttons.

The background color of an unacknowledged emergency or alarm flashes red and an unacknowledged warning flashes yellow-orange. The text of an acknowledged emergency or alarm is red and the text of an acknowledged warning is yellow-orange. The text of a caution is yellow. Category B alerts can be acknowledged by clicking the alert. The buzzer for category A alerts can be temporarily stopped by clicking the alert; but, acknowledgement must be done from the equipment that generated the alert.



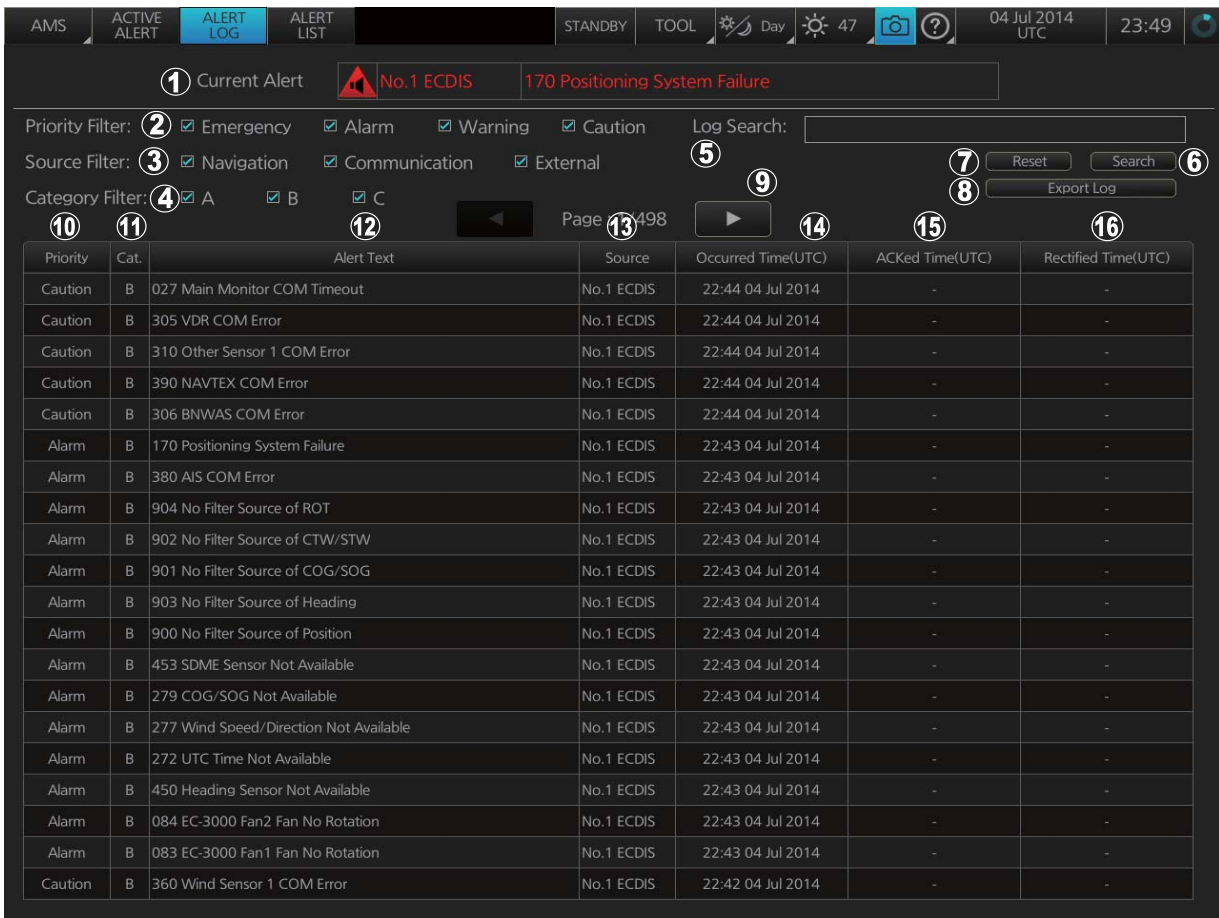
See the next page for a description of the contents of the list.

No.	Item name	Description
1	Priority Filter	Filter the list by alert priority, [Emergency], [Alarm], [Warning], [Caution].
2	Source Filter	Filter the list by the source of the alert, [Navigation], [Communication], [External].
3	Category Filter	Filter the list by category, A, B or C.
4	Decision Support box	Displays the reason for an alert and troubleshooting tip when an information icon is clicked.
5	[◀], [▶] (page selection buttons)	Select the page to display, when there are more than 20 active alerts. Greyed out when inoperative.
6	Alert Icon description button	Provides a description of the alert icons. 
7	Alert state icon	Show alert state by icon.
8	Alert Text	Displays alert no. and name of alert.
9	Source	The name of the device that generated the alert.
10	Occurred Time(UTC)	The time (UTC) the alert occurred.
11	ACKed Time(UTC)	The time (UTC) the alert was acknowledged.
12	Information icon	Click the icon to display a description of the alert (reason for alert and troubleshooting tip) in the Decision Support box. Note that some alerts provide no information.
13	Silence button	Silence the buzzer.

25. ALERT MANAGEMENT SYSTEM (option)

ALERT LOG window

The [ALERT LOG] window provides a comprehensive list of generated alerts.



No.	Item name	Description
1	Current Alert box	This box shows the name of the active alert that has the highest priority. You can acknowledge the alert by clicking the box.
2	Priority Filter	Filter the list by the alert priority, [Emergency]. [Alarm], [Warning], [Caution].
3	Source Filter	Filter the list by the source of alert, [Navigation], [Communication], [External].
4	Category Filter	Filter the list by alert category, A, B or C.
5	Log Search box	Enter the text string to search.
6	Search button	Click this button to search the text string entered in the [Log Search] box.
7	Reset button	Stop the text search and restore the list to its pre-search state.
8	Export Log button	Export the contents of the log to a USB flash memory, in .dat format.
9	[◀], [▶] (page selection buttons)	Select the page to display, when there are more than 20 alerts. Greyed out when inoperative.
10	Priority	Priority of the alert.
11	Cat.	Category of the alert.
12	Alert Text	Alert no. and name of alert.
13	Source	The name of the device that generated the alert.
14	Occurred Time(UTC)	The time (UTC) the alert occurred.
15	ACKed Time(UTC)	The time (UTC) the alert was acknowledged.
16	Rectified Time(UTC)	The time (UTC) the alert was rectified.

ALERT LIST window

The [ALERT LIST] window provides a context-based list of generated alerts, by source and priority.

The screenshot shows the ALERT LIST window with the following details:

- Current Alert:** No.1 ECDIS (170 Positioning System Failure)
- Alert Source:** Navigation (selected)
- Priority Filter:** Emergency(0/0), Alarm(0/15), Warning(14/67), Caution(31/161)
- Category Filter:** A, B, C
- Page:** 1/13
- Alert List Table:**

Priority	Cat.	Alert Text
Caution	B	001 Fan1 Rotation Speed Lowering
Caution	B	002 Fan2 Rotation Speed Lowering
Caution	B	003 Fan3 Rotation Speed Lowering
Caution	B	004 Fan4 Rotation Speed Lowering
Warning	B	005 LCD Unit Lifetime Over
Warning	B	006 High Temperature Inside Monitor
Warning	B	007 Fan1 No Rotation
Warning	B	008 Fan2 No Rotation
Warning	B	009 Fan3 No Rotation
Warning	B	010 Fan4 No Rotation
Caution	B	011 RS485 Communication Timeout
Caution	B	012 No Signal
Caution	B	013 Sentence Syntax Error
Caution	B	014 Fan1 Rotation Speed Lowering
Caution	B	015 Fan2 Rotation Speed Lowering
Caution	B	016 Fan3 Rotation Speed Lowering
Caution	B	017 Fan4 Rotation Speed Lowering
Warning	B	018 LCD Unit Lifetime Over
Warning	B	019 High Temperature Inside Monitor
Warning	B	020 Fan1 No Rotation

7

No.	Item name	Description
1	Current Alert box	This box shows the name of the active alert(s), in order of priority.
2	Alert Source window	Alert sources, [Navigation], [Communication], [External].
3	Priority filter	Filter the list by the alert priority, [Emergency], [Alarm], [Warning], [Caution].
4	Category filter	Filter the list by the alert category, A, B or C.
5	[◀], [▶] (page selection buttons)	Select the page to display, when there are more than 20 alerts.
6	Alert state icon	Shows alert state. (Active alerts only)
7	Alert priority, category, alert text	The data (priority, category, alert no., alert name) of all alerts related to the alert source selected from the [Alert Source] window are shown in green. However active alerts are shown in red (emergency and alarm), yellow-orange (warning) or yellow (caution).

25. ALERT MANAGEMENT SYSTEM (option)

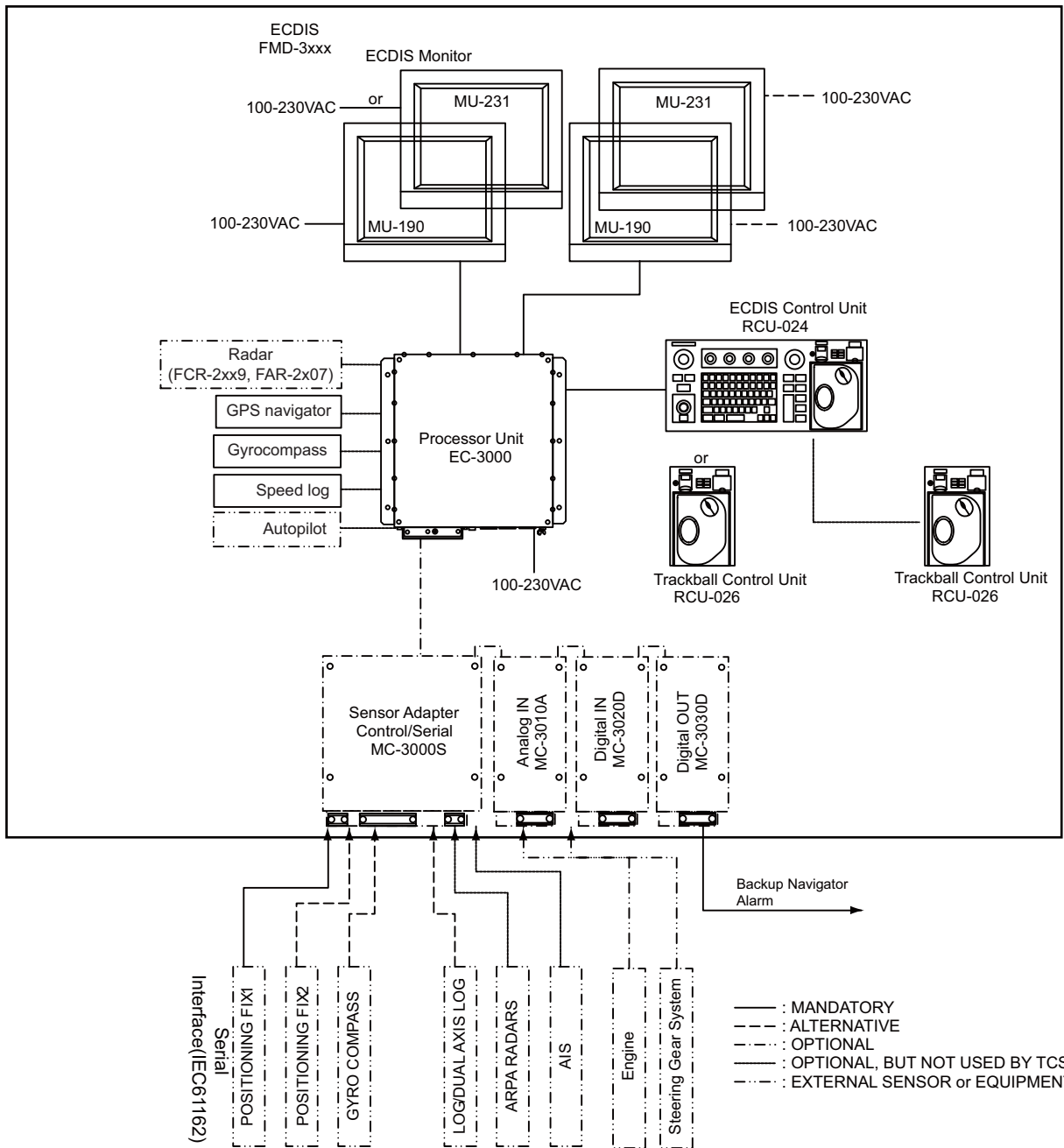
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26. AUTOPILOT OPERATIONS

This chapter covers the type approval testing for the following autopilots:

- **Type Approval TC-3000:** YOKOGAWA PT-500A, TOKYO KEIKI PR-6000, EMRI FAP-2000, EMRI FAP-3000. (These Autopilots comply with IEC 62065 Ed.1.0.)

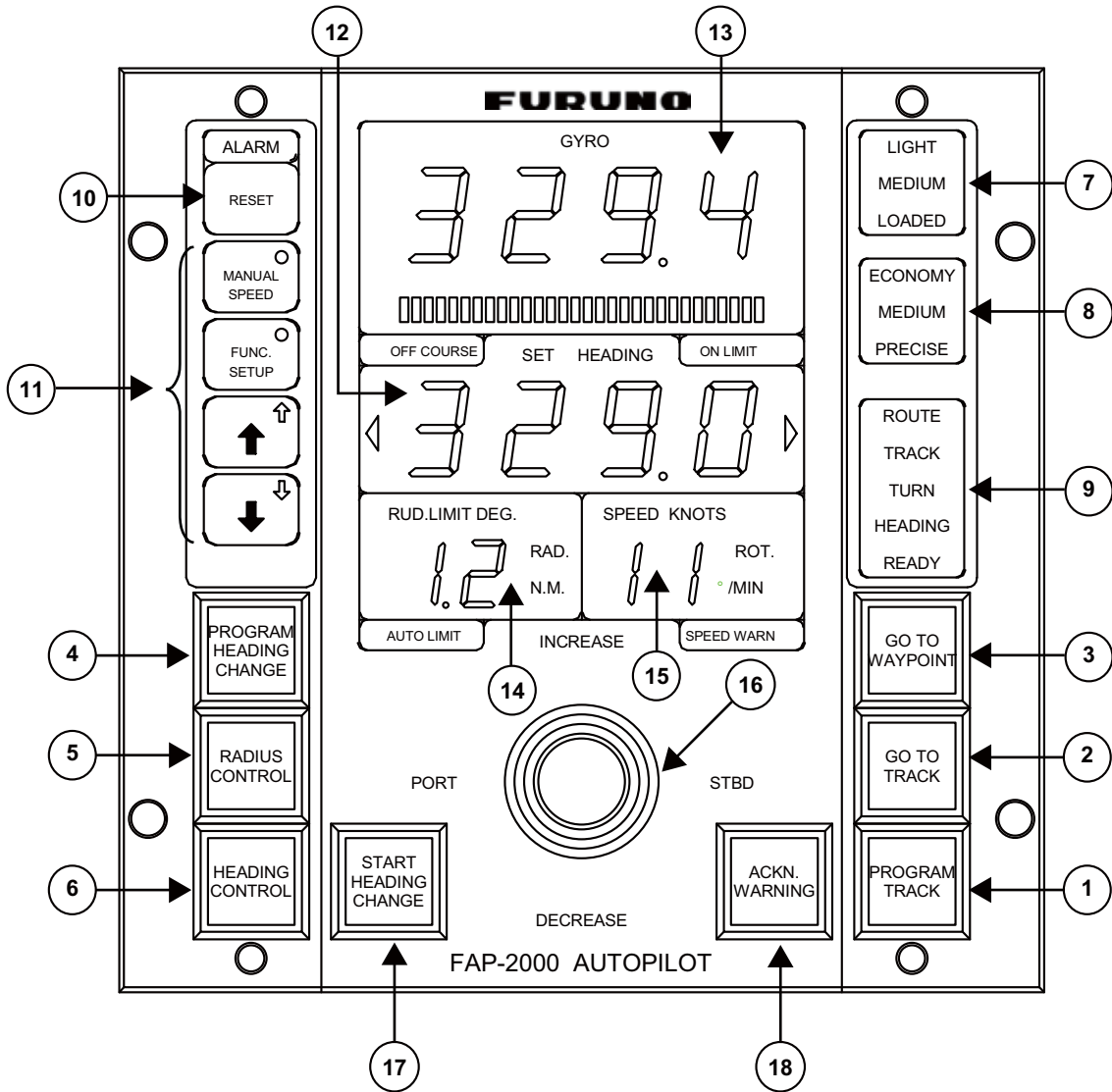
26.1 Configuration



26.2 Controls

26.2.1 EMRI FAP-2000

Control Panel

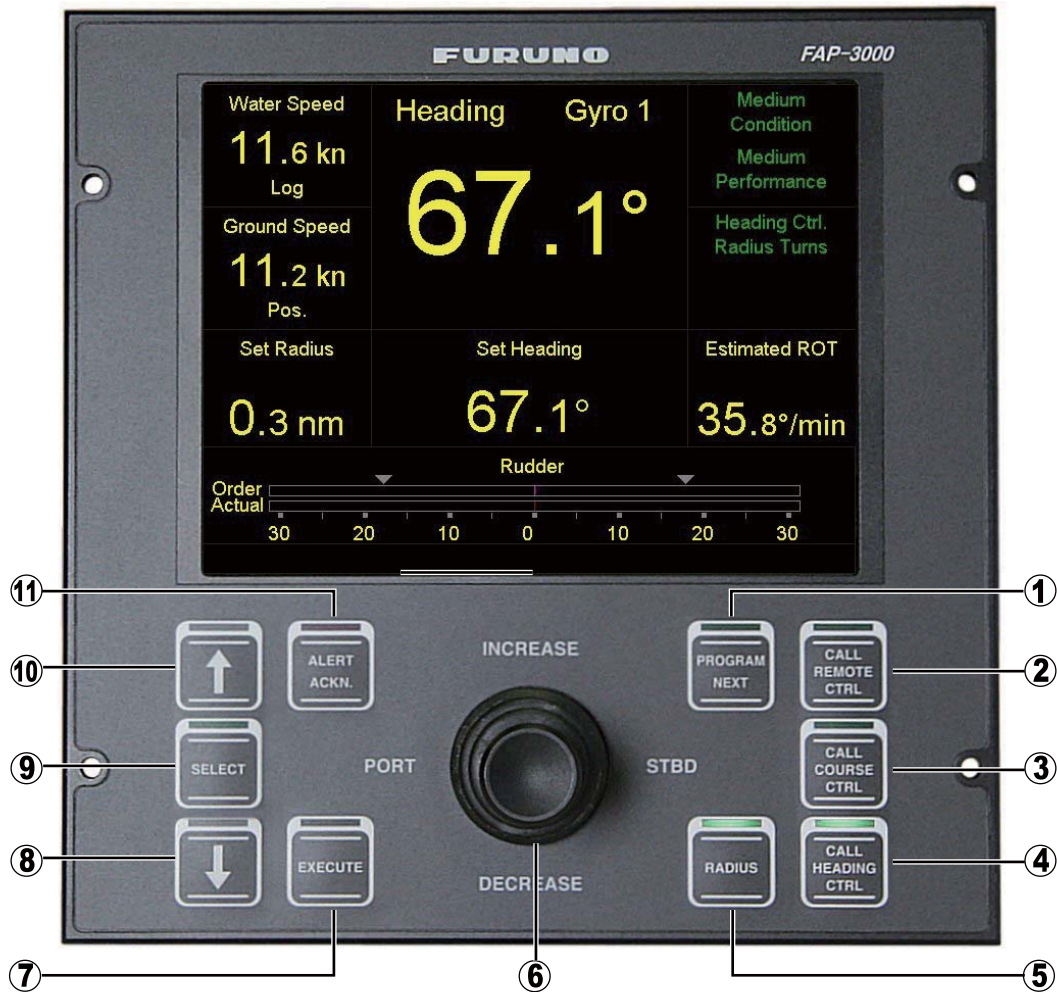


No.	Description
1	PROGRAM TRACK: Program Track-controlled heading change using set radius. Also for steering with selected TT models.
2	GOTO TRACK: Track-controlled route steering.
3	GOTO WAYPOINT: Course-controlled route steering.
4	PROGRAM HEADING CHANGE: Program heading-controlled course change using set radius.
5	RADIUS CONTROL: Immediate radius-controlled course change using set radius.
6	HEADING CONTROL: Immediate heading-controlled course change using set rudder angle limit.
7	Loading condition indicator - Light, Medium or Loaded.
8	Performance indicator - Economy, Medium or Precise.

9	Status indicator - Shows selected mode and state of readiness: <ul style="list-style-type: none"> • ROUTE: FAP-2000 route steering • TRACK: FAP-2000 control mode • TURN: FAP-2000 track controlled turn • HEADING: FAP-2000 control mode • READY: FAP-2000 in operation
10	Alert indicator and buzzer control: <ul style="list-style-type: none"> • ALARM lamp lights for FAP-2000 related alarms and errors. • RESET button acknowledges FAP-2000 related alarms and errors.
11	Special function buttons: <ul style="list-style-type: none"> • MANUAL SPEED: Manually enter speed. • FUNC. SETUP: Adjust panel dimmer. • Up, Down arrow buttons: Set manual speed value, auto speed, rudder limit function, performance and conditions.
12	Set heading display includes: <ul style="list-style-type: none"> • Off course alert • Turn side • Rudder-on limit indication
13	Gyro reading and a bar graph showing rate of turn
14	Rudder displays: <ul style="list-style-type: none"> • Rudder set point in the Radar Control mode. • Rudder limit in the Heading Control mode. • AUTO LIMIT lamp lights to indicate selection of automatic rudder limit function.
15	Speed displays: <ul style="list-style-type: none"> • ROT in the Radar Control mode. • Speed in the Heading Control mode. • Speed warning indicator (LOG FAILURE or LOW).
16	Tiller: <ul style="list-style-type: none"> • Set course and radius. • PORT and STBD lamps show when the tiller can set course. • INCREASE and DECREASE lamps show when the tiller can set radius or rudder angle limit.
17	START HEADING CHANGE button: <ul style="list-style-type: none"> • Flashes if the newly set heading is different from used set heading. • Push to start course change.
18	ACKN WARNING button: <ul style="list-style-type: none"> • Lights when an alert is generated. • Push to acknowledge an alert.

