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(product code)

ТУ 6487-016-96021685-2015

ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM NavCom Voyager

USER'S MANUAL

CONTENTS

1. INTRODUCTION

1.1 User Manual Structure

The ECDIS User Manual contains detailed information about all functions of the ECDIS.

The user manual consists of eight chapters each containing a number of sub-chapters. Each chapter presents information on how to perform specific tasks using the ECDIS. The order of chapters is determined by the order of tasks that the user faces when navigating at sea.

1.2 Typographic Conventions

The ECDIS User Manual is written under assumption that the user is familiar with the main principles of work in the MS Windows environment and has experience in using MS Windows applications.

This manual uses certain conventions to provide a consistent means of recognizing specific information, as follows:

'Keys' are physical keys of the computer keyboard.

'Buttons' are displayed graphically on the screen.

Text written like **Chart** refers to the names of keys and buttons as well as the names of all other user interface elements.

Program messages are written like this: *'Would you like to copy the database to a local hard disk?'*

Text written like **Data → Licensing → Add License manually** is contracted from "press the **Data** button, open the **Licensing** panel and press the **Add License manually** button," and presents a sequence of commands that user should perform to reach a function.

IMPORTANT!

Information that is crucial for correct functioning of the system or a function is marked by the word "Important" and solid lines above and below the text.

1.3 Normative References

The ECDIS is created in compliance with the following international standards:

- IEC 60945 ed.4 – 2002, Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results
- IEC 61161-1 ed.4 – 2010, Maritime navigation and radiocommunication equipment and systems –Digital interfaces, Part 1: Single talker and multiple listeners
- IEC 62288 ed.1 – 2008, Maritime navigation and radiocommunication equipment and systems – Presentation of navigation-related information on shipborne navigational displays – General requirements, methods of testing and required test results
- IEC 61174 ed.3 – 2008, Maritime navigation and radiocommunication equipment and systems – Electronic chart display and information system (ECDIS) – Operational and performance requirements, methods of testing and required test results
- IHO S-52 ed.6.0 – Presentation Library v.3.4, Specifications for chart content and display aspects of ECDIS
- IHO S-57 ed.3.1(.2) – 2000 + 2014, IHO transfer standard for digital hydrographic data
- IHO S-63 ed.1.1.1 – 2012, IHO data protection scheme
- ITU-R 1371-1, Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile band

- MSC.192 2004, Adoption of the revised performance standards for radar equipment10

1.4 New Feature Highlights

As compared to the previous version of the program of 5.0.83, the following new functionalities have been implemented with the 5.0.84 version, Table 1.

Table 1 New features in 5.0.84 version

Function		Reference
Extended time range for display of weather data		"Weather Time Series" on page 106.
Image overlay supported of data from two independent radars		"Radar Image Overlay" on page 148
Extra functionalities for AIS target monitoring, including safety issues, in particular:		
	Meeting point located on the chart	"AIS" on page 139.
	New target type recognition	
	Meet target calculations and indicators on the chart	
System diagnostic utility implemented		"System Diagnostics Tools" on page 26.
The function abolished to read the value of the vertical offset of the echsounder from **DPT** sentences		"Echo Sounder" on page 138.
RTE and WPL remain as the only supported outgoing AIS sentence types		APPENDIX B

2. ECDIS INTERFACE

2.1 Starting and Terminating the ECDIS

To start the ECDIS application, turn the system power on. To terminate the application press the **Close** button in the upper right corner of the application window. The termination of the application turns the system power off.

2.2 Main Window

The ECDIS starting window looks as follows:

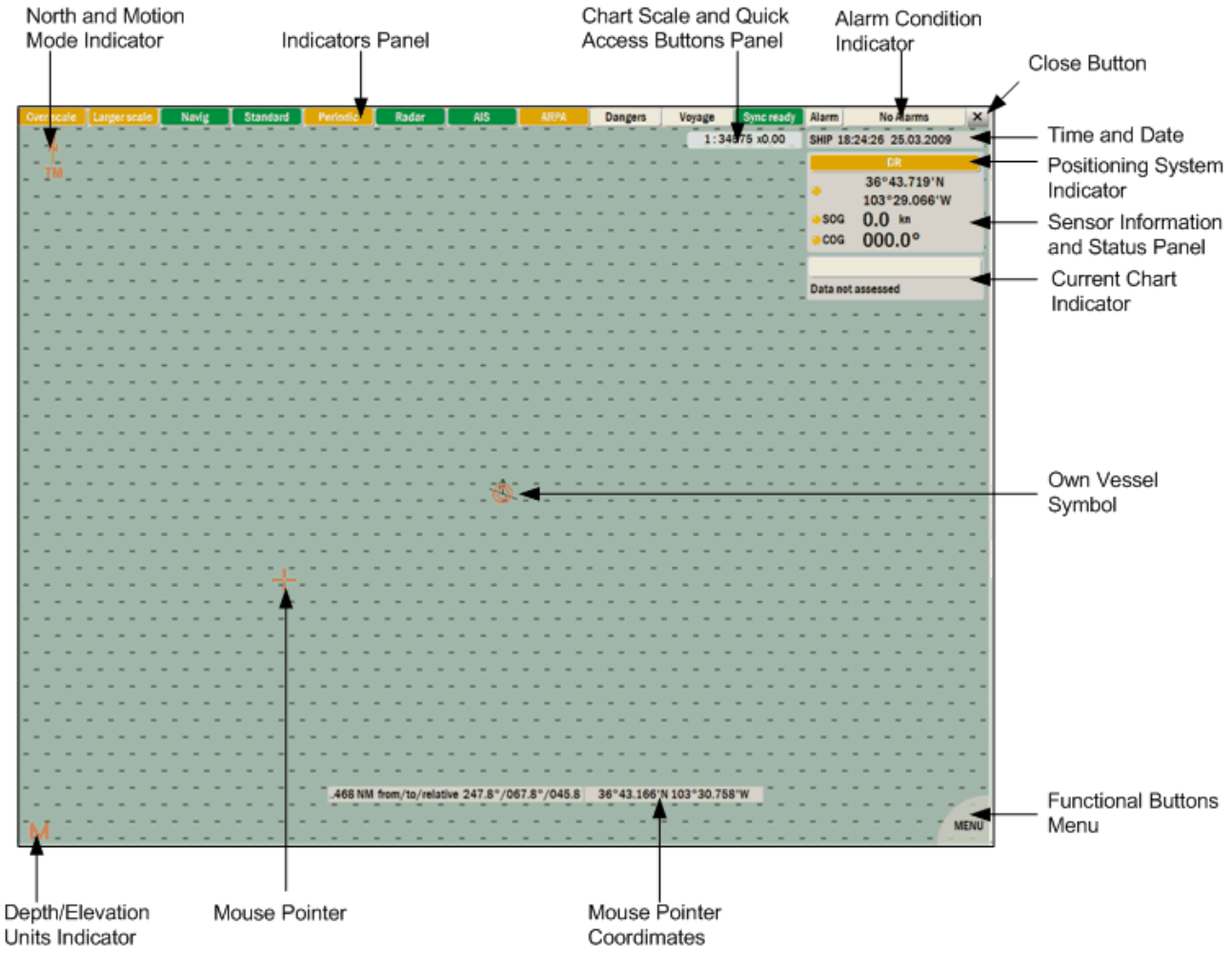


Figure 1 ECDIS Main window

2.3 Indicators Panel

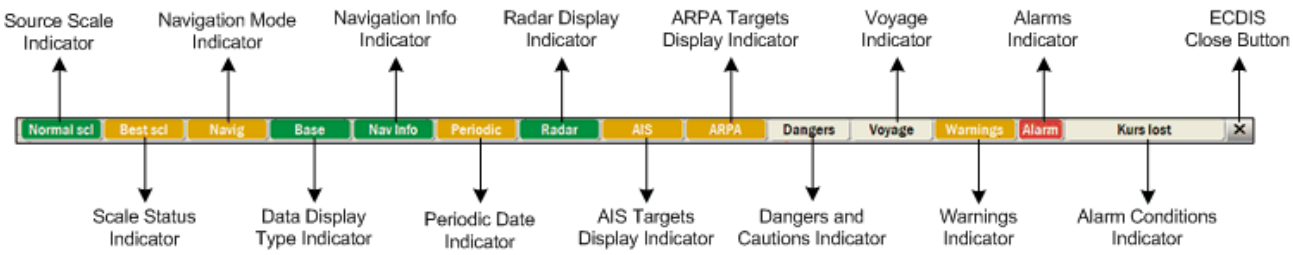


Figure 2 Indicators panel

➢ **Position Source indicator has the following states:**

The **Position Source** indicator is situated in the Navigational panel. It indicates which position source is being used at the moment for displaying the own ship symbol in the chart view. The indicator turns orange if the Primary Position Source fails and the Secondary Position Source is used (*see chapter 7.2.1, Primary and Secondary Position Sources*).

The currently used position source is a GPS receiver set as the primary or secondary position source in the **Navi → Navigation Data** tab, **Position Sources** tab. The indicator displays the name of the position source as it is registered in the **Config → Input/Output** tab.

The currently used positioning method is dead reckoning (*see chapter 7.2.2, Dead Reckoning*).

➢ **Source Scale indicator has the following states:**

The **Source Scale** indicator turns orange if the scale of the current chart (the chart under the own ship or under the center of the chart view) is twice or more as large or as small as the original chart scale.

The current chart scale is not twice as large or as small as the original chart scale (for example the original scale is 1:100 000 and the current scale is 1:75 000).

The current chart scale is twice as large as the original chart scale (for example the original scale is 1:100 000 and the current scale is 1:50 000).

The current chart scale is twice as small as the original chart scale (for example the original scale is 1:100 000 and the current scale is 1:200 000