26.2.2 EMRI FAP-3000

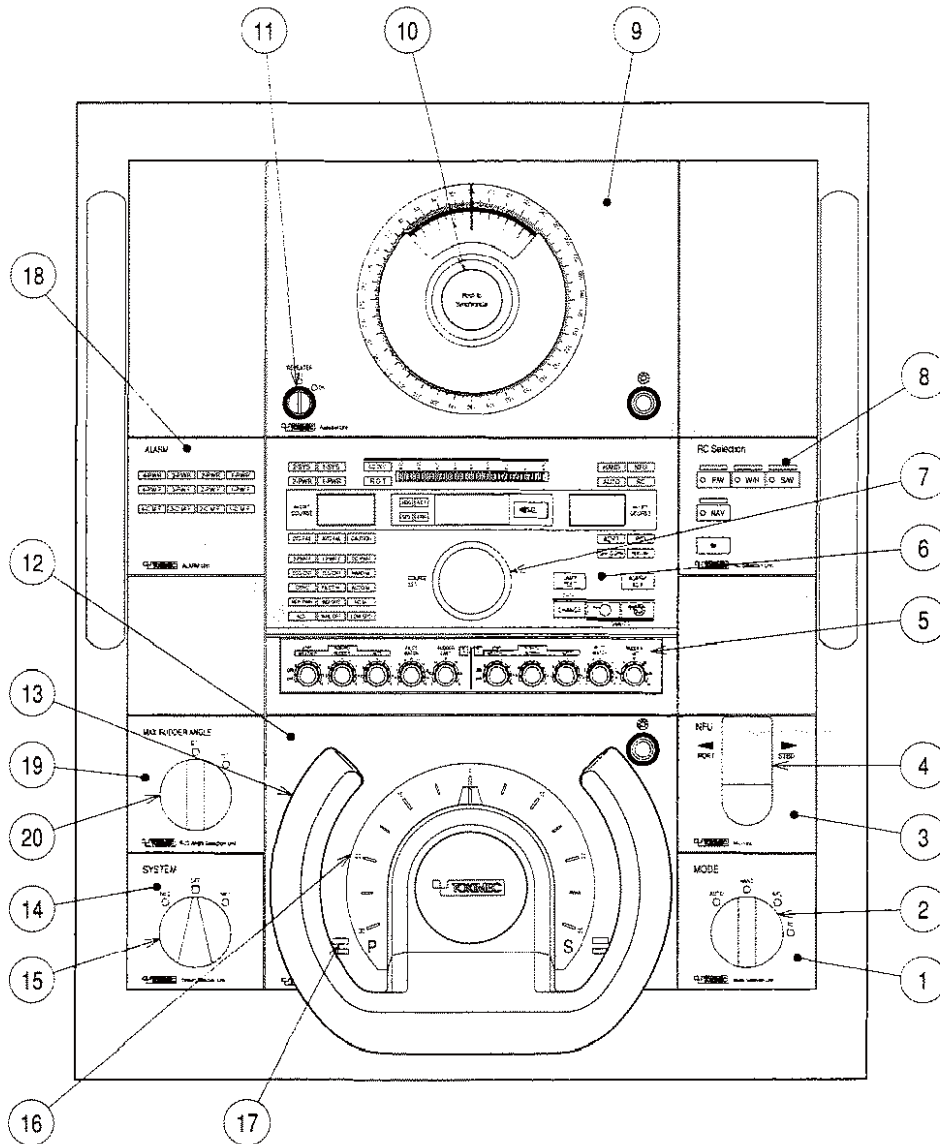
Steering Control Unit



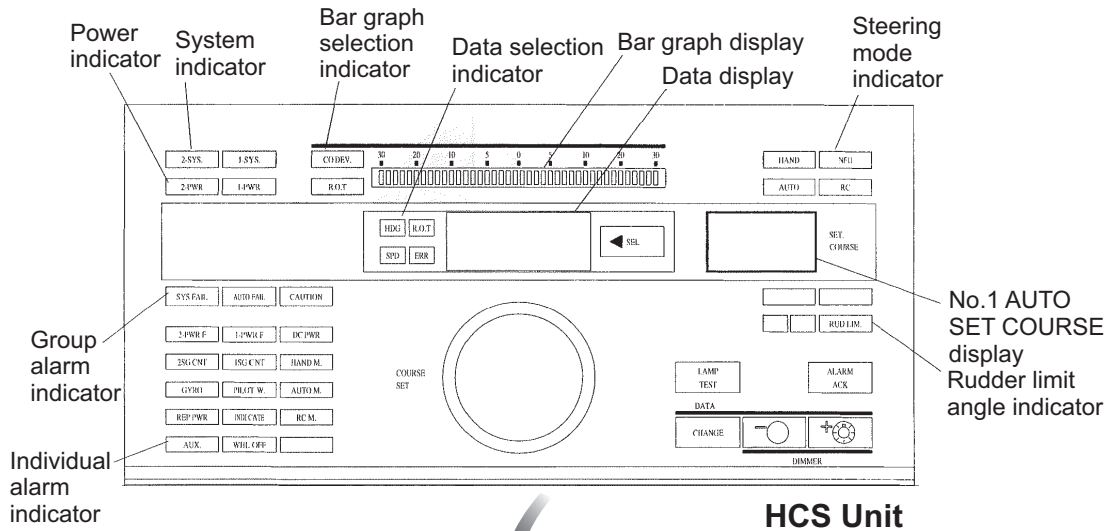
No.	Description
1	PROGRAM NEXT button: Shows next heading, next course, next radius, next rudder limit field.
2	CALL REMOTE CTRL button: Initiates integrated control with external navigation equipment (ECDIS, etc.)
3	CALL COURSE CTRL button: Heading-controlled course change using set radius
4	CALL HEADING CTRL button: Immediate heading-controlled course change using set rudder angle limit.
5	RADIUS button: Immediate radius-controlled course change using set radius.
6	Tiller <ul style="list-style-type: none"> • Set course and radius. • PORT and STBD lamps show when the tiller can set course. • INCREASE and DECREASE lamps show when the tiller can set radius or rudder angle limit.
7	EXECUTE button: Push to start course change.
8-10	SELECT buttons, arrow buttons: Select item to set (manual speed value, auto speed, rudder limit function, performance and conditions) with arrow buttons.
11	ALERT ACKN button: Lights when alert is generated; push to acknowledge alert.

26.2.3 TOKYO KEIKI PR-6000

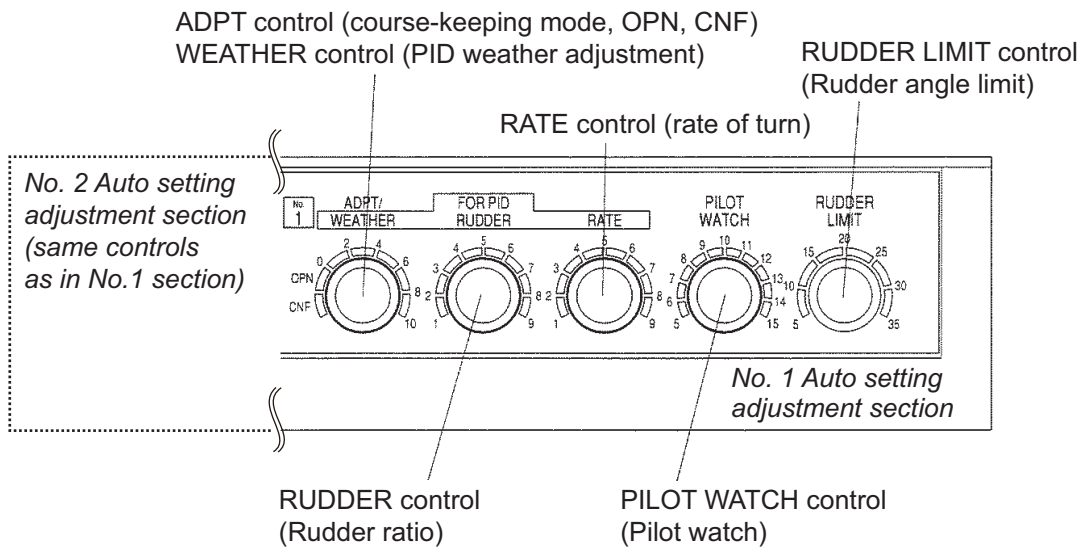
Steering Control Unit



- | | |
|----------------------------------|--|
| 1: Mode selection unit | 11: Repeater switch |
| 2: Mode selection switch | 12: Helm unit |
| 3: Non-follow-up unit | 13: Steering wheel |
| 4: Non-follow-up steering lever | 14: System selection unit |
| 5: Auto steering control knobs | 15: System selection switch |
| 6: HCS unit (see next page) | 16: Order rudder angle indicator |
| 7: Course setting knob | 17: PS display lamps |
| 8: Remove control selection unit | 18: Alert unit |
| 9: Repeater unit | 19: Max. rudder angle selection unit |
| 10: Repeater synchronizing knob | 20: Max. rudder angle selection switch |



Beneath lid



ADPT control: Select OPN (Open Sea) when economical operation is required. The course is followed with the least necessary steering, allowing a little meandering when; for example, sailing on the open sea.

The CNF (Confined) position keeps the ship straight on the course, for better route steering accuracy. Large rudder may be necessary. The ADPT and CNF/OPN lamps are turned on.

WEATHER control: Adjust this control when the weather or sea state changes. The ship should go straight with a rudder angle as small as possible (a lower angle than 5 degrees is desirable), with few rudder operations (less than six times a minute is desirable). The PID lamp goes on when the manual PID is active.

RUDDER control: Set the best value of the rudder ratio changes according to the ship's speed.

RATE control: Set the best value of the rate of turn changes according to the loading condition.

PILOT WATCH control: Set the amount of course deviation to allow in automatic steering. An alert is generated at the Autopilot when the deviation is more than the value set.

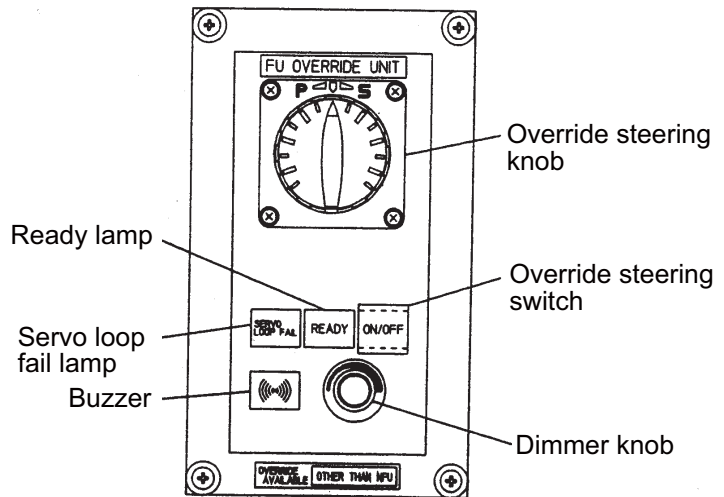
RUDDER LIMIT control: Limit the rudder motion to the least necessary rudder angle during AUTO steering.

Steering override units

FU Override Unit

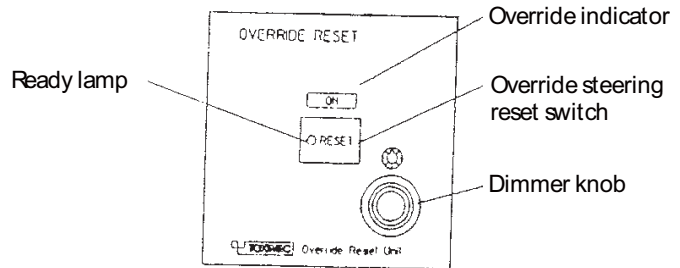
Starting steering override:

- 1) Confirm that the Ready lamp in the FU unit is ON.
- 2) Press the Override steering switch to give the control of the steering to this unit, by the Override steering knob. A beep sounds intermittently then the selected steering mode indicator flashes.



Stopping steering override:

- 1) Push the ON/OFF switch to show ON in the FU override unit or push the RESET switch on the Override reset unit in the steering stand to return to the previous steering mode.
- 2) If the steering mode was AUTO, the heading at the time override steering became active is set as heading. Auto resume is disabled if the steering mode was RC/NAV. To restore the RC mode, turn the mode selection switch to another steering mode then select the RC mode again.



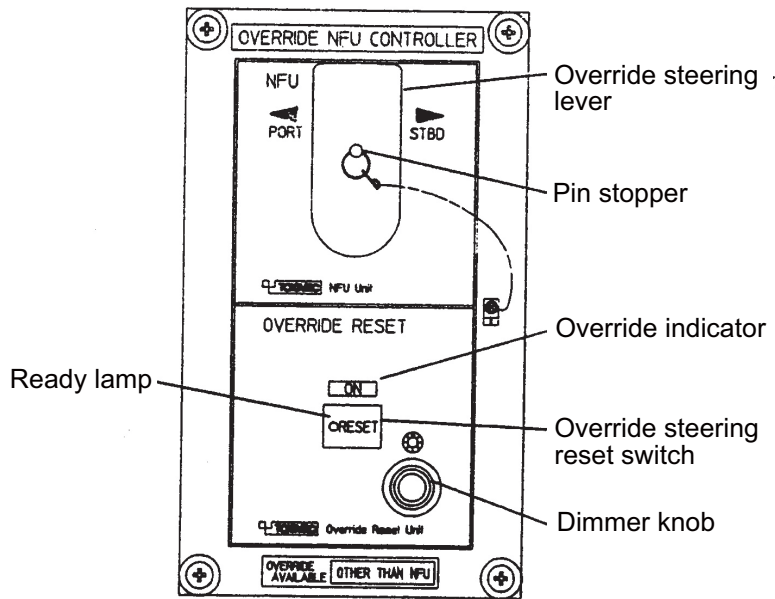
FU Override NFU Controller

Starting steering override:

- 1) Confirm that the Ready lamp in the NFU controller is ON.
- 2) Pull out the pin stopper inserted in the override NFU controller and turn the lever to the desired direction. Beeps sounds then the selected steering mode flashes. The ON lamp in the Override reset unit is lit.
- 3) The rudder is taken when the lever is turned, and the rudder stops when the lever is returned to the neutral position.

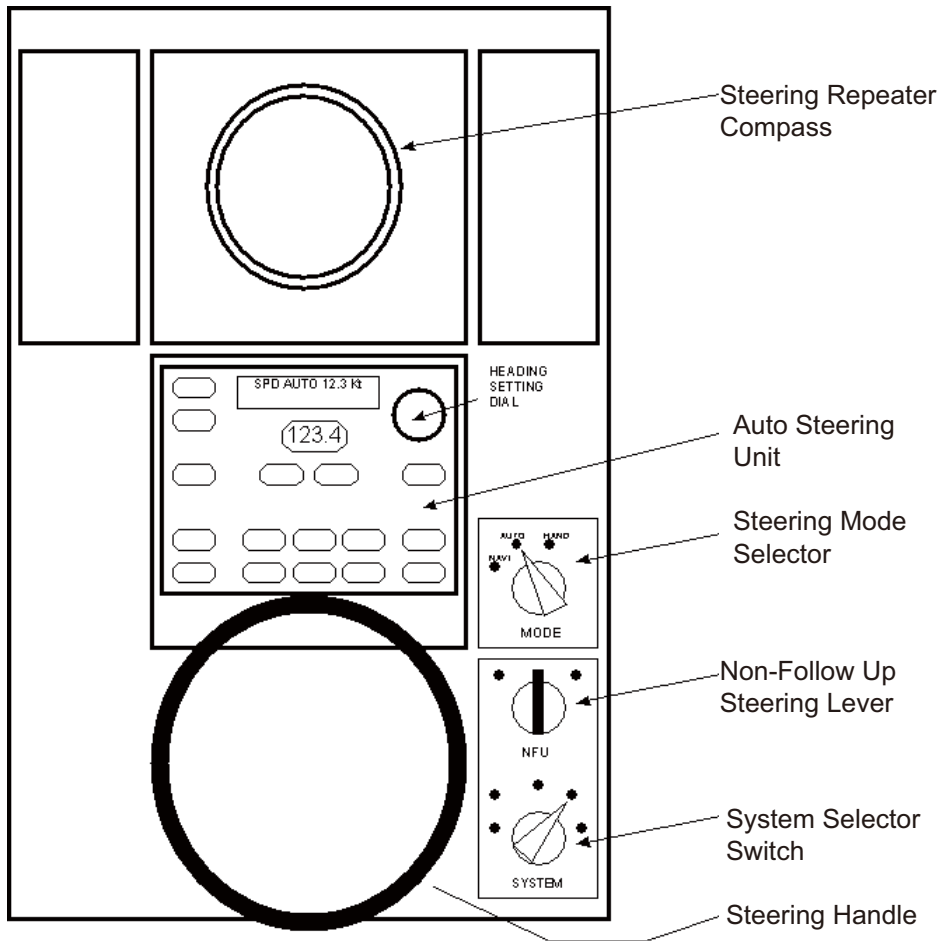
Stopping steering override:

- 1) Push the Override steering reset switch on the override reset unit in the steering stand to return to the previous steering mode.
- 2) If the steering mode was AUTO, the heading at the time the override steering became active is set as heading. Auto resume is disabled if the steering mode was RC/NAV. To restore the RC mode, turn the mode selection switch to another steering mode then select the RC mode again.



26.2.4 YOKOGAWA PT-500A

Steering Control Unit



Control	Description
Steering Repeater Compass	Shows heading.
Heading Steering Dial	Rotate to set heading.
Auto Steering Unit	Provides controls for automatic steering functions.
Steering Mode Selector	Select NAVI, AUTO, HAND, or RC (Remote Control) steering mode.
Non-Follow-Up Steering Lever	Steers the rudder in the direction selected, port or starboard.
System Selector Switch	Selects the system to use: OFF, FU-1 (No.1 operating system), FU-2 (No.2 operating system, NFU (Non-follow-up steering)
Steering Handle	Steers the vessel.

26.3 Steering Modes

26.3.1 EMRI FAP-2000, FAP-3000

The FAP-2000, FAP-3000 receives position, heading and speed data, compares them with the track section to be steered, and applies that information to calculate and command the necessary rudder angle.

Hand (manual) steering modes

The following hand steering modes are available without the autopilot: Steering wheel, Wing steering control, and Override tiller. While in a hand steering mode, the ECDIS indicates the rudder angle and the hand steering mode.

Autopilot steering modes

The autopilot steering modes are selected from the autopilot control panel.

<p>Heading control mode</p> <p>The autopilot steering modes are selected from the autopilot control panel.</p> <ul style="list-style-type: none"> • Mode selection: HEADING CONTROL (FAP-2000), CALL HEADING CTRL button (FAP-3000) • The HEADING CONTROL (FAP-2000), CALL HEADING CTRL button (FAP-3000) lights. • Immediate course change when the tiller is used to set the heading. • Course change is defined as heading controlled by the set rudder angle limit.
<p>Radius control mode</p> <p>The Radius Control steering mode can be used always because it does not require position data.</p> <ul style="list-style-type: none"> • Mode selection: RADIUS button • The lamp on the RADIUS button (FAP-2000, FAP-3000) and CALL HEADING CTRL button (FAP-3000) lights. • Course change is radius controlled with the set radius. • If wind, current, etc. affect the ship, the ship will drift (inside or outside) from the planned turn. This is displayed on the radar screen.
<p>Program heading change mode</p> <p>The Program Heading Change steering mode can be used always because it does not require position data.</p> <ul style="list-style-type: none"> • Mode selection: PROGRAM HEADING CHANGE (FAP-2000), PROGRAM NEXT button (FAP-3000) • The PROGRAM NEXT button (FAP-3000) lights. • The tiller is first used to set a new heading and radius, which are also displayed on the radar screen. • The START HEADING CHANGE (FAP-2000), EXECUTE button (FAP-3000) flashes if the newly set heading is different from the currently used heading. • Start course change by pushing the START HEADING CHANGE (FAP-2000) button, EXECUTE button (FAP-3000). • After activation, control is returned to the RADIUS button (FAP-2000, FAP-3000). • If wind, current, etc. affect the ship, the ship will drift (inside or outside) from the planned turn. This is displayed on the radar screen.

26.3.2 TOKYO KEIKI PR-6000, YOKOGAWA PT-500A

Steering functions are available when the ECDIS system is connected to the Autopilot. To use a steering mode, set your Autopilot's system selection switch to the FU-1 (PT-500A) or No. 1 (PR-6000) position.

Hand (manual) steering mode (Mode selector: HAND)

Set the Steering Mode Selector Switch to HAND. The ECDIS displays the rudder angle and indicates the steering mode in the [Route Information] box.

Autopilot steering mode (Mode selector: AUTO)

The operator sets the required heading of the ship with the Course Setting knob. Turns are controlled by the rudder limit or rate of turn and are started the operator.

Turn the Mode selection switch to the AUTO position, and the set course is shown in the SET. COURSE display. The initial value of the set course is the ship's heading at that time. To change the course, press the Course setting knob and release it when the required course appears. Now, the course deviation (CO.DEV: COURSE DEVIATION) is shown in the bar graph and AUTO is lit. AUTO goes off when the ship is following new course.

When the loading condition changes remarkably, yawing can large at the departure. Then, do auto course; change by 20° of port and starboard two or three times, and follow the state for approx. 15 minutes.

Turn controlled by the rudder angle: When a new course is set, turns are controlled by the rudder angle. You can set the required rudder angle limit with the Rudder limit knob.

Turn controlled by rate of turn: Press the AUTO unit <-SEL switch a number of times to light the data selection indicator R.O.T. and show the rate of turn (unit deg/min). Now, press the DATA CHANGE switch (located at the lower right) to show the turn rate order. The displayed value can be changed with - or + while pressing the DATA CHANGE switch. This value becomes the turn of rate order during automatic course change. The setting, however, cannot be changed during automatic course change.

Route steering mode (Mode selector: NAVI (PT-500A), RC (PR-6000))

GoSEA mode (open sea mode): The planned track is followed at moderate and "economical accuracy" between waypoints and also during the turns (position-controlled turn). When the ship nears a waypoint, the ECDIS alerts the operator both well before the turn and just before the turn.

GoAW mode (all waters mode): The planned track is followed at the "maximum accuracy" between waypoints and also during the turns (position-controlled turn). When the ship nears a waypoint, the ECDIS alerts the operator both well before the turn and just before the turn.

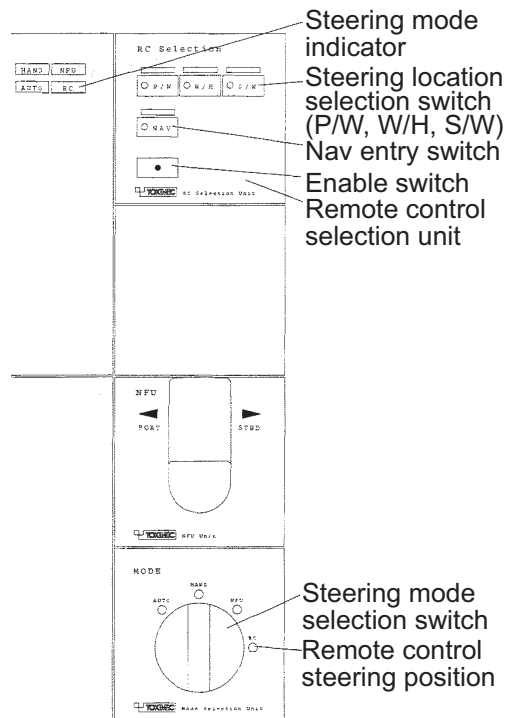
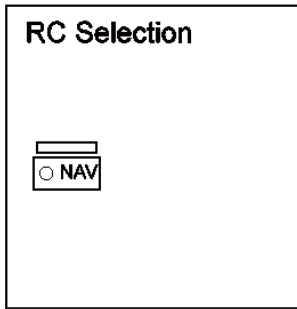
Non-follow-up steering mode (Mode selector: NFU) (PR-6000)

The operator sets the steering mode selector to NFU and steers with the Non-Follow-Up lever. While in the NFU steering mode the ECDIS system displays both the rudder angle and the steering mode.

Remote hand steering mode (Mode selector: RC) (PR-6000)

When the Mode selection switch mode is set to RC, the mode becomes RC, not the selected condition. The steering mode indicator “RC” flashes. The hand steering is in use while “RC” flashes. (This operation is like the HAND mode.) At this time you can switch to the remote steering mode. Press the Enable switch button while pressing the Steering location selection switch. The lamp of the steering location comes on. (See Note 1.) The state of the steering mode indicator RC changes from flashing to lighting.

Note 1: If your RC Selection Unit does not have the Enable switch button, like the figure below, press the NAV button to start the TCS.



Note 2: When you select the RC mode, select "RC" in one motion. Do not stop at any of the secondary positions on the switch, to prevent loss of the TCS. If the TCS is lost, first check that the rudder is centered then restore manual steering (HAND) at the autopilot. Restart TCS (GoAW) at the ECDIS then reselect RC.

26.3.3 Summary of steering modes

Route steering modes (all autopilots)

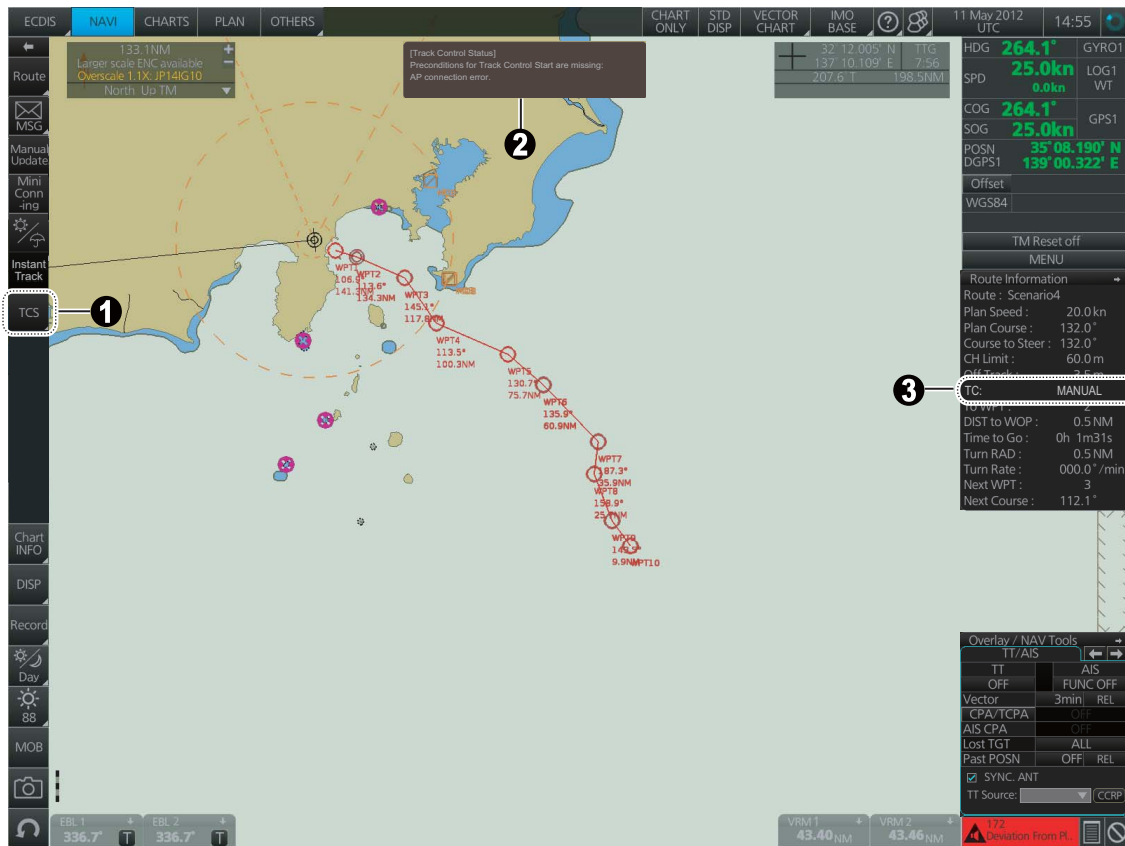
Item	Mode	
	GoSEA	GoAW
Set course	Automatic	Automatic
Set radius	Automatic	Automatic
Radius control	Yes	Yes
Design before execution	Yes	Yes
Wind, current, etc. compensation running straights between WPT	Low gain	High gain
Wind, current, etc. compensation in turns	Yes	Yes
Needs a gyrocompass	Yes	Yes
Needs a log	Yes	Yes
Precision of position-fixing equipment	Good(GPS)	High(GPS)
Needs direct SOG/COG sensor	No	No

Summary of autopilot steering modes (FAP-2000, FAP-3000)

Item	Heading Control	Radius Control	Program Heading Change	Program Track
Set heading	Yes	Yes	Yes	Yes
Set radius	No	Yes	Yes	Yes
Radius control	No	Yes	Yes	Yes
Design before execution	No	No	Yes	Yes
Wind, current, etc. compensation	No	No	No	Yes
Needs a gyrocompass	Yes	Yes	Yes	Yes
Needs a log	No	Yes	Yes	Yes
Needs precise position-fixing equipment	No	No	No	Yes
Needs direct SOG/COG sensor	No	No	No	Yes

26.4 Autopilot Functions at the ECDIS

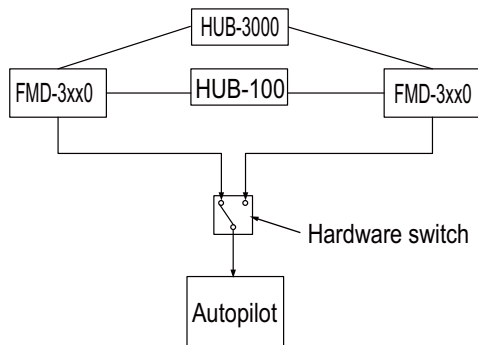
Autopilot functions are available in the Voyage navigation mode. Click the [NAVI] button to get into this mode.



(1) TCS buttons	(2) [Track Control Status] window	(3) [Route Information] box
<div data-bbox="167 1276 383 1512"> </div> <p>The buttons in the TCS button group do the following tasks. See section 26.6.</p> <p>[TCS]: Opens the TCS button group.</p> <p>[TCS Setting]*: Selects a steering mode, [GoAW] or [GoSEA]. *Not shown on FAP-2000.</p> <p>[TCS State]: Shows or hides the [Track Control Status] window. See "Messages" on page 26-19.</p>	<div data-bbox="550 1288 1029 1411"> </div> <p>The [Track Control Status] window displays a message when the route steering preconditions are not complete. See "Messages" on page 26-19.</p>	<div data-bbox="1061 1288 1316 1646"> </div> <p>The [TC] field shows Autopilot status. In the example above, the status is [GoAW Appr. Enabled]. See section 26.7.1 for a description of the autopilot status information that appears in this box.</p>

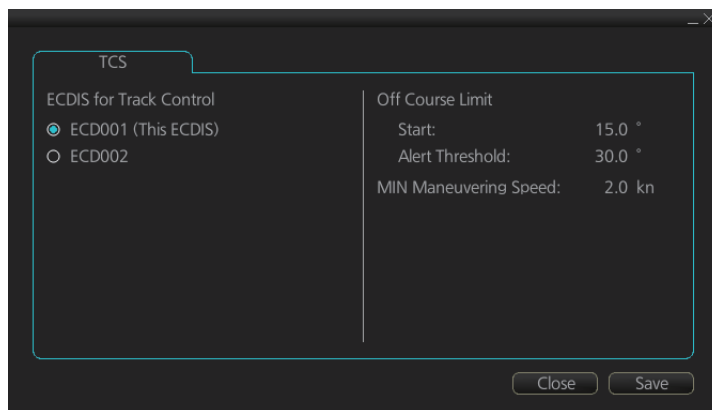
26.5 How to Select the ECDIS to Control the Autopilot

If the ship has more than one ECDIS, you can select the ECDIS to control the Autopilot. The ECDIS are connected to the Autopilot via a hardware switch to permit manual switching of the ECDIS.



For example, ECD0002 is currently the primary ECDIS and ECD003 is the secondary ECDIS. Then, to swap primary and secondary ECDIS units, do as follows.

1. **If the TCS is engaged to the ECDIS, stop the TCS.**
CAUTION: DO NOT switch the ECDIS units while the TCS is engaged. Stop the TCS, then switch the units. Failure to disengage the TCS from the ECDIS can cause sudden and violent movement, creating a potentially dangerous situation.
2. Switch from ECD002 to ECD003 with the hardware switch.
3. Open the ECDIS menu.
4. From the [General] menu, open the [TCS] dialog box.



5. Click the radio button [ECD003].
6. Click the [Save] button to finish.

Then, the [TCS] button (InstantAccess bar) at the ECDIS formerly selected as Primary becomes inoperative (greyed out) and the [TCS] button at the ECDIS now selected as Primary becomes operative.

Description of items in TCS dialog box

Start: The deviation threshold for the planned route and heading at the start of track control.

Alert Threshold: The deviation threshold for the planned route and heading in route monitoring and track control.

Min Maneuvering Speed: The minimum allowable maneuvering speed in track control. A speed lower than this triggers the low speed alarm.

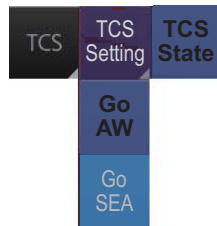
26.6 How to Activate, Deactivate the Track Control System (TCS) from the ECDIS

26.6.1 How to activate the TCS

The TCS cannot be activated if the route steering preconditions have not been met. A related alert and status message appear on the ECDIS.
See section 26.7.2 for the status messages.

FAP-3000, PR-6000, PT-500A

1. Click the [TCS] button on the InstantAccess bar to show the TCS button group.



2. Click the [TCS Setting] and [Go AW] or [Go SEA] buttons to activate the route steering.
3. Do one of the following:
 - FAP-3000:** Push the CALL REMOTE CTRL button.
 - PR-6000:** Select the RC mode.
 - PT-500A:** Select the NAVI mode.

FAP-2000

At the Autopilot, push the GoAW or Go SEA button as appropriate. The TCS starts with the steering mode selected.

26.6.2 How to deactivate the TCS

Change the steering mode at the Autopilot to hand to automatic.

26.7 Route Steering Related Indications, Alerts and Messages Generated by ECDIS

26.7.1 Route steering related information in Route Information box

The [TC] field in the [Route Information] box shows the route steering related information.

Route Information	
Route :	Scenario4
Plan Speed :	20.0 kn
Plan Course :	132.0°
Course to Steer :	132.0°
CH Limit :	60.0 m
Off Track :	3.5 m
TC:	GoAW Appr. Enabled
To WPT :	2
DIST to WOP :	0.5 NM
Time to Go :	0h 1m31s
Turn RAD :	0.5 NM
Turn Rate :	000.0° /min
Next WPT :	3
Next Course :	112.1°

Indication	Reason	Comments
AUTO	Automatic steering activated.	
DPS*	Dynamic Positioning System activated.	
GoAW	GoAW mode activated.	
GoAW Appr. Enabled	Shown between the time of the WPT pre-warning notice and its acknowledgement.	
GoAW GC	Great circle navigation in the GoAW mode.	
GoAW Turn	Turning in the GoAW mode.	
GoAW Turn Enabled	Shown between the time of the prewarning acknowledgement and the beginning of the turn.	
GoSEA	The GoSEA mode activated.	
GoSEA Appr. Enabled	Shown between the time of the WPT pre-warning notice and its acknowledgement.	
GoSEA GC	Great circle navigation in the GoSEA mode.	
GoSEA Turn	Turning in the GoSEA mode.	
GoSEA Turn Enabled	Shown between the time of the prewarning acknowledgement and the beginning of the turn.	
JOY*	Joystick is being operated.	
MANUAL	Manual steering activated.	
NAVI	Mode is different from GoAW or GoSEA.	
Service State	Vessel is now making gradual advancement (instead of immediate).	[TC] is yellow.
[TC] is red	TCS module error found.	The TCS cannot be started.
[TC] is yellow	Service state or TCS module status is NA.	

*Not shown on FAP-2000, FAP-3000, PR-6000.

26.7.2 Alerts and messages when precondition for route steering are not complete

When you select the GoAW mode and change the steering mode to NAVI at the Autopilot to activate the route steering, but route steering preconditions are not complete, an alert and a message are given.

Alerts

Route steering precondition related alerts appear in the [Alert] box, at the bottom-right position on the ECDIS screen. The alert flashes if it is an alarm or warning category alert.



Alert ID no. and alert name

Alert "**158 Course Difference**" informs you that there is a difference between the current heading of your ship and the required heading. The alert threshold is set during the installation.

Alert "**172 Off Track Alarm**" appears if the ship is outside the channel limits of the route.

Alert "**665 Auto Pilot Mode Conflict**" informs you that neither the ECDIS nor the Autopilot can start the route steering mode. First change the steering mode from NAVI^{*1} to AUTO^{*2} then check that the preconditions for the route steering are complete.

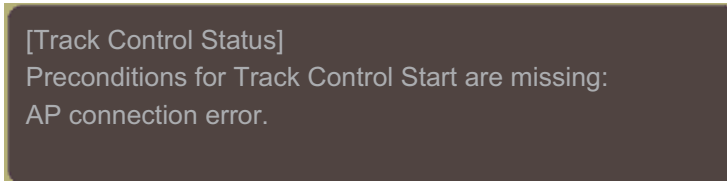
*1 REMOTE CONTROL on FAP-3000

*2 HEADING CONTROL on FAP-3000

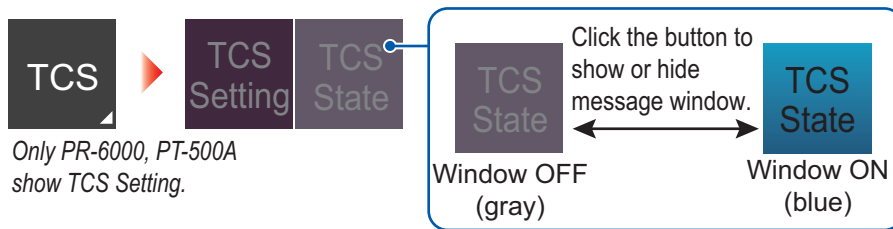
Alert "**690 TC Start Timeout**" informs you that the 60-second timeout has passed before you changed the mode to NAVI. After you select the GoSEA or GoAW at the ECDIS, you have 60 seconds to change the mode to NAVI, otherwise alert 690 is given.

Messages

The message in the [Track Control Status] window (at the top of the display) states the reason why the preconditions for the start of track control are not complete.



This window can be shown or hidden with the [TCS State] button.



Messages in the Track Control Status window

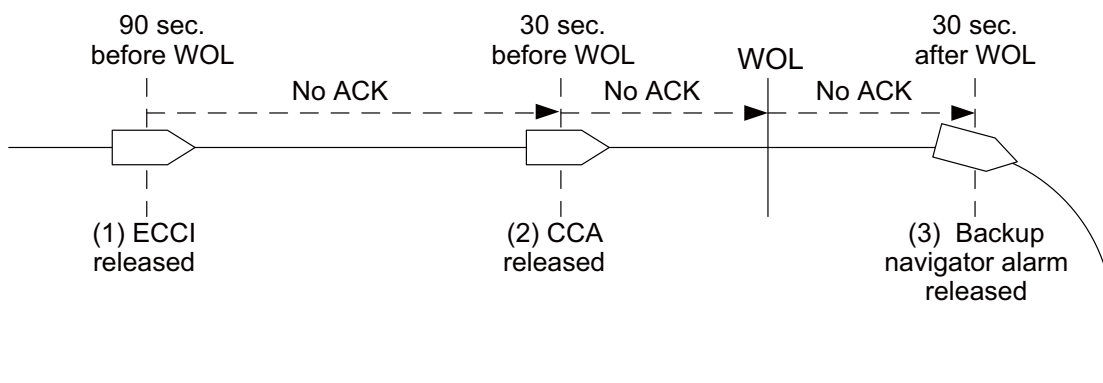
Message	Reason	Action
"AP connection error"	Problem with connections at the Autopilot.	Check the Autopilot.
"AP heading error"	No HDG at Autopilot.	Check connections, heading source.
"AP not ready"	AP is in the NFU mode.	Select NAVI (REMOTE CONTROL on FAP-3000) mode.
"Off course"	Ship is off course.	Correct your course.
"Invalid HDG"	No HDG at ECDIS.	Check connections, heading source.
"Speed too low"	Current speed is lower than that set as the maneuvering speed.	Raise speed to match maneuvering speed set.
"Not using filter"	The filter is not being used.	
"Out of channel"	You tried to activate the route steering outside the channel limits.	Steer the ship inside the channel then try to activate the route steering again.
"Unreliable POSN"	Position data is not reliable.	Check navigator.

26.7.3 Alerts given when approaching a waypoint

This section provides examples of how the ECDIS responds to acknowledged, unacknowledged alerts when approaching a waypoint.

Condition 1: No acknowledgement to alerts

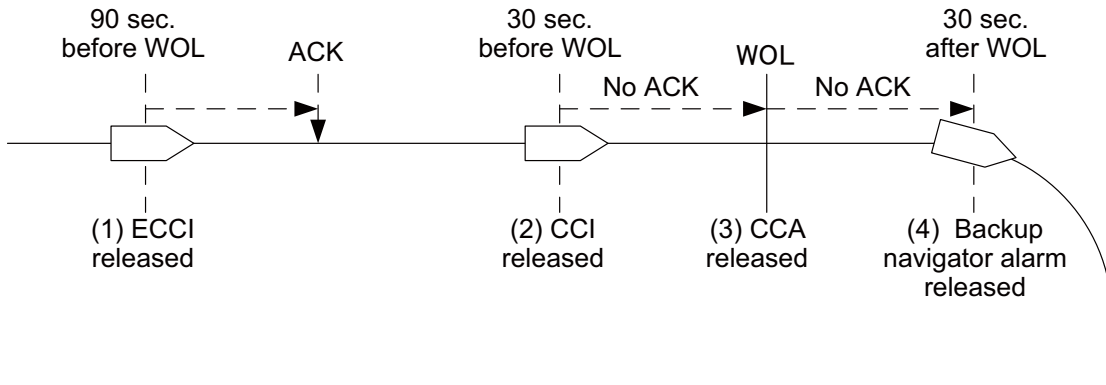
1. The vessel's position is 90 seconds from the WOL.
2. The ECDIS releases the Early Course Change Indication (ECCI), which is the Alert "**150 Early Course Change Indication**".
3. The ECCI is not acknowledged.
4. The vessel's position is now 30 seconds from the WOL.
5. The ECDIS releases the Course Change Alarm (CCA), which is the Alert "**152 Wheel Over Line**".
6. The vessel passes the WOL.
7. 30 seconds after the vessel passes the WOL, the ECDIS outputs the Backup Navigator Alarm (contact signal, N/O or N/C) to the BNWAS.
8. The CCA is acknowledged.
9. The ECDIS stops the Backup Navigator Alarm and resets the contact signal.



Condition 2: Early course change acknowledged, actual course change not acknowledged

1. The vessel's position is 90 seconds from the WOL.
2. The ECDIS releases the Early Course Change Indication (ECCI), which is the Alert "**150 Early Course Change Indication**".
3. The ECCI is acknowledged.
4. The vessel's position is 30 seconds from the WOL.
5. The ECDIS releases the Course Change Indication (CCI), which is the Alert "**151 Actual Course Change Indication**".
6. The CCI is not acknowledged.
7. When the vessel passes the WOL, the ECDIS releases the Course Change Alarm (CCA), which is the Alert "**152 Wheel Over Line**".
8. The CCA is not acknowledged.
9. 30 seconds after the vessel passes the WOL, the ECDIS outputs the Backup Navigator Alarm (contact signal, N/O or N/C) to the BNWAS.
10. The CCA is acknowledged.

11. The ECDIS stops the Backup Navigator Alarm and resets the contact signal.



Waypoint-related indications in the Route Information box

The text "GoSEA Appr. Enabled" or "GoAW Appr. Enabled" appears in the [Route Information] box until you acknowledge the Alert "**150 Early Course Change Indication**".

Route Information → Route : 20120419X_import Plan Speed : 20.0 kn Plan Course : 208.1 ° Course to Steer : 250.1 ° CH Limit : 185.0 m Off Track : -9999.9 m TC : GoSEA Appr. Enabled	Route Information → Route : 20120419X_import Plan Speed : 20.0 kn Plan Course : 208.1 ° Course to Steer : 250.1 ° CH Limit : 185.0 m Off Track : -9999.9 m TC : GoAW Appr. Enabled
--	---

When you acknowledge the waypoint approach alert, the text "GoSEA Turn Enabled" or "GoAW Turn Enabled" appears in the [Route Information] box.

Route Information → Route : 20120419X_import Plan Speed : 20.0 kn Plan Course : 208.1 ° Course to Steer : 250.1 ° CH Limit : 185.0 m Off Track : -9999.9 m TC : GoSEA Turn Enabled	Route Information → Route : 20120419X_import Plan Speed : 20.0 kn Plan Course : 208.1 ° Course to Steer : 250.1 ° CH Limit : 185.0 m Off Track : -9999.9 m TC : GoAW Turn Enabled
---	--

During a turn, the text "GoSEA Turn" or "GoAW Turn" appears in the [Route Information] box.

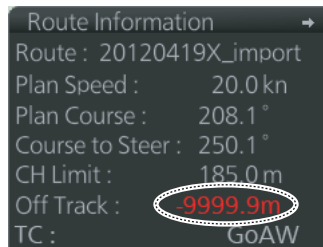
Route Information → Route : 20120419X_import Plan Speed : 20.0 kn Plan Course : 208.1 ° Course to Steer : 250.1 ° CH Limit : 185.0 m Off Track : -9999.9 m TC : GoSEA Turn	Route Information → Route : 20120419X_import Plan Speed : 20.0 kn Plan Course : 208.1 ° Course to Steer : 250.1 ° CH Limit : 185.0 m Off Track : -9999.9 m TC : GoAW Turn
---	--

Note: When you approach the last waypoint, the Alert "**652 Last WPT Approach**" appears. If you acknowledge Alert 652 when the Autopilot is in the NAVI mode, the route steering is automatically stopped and the system shows Alert "**665 Auto Pilot Mode Conflict**". Route steering is deactivated until the NAVI mode is selected again at the Autopilot. To return to the route steering, the ship's heading must be set toward the next waypoint and the ship must be inside the channel limits. Otherwise, an alert is given.

26.7.4 Other route steering indications and alerts

Route steering indications in the Route Information box

Permanent alerts appear in the [Route Information] box in red in any the steering mode. In the example below the [Off Track] value is shown in red when the vessel is outside the channel.



Route steering alerts

Alert "**150 Early Course Change Indication**" appears 90 seconds before you arrive to the wheel over line (WOL).

Alert "**152 Wheel Over Line**" appears if (1) Alert "**150 Early Course Change Indication**" is not acknowledged within 30 seconds of arrival to the wheel over line, or (2) Alert "**151 Actual Course Change Indication**" is not acknowledged at the arrival at the wheel over point. If Alert 152 stays unacknowledged, Alert 150 is given at the next waypoint.

Alert "**153 Track Control Stop**" appears when the heading signal is lost.

Alert "**156 Sensor Failure**" appears when there is no gyro data or the conditions of Alert 156 have been valid for the last minute.

Alert "**158 Course Difference**" appears when there is a large difference between the planned course and the current course.

Alert "**172 Off Track Alarm**" appears when your vessel is off track.

Alert "**652 Last WPT Approach**" appears when your vessel is near the last WPT in the route monitored.

Alert "**667 AP Receive Error**" appears when the ECDIS cannot communicate with the Autopilot. Change the steering mode to AUTO (HEADING CONTROL on FAP-3000).

Alert "**675 Use MAN Steering**" is instruction for the user to change the steering mode to AUTO (HEADING CONTROL on FAP-3000) or HAND. This alert is generated if there is not enough conditions to continue the TCS.

26.8 Route Steering Operations

26.8.1 How to stop or change a pre-enabled turn in route steering

There are two conditions where an automatic turn in a route must be stopped or changed:

- The turn cannot be done to the last value.
- The turn is outside of the planned turn (too fast or too slow).

How to stop a turn

FAP-2000, PR-6000, PT-500A: Change the steering mode from NAVI to HAND.

FAP-3000: Change the steering mode from REMOTE CONTROL to HAND.

How to change a turn

What to do	How to execute the turn
Use different final value of set course	<p>The problem is that radius control is only available in the NAVI^{*1} steering mode. When you change the steering mode to a mode different from NAVI^{*1}, the ship stops following the radius. Below is what you can do:</p> <ul style="list-style-type: none"> • Change the steering mode from NAVI^{*1} to AUTO^{*2}. This stops the turn completely and the current gyro heading is selected as the new set course for the Autopilot. Then, set a new final value for the set course and select an acceptable max. rudder angle to prevent too fast turning. • Turn the steering wheel to an acceptable angle to continue with a new radius (i.e. to equal previous rudder angle). Then, change the steering mode from NAVI^{*1} to AUTO^{*2}. Continue manual steering. • Change the steering mode from NAVI^{*1} to NFU, then use the NFU steering lever. Manually steer the ship.
Compensate too fast turning	<p>As soon as you change the steering mode to something other than NAVI^{*1} the ship stops following the radius. Below is what you can do:</p> <ul style="list-style-type: none"> • Change the steering mode from NAVI^{*1} to AUTO^{*2}. This stops the turn completely and the current gyro heading is selected as the new set course for the Autopilot. Then set a final value for the set course and select a suitable max. rudder angle to prevent too fast turning. • Set the steering wheel to a suitable angle to continue with a larger radius (i.e. smaller than previous rudder angle). Then change the steering mode from NAVI^{*1} to HAND. Manually steer the ship. • Change the steering mode from NAVI^{*1} to NFU. Manually steer the ship.
Compensate too slow turning	<p>As soon as you change the steering mode to something other than NAVI^{*1}, the ship stops following the radius. Below is what you can do:</p> <ul style="list-style-type: none"> • Set the steering wheel to a suitable angle to continue with a smaller radius (i.e. higher rudder angle than before). Then change the steering mode from NAVI^{*1} to HAND. Continue manual steering. • Change the steering mode from NAVI^{*1} to NFU. Manually steer the ship.

^{*1} REMOTE CONTROL on FAP-3000

^{*2} HEADING CONTROL on FAP-3000

26.8.2 Collision avoidance maneuver in route steering

Route steering is often interrupted by a collision avoidance maneuver, but there are also several other reasons to interrupt route steering. There are several possibilities to set the collision avoidance or any other maneuver:

- Use the Non-Follow-Up steering lever to directly control rudder pumps.
- Use the Override steering.
- Use the Follow-Up rudder control. (Change mode from NAVI^{*1} to HAND.)
- Use the local Autopilot Heading control. (Change mode from NAVI^{*1} to AUTO^{*2})

^{*1} REMOTE CONTROL on FAP-3000

^{*2} HEADING CONTROL on FAP-3000

26.9 Steering Performance

Below is a summary of how different environmental conditions change steering performance.

26.9.1 Expected steering performance for going ahead

Environmental conditions	Heading control= AUTO	Mode	
		GoSea (FAP-2000/3000) GoSea+RC (PR-6000) GoSea+NAVI (PT-500A)	GoAW (FAP-2000/3000) GoAW+RC (PR-6000) GoAW+NAVI (PT-500A)
Calm sea, no wind, no current	COG is approx. the same as Set Course in Autopilot.	Ship follows monitored route.	Ship follows monitored route accurately.
Moderate wind and/or current	Ship has a tendency to drift.	Ship follows monitored route.	Ship follows monitored route accurately.
High wind and/or current	Ship is drifting.	1) Ship follows monitored route but may go outside channel limit area.* 2) Ship may have a problem following monitored route inside the channel limit, however.	1) Ship follows monitored route.* 2) Ship can have a problem following monitored route inside the channel limit.
Wind and/or current changes slowly.	There is no compensation for change.	Ship follows monitored route.	Ship follows monitored route accurately.
Sudden change of wind and/or current (For example sudden change from no current to 5 kn current perpendicular to track)	There is no compensation for change.	1) Ship may go outside channel limit but is "re-turned" to center of channel.* 2) Ship can have a problem following monitored route inside the channel limit.	1) Ship is kept within channel limit.* 2) Ship can have a problem following monitored route inside the channel limit.
Fast change of speed (For example, speed decreased from 20 to 7 kn)	There is no compensation for change.	Ship follows monitored route, but may need full channel limit area.	Ship follows monitored route, but may need full channel limit area.

* The Track Control System can compensate drift up to 45 degrees. If the drift is larger, your ship may go outside the channel limit.

26.9.2 Expected steering performance for turns

Environmental conditions	Heading control= AUTO	Mode	
		GoSea (FAP-2000/3000) GoSea+RC (PR-6000) GoSea+NAVI (PT-500A)	GoAW (FAP-2000/3000) GoAW+RC (PR-6000) GoAW+NAVI (PT-500A)
Calm sea, no wind, no current	Ship does normal Autopilot turn under this condition.	Ship follows monitored route.	Ship follows monitored route accurately.
Moderate wind and/or current	Ship does normal Autopilot turn under this condition.	Ship follows monitored route.	Ship follows monitored route accurately.
High wind and/or current	Ship does normal Autopilot turn under this condition.	1) Ship follows monitored route, but may go outside channel limit area.* 2) Ship can have a problem following monitored route inside the channel limit.	1) Ship follows monitored route.* 2) Ship can have a problem following monitored route inside the channel limit.
Wind and/or current changes slowly.	Ship does normal Autopilot turn under this condition.	Ship follows monitored route.	Ship follows monitored route accurately.
Sudden change of wind and/or current (For example sudden change from no current to 5 kn current perpendicular to track)	Ship does normal Autopilot turn under this condition.	1) Ship may go outside channel limit but is "re-turned" to center of channel.* 2) Ship can have a problem following monitored route inside the channel limit.	1) Ship is kept within channel limit.* 2) Ship can have a problem following monitored route inside the channel limit.
Slow change of speed	Ship does normal Autopilot turn under this condition.	Ship follows monitored route, but may need full channel limit area.	Ship follows monitored route.
Fast change of speed (For example, speed decreased from 20 to 7 kn)	Ship does normal Autopilot turn under this condition.	Ship follows monitored route, but may need full channel limit area.	Ship follows monitored route, but may need full channel limit area.

* The Track Control System can compensate drift up to 45 degrees. If the drift is larger, your ship may go outside the channel limit.

26.9.3 Expected steering performance under critical failure

Below is a summary of the system behavior in different failures in the GoSEA or GoAW steering mode.

Lost heading to Autopilot and/or ECDIS

	Related alerts	Expected system performance	Operator action
Immediately	<ul style="list-style-type: none"> These alerts and warnings may be generated at the ECDIS: <ol style="list-style-type: none"> Alert "450 Heading Sensor Not Available" Alert "902 No Filter Source of COG/ SOG" Alert "903 No Filter Source of Heading" The lamp^{*1} on the Autopilot's Steering Control Unit (or Control Panel) lights. 		<ul style="list-style-type: none"> Acknowledge alerts. Monitor situation.
Within a few seconds	<ul style="list-style-type: none"> Alert "153 Track Control Stop"* *Transferred to BN-WAS if not acknowledged within 30 seconds. Alert "156 Sensor Failure" Alert "665 Auto Pilot Mode Conflict" 	<p>TCS stops and</p> <ul style="list-style-type: none"> If the ship is running straight, the rudder order is frozen at the last value to approximately continue ahead. If the ship is turning, the rudder order is frozen at the last value to approximately continue the rate of turn. 	<ul style="list-style-type: none"> Acknowledge alerts. Monitor situation.

*1 PT-500A: EMRG ALM; PR-6000: RC, FAP-2000, FAP-3000: ALARM

Lost speed

	Associated alerts	Expected system performance	Operator action
	<ul style="list-style-type: none"> Speed log data, VTG sentence lost. Alert "901 No Filter Source of COG/SOG", Alert "902 No Filter Source of CTW/STW" given. 		<ul style="list-style-type: none"> Acknowledge alerts. Monitor situation.
Repeated every two minutes	<ul style="list-style-type: none"> Alert "675 Use Man Steering" 	Guidance for navigator	<ul style="list-style-type: none"> Change immediately to local Autopilot control. Acknowledge alerts.
Within 30 seconds	<ul style="list-style-type: none"> Alert "156 Sensor Failure" 		<ul style="list-style-type: none"> Acknowledge alerts. Monitor situation.
Within 10 minutes	<ul style="list-style-type: none"> Alert "153 Track Control Stop"* and Alert "665 Auto Pilot Mode Conflict" are generated at the ECDIS. The lamp^{*1} on the Autopilot's Steering Control Unit lights. <p>*Transferred to BNWAS if not acknowledged within 30 seconds.</p>	<p>TCS stops and</p> <ul style="list-style-type: none"> If the ship is running straight, actual heading is used as set course. If the ship is turning, last-set course and radius are used to complete the turn. 	<ul style="list-style-type: none"> Acknowledge alerts. Monitor situation. Change the steering mode to AUTO (HEADING CONTROL on FAP-3000).

*1 PT-500A: CAUT ALM; PR-6000: RC; FAP-2000, FAP-3000: ALARM

Low speed

	Associated alerts	Expected system performance	Operator action
	<ul style="list-style-type: none"> Alert "159 Low Speed Alarm". 		<ul style="list-style-type: none"> Acknowledge alerts. Monitor situation.

Position discrepancy (position from only one GPS navigator is reliable)

	Associated alerts	Expected system performance	Operator action
Precondition	<ul style="list-style-type: none"> If sensors in Filter calculation are NOT inside operator selected position discrepancy limit, Alert "851 Sensor Banned"* appears. * "222 Position Discrepancy" on FAP-2000. 		<ul style="list-style-type: none"> Monitor situation.

Total lost position (position from ALL GPS navigators is unreliable)

	Associated alerts	Expected system performance	Operator action
Precondition	<ul style="list-style-type: none"> Alert "290 EPFS1 COM Error" (example). OR The Kalman filter detects position jump, etc. 		<ul style="list-style-type: none"> Acknowledge alerts. Monitor situation.
Within 30 seconds	<ul style="list-style-type: none"> Alert "156 Sensor Failure" Alert "170 Positioning System Failure". Alert "900 No Filter Source of Position". Alert "901 No Filter Source of COG/SOG". 	<ul style="list-style-type: none"> The Kalman filter is turned OFF and the system uses dead reckoning for positioning. If you have a log or dual-axis log, then dead reckoning is based on them and the gyro. If you have a log or dual-axis log, then dead reckoning is based on last valid speed from position sensors. 	<ul style="list-style-type: none"> Acknowledge alerts. Monitor situation.
Repeated every two minutes	<ul style="list-style-type: none"> Alert "675 Use MAN Steering" 	Guidance for navigator	<ul style="list-style-type: none"> Change immediately to local Autopilot control. Acknowledge alerts.
Within 10 minutes	<ul style="list-style-type: none"> Alert "153 Track Control Stop"* and Alert "156 Sensor Failure" are generated at the ECDIS. The lamp^{*1} on the Autopilot's Steering Control Unit lights. <p>*Transferred to BNWAS if not acknowledged within 30 seconds.</p>	<p>TCS stops and</p> <ul style="list-style-type: none"> If the ship is running straight, actual heading is used as set course. If the ship is turning, last-set course and radius are used to complete the turn. 	<ul style="list-style-type: none"> Acknowledge alerts. Monitor situation. Change the steering mode to AUTO (HEADING CONTROL on FAP-3000).

*1 PT-500A: EMRG ALM; PR-6000: RC; FAP-2000, FAP-3000: ALARM

Lost communication between Autopilot and ECDIS and vice versa

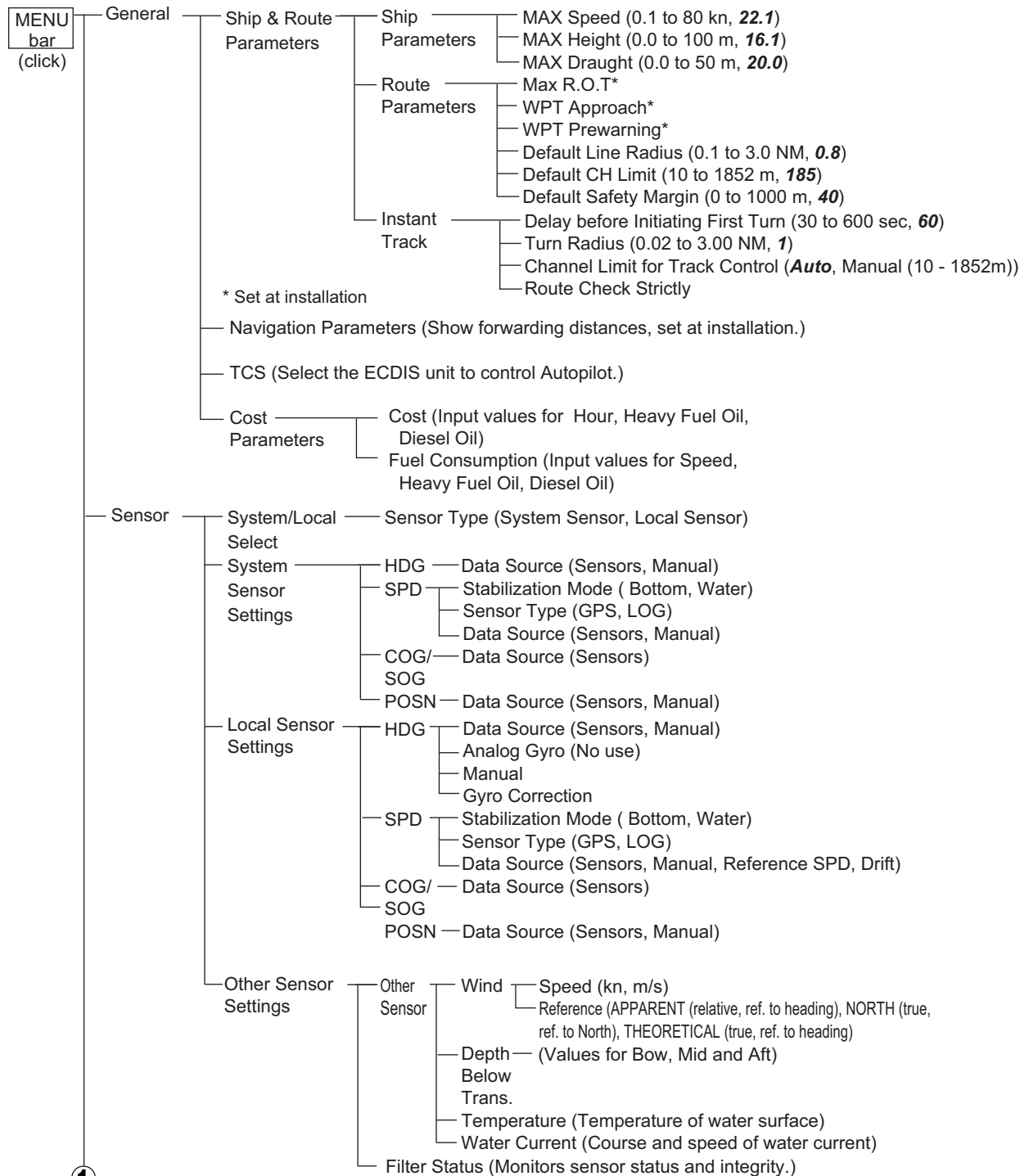
	Associated alerts	Expected system performance	Operator action
Within 15 seconds	<ul style="list-style-type: none"> Alert "667 AP Receive Error" is generated at the ECDIS. 	Guidance for the navigator	<ul style="list-style-type: none"> Acknowledge alerts. Monitor situation.
After Alert " 667 AP Receive Error "	<ul style="list-style-type: none"> Alert "153 Track Control Stop"* is generated at the ECDIS. Track control is stopped and the lamp*¹ on the Autopilot's Steering Control Unit lights. <p>*Transferred to BNWAS if not acknowledged within 30 seconds.</p>	TCS stops and <ul style="list-style-type: none"> If the ship is running straight, actual heading is used as set course. If the ship is turning, last set course and radius are used to complete the turn. 	<ul style="list-style-type: none"> Acknowledge alerts. Monitor situation. Change the steering mode to AUTO (HEADING CONTROL on FAP-3000).

*¹ PT-500A: CAUT ALM; PR-6000: RC; FAP-2000, FAP-3000: ALARM

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APPENDIX 1 MENU TREE

Main Menu

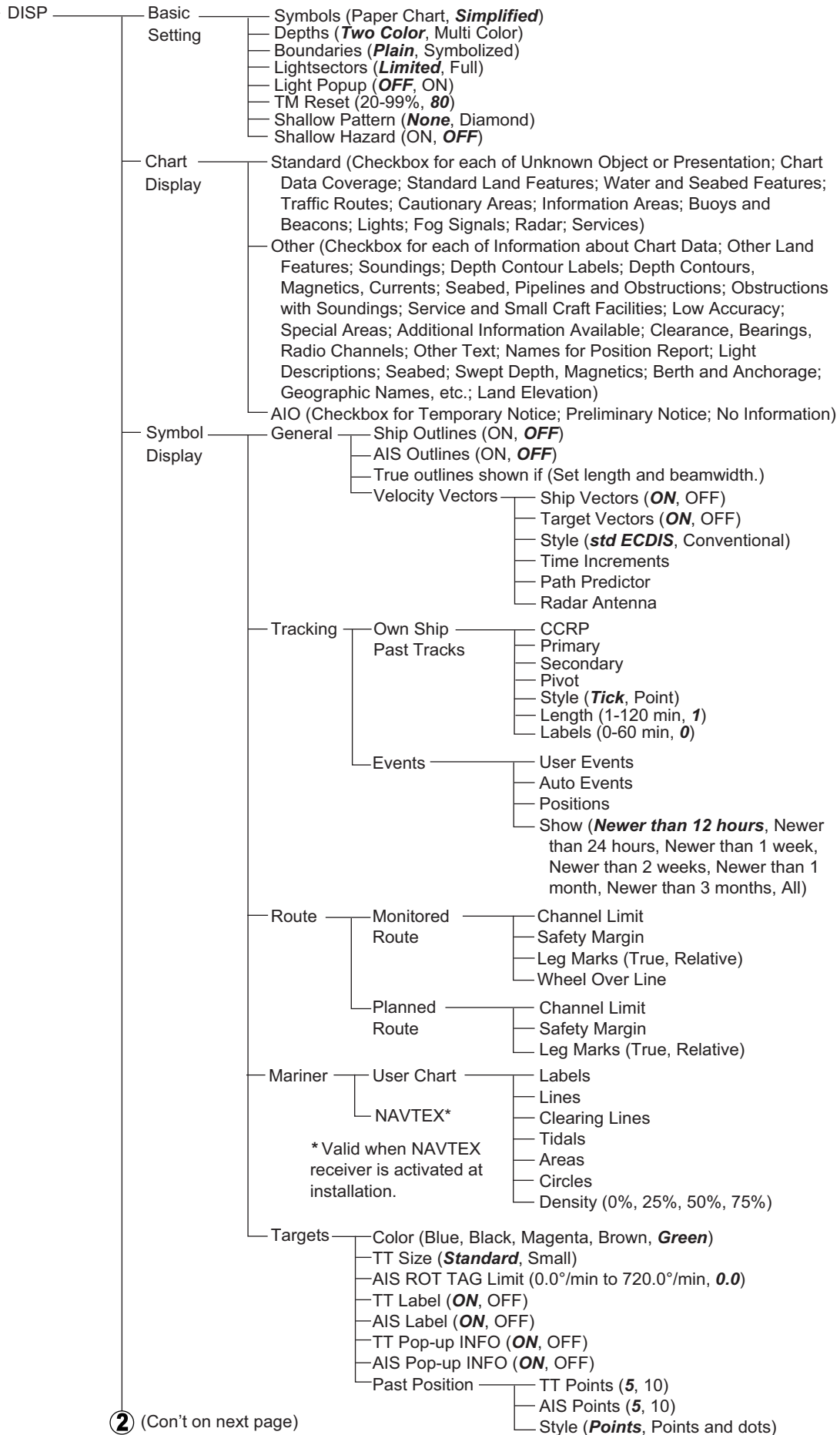


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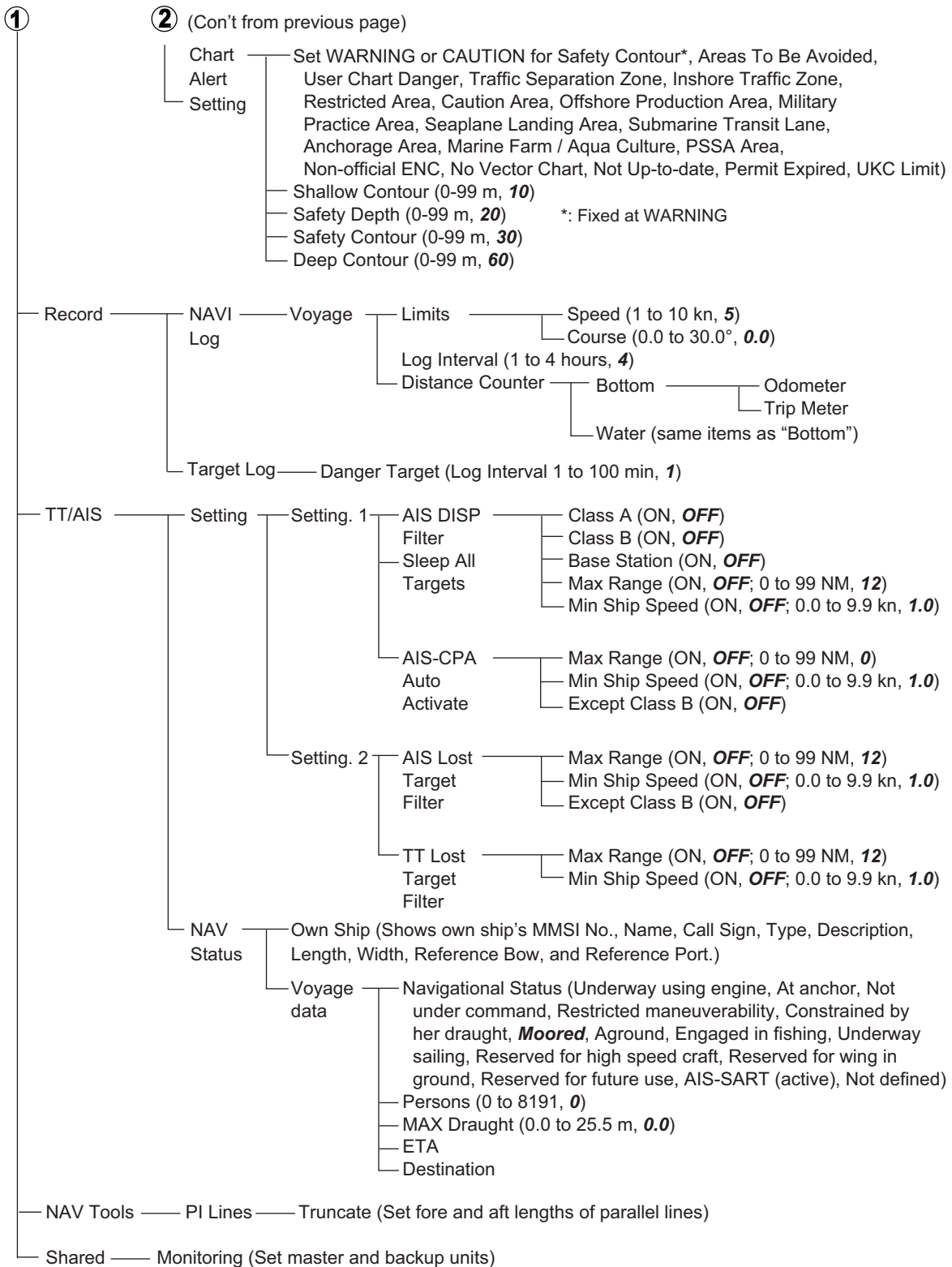
APPENDIX 1 MENU TREE

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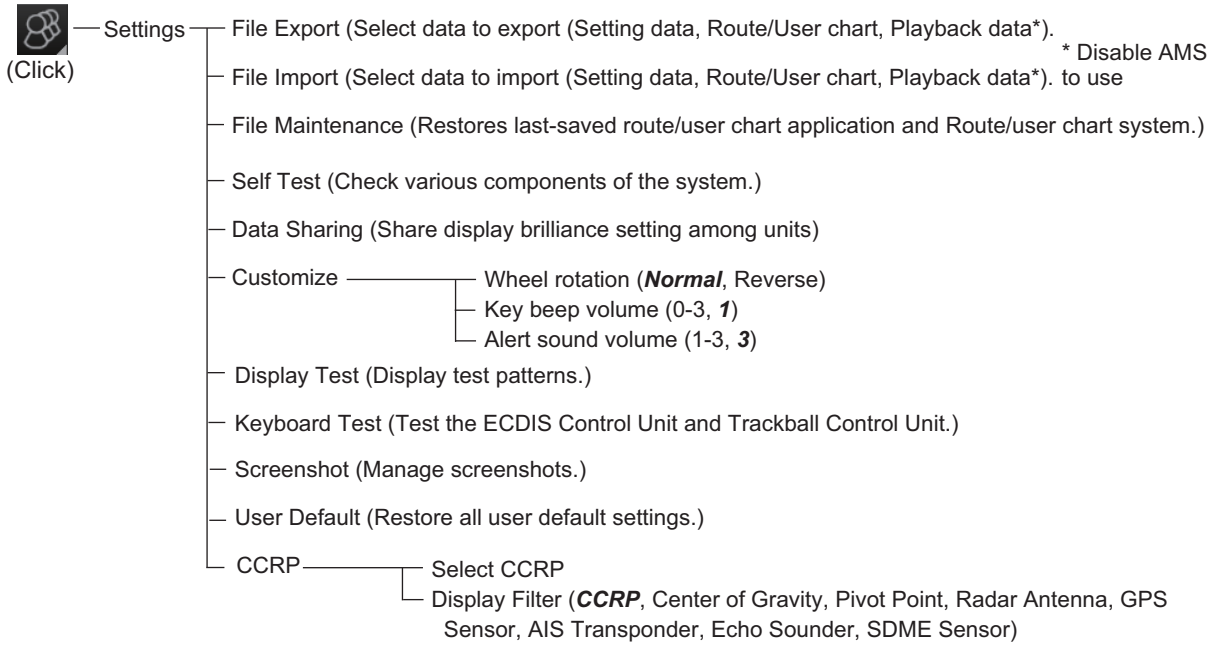


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Settings Menu



APPENDIX 2 ABBREVIATIONS, SYMBOLS

Abbreviations

Abbreviation	Meaning
ACQ	Acquire
ACT	Activate
ADJ	Adjustment
AIS	Automatic Identification System
ANT	Antenna
Apr	April
ATON	Aid To Navigation
Aug	August
AUTO	Automatic
BB	Blackbox
BCR	Bow Cross Range
BCT	Bow Cross Time
BLU	Blue
BRG	Bearing
BT	Bottom Tracking
Caps	Capital (letters)
CAT	Category
CCRP	Common Consistent Reference Point
COG	Course over the Ground
CONFIG	Configuration
CORRE	Correlation
CPA	Closest Point of Approach
CPU	Central Processing Unit
CSE	Course
CU/TM	Course-up/True Motion
CYA	CYAN
Dec	December
DEMO	Demonstration
DISP	Display

APPENDIX 2 ABBREVIATIONS, SYMBOLS

Abbreviation	Meaning
DR	Dead Reckoning
E	English
E	East
ETA	Estimated Time of Arrival
EXT	External
Feb	February
FILT	Filter
GPS	Global Positioning System
GRN	Green
GRY	Gray
Gyro	Gyrocompass
HDG	Heading
IHO	International Hydrographic Organization
IMO	International Maritime Organization
IND	Indication
INS	Integrated Navigation System
J	Japanese
Jan	January
Jul	July
Jun	June
kyd	kiloyard
L	Long (pulse length)
L/L	Latitude/Longitude
LAN	Local Area Network
LL	Latitude, Longitude
LO	Low
MAG	Magnetic or Magenta
MAN	Manual
Mar	March
MAX	Maximum
MID	Middle
min	minute
MIN	Minimum
MMSI	Maritime Mobile Service Identity





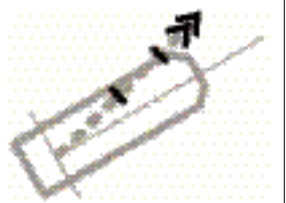
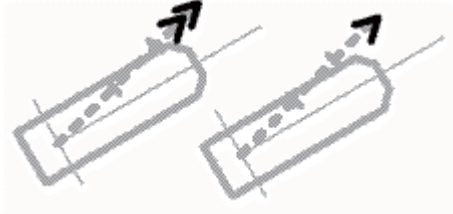
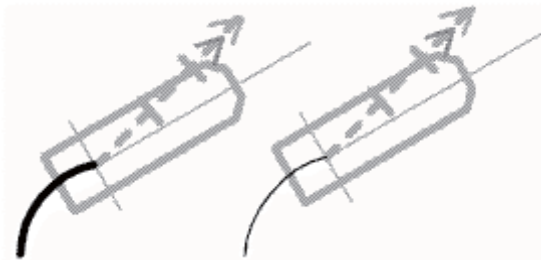
Abbreviation	Meaning
MOB	Man Overboard
MON	Monitor
Navtex	Navigational Telex
NM	Nautical miles
NO.	Number
N	North
Nov	November
Oct	October
OP	Operation
OS	Own Ship
PC	Personal Computer
PERPENDIC	Perpendicular
PI	Parallel Index (lines)
POSN	Position
R	Relative
REF	Reference
Rel	Relative
RM	Relative Motion
RNG	Range
ROT	Rate of Turn
S	South
S1 (2)	Short1(2) (pulse length)
SAR	Search And Rescue
SART	Search And Rescue Transponder
SEL	Select
Sep	September
SM	Statute Miles
SOG	Speed Over the Ground
SPD	Speed
SPEC	Specification
STAB	Stabilization
STBY	Stand-by
SW	Switch
SYNC	Synchronization

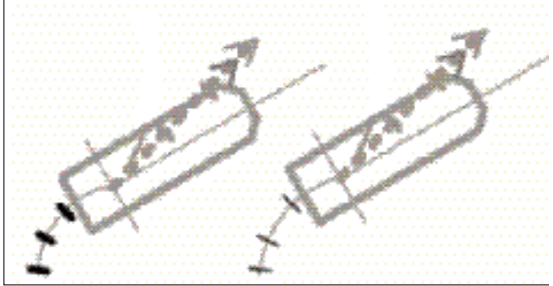
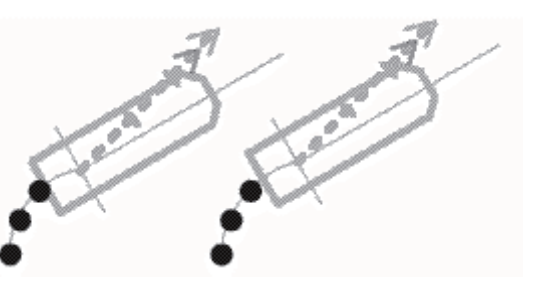








APPENDIX 2 ABBREVIATIONS, SYMBOLS


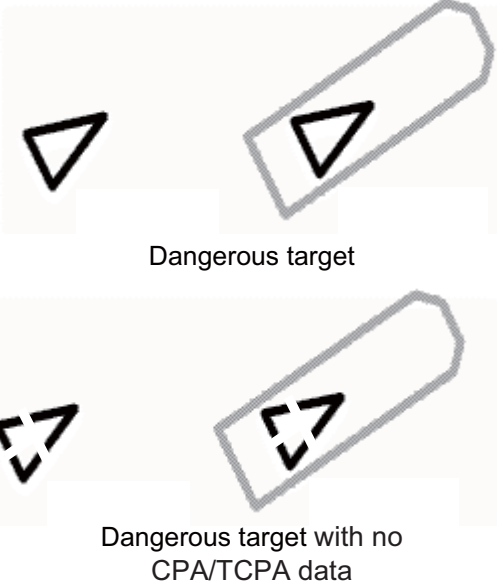


Abbreviation	Meaning
T	True
TB	True Bearing
TC	Track Control
TCPA	Time to Closest Point of Approach
TCS	Track Control System
TGT	Target
TGT, TGTS	Target, Targets
TM	True Motion
True-G	True-ground
True-S	True-sea
TT	Tracked Target or Target Tracking
TTD	Tracked Target Data
TTG	Time to go
TTM	Tracked Target Information
TX	Transmit
UTC	Universal Time, Coordinated
VECT	Vector
VRM	Variable Range Marker
W	West
W/O	Without
WHT	White
WPT	Waypoint
WT	Water Tracking
YEL	Yellow

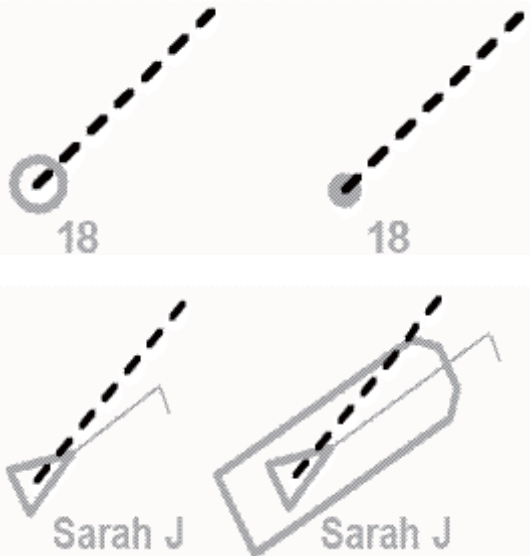
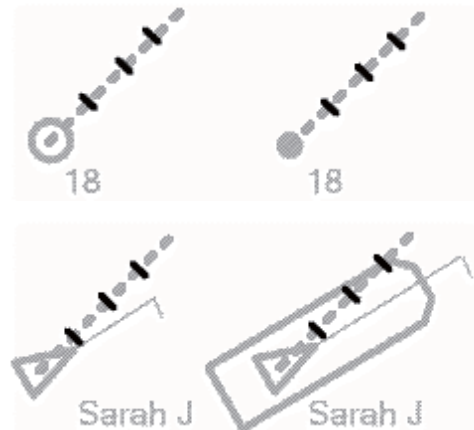

Symbols

ECDIS symbols

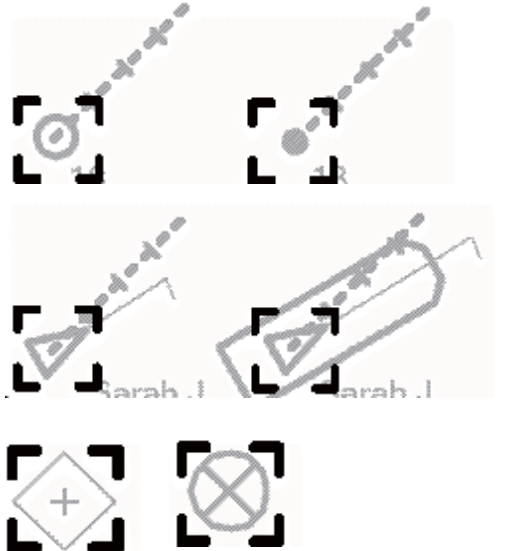
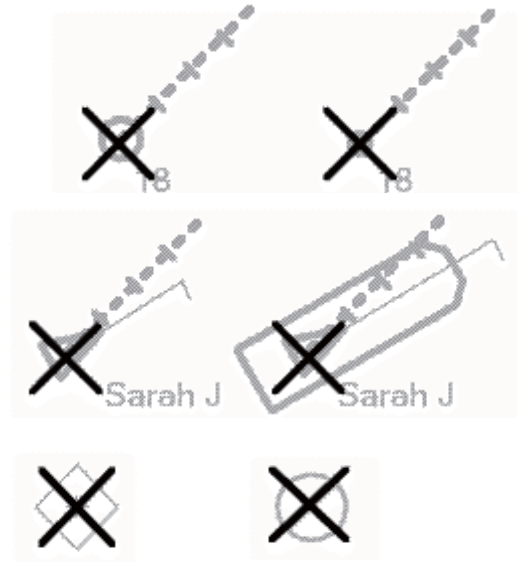


Symbol name and description	Symbol graphic(s)
<p>Own ship - true scaled outline This can be displayed when based on user selection either beam width or length is more than 6 mm.</p>	
<p>Radar antenna position This symbol indicates location of the radar antenna. Select if position of radar antenna is displayed with symbol X by Symbol Display menu.</p>	
<p>Heading line This line originates from CCRP or Radar antenna position. CCRP: Consistent Common Reference Point</p>	
<p>Beam line This line passed through the CCRP or Radar antenna position.</p>	
<p>Velocity vector - time increments</p>	
<p>Velocity vector - stabilization indicator Ground stabilization is indicated by double arrowhead and water stabilization is indicated as single arrowhead.</p>	
<p>Past track System past track is indicated by thick line. Raw sensor primary past track is indicated by thin line. Raw sensor secondary past track is indicated by grey thin line.</p>	

Symbol name and description	Symbol graphic(s)
<p>Past track - time increments Time increments are presented as single lines perpendicular to the past track.</p>	
<p>Past track - past positions Past positions are drawn as small filled circular symbols.</p>	
<p>Radar targets in acquisition state</p>	 5 mm in diameter
<p>Tracked radar targets TT: Std or small user selection by Symbol Display</p>	 3 mm in diameter
<p>Tracked radar targets - alternative TT: Std or small user selection by Symbol Display</p>	 1 mm in diameter
<p>Tracked radar targets - dangerous target Dangerous target symbol is red and it flash until acknowledged.</p>	 5 mm in diameter
<p>Sleeping AIS targets Orientation is towards heading (or COG if heading unknown). If both heading and COG are unknown the orientation is toward top of display.</p>	 Sleeping AIS target  Sleeping AIS target with no CPA/TCPA data
<p>Activated AIS targets Orientation is towards heading (or COG if heading unknown). If both heading and COG are unknown the orientation is toward top of display.</p>	 Activated AIS target  Activated AIS target with no CPA/TCPA data

Symbol name and description	Symbol graphic(s)
<p>Activated AIS targets - true scaled outline</p> <ul style="list-style-type: none"> This can be displayed when based on user selection either beam width or length is more than 7.5 mm. AIS outline: ON/OFF 	
<p>Activated AIS targets - dangerous targets</p> <p>Dangerous target symbol is red and it flash until acknowledged.</p> <p>If both heading and COG are unknown the orientation is toward top of display.</p>	
<p>Activated AIS targets - heading lines</p>	
<p>Activated AIS targets - heading lines - turn indicators</p>	

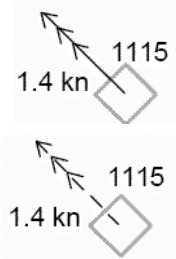
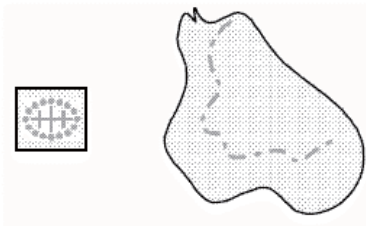
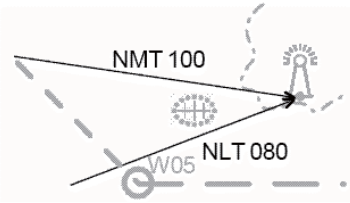




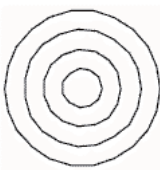
Symbol name and description	Symbol graphic(s)
<p>Velocity vectors</p> <ul style="list-style-type: none"> • Radar target • AIS target 	 <p>The graphic shows four symbols arranged in a 2x2 grid. The top row shows Radar targets: a circle with a dot inside and a dashed line extending from it, labeled '18' below; and a solid dot with a dashed line extending from it, also labeled '18' below. The bottom row shows AIS targets: a triangle with a dashed line extending from it, labeled 'Sarah J' below; and a rectangle containing a triangle with a dashed line extending from it, also labeled 'Sarah J' below.</p>
<p>Velocity vectors - time increments</p> <ul style="list-style-type: none"> • Radar target • AIS target 	 <p>The graphic shows four symbols arranged in a 2x2 grid, similar to the first row but with multiple dots along the dashed lines. The top row shows Radar targets: a circle with a dot inside and a dashed line with several dots along it, labeled '18' below; and a solid dot with a dashed line with several dots along it, also labeled '18' below. The bottom row shows AIS targets: a triangle with a dashed line with several dots along it, labeled 'Sarah J' below; and a rectangle containing a triangle with a dashed line with several dots along it, also labeled 'Sarah J' below.</p>
<p>Velocity vectors - path predictor</p>	 <p>The graphic shows two symbols. The left one is a triangle with a dashed line extending from it, labeled 'Sarah J' below. The right one is a rectangle containing a triangle with a dashed line extending from it, also labeled 'Sarah J' below. Both dashed lines are curved, indicating a predicted path.</p>

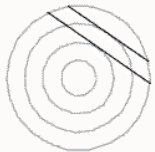
Symbol name and description	Symbol graphic(s)
<p>Target past positions</p>	
<p>AIS aid to navigation (ATON) Real ATON is without "V" and virtual ATON is with "V". An ATON in off position is yellow.</p>	
<p>AIS search and rescue transmitter -SART</p>	

Symbol name and description	Symbol graphic(s)
<p>Selected targets</p>	
<p>Lost targets Lost target symbol is red and it flash until acknowledged.</p>	
<p>Waypoint</p>	
<p>Next waypoint</p>	










Symbol name and description	Symbol graphic(s)
<p>Routes - Monitor Monitored route leg lines are dashed. Leg lines may indicate planned speed and bearing.</p>	
<p>Planned Position</p>	
<p>Wheel over position</p>	
<p>Plotted positions Plotted position includes some labels. Type is DR, EP or Fix (Fix is without label). Examples of source labels are GNSS: G GPS: G DGPS: dG Loran: L etc.</p>	
<p>Line of position Abbreviation is LOP. Label TPL is used to indicate measurement transferred by dead reckoning.</p>	

APPENDIX 2 ABBREVIATIONS, SYMBOLS

Symbol name and description	Symbol graphic(s)
<p>Tidal stream User defined tidal stream symbols are available as part of User Chart. Actual tidal stream use solid vector and predicted tidal stream use dashed vector.</p>	
<p>Danger highlight Route Plan, Route Monitor and own ship Chart Alarm search area use danger highlight to indicate violation against user selected dangers.</p>	
<p>Danger bearing Also called by traditional name clearing line. User defined clearing line symbols are available as part of User Chart.</p>	
<p>Event marker Event markers indicate events recorded into the Voyage record. The Man overboard event marker has the label "MOB".</p>	
<p>User cursor</p>	
<p>Electronic bearing line (EBL) Second example show with range marker.</p>	
<p>Variable range marker (VRM)</p>	
<p>Range rings</p>	

Symbol name and description	Symbol graphic(s)
Parallel index lines	

Symbols on operating buttons

Symbol	Meaning	Symbol	Meaning
	Minimize button (on InstantAccess bar)		Screenshot capture
	Access AIS, Navtex message processing		Monitor brilliance (FURUNO or Hatteland monitor only)
	Access user profile, common settings		Color palette selection
	Information (show program no., operator's manual)		Activate weather display
	Undo, redo		

APPENDIX 3 DIGITAL INTERFACE

Digital Interface

Input sentence

ABK, ALR, CUR, DBT, DPT, DTM, ETL, GGA, GLL, GNS, HDT, HTD, MTW, MWV, NRX, OSD, PRC, RMC, ROT, RPM, RSA, RSD, THS, TLL, TRC, TRD, TTM, VBW, VDM, VDO, VDR, VHW, VTG, XDR, XTE, ZDA

Output sentences

ABM, ACK, BBM, EVE, HTC, OSD, VBW, VSD, XTE

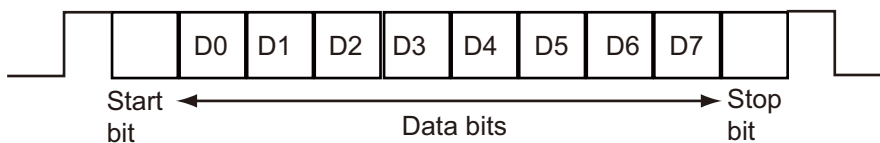
Data reception

Data is received in serial asynchronous form in accordance with the standard referenced in IEC 61162-2.

The following parameters are used:

Baud rate: 38,400 bps (HDT, THS, !AIVDM, !AIVDO, !AIABK, \$AIALR). The baud rate of all other sentences is 4800 bps

Data bits: 8 (D7 = 0), Parity: none, Stop bits: 1



Data Sentences

Input sentences

ABK - UAIS Addressed and binary broadcast acknowledgement

```
$**ABK,xxxxxxxx,x,x,x,x,x,*hh<CR><LF>
```

1. MMSI of the addressed AIS unit (9 digits)
2. AIS channel of reception (No use)
3. Message ID (6, 8, 12, 14)
4. Message sequence number (0 - 9)
5. Type of acknowledgement (See below)
 - 1 = message was broadcast (6 or 12), but not ACK by addressed AIS unit
 - 2 = message could not be broadcast (quantity of encapsulated data exceeds five slots)
 - 3 = requested broadcast of message (8, 14 or 15) has been successfully completed
 - 4 = late reception of message (7 or 13) ACK that was addressed to this AIS unit (own ship and referenced a valid transaction)
 - 5 = message has been read and acknowledged on a display unit.

ALR - Set alarm state

```
$**ALR,Hhmmss.ss,xxx,A,A,c—c,*hh<CR><LF>
```

```
1 2 3 4 5
```

1. Time of alarm condition change, UTC (000000.00 - 235960.99)
2. Unique alarm number (identifier) at alarm source (000 - 999)
3. Alarm condition (A=threshold exceeded, V=not exceeded)
4. Alarm acknowledge state (A=acknowledged, V=not acknowledged)
5. Alarm description text (alphanumeric characters, max. 32)

CUR - Current

```
$**CUR,A,x,x,x,x,x,x,x,a,x,x,x,x,x,a,a,*hh<CR><LF>
```

```
1 2 3 4 5 6 7 8 9 10 11
```

1. Validity of data (A=valid, V=not valid)
2. Data set number (0 - 9)
3. Layer number (0.0 - 3.0)
4. Current depth in meters (No use)
5. Current direction in degrees (0.00 - 360.00)
6. Direction reference in use (true or relative)
7. Current speed in knots (0.00 - 99.99)
8. Reference layer depth in meters (No use)
9. Heading (0 to 360.00)
10. Heading reference in use (true or magnetic)
11. Speed reference (B=Bottom track W=Water track P=Positioning system)

DBT - Depth below transducer

```
$**DBT,xxxx.x,f,xxxx.x,M,xxxx.x,F,*hh<CR><LF>
```

```
1 2 3 4 5 6
```

1. Water depth (0.00-99999.99)
2. feet
3. Water depth (0.00-99999.99)
4. Meters
5. Water depth (0.00-99999.99)
6. Fathoms

DPT - Depth

```
$**DPT,x,x,x,x,x,x,*hh<CR><LF>
```

```
1 2 3
```

1. Water depth relative to the transducer, meters (0.00-99999.99)
2. Offset from transducer, meters (No use)
3. Minimum range scale in use (No use)

DTM - Datum reference

```
$**DTM,ccc,a,x,x,a,x,x,a,x,x,ccc,*hh<CR><LF>
```

```
1 2 3 4 5 6 7 8
```

1. Local datum (W84=WGS84 W72=WGS72 S85=SGS85, P90=PE90)
2. Local datum subdivision code (NULL or one character)
3. Lat offset, min (0 - 59.99999)
4. N/S
5. Lon offset, min (0 - 59.99999)
6. E/W
7. Altitude offset, meters (No use)
8. Reference datum (W84=WGS84 W72=WGS72 S85=SGS85, P90=PE90)

APPENDIX 3 DIGITAL INTERFACE

ETL - Engine telegraph operation status

\$**ETL,hhmmss.ss,a,xx,xx,a,x*hh<CR><LF>
1 2 3 4 5 6

1. Event time (UTC)
2. Message type (O=order A=answerback)
3. Position indicator of engine telegraph
 - 00 = Stop engine
 - 01 = [AH] Dead Slow
 - 02 = [AH] Slow
 - 03 = [AH] Half
 - 04 = Full
 - 05 = [AH] Nav. Full
 - 11 = [AS] Dead Slow
 - 12 = [AS] Slow
 - 13 = [AS] Half
 - 14 = [AS] Full
 - 15 = [AS] Crash Astern
4. Position indication of sub telegraph (000 to 100)
5. Operating location indicator (B=bridge P=port wing S=starboard wing C=engine control room E=engine side/local W=wing)
6. Number of engine or propeller shaft (000 to 100)

GGA - Global positioning system fix data

\$**GGA,hhmmss.ss,lll.lll,a,yyyyy.yyy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx,*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10 11 12 13 14

1. UTC of position (no use)
2. Latitude (0000.00000 - 9000.00000)
3. N/S
4. Longitude (0000.00000 - 18000.00000)
5. E/W
6. GPS quality indicator (1 - 8)
7. Number of satellite in use (No use)
8. Horizontal dilution of precision (0.0 - 999.9)
9. Antenna altitude above/below mean sealevel (No use)
10. Unit, m (No use)
11. Geoidal separation (No use)
12. Unit, m (No use)
13. Age of differential GPS data (0 - 999)
14. Differential reference station ID (No use)

GLL - Geographic position, latitude/longitude

\$**GLL,lll.lll,a,yyyyy.yyy,a,hhmmss.ss,a,x,*hh<CR><LF>
1 2 3 4 5 6 7

1. Latitude (0000.00000 - 9000.00000)
2. N/S
3. Longitude (0000.00000 - 18000.00000)
4. E/W
5. UTC of position (No use)
6. Status (A=data valid V=data invalid)
7. Mode indicator (A=Autonomous D=Differential E=Estimated M=Manual input S=Simulator)

GNS - GNSS fix data

```
$**GNS,hhmmss.ss,llll.lll,a,lllll.lll,a,c--c,xx,x.x,x.x,x.x,x.x,x.x,x.x,a*hh<CR><LF>
      1   2 3 4 5 6 7 8 9 10 11 12 13
```

1. UTC of position (no use)
2. Latitude (0000.00000 - 9000.00000)
3. N/S
4. Longitude (0000.00000 - 18000.00000)
5. E/W
6. Mode indicator (P, R, D, F, A, E, M, S)
N=No fix A=Autonomous D=Differential P=Precise R=Real Time Kinematic
F=Float RTK E=Estimated Mode M=Manual Input Mode S=Simulator Mode
7. Total number of satellites in use (No use)
8. HDOP (0.00 - 999.99)
9. Antenna altitude, meters (-999.99 - 9999.99)
10. Geoidal separation (No use)
11. Age of differential data (0 - 99)
12. Differential reference station ID (No use)
13. Navigational status indicator (S=Safe, C=Caution, U=Unsafe, V=Not valid)

HDT - Heading, true

```
$**HDT,xxx.x,T*hh<CR><LF>
      1 2
```

1. Heading, degrees (0.00 to 360.00)
2. True (T)

HTD - Heading/Track control data

```
$**HTD,A,x.x,a,a,x.x,x.x,x.x,x.x,x.x,x.x,a,A,A,x.x*hh<CR><LF>
      1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
```

1. Override, A = in use, V = not in use
2. Commanded rudder angle, degrees
3. Commanded rudder direction, L/R = port/starboard
4. Selected steering mode
5. Turn mode R = radius controlled
T = turn rate controlled
N = turn is not controlled
6. Commanded rudder limit, degrees (unsigned)
7. Commanded off-heading limit, degrees (unsigned)
8. Commanded radius of turn for heading changes, n.miles
9. Commanded rate of turn to heading changes, deg/min
10. Commanded heading-to-steer, degrees
11. Commanded off-track limit, n.miles (unsigned)
12. Commanded track, degrees
13. Heading reference in use, T/M
14. Rudder status (A = within limits, V = limit reached or exceeded)
15. Off-heading status (A = within limits, V = limit reached or exceeded)
16. Off-track status (A = within limits, V = limit reached or exceeded)
17. Vessel heading, degrees

MTW - Water temperature

```
$**MTW,x.x,C<CR><LF>
      1
```

1. Water temperature, degrees C (-100.000 - 100.000)

APPENDIX 3 DIGITAL INTERFACE

MWV - Wind speed and angle

\$**MWV,x.x,a,x.x,a,A*hh<CR><LF>

1 2 3 4 5

1. Wind angle, degrees (0.00 - 360.00)
2. Reference (R/T) (R=Relative, T=Theoretical)
3. Wind speed (0.00 - 9999.99)
4. Wind speed units (K=km/h M=m/s N=nm)
5. Status (A)

NRX - Navtex received data

\$**NRX,xxx,xxx,xx,aaax,x,hhmmss.ss,xx,xx,xxxx,x.x,x.x,A,c--c,*hh<CR><LF>

1 2 3 4 5 6 7 8 9 10 11 12 13

1. Number of sentences (001 to 999)
2. Sentence number (001-999)
3. Sequential message ID (00 to 99)
4. Navtex message code (aaax aa: AA to ZZ xx: 00 to 99)
5. Frequency table index (0 to 9, null)
6. UTC of receipt of message (No use)
7. Day (0 to 31, null)
8. Month (01 to 12, null)
9. Year (0000 to 9999, null)
10. Total number of characters in this series of NRX sentences (1 to 8000, null)
11. Total number of bad characters (0 to 8000, null)
12. Status indication (A=correct message, V=incorrect message; Null)
13. Message body (English alphanumeric characters)

OSD - Own ship data

\$**OSD,x.x,A,x.x,R,x.x,R,x.x,x.x,N*hh<CR><LF>

1 2 3 4 5 6 7 8 9

1. Heading, degrees true (0.00 - 359.99, null)
2. Heading status (A=data valid, V=data invalid)
3. Vessel course, degrees true (0.00 - 359.99, null)
4. Course reference (B/M/W/R/P, null)
 - B=Bottom tracking log
 - M=Manually entered
 - W=Water referenced
 - R=Radar tracking (of fixed target)
 - P=Positioning system ground reference
5. Vessel speed (0.00 - 999.99, null)
6. Speed reference, B/M/W/R/P
7. Vessel set, degrees true, manually entered (0.00 - 359.99)
8. Vessel drift (speed), manually entered (0.00 - 99.99, null)
9. Speed units (N=Knots)

PRC - Propulsion remote control

\$**PRC,x.x,A,x.x,a,x.x,a,a,x*hh<CR><LF>
 1 2 3 4 5 6 7 8

1. Lever demand position (-100 to 100, 0=stop)
2. Lever demand status (A=data valid V=data invalid)
3. RPM demand value (-9999.9 to 9999.9)
4. RPM mode indicator (P=per cent R=Revolutions per min.)
5. Pitch demand value (-999.9 to 999.9)
6. Pitch mode indicator (P=per cent D=degrees V=data invalid)
7. Operating location indicator (B=bridge P=port wing S=starboard wing
 C=engine control room E=engine side/local W=Wing)
8. Number of engine or propeller shaft (00 to 99)

RMC - Recommended minimum specific GPS/TRANSIT datas

\$**RMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,ddmmyy,x.x,a,a,a*hh<CR><LF>
 1 2 3 4 5 6 7 8 9 10 11 12 13

1. UTC of position fix (000000 - 235959)
2. Status (A=data valid, V=navigation receiver warning)
3. Latitude (0000.00000 - 9000.00000)
4. N/S
5. Longitude (0000.00000 - 18000.00000)
6. E/W
7. Speed over ground, knots (0.00 - 99.94)
8. Course over ground, degrees true (0.0 - 360.0)
9. Date (010100 - 311299)
10. Magnetic variation, degrees E/W (0.00 - 180.0/NULL)
11. E/W
12. Mode indicator (A= Autonomous mode D= Differential mode S= Simulator
 F=Float RTK P=Precise R=Real time kinematic E=Estimated (DR) M=Manual)
13. Navigational status indication (S=Safe C=Caution U=Unsafe V=Navigational status not valid)

ROT - Rate of turn

\$**ROT,x.x,A*hh<CR><LF>
 1 2

1. Rate of turn, deg/min, "-"=bow turns to port (-9999.9 - 9999.9)
2. Status (A=data valid, V=data invalid)

RPM - Revolutions

\$**RPM, a, x, x.x, x.x, A*hh<CR><LF>
 1 2 3 4 5

1. Source (S=shaft E=engine)
2. Engine or shaft number (00 to 99)
3. Speed, revolutions/min (-9999.99 to 9999.99)
4. Propeller pitch (-100.0 to 100.0)
5. Status (A=data invalid V=data valid)

APPENDIX 3 DIGITAL INTERFACE

RSA - Rudder sensor angle

\$**RSA,x.x,A,x.x,A*hhCR><LF>

1 2 3 4

1. Starboard(or single) rudder sensor data (-180 - 180.0, NULL)
2. Starboard(or single) rudder sensor status (A=Vaild N=Data invalid)
3. Port rudder sensor data (-180 - 180.0, NULL)
4. Port rudder sensor status (A=Vaild N=Data invalid)

RSD - Radar system data

\$**RSD,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,N,H*hh <CR><LF>

1 2 3 4 5 6 7 8 9 10 11 12 13

1. Origin 1 range, from own ship (0.000 - 999) (see note 2)
2. Origin 1 bearing, degrees from 0 (0.0 - 359.9) (see note 2)
3. Variable range marker 1(VRM1), range (0.000 - 999)
4. Bearing line 1(EBL1), degrees from 0 (0.0 - 359.9)
5. Origin 2 range (0.000 - 999.9) (see note 2)
6. Origin 2 bearing (0.0 - 359.9)(see note 2)
7. VRM2,.9 range (0.000 - 999)
8. EBL2, degrees (0.0 - 360.0)
9. Cursor range, from own ship (0.000 - 999)
10. Cursor bearing, degrees clockwise from 0 (0.0 - 359.9)
11. Range scale in use (0.0625 - 120)
12. Range units (K/N/S)
13. Display rotation (see note 1)

NOTES

- 1 Display rotation:
 - C=Course-up, course-over-ground up, degrees true
 - H=Head-up, ship's heading(center-line) 0 up
 - N=North-up, true north is 0 up
- 2 Origin 1 and origin 2 are located at the stated range and bearing from own ship and provide for two independent sets of variable range markers (VRM) and electronic bearing lines (EBL) originating away from own ship position.

THS - True heading & status

\$**THS,xxx.x,a*hh<CR><LF>

1 2

1. Heading, degrees True (0.00 to 360.00)
2. Mode indicator (A=Autonomous S=Simulator)

TLL - Target latitude and longitude

```
$**TLL,xx,lll.l, a,yyyyy.yy,a,c--c,hhmmss.ss,a,a*hh<CR><LF>
      1 2 3 4 5 6 7 8 9
```

1. Target number, NULL
2. Latitude (0.0000 - 9000.0000)
3. N/S
4. Longitude (0.0000 - 18000.0000)
5. E/W
6. Target name, NULL
7. UTC of data (000000 - 235959)
8. Target status, NULL
L=lost, tracked target has been lost Q=query, target in the process of acquisition
T=tracking
9. Reference target=R, NULL otherwise

TRC - Thruster control data

```
$**TRC,x,x.x,a,x.x,a,x.x,a,a*hh<CR><LF>
      1 2 3 4 5 6 7 8
```

1. Number of thruster, bow or stern (01 to 99)
2. RPM demand value (-999.9 to 999.9)
3. RPM mode indicator (P=per cent R=revolutions per min
V=data invalid)
4. Pitch demand value (-180.0 to 180.0)
5. Pitch mode indicator (P=per cent D=degree V=data invalid)
6. Azimuth demand (000.0 to 359.9)
7. Operating location indicator (B=bridge P=port wing S=starboard wing
C=engine control room E=engine side/local W=Wing)
8. Sentence flag status (R=Sentence is a status report of current settings
(Used for a reply to a query.) C=Sentence is a configuration command
to change settings. A sentence without "C" is not a command.)

TRD - thruster data response

```
$**TRD,x,x.x,a,x.x,a,x.x*hh<CR><LF>
      1 2 3 4 5 6
```

1. Number of thruster, bow or stern (01 to 99)
2. RPM response (-999.9 to 999.9)
3. RPM mode indicator (P=per cent R=revolutions per min
V=data invalid)
4. Pitch response value (-999.9 to 999.9)
5. Pitch mode indicator (P=per cent D=degree V=data invalid)
6. Azimuth response (000.0 to 359.0, Null)

APPENDIX 3 DIGITAL INTERFACE

TTM - Tracked target message

\$**TTM,05,12.34,23.4,R,45.67,123.4,T,1.23,8.23,N,c--c,T,R,hhmmss.ss,M*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

1. Target number (00 to 999)
2. Target distance from own ship (0.000 - 99.999)
3. Bearing from own ship,degrees (0.0 - 359.9)
4. True or Relative (T)
5. Target speed (0.00 - 999.99, null)
6. Target course, degrees (0.0 - 359.9, null)
7. True or Relative
8. Distance of closet point of approach (0.00 - 99.99, null)
9. Time to CPA, min., "-" increasing (-99.99 - 99.99, null)
10. Speed/distance units (N=nm)
11. Target name (null)
12. Target status (L=Lost Q=Acquiring T=Tracking)
13. Reference target (R, NULL otherwise)
14. UTC of data (null)
15. Type of acquisition (A=Automatic M=Manual)

VBW - Dual ground/water speed

\$**VBW,x,*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10

1. Longitudinal water speed, knots (-9999.999 - 9999.999)
2. Transverse water speed, knots (-9999.999 - 9999.999, null)
3. Status: water speed, A=data valid V=data invalid
4. Longitudinal ground speed, knots (-9999.999 - 9999.999)
5. Transverse ground speed, knots (-9999.999 - 9999.999, null)
6. Status: ground speed, A=data valid V=data invalid
7. Stern transverse water speed, knots (-9999.999 - 9999.999)
8. Status: stern water speed, A=data valid V=data invalid
9. Stern transverse ground speed, knots (-9999.999 - 9999.999)
10. Status: stern ground speed, A=data valid V=data invalid

VDM - UAIS VHF data-link message

!**VDM,x,x,x,x,s--s,x,*hh<CR><LF>
1 2 3 4 5 6

1. Total number of sentences needed to transfer the message (1 to 9)
2. Message sentence number (1 to 9)
3. Sequential message identifier (0 to 9, NULL)
4. AIS channel Number (A or B)
5. Encapsulated ITU-R M.1371 radio message (1 - 63 bytes)
6. Number of fill-bits (0 to 5)

VDO - UAIS VHFG data-link own vessel report

!**VDO,x,x,x,x,s--s,x,*hh<CR><LF>
1 2 3 4 5 6

1. Total number of sentences needed to transfer the message (1 to 9)
2. Message sentence number (1 to 9)
3. Sequential message identifier (0 to 9, NULL)
4. AIS channel Number (A or B, NULL)
5. Encapsulated ITU-R M.1371 radio message (1 - 63 bytes)
6. Number of fill-bits (0 to 5)

VDR - Set and drift

```
$**VDR,x.x,T,x.x,M,x.x,N,*hh <CR><LF>
  1 2 3 4 5 6
```

1. Direction, degrees (0.00 - 360.00, null)
2. T=True (fixed)
3. Direction, degrees (0.00 - 360.00, null)
4. M=Magnetic (fixed)
5. Current speed (0 - 99.99)
6. N=Knots (fixed)

VHW - Water speed and headings

```
$**VHW,x.x,T,x.x,M,x.x,N,x.x,K,*hh <CR><LF>
  1 2 3 4 5 6 7 8
```

1. Heading, degrees (0.00 - 360.00)
2. T=True (fixed)
3. Heading, degrees (0.00 - 360.00)
4. M=Magnetic (fixed)
5. Speed, knots (0.00 - 9999.99)
6. N=Knots (fixed)
7. Speed, knots (0.00 - 9999.99)
8. K=km/hr (fixed)

VTG - Course over ground and ground speed

```
$**VTG,x.x,T,x.x,M,x.x,N,x.x,K,a,*hh <CR><LF>
  1 2 3 4 5 6 7 8 9
```

1. Course over ground, degrees (0.00 - 360.00)
2. T=True (fixed)
3. Course over ground, degrees (No use)
4. M=Magnetic (No Use)
5. Speed over ground, knots (0.00-99.94)
6. N=Knots (fixed)
7. Speed over ground (0.00-99.94)
8. K=km/h (fixed)
9. Mode indicator (A=Autonomous, D=Differential E=Estimated (dead reckoning)
M=Manual input S=Simulator P=Precision)

XDR - Transducer measurements

```
$**XDR,a,x.x,a,c,c,.....a,x.x,a,c...c*hh<CR><LF>
  1 2 3 4 5 5
```

1. Transducer type, transducer no. (C, A, F, N, P, R, T, H, V)
2. Measurement data, transducer no. (Transducer no. N)
3. Units of measure, transducer no. (Transducer type, transducer no. N)

#1=C→C	#1=A→D
#1=D→M	#1=F→H
#1=N→N	#1=P→B
#1=R→I	#1=T→R
#1=H→P	#1=V→M
4. Data, variable number of transducers
5. Transducer "n"

APPENDIX 3 DIGITAL INTERFACE

XTE - Cross-track error, measured

\$**XTE,A,A,x.x,a,N,a,*hh<CR><LF>
1 2 3 4 5 6

1. Status: A=data valid V=LORAN C blink or SNR warning
2. Status: V=LORAN C blink or SNR warning
3. Magnitude of cross-track error (0.0000 - 9.9999)
4. Direction to steer, L/R
5. Units, nautical miles (fixed)
6. Mode indicator (A=Autonomous mode D=Differential mode S=Simulator mode)

ZDA - Time and date

\$**ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx<CR><LF>
1 2 3 4 5 6

1. UTC (000000.00 - 235960.99)
2. Day (01 - 31)
3. Month (01 -12)
4. Year (UTC, 1970 - 2037)
5. Local zone, hours (No use)
6. Local zone, minutes (No use)

Output sentences

See input sentences for OSD, VBW, XTE.

ABM - UAIS Addressed binary and safety related message

!**ABM,x,x,x,xxxxxxxx,x,x,x,s--s,x,*hh<CR><LF>
1 2 3 4 5 6 7 8

1. Total number of sentences needed to transfer the message (1 - 9)
2. Message sentence number (1 - 9)
3. Message sequence identifier (0 - 3)
4. The MMSI of destination AIS unit for the ITU-R M.1371 message (9 digits)
5. AIS channel for broadcast of the radio message (0 - 3)
6. VDL message number (6 or 12), see ITU-R M.1371
7. Encapsulated data (1 - 63 bytes)
8. Number of fill-bits (0 - 5)

ACK - Acknowledge alarm

\$**ACK,xxx,*hh<CR><LF>
1

1. Local alarm number (identifier) (000 - 999)

BBM - UAIS broadcast binary message

\$**BBM,x,x,x,x,xx,s--s,x,*hh<CR><LF>
1 2 3 4 5 6 7

1. Total number of sentences needed to transfer the message (1 - 9)
2. Sentence number (1 - 9)
3. Sequential Message identifier (0 - 9)
4. AIS channel for broadcast of the radio message (0 - 3)
5. ITU-R M.1371 message ID (8 or 14)
6. Encapsulated data (1 - 63 bytes)
7. Number of fill-bits, 0 to 5

EVE - General event message

\$**EVE,hhmmss.ss,c--c,c--c*hh<CR><LF>

1 2 3

1. Event time (000000.00 - 235960.99)
2. Tag code used for identification of source of event (RA0001 - RA0010, EI0001 - EI0016, IN0001 - IN0016, II0001 - II0016)
3. Event description (OPERATION)

HTC - Heading/Track control command

\$**HTC,A,x,x,a,a,a,x,x,x,x,x,x,x,x,x,x,x,x,x,x,x,x,x,x,x,a*hh<CR><LF>

1 2 3 4 5 6 7 8 9 10 11 12 13 14

1. Override, A = in use, V = not in use
2. Commanded rudder angle, degrees
3. Commanded rudder direction, L/R = port/starboard
4. Selected steering mode
5. Turn mode R = radius controlled
T = turn rate controlled
N = turn is not controlled
6. Commanded rudder limit, degrees (unsigned)
7. Commanded off-heading limit, degrees (unsigned)
8. Commanded radius of turn for heading changes, n.miles
9. Commanded rate of turn to heading changes, deg/min
10. Commanded heading-to-steer, degrees
11. Commanded off-track limit, n.miles (unsigned)
12. Commanded track, degrees
13. Heading reference in use, T/M
14. Sentence status

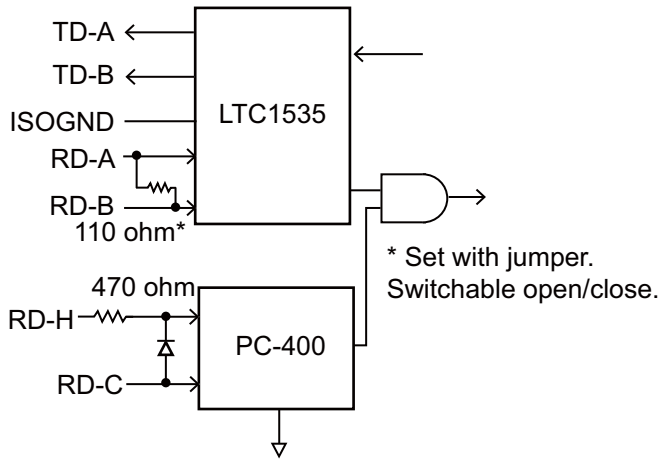
VSD - UAIS Voyage static data

\$**VSD,x,x,x,x,x,c--c,hhmmss.ss,xx,xx,x,x,x*x*hh<CR><LF>

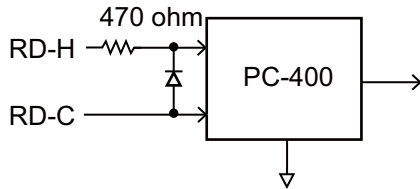
1 2 3 4 5 6 7 8 9

1. Type of ship and cargo category (0 - 255)
2. Maximum present static draught (0 to 25.5 meters, null)
3. Persons on-board (0 - 8191, null)
4. Destination (1 - 20 characters, null)
5. Estimated UTC of arrival at destination (000000.00 - 235959.99)
6. Estimated day of arrival at destination (00 to 31(UTC))
7. Estimated month of arrival at destination (00 to 12(UTC))
8. Navigational status (0 - 15, null)
9. Regional application flags (0 - 15)

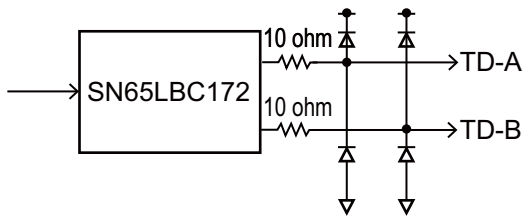
Serial Interface



Processor Unit, Sensor Adapter: IEC 61162-2/1 input/output

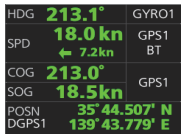

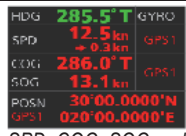
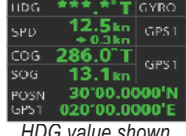



Processor Unit, Sensor Adapter: IEC 61162-1 input



Processor Unit, Sensor Adapter: IEC 61162-1 output

APPENDIX 4 DATA COLOR AND MEANING

	Indication color	Sensor color	HDG	L/L	SPD	COG/SOG	Display example
SYSTEM	GRN	WHT	THS-A HDT	GNS-A,D*,F,P,R GGA-1,2,3,4,5* GLL-A,D and (status: A)* RMC-A,D,F,P,R and (status: A)*	VBW-A VHW	VTG-A,D,P	 <p>All values in green.</p>
	YEL	WHT		RAIM error in GBS sentence is greater than 10 m and DGPS update interval in GGA, GNS sentence is higher than 10 s.*1			 <p>Position in yellow characters.</p>
	RED	RED		GNS-E("YEL*"),M,S GGA-6("YEL*"),7,8 GLL-E("YEL*"),M,S or (status: V) RMC-E,M,S or(status: V) ("YEL*") DGPS update interval in GGA, GNS sentence is higher than 30 s.	VBW-V (Color remains yellow when switched A to V.)	VTG-E,M,S	 <p>SPD, COG, SOG and POSN values and pos. source name in red.</p>
	GRN (***)	WHT	THS-E,M, S, N (status: V)	GNS-N, GGA("YEL*") GLL-N, RMC-N		VTG-N	 <p>HDG value shown with asterisks.</p>
LOCAL	GRN	WHT	THS-A HDT	GNS-A,D*,F,P,R GGA-1,2,3,4,5* GLL-A,D and (status: A)* RMC-A,D,F,P,R and (status: A)	VBW-A VHW	VTG-A,D,P	Same as corresponding indication in SYSTEM.
	YEL	WHT		RAIM error in GBS sentence is greater than 10 m and DGPS update interval in GGA, GNS sentence is higher than 10 s.*1			Same as corresponding indication in SYSTEM.
	RED	RED		GNS-E("YEL*"),M,S GGA-6("YEL*"),7,8 GLL-E("YEL*"),M,S or (status: V) RMC-E,M,S or(status: V) ("YEL*") DGPS update interval in GGA, GNS sentence is higher than 30 s.	VBW-V (Color remains yellow when switched A to V.)	VTG-E,M,S	Same as corresponding indication in SYSTEM.
	GRN (***)	WHT	THS-E,M, S, N (status: V)	GNS-N, GGA("YEL*") GLL-N, RMC-N		VTG-N	Same as corresponding indication in SYSTEM.
MANUAL	YEL	YEL (MAN) (DR)	Manual setting value	Manual setting value (Dead Reckoning)	Manual setting value		 <p>HDG, SPD and POSN values and "MAN" in yellow characters.</p>

*1 Navigational status in RMC sentence shown in "C", "U" only (IEC 61162-1 ed4).

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APPENDIX 5 ALERT LIST

No.	Text	Default	Meaning	Remedy
001	Fan1 Rotation Speed Lowering	Caution	For MU-190/231: Connected to COM1(Main Monitor). Fan1 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
002	Fan2 Rotation Speed Lowering	Caution	For MU-231: Connected to COM1(Main Monitor). Fan2 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
003	Fan3 Rotation Speed Lowering	Caution	For MU-231: Connected to COM1(Main Monitor). Fan3 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
004	Fan4 Rotation Speed Lowering	Caution	For MU-190: Connected to COM1(Main Monitor). Fan4 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
005	LCD Unit Lifetime Over	Warning	For MU-190: Connected to COM1. LCD unit operating time exceeds 50000 hours. For MU-231: Connected to COM1. LCD unit operating time exceeds 50000 hours.	LCD unit replacement is required. Contact FURUNO.
006	High Temperature Inside Monitor	Warning	Internal temperature exceeds threshold. Monitor: Connected to COM1 (Main Monitor).	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
007	Fan1 No Rotation	Warning	For MU-190/231: Connected to COM1 (Main Monitor). Fan1 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
008	Fan2 No Rotation	Warning	For MU-190/231: Connected to COM1 (Main Monitor). Fan2 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
009	Fan3 No Rotation	Warning	For MU-231: Connected to COM1 (Main Monitor). Fan3 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
010	Fan4 No Rotation	Warning	For MU-190: Connected to COM1 (Main Monitor). Fan4 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.

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No.	Text	Default	Meaning	Remedy
011	RS485 Communication Timeout	Caution	For MU-190/231: Connected to COM1. There has been no communication from processor unit through RS485 for 180 seconds. (No communication implies in completed sentence or checksum error.)	Check the connection of brightness control cable.
012	No Signal	Caution	For MU-190/231: Connected to COM1. There has been no signal continuously for 60 seconds.	Check the connection of video cable.
013	Sentence Syntax Error	Caution	For Main monitor, connected to COM1, value of externally input sentence is out of range that defined by sentence.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
014	Fan1 Rotation Speed Lowering	Caution	For MU-190/231: Connected to COM2 (Sub Monitor). Fan1 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
015	Fan2 Rotation Speed Lowering	Caution	For MU-231: Connected to COM2 (Sub Monitor). Fan2 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
016	Fan3 Rotation Speed Lowering	Caution	For MU-231: Connected to COM2 (Sub Monitor). Fan3 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
017	Fan4 Rotation Speed Lowering	Caution	For MU-190: Connected to COM2 (Sub Monitor). Fan4 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
018	LCD Unit Lifetime Over	Warning	For MU-190: Connected to COM2 LCD unit operating time exceeds 50000 hours. For MU-231: Connected to COM2 LCD unit operating time exceeds 50000 hours.	LCD unit replacement is required. Contact FURUNO.
019	High Temperature Inside Monitor	Warning	Internal temperature exceeds threshold. Monitor: Connected to COM2 (Sub Monitor).	Please turn off monitor. If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
020	Fan1 No Rotation	Warning	For MU-190/231: Connected to COM2 (Sub Monitor). Fan1 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
021	Fan2 No Rotation	Warning	For MU-190/231: Connected to COM2 (Sub Monitor). Fan2 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.

No.	Text	Default	Meaning	Remedy
022	Fan3 No Rotation	Warning	For MU-231: Connected to COM2 (Sub Monitor). Fan3 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
023	Fan4 No Rotation	Warning	For MU-190: Connected to COM2 (Sub Monitor). Fan4 rotation speed is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence..
024	RS485 Communication Timeout	Caution	For MU-190/231: Connected to COM2. There has been no communication from processor unit through RS485 for 180 seconds. (No communication implies incomplete sentence or checksum error.)	Check the connection of brightness control cable.
025	No Signal	Caution	For MU-190/231: Connected to COM2. There has been no signal continuously for 60 seconds.	Check the connection of video cable.
026	Sentence Syntax Error	Caution	For Sub monitor, connected to COM2, value of externally input sentence is out of range defined by sentence.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
027	Main Monitor COM Timeout	Caution	Communication with MU is interrupted. 60 seconds timeout.	Check the connection with the monitor.
028	Sub Monitor COM Timeout	Caution	Communication with MU is interrupted. 60 seconds timeout.	Check the connection with the monitor.
030	Sensor Adapter 1 COM Timeout	Caution	Communication error with No.1 sensor adapter is detected. 30 seconds timeout. No.1 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.1 sensor adapter and network.
031	Sensor Adapter 2 COM Timeout	Caution	Communication error with No.2 sensor adapter is detected. 30 seconds timeout. No.2 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.2 sensor adapter and network.
032	Sensor Adapter 3 COM Timeout	Caution	Communication error with No.3 sensor adapter is detected. 30 seconds timeout. No.3 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.3 sensor adapter and network.
033	Sensor Adapter 4 COM Timeout	Caution	Communication error with No.4 sensor adapter is detected. 30 seconds timeout. No.4 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.4 sensor adapter and network.

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No.	Text	Default	Meaning	Remedy
034	Sensor Adapter 5 COM Timeout	Caution	Communication error with No.5 sensor adapter is detected. 30 seconds timeout. No.5 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.5 sensor adapter and network.
035	Sensor Adapter 6 COM Timeout	Caution	Communication error with No.6 sensor adapter is detected. 30 seconds timeout. No.6 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.6 sensor adapter and network.
036	Sensor Adapter 7 COM Timeout	Caution	Communication error with No.7 sensor adapter is detected. 30 seconds timeout. No.7 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.7 sensor adapter and network.
037	Sensor Adapter 8 COM Timeout	Caution	Communication error with No.8 sensor adapter is detected. 30 seconds timeout. No.8 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.8 sensor adapter and network.
038	Sensor Adapter 9 COM Timeout	Caution	Communication error with No.9 sensor adapter is detected. 30 seconds timeout. No.9 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.9 sensor adapter and network.
039	Sensor Adapter 10 COM Timeout	Caution	Communication error with No.10 sensor adapter is detected. 30 seconds timeout. No.10 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.10 sensor adapter and network.
070	RCU 1 COM Timeout	Caution	Communication error with No.1 remote control unit is detected. 40 seconds timeout.	Check the connection with No.1 remote control unit.
071	RCU 2 COM Timeout	Caution	Communication error with No.2 remote control unit is detected. 40 seconds timeout.	Check the connection with No.2 remote control unit.
072	RCU 3 COM Timeout	Caution	Communication error with No.3 remote control unit is detected. 40 seconds timeout.	Check the connection with No.3 remote control unit.
073	EC-3000 CPU Temp High	Caution	CPU temperature in processor unit exceeds threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.

No.	Text	Default	Meaning	Remedy
074	EC-3000 GPU Temp High	Caution	CPU temperature in processor unit exceeds threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
075	EC-3000 CPU Board Temp High	Caution	CPU temperature in processor unit exceeds threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
076	EC-3000 Remote 1 Temp High	Caution	CPU temperature in processor unit exceeds threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
077	EC-3000 Remote 2 Temp High	Caution	CPU temperature in processor unit exceeds threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
078	EC-3000 CPU Fan Rotation Speed Lowering	Caution	Rotation speed of CPU fan in processor unit is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
079	EC-3000 Fan1 Rotation Speed Lowering	Caution	Rotation speed of fan1 in processor unit is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
080	EC-3000 Fan2 Rotation Speed Lowering	Caution	Rotation speed of fan2 in processor unit is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
082	EC-3000 CPU Fan No Rotation	Warning	Rotation speed of fan in processor unit is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
083	EC-3000 CPU Fan1 No Rotation	Warning	Rotation speed of fan1 in processor unit is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
084	EC-3000 CPU Fan2 No Rotation	Warning	Rotation speed of fan2 in processor unit is below threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
086	EC-3000 CPU board 5V Power Error	Warning	5 V power voltage of CPU board in processor unit is out of threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
087	EC-3000 CPU board 3.3V Power Error	Warning	3.3 V power voltage of CPU board in processor unit is out of threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
088	EC-3000 CPU board 12V Power Error	Warning	12 V power voltage of CPU board in processor unit is out of threshold.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.

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No.	Text	Default	Meaning	Remedy
089	EC-3000 CPU board Battery Power Error	Caution	CPU board battery voltage in processor unit is out of threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
090	EC-3000 CPU board Core Power Error	Caution	CPU board core voltage in processor unit is out of threshold.	Turn off Processor Unit. If same error occurs after a few minutes, contact FURUNO.
094	Sensor Adapter 11 COM Timeout	Caution	Communication error with No.11 sensor adapter is detected. 30 seconds timeout. No.11 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.11 sensor adapter and network.
095	Sensor Adapter 12 COM Timeout	Caution	Communication error with No.12 sensor adapter is detected. 30 seconds timeout. No.12 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.12 sensor adapter and network.
096	Sensor Adapter 13 COM Timeout	Caution	Communication error with No.13 sensor adapter is detected. 30 seconds timeout. No.13 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.13 sensor adapter and network.
097	Sensor Adapter 14 COM Timeout	Caution	Communication error with No.14 sensor adapter is detected. 30 seconds timeout. No.14 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.14 sensor adapter and network.
098	Sensor Adapter 15 COM Timeout	Caution	Communication error with No.15 sensor adapter is detected. 30 seconds timeout. No.15 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.15 sensor adapter and network.
099	Sensor Adapter 16 COM Timeout	Caution	Communication error with No.16 sensor adapter is detected. 30 seconds timeout. No.16 sensor adapter is turned off, or there is a problem with network.	Check the connection with No.16 sensor adapter and network.
150	Early Course Change Indication	Warning	Waypoint is soon being approached. Ship's position is less than set time of prewarning from WOL. Default: 90 seconds	Be careful that WPT is approaching.

No.	Text	Default	Meaning	Remedy
151	Actual Course Change Indication	Warning	Waypoint is now being approached. Alert150 is acknowledged and the ship's position is less than set time of approach alarm from WOL. Default: 30 seconds	Be careful that WPT is approaching.
152	Wheel Over Line	Alarm	Waypoint is now being approached. When alert 150 and 151 are not acknowledged, ship crosses WOL. When alert 150 is not acknowledged, this is generated instead of alert 151. (30 seconds before WOL)	Be careful that ship crossed WPT.
153	Track Control Stop	Alarm	Track Control is discontinued because sensors such as GYRO, GPS, LOG and Autopilot stop input during Track Control.	Check the connection with sensors such as GYRO, GPS and LOG, or connection with Autopilot.
154	Position Monitor	Warning	When inputting position data from 2 GPS or more GPS, there is a difference between position data from each GPS.	Check an accurate position data, GPS reception status and GPS setting.
156	Sensor Failure	Alarm	Sensor data related to Track Control (GYRO, GPS, LOG) is lost.	Check the connection with sensors such as GYRO, GPS and LOG.
158	Course Difference	Warning	Deviation between current heading and plan course is more than set value. Default: 30 degrees	Make deviation between current heading and plan course smaller.
159	Low Speed Alarm	Alarm	While carrying out TCS, ship's speed becomes less than set value.	Raise speed or stop track control.
170	Positioning System Failure	Warning	All position data has been lost for more than 30 seconds.	Check the connection with all GPS.
171	Crossing Safety Contour	Alarm	When check area is set, ship entered in the shallower area than check area set in Safety Contour.	Reconfirm Safety Contour setting or change the course.

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No.	Text	Default	Meaning	Remedy
172	Off Track Alarm	Alarm	Deviation is big between planning course and current heading. While monitoring route, ship position deviates Channel Limit.	Reconfirm Channel Limit or keep own ship inside of channel limit.
235	Echo Sounder 1 COM Error	Caution	Input of depth data from No.1 echo sounder has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.1 echo sounder is turned off, or there is a problem with network.	Check the connection with No.1 echo sounder and network.
236	Echo Sounder 2 COM Error	Caution	Input of depth data from No.2 echo sounder has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.2 echo sounder is turned off, or there is a problem with network.	Check the connection with No.2 echo sounder and network.
237	Echo Sounder 3 COM Error	Caution	Input of depth data from No.3 echo sounder has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.3 echo sounder is turned off, or there is a problem with network.	Check the connection with No.3 echo sounder and network.
255	Gyro 1 COM Error	Caution	Data from No.1 gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.1 gyro is turned off, or there is a problem with network.	Check the connection with No.1 gyro and network.
256	Gyro 2 COM Error	Caution	Data from No.2 gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.2 gyro is turned off, or there is a problem with network.	Check the connection with No.2 gyro and network.

No.	Text	Default	Meaning	Remedy
257	Gyro 3 COM Error	Caution	Data from No.3 gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.3 gyro is turned off, or there is a problem with network.	Check the connection with No.3 gyro and network.
258	Gyro 4 COM Error	Caution	Data from No.4 gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.4 gyro is turned off, or there is a problem with network.	Check the connection with No.4 gyro and network.
259	Gyro 5 COM Error	Caution	Data from No.5 gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.5 gyro is turned off, or there is a problem with network.	Check the connection with No.5 gyro and network.
260	Backup Navigator	Alarm	When not acknowledging alerts related to WPT approach or track control stop alert during track control, alert is forwarded to BNWAS by this signal on 30 seconds after passing WOL. This is not shown.	Acknowledge 152 Wheel Over Line alert or 153 Track Control Stop.
272	UTC Time Not Available	Warning	Time data of all available GPS sensor has been not available for more than 3 seconds.	Check the connection with all GPS.
273	Depth(Bow) Not Available	Caution	Depth data of all available depth sensor(Bow) has been not available for more than 3 seconds.	Check the connection with all echo sounders.
274	Depth(Midship) Not Available	Caution	Depth data of all available depth sensor(Midship) has been not available for more than 3 seconds.	Check the connection with all echo sounders.
275	Depth(Stern) Not Available	Caution	Depth data of all available depth sensor(Stern) has been not available for more than 3 seconds.	Check the connection with all echo sounders.

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No.	Text	Default	Meaning	Remedy
277	Wind Speed/Direction Not Available	Warning	Wind speed/direction data of all available WIND sensors has been not available for more than 3 seconds.	Check the connection with all wind sensors.
278	STW Not Available	Caution	STW data of all available SDME sensors has been not available for more than 3 seconds.	Check the connection with all SDME.
279	COG/SOG Not Available	Warning	COG/SOG data of all available GPS sensor has been not available for more than 3 seconds.	Check the connection with all GPS.
280	SDME 1 COM Error	Caution	Speed data from No.1 SDME has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.1 SDME is turned off, or there is a problem with network.	Check the connection with No.1 SDME and network.
281	SDME 2 COM Error	Caution	Speed data from No.2 SDME has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.2 SDME is turned off, or there is a problem with network.	Check the connection with No.2 SDME and network.
282	SDME 3 COM Error	Caution	Speed data from No.3 SDME has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.3 SDME is turned off, or there is a problem with network.	Check the connection with No.3 SDME and network.
285	Heading Magnetic Not Available	Caution	Heading data of all available magnetic gyro has been not available for more than 3 seconds.	Check the connection with all magnetic gyro.
290	EPFS 1 COM Error	Caution	Ship position data from No.1 GPS has been discontinued for more than set time.(Set at installation) Default: 60 seconds No.1 GPS is turned off, or there is a problem with network.	Check the connection with No.1 GPS and network.

No.	Text	Default	Meaning	Remedy
291	EPFS 2 COM Error	Caution	Ship position data from No.2 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.2 GPS is turned off, or there is a problem with network.	Check the connection with No.2 GPS and network.
292	EPFS 3 COM Error	Caution	Ship position data from No.3 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.3 GPS is turned off, or there is a problem with network.	Check the connection with No.3 GPS and network.
293	EPFS 4 COM Error	Caution	Ship position data from No.4 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.4 GPS is turned off, or there is a problem with network.	Check the connection with No.4 GPS and network.
294	EPFS 5 COM Error	Caution	Ship position data from No.5 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.5 GPS is turned off, or there is a problem with network.	Check the connection with No.5 GPS and network.
295	EPFS 6 COM Error	Caution	Ship position data from No.6 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.6 GPS is turned off, or there is a problem with network.	Check the connection with No.6 GPS and network.
296	EPFS 7 COM Error	Caution	Ship position data from No.7 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.7 GPS is turned off, or there is a problem with network.	Check the connection with No.7 GPS and network.

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No.	Text	Default	Meaning	Remedy
297	EPFS 8 COM Error	Caution	Ship position data from No.8 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.8 GPS is turned off, or there is a problem with network.	Check the connection with No.8 GPS and network.
298	EPFS 9 COM Error	Caution	Ship position data from No.9 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.9 GPS is turned off, or there is a problem with network.	Check the connection with No.9 GPS and network.
299	EPFS 10 COM Error	Caution	Ship position data from No.10 GPS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.10 GPS is turned off, or there is a problem with network.	Check the connection with No.10 GPS and network.
300	Rudder 1 COM Error	Caution	Rudder data from No.1 rudder sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.1 Rudder is turned off, or there is a problem with network.	Check the connection with No.1 rudder sensor and network.
301	Rudder 2 COM Error	Caution	Rudder data from No.2 rudder sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.2 Rudder is turned off, or there is a problem with network.	Check the connection with No.2 rudder sensor and network.
302	Rudder 3 COM Error	Caution	Rudder data from No.3 rudder sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.3 Rudder is turned off, or there is a problem with network.	Check the connection with No.3 rudder sensor and network.

No.	Text	Default	Meaning	Remedy
303	HCS 1 COM Error	Caution	Data from No.1 HCS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.1 HCS is turned off, or there is a problem with network.	Check the connection with No.1 HCS and network.
304	HCS 2 COM Error	Caution	Data from No.2 HCS has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.2 HCS is turned off, or there is a problem with network.	Check the connection with No.2 HCS and network.
305	VDR COM Error	Caution	Sentence from VDR has been discontinued for more than set time. (Set at installation) Default: 180 seconds VDR is turned off, or there is a problem with network.	Check the connection with VDR and network.
306	BNWAS COM Error	Caution	Caution Sentence from BNWAS has been discontinued for more than set time. (Set at installation) Default: 180 seconds BNWAS is turned off, or there is a problem with network.	Check the connection with BNWAS and network.
310	Other Sensor 1 COM Error	Caution	Data from No.1 other sensor has been discontinued for more than set time.(Set at installation) Default: 180 seconds No.1 other sensor is turned off, or there is a problem with network.	Check the connection with No.1 other sensor and network.
311	Other Sensor 2 COM Error	Caution	Data from No.2 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.2 other sensor is turned off, or there is a problem with network.	Check the connection with No.2 other sensor and network.

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No.	Text	Default	Meaning	Remedy
312	Other Sensor 3 COM Error	Caution	Data from No.3 other sensor has been discontinued for more than set time.(Set at installation) Default: 180 seconds No.3 other sensor is turned off, or there is a problem with network.	Check the connection with No.3 other sensor and network.
313	Other Sensor 4 COM Error	Caution	Data from No.4 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.4 other sensor is turned off, or there is a problem with network.	Check the connection with No.4 other sensor and network.
314	Other Sensor 5 COM Error	Caution	Data from No.5 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.5 other sensor is turned off, or there is a problem with network.	Check the connection with No.5 other sensor and network.
315	Other Sensor 6 COM Error	Caution	Data from No.6 other sensor has been discontinued for more than set time.(Set at installation) Default: 180 seconds No.6 other sensor is turned off, or there is a problem with network.	Check the connection with No.6 other sensor and network.
316	Other Sensor 7 COM Error	Caution	Data from No.7 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.7 other sensor is turned off, or there is a problem with network.	Check the connection with No.7 other sensor and network.
317	Other Sensor 8 COM Error	Caution	Data from No.8 other sensor has been discontinued for more than set time.(Set at installation) Default: 180 seconds No.8 other sensor is turned off, or there is a problem with network.	Check the connection with No.8 other sensor and network.

No.	Text	Default	Meaning	Remedy
318	Other Sensor 9 COM Error	Caution	Data from No.9 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.9 other sensor is turned off, or there is a problem with network.	Check the connection with No.9 other sensor and network.
319	Other Sensor 10 COM Error	Caution	Data from No.10 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.10 other sensor is turned off, or there is a problem with network.	Check the connection with No.10 other sensor and network.
320	EC-3000 Ch.01 COM Timeout	Caution	Input from EC-3000 serial ch.1 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.1.
321	EC-3000 Ch.02 COM Timeout	Caution	Input from EC-3000 serial ch.2 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.2.
322	EC-3000 Ch.03 COM Timeout	Caution	Input from EC-3000 serial ch.3 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.3.
323	EC-3000 Ch.04 COM Timeout	Caution	Input from EC-3000 serial ch.4 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.4.
324	EC-3000 Ch.05 COM Timeout	Caution	Input from EC-3000 serial ch.5 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.5.
325	EC-3000 Ch.06 COM Timeout	Caution	Input from EC-3000 serial ch.6 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.6.

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No.	Text	Default	Meaning	Remedy
326	EC-3000 Ch.07 COM Timeout	Caution	Input from EC-3000 serial ch.7 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.7.
327	EC-3000 Ch.08 COM Timeout	Caution	Input from EC-3000 serial ch.8 has been discontinued for more than certain time. (Set at installation) Default: No timeout	Check the connection of Ch.8.
330	Double Gyro Sta- tus Conflict	Warning	When connected with Double Gyro System, instrument produced by Yokogawa Electric, two gyro has been displayed "Selected" status for 3 seconds.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
331	Select Gyro Status Missing	Warning	When connected with Double Gyro System, instrument produced by Yokogawa Electric, "Double Gyro" status cannot be acquired.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
360	Wind Sensor 1 COM Error	Caution	Data from No.1 wind sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.1 wind sensor is turned off, or there is a problem with network.	Check the connection with No.1 wind sensor.
361	Wind Sensor 2 COM Error	Caution	Data from No.2 wind sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.2 wind sensor is turned off, or there is a problem with network.	Check the connection with No.2 wind sensor.
362	Wind Sensor 3 COM Error	Caution	Data from No.3 wind sensor has been discontinued for more than set time. (Set at installation) Default: 60 seconds No.3 wind sensor is turned off, or there is a problem with network.	Check the connection with No.3 wind sensor.

No.	Text	Default	Meaning	Remedy
370	Water Current COM Error	Caution	Data from water current has been discontinued for more than set time. (Set at installation) Default: 60 seconds Water current sensor is turned off, or there is a problem with network. Check the connection with water current and network.	Check the connection with water current and network.
371	Water Temp COM Error	Caution	Data from water temp. has been discontinued for more than set time. (Set at installation) Default: 60 seconds Water temp sensor is turned off, or there is a problem with network.	Check the connection with water temp and network.
380	AIS COM Error	Warning	Data from AIS has been discontinued for more than set time. (Set at installation) Default: 60 seconds AIS is turned off, or there is a problem with network.	Check the connection with AIS and network.
390	NAVTEX COM Error	Caution	Data from NAVTEX has been discontinued for more than set time. (Set at installation) Default: 180 seconds NAVTEX is turned off, or there is a problem with network	Check the connection with NAVTEX and network.
391	ROT Gyro 1 COM Error	Caution	Data from No.1 ROT gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds	Check the connection with No.1 ROT gyro.
392	ROT Gyro 2 COM Error	Caution	Data from No.2 ROT gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds	Check the connection with No.2 ROT gyro.
393	ROT Gyro 3 COM Error	Caution	Data from No.3 ROT gyro has been discontinued for more than set time. (Set at installation) Default: 60 seconds	Check the connection with No.3 ROT gyro.

APPENDIX 5 ALERT LIST

No.	Text	Default	Meaning	Remedy
400	Network Printer Not Available	Caution	When executing printout, network printer is not recognized, network printer connection is interrupted, or printer error such as paper shortage, paper jam and run out of ink occurs.	Check that the printer is connected to network or printer errors such as paper shortage, paper jam and run out of ink does not occur.
401	Local Printer Not Available	Caution	When executing printout, local printer is not recognized, local printer connection is interrupted, or printer error such as paper shortage, paper jam and run out of ink occurs.	Check that the printer is connected to network or printer errors such as paper shortage, paper jam and run out of ink does not occur.
411	Other Sensor 11 COM Error	Caution	Data from No.11 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.11 other sensor is turned off, or there is a problem with network.	Check the connection with No.11 other sensor and network.
412	Other Sensor 12 COM Error	Caution	Data from No.12 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.12 other sensor is turned off, or there is a problem with network.	Check the connection with No.12 other sensor and network.
413	Other Sensor 13 COM Error	Caution	Data from No.13 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.13 other sensor is turned off, or there is a problem with network.	Check the connection with No.13 other sensor and network.
414	Other Sensor 14 COM Error	Caution	Data from No.14 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.14 other sensor is turned off, or there is a problem with network.	Check the connection with No.14 other sensor and network.

No.	Text	Default	Meaning	Remedy
415	Other Sensor 15 COM Error	Caution	Data from No.15 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.15 other sensor is turned off, or there is a problem with network.	Check the connection with No.15 other sensor and network.
416	Other Sensor 16 COM Error	Caution	Data from No.16 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.16 other sensor is turned off, or there is a problem with network.	Check the connection with No.16 other sensor and network.
417	Other Sensor 17 COM Error	Caution	Data from No.17 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.17 other sensor is turned off, or there is a problem with network.	Check the connection with No.17 other sensor and network.
418	Other Sensor 18 COM Error	Caution	Data from No.18 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.18 other sensor is turned off, or there is a problem with network.	Check the connection with No.18 other sensor and network.
419	Other Sensor 19 COM Error	Caution	Data from No.19 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.19 other sensor is turned off, or there is a problem with network.	Check the connection with No.19 other sensor and network.

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No.	Text	Default	Meaning	Remedy
420	Other Sensor 20 COM Error	Caution	Data from No.20 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.20 other sensor is turned off, or there is a problem with network.	Check the connection with No.20 other sensor and network.
421	Other Sensor 21 COM Error	Caution	Data from No.21 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.21 other sensor is turned off, or there is a problem with network.	Check the connection with No.21 other sensor and network.
422	Other Sensor 22 COM Error	Caution	Data from No.22 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.22 other sensor is turned off, or there is a problem with network.	Check the connection with No.22 other sensor and network.
423	Other Sensor 23 COM Error	Caution	Data from No.23 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.23 other sensor is turned off, or there is a problem with network.	Check the connection with No.23 other sensor and network.
424	Other Sensor 24 COM Error	Caution	Data from No.24 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.24 other sensor is turned off, or there is a problem with network.	Check the connection with No.24 other sensor and network.

No.	Text	Default	Meaning	Remedy
425	Other Sensor 25 COM Error	Caution	Data from No.25 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.25 other sensor is turned off, or there is a problem with network.	Check the connection with No.25 other sensor and network.
426	Other Sensor 26 COM Error	Caution	Data from No.26 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.26 other sensor is turned off, or there is a problem with network.	Check the connection with No.26 other sensor and network.
427	Other Sensor 27 COM Error	Caution	Data from No.27 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.27 other sensor is turned off, or there is a problem with network.	Check the connection with No.27 other sensor and network.
428	Other Sensor 28 COM Error	Caution	Data from No.28 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.28 other sensor is turned off, or there is a problem with network.	Check the connection with No.28 other sensor and network.
429	Other Sensor 29 COM Error	Caution	Data from No.29 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.29 other sensor is turned off, or there is a problem with network.	Check the connection with No.29 other sensor and network.

APPENDIX 5 ALERT LIST

No.	Text	Default	Meaning	Remedy
430	Other Sensor 30 COM Error	Caution	Data from No.30 other sensor has been discontinued for more than set time. (Set at installation) Default: 180 seconds No.30 other sensor is turned off, or there is a problem with network.	Check the connection with No.30 other sensor and network.
450	Heading Sensor Not Available	Warning	Heading data of all available gyro has been not available for more than 2 seconds.	Check the connection with all gyro.
451	Gyro CORR. Source Change	Caution	Heading sensor used in system is changed.	-
453	SDME Sensor Not Available	Warning	Speed data from all available SDME has been not available for more than 3 seconds.	Check the connection with all SDME.
469	WGS84 Not Used	Warning	WGS84 is not used for datum of EPSF or cannot be acquired. Acquisition timing: Once in 60 seconds or when position sensor is changed.	Check the operator's manual of GPS.
470	Datum Change	Caution	Current datum of EPSF is changed. Acquisition timing: Once in 60 seconds or when position sensor is changed.	Check the operator's manual of GPS.
472	Position Source Change	Warning	Position sensor used in system (distributed by own ship's information management) is changed.	-
473	Heading Source Change	Warning	Heading sensor used in system (distributed by own ship's information management) is changed.	-
474	COG/SOG Source Change	Warning	COG/SOG sensor used in system (distributed by own ship's information management) is changed.	-
475	CTW/STW Source Change	Warning	CTW/STW sensor used in system (distributed by own ship's information management) is changed.	-
485	Depth Limit	Alarm	Seabed has been less than set depth for more than 3 seconds.	Be careful of risk of grounding.

No.	Text	Default	Meaning	Remedy
495	Anchor Watch Error	Warning	While anchor watch alert function is enabled, ship's position has been outside of alarm area centering certain position for more than 3 seconds.	Be careful of dragging anchor.
526	TT CPA/TCPA	Alarm	CPA(Closest Point of Approach) and TCPA(Time to CPA) of TT is within the set range.	Be careful of the risk of collision with other ships.
527	TT Lost	Warning	Target has been not detected 5 times successively. Tracked target is lost.	TT is lost. Check the lost target.
528	REF Target Lost	Warning	REF target is lost and cannot be tracked.	REF target is lost. Check the lost target.
529	AIS New Target	Warning	System detected the new AIS target.	AIS target entered into AZ.
530	AIS Target Display 95%	Caution	95% of maximum number of target which can be displayed is used.	The number of AIS target became 95% of that can be displayed. Change the display number using filter function.
531	AIS Target Display 100%	Warning	100% of maximum number of target which can be displayed is used.	The number of AIS target became 100% of that can be displayed. Change the display number using filter function.
532	AIS Target Capacity 95%	Caution	95% of memory capacity for AIS targets is filled.	Memory for AIS targets is filled 95%. Cancel unnecessary targets.
533	AIS Target Capacity 100%	Warning	100% of memory capacity for AIS targets is filled.	Memory for AIS targets is filled 100%. Cancel unnecessary targets.
534	AIS Target Activate 95%	Caution	95% of capacity for active AIS is used.	The number of active AIS target became 95% of its limit. Change the unnecessary targets to sleep mode.
535	AIS Target Activate 100%	Warning	100% of capacity for active AIS is used.	The number of active AIS target became 100% of its limit. Change the unnecessary targets to sleep mode.
536	AIS CPA/TCPA	Alarm	CPA and TCPA of AIS activating target is below the value set in menu.	Be careful of the risk of collision with other ships.

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No.	Text	Default	Meaning	Remedy
537	AIS Lost	Warning	AIS data has not been received for certain time (shorter time between 6 minutes and 5 report interval). Lost target. Dangerous AIS target has not been received for certain time (shorter time between 6 minutes and 5 report interval).	AIS target is lost. Check the lost target.
539	AIS Message Received	Caution	AIS message is received.	-
541	AIS Message Transmit Error	Caution	AIS message transmission is failed.	Check the connection with AIS.
542	AIS Transmitting	Caution	AIS transponder is transmitting.	-
543	No CPA/TCPA for AIS	Warning	Ship's SOG/COG data is not available, and L/L of own ship and AIS are not available. System cannot calculate CPA/TCPA for AIS.	Check the connection with GPS. Check that grounding speed is available.
620	User Chart Danger Area	Warning	When User Chart Danger Area is set to Warning/ Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
621	Traffic Separation Zone	Warning	When Traffic Separation Zone is set to Warning/ Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
622	Inshore Traffic Zone	Warning	When Inshore Traffic Zone is set to Warning/Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
623	Restricted Area	Warning	When Restricted Area is set to Warning/Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
624	Caution Area	Warning	When Caution Area is set to Warning/Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
625	Offshore Production Area	Warning	When Offshore Production Area is set to Warning/ Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.

No.	Text	Default	Meaning	Remedy
626	Military Practice Area	Warning	When Military Protection Area is set to Warning/ Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
627	Seaplane Landing Area	Warning	When Seaplane Landing Area is set to Warning/ Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
628	Submarine Transit Lane	Warning	When Submarine Transit Lane is set to Warning/ Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
629	Anchorage Area	Warning	When Anchorage Area is set to Warning/Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
630	Marine Farm / Aquaculture	Warning	When Marine Farm/ Aquaculture is set to Warning/Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
631	PSSA Area	Warning	When PSSA Area is set to Warning/Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
632	Areas to be Avoided	Warning	When Areas to be Avoided is set to Alarm in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
633	Buoy	Warning	When Buoy is set to Alarm in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
634	UKC Limit	Warning	Measured depth from echo sounder is less than set UKC limit value.	Be careful that measured depth is less than UKC limit.
635	Non-official ENC	Warning	When No Official Data is set to Warning/Caution in chart alert, ship entered in check area.	Be careful of the object mentioned left, on ship's direction.
636	No Vector Chart	Warning	When No Vector Chart is set to Warning/Caution in chart alert, chart except vector chart is in check area.	Be careful of the object mentioned left, on ship's direction.
637	Not Up-to-date	Warning	When Not Up to Date is set to Warning/Caution in chart alert, chart except vector chart is in check area.	Be careful of the object mentioned left, on ship's direction.

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No.	Text	Default	Meaning	Remedy
638	Permit Expired	Warning	When Permit Expired is set to Warning/Caution in chart alert,	Be careful of the object mentioned left, on ship's direction.
640	Chart align: Over 30 min	Caution	Own ship position has been offset for more than 30 minutes.	Reset offset.
652	Last WPT Approach	Alarm	Ship will reach last waypoint in 30 seconds.	Be careful that last waypoint is approaching.
665	Autopilot Mode Conflict	Alarm	In communication between AP, TCS mode of ECDIS and AP are different.	Check the mode in autopilot.
667	AP Receive Error	Caution	Communication between AP and ECDIS is discontinued.	Check the connection with autopilot.
675	Use MAN Steering	Warning	All GPS signals are lost during track control, and track control has been continued for 10 minutes in DR. Alarm generates every 2 minutes.	Switch autopilot mode to manual or auto.
690	TC Start Timeout	Alarm	Operation to start track control in autopilot is not performed in 30 seconds after performing the operation to start track control in ECDIS. *Currently not used because TCS start operation is caused by autopilot.	Perform operation to start track control again.
691	RM Stop - Exceed Max XTE	Alarm	Route monitoring is stopped because distance from route is more than set value of Max XTE.	Start route monitoring after approaching the monitoring route.
692	RM Stop - Disconnect Sensors	Alarm	Error occurs inside of route monitoring function.	If the error frequently occurs, contact FURUNO and inform frequency of occurrence.
693	RM Stop - Other Causes	Alarm	Required data for route monitoring such as position, SOG/COG cannot be acquired.	Check the connection with GYRO, GPS and SDME.
820	NAVTEX Message Received	Caution	NAVTEX message is received.	-

No.	Text	Default	Meaning	Remedy
851	EPFS 1 Sensor Banned	Caution	Own ship position data from No.1 GPS is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
852	EPFS 2 Sensor Banned	Caution	Own ship position data from No.2 GPS is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
853	EPFS 3 Sensor Banned	Caution	Own ship position data from No.3 GPS is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
854	EPFS 4 Sensor Banned	Caution	Own ship position data from No.4 GPS is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
855	EPFS 5 Sensor Banned	Caution	Own ship position data from No.5GPS is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.

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No.	Text	Default	Meaning	Remedy
856	EPFS 6 Sensor Banned	Caution	Own ship position data from No.6 GPS is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
857	EPFS 7 Sensor Banned	Caution	Own ship position data from No.7 GPS is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
858	EPFS 8 Sensor Banned	Caution	Own ship position data from No.8 GPS is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
859	EPFS 9 Sensor Banned	Caution	Own ship position data from No.9 GPS is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
860	EPFS 10 Sensor Banned	Caution	Own ship position data from No.10 GPS is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.

No.	Text	Default	Meaning	Remedy
861	SDME 1 Sensor Banned	Caution	Own ship speed data from No.1 SDME is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
862	SDME 2 Sensor Banned	Caution	Own ship speed data from No.2 SDME is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
863	SDME 3 Sensor Banned	Caution	Own ship speed data from No.3 SDME is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
871	Gyro 1 Sensor Banned	Caution	Heading data from No.1 Gyro is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
872	Gyro 2 Sensor Banned	Caution	Heading data from No.2 Gyro is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.

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No.	Text	Default	Meaning	Remedy
873	Gyro 3 Sensor Banned	Caution	Heading data from No.3 Gyro is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
874	Gyro 4 Sensor Banned	Caution	Heading data from No.4 Gyro is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
875	Gyro 5 Sensor Banned	Caution	Heading data from No.5 Gyro is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
881	ROT Gyro 1 Sensor Banned	Caution	Heading data from No.1 ROT Gyro is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
882	ROT Gyro 2 Sensor Banned	Caution	Heading data from No.2 ROT Gyro is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.

No.	Text	Default	Meaning	Remedy
883	ROT Gyro 3 Sensor Banned	Caution	Heading data from No.3 ROT Gyro is determined abnormal by integrity check.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
891	Water Current Sensor Banned	Caution	Data from water current is determined abnormal by integrity check. *Currently not generated because integrity check is not performed for Current.	Reset the filter to confirm that it isn't a temporal error value. If the data is normal, it is reusable. However, if it's continually removed, there is a possibility that correct data is not received from sensor. In this case, contact FURUNO.
900	No Filter Source of Position	Warning	No valid position sensor is available for filter. (Banned or connection error)	Check the connection with all GPS.
901	No Filter Source of COG/SOG	Warning	No valid COG/SOG sensor is available for filter. (Banned or connection error)	Check the connection with all GPS.
902	No Filter Source of CTW/STW	Warning	No valid CTW/STW sensor is available for filter. (Banned or connection error)	Check the connection with all GPS.
903	No Filter Source of Heading	Warning	No valid heading sensor is available for filter. (Banned or connection error)	Check the connection with all GPS.
904	No Filter Source of ROT	Warning	No valid position sensor is available for filter. (Banned or connection error)	Check the connection with all GPS.

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**SPECIFICATIONS OF
Electronic Chart Display and Information System (ECDIS)
FMD-3200/3300/3200-BB**

1 MONITOR UNIT

- 1.1 Display type
 - MU-190 (FMD-3200) 19-inch color LCD, 1,280 x 1,024 pixel (SXGA)
 - MU-231 (FMD-3300) 23.1-inch color LCD, 1,600 x 1,200 pixel (UXGA)
 - HD26T21 MMD-MA4-FAGA (FMD-3300)
25.54-inch color LCD, 1,920 x 1,200 pixel (WUXGA)
 - FMD-3200-BB Commercial monitor (user supply)
- 1.2 Brilliance
 - MU-190: 450 cd/m² typical, MU-231: 400 cd/m² typical
 - HD26T21 MMD-MA4-FAGA: 350 cd/m² typical
- 1.3 Viewable distance
 - MU-190: 1.02 m nominal, MU-231: 1.20 m nominal
- 1.4 Video interface
 - DVI-D: DVI-standard, VESA-DDC2B
- 1.5 Brilliance control
 - RS-485, serial data control (DDC sentence)

2. PROCESSOR UNIT

- 2.1 Display mode
 - HU/NU/CU/RU (True/Relative motion)
- 2.2 Chart materials
 - IMO/IHO S57-3 ENC or C-MAP CM-93/3 vectorized material
 - BA ARCS rasterized material
- 2.3 Own ship's indication
 - Own ship's mark/track and numeral position in lat/lon, speed, course and heading
- 2.4 Target tracking (TT)
 - Range, bearing, speed, course, CPA/TCPA
 - Target information from AIS
- 2.5 Other information
 - Waypoint, Route monitoring and several alarms
- 2.6 Display features
 - Chart zoom-in/out, Cursor (EBL, VRM, parallel index lines), Scroll, Symbol select, Palette select, One touch activation, Electric chart information auto-update
- 2.7 Position calculation
 - Navigation by result of positioning found with external sensor
 - Dead reckoning with gyro and log
 - Highly accurate position, speed and heading from Kalman filter
- 2.8 Route planning
 - Planning by rhumb line, great circle, Chart alarm, SAR composition, Optimize
- 2.9 Route monitoring
 - Off-track display, Waypoint arrival alarm, Shallow depth alarm
 - Route creation; route data may be transferred to radar
- 2.10 User chart creation
 - 1000 points max. (200 points x 5 files)
- 2.11 Notes
 - Create and display notes data; transferred to radar
- 2.12 AIS safety message
 - Receive, create and transmit safety messages
 - View and modify own ship information stored in AIS transponder
- 2.13 NAVTEX message
 - Receive and display NAVTEX messages
- 2.14 MOB (Man Overboard)
 - Position and other data at time of man overboard are recorded
 - MOB mark is displayed on the screen

- 2.15 Manual update User selects symbols
- 2.16 Other functions Radar overlay, Playback log

3 INTELLIGENT HUB (OPTION)

- 3.1 Number of ports 8 ports (10/100/1000BASE-T)
- 3.2 Switching method Store and forward, non-blocking L2 switching
- 3.3 Capacitance of switching 16 Gbps
- 3.4 Flow Control Full-Duplex (IEEE802.3x flow-controlled at automatic mode)
- 3.5 Ring aggregation 8 group max.
- 3.6 Spanning tree STP(IEEE802.1D), RSTP(IEEE802.1w), MST(IEEE802.1s)
- 3.7 IGMP snooping IGMP v1, v2, v3
- 3.8 Operation control PING, SNMPv1, v2c, v3
- 3.9 VLAN Port-base VLAN, IEEE802.1Q Tag VLAN supported,
VLAN ID: 1 to 4094, VLAN registration: 128 group
- 3.10 Multiple VLAN Communication between isolated ports is disabled
- 3.11 Cast control Broadcast, Multicast suppression

4 INTERFACE

- 4.4 Serial I/O 7 ports (IEC61162-1/2: 2 ports, IEC61162-1: 5 ports)
 - Input ABK, ALR, CUR, DBT, DPT, DTM, ETL, GGA, GLL, GNS, HDT, HTD, MTW, MWV, NRX, OSD, PRC, RMC, ROR, ROT, RPM, RSA, RSD, THS, TRC, TRD, TTM, VBW, VDM, VDO, VDR, VHW, VTG, XDR, ZDA
 - Output ABM, ACK, BBM, DDC, EVE, HTC, OSD, VBW, VSD, XTE
- 4.5 Digital input 1 channel: contact signal, 100 ohm max. or 24VDC input
- 4.6 Alarm output 6 channels: contact signal, load current 250 mA
Normal close: 2, Normal open: 2, System fail: 1, Power fail: 1
- 4.7 DVI output 2 ports: DVI-D (DVI1/2), 1 port: DVI-I or RGB (DVI3)
- 4.8 USB 4 ports (3 ports for control units)
- 4.9 LAN 3 ports: Ethernet 1000Base-T for network equipment, sensor adapter and spare
- 4.10 Sensor adapter (option)
 - MC-3000S (serial) 8 ports: I/O, IEC61162-1/2: 4 ports, IEC61162-1: 4 ports
 - MC-3010A (analog) 3 ports: Input, -10 to +10V, 0 to 10V or 4 to 20mA
 - MC-3020D (digital-in) 8 ports: relay contact, logics set from program
 - MC-3030D (digital-out) 8 ports: relay contact, normal open and normal close available

5 POWER SUPPLY

- 5.1 Monitor unit
 - MU-190 100-230 VAC: 0.7-0.4 A, 1 phase, 50/60 Hz
 - MU-231 100-230 VAC: 1.0-0.6 A, 1 phase, 50/60 Hz
 - HD26T21 MMD-MA4-FAGA 115/230 VAC: 1.1-0.5 A, 1 phase, 50/60 Hz, 24 VDC: 5.2 A
- 5.2 Processor unit 100-115/220-230 VAC: 1.5-0.7 A, 1 phase, 50/60 Hz

- 5.3 Sensor adapter (option) 24 VDC: 1.4 A (for 11 units), Input to MC-3000S, the sources of other sensor adapters are fed from MC-3000S
- 5.4 HUB (HUB-3000, HUB-100, option) 100-230 VAC: 0.1 A, 1 phase, 50-60 Hz

6 ENVIRONMENTAL CONDITION

- 6.1 Ambient temperature -15°C to +55°C
- 6.2 Relative humidity 95% or less at 40°C
- 6.3 Degree of protection
- | | |
|--------------|--|
| Monitor unit | IP22 |
| HUB | IP22 (HUB-3000), IPX0 (HUB-100) |
| Others | IP20 (IP22 by specified mounting method, option) |
- 6.4 Vibration IEC 60945 Ed.4

7 COATING COLOR

- 7.1 Monitor unit N2.5 (fixed)
- 7.2 Processor/control unit N3.0 (fixed)
- 7.3 Sensor adapter N3.0
- 7.4 HUB N2.5 (HUB-3000), N3.0 (HUB-100)
- 7.5 Console 2.5GY5/1.5 (standard)

FURUNO

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Declaration of Conformity



0735

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

**ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM
FMD-3200, FMD-3200-BB and FMD-3300**

(Model name, type number)

to which this declaration relates conforms to the following standard(s) or normative document(s)

IMO Resolution A.694(17)	IEC 61174 Ed. 3.0: 2008
IMO Resolution MSC.191(79)	IEC 61162-1 Ed. 4.0: 2010
IMO Resolution MSC.232(82)	IEC 61162-2 Ed. 1.0: 1998
	IEC 62288 Ed. 1.0: 2008
	IEC 60945 Ed. 4.0: 2002

IHO'S ENC/ECDIS Data Presentation and Performance Check: 2011

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

For assessment, see

- EC Type Examination (Module B) Certificate No.MED-B-7725 issued by DET NORSKE VERITAS(DNV), Norway.
- EC Quality System (Module D) Certificate No. BSH/4613/02208/2345/12 issued by Federal Maritime and Hydrographic Agency (BSH), The Federal Republic of Germany.

This declaration is issued according to the provisions of European Council Directive 96/98/EC on marine equipment and amending Directive 2011/75/EU and 2012/32/EU.

On behalf of Furuno Electric Co., Ltd.

Nishinomiya City, Japan
December 17, 2012

(Place and date of issue)

Yoshitaka Shogaki
Department General Manager
Quality Assurance Department

(name and signature or equivalent marking of authorized person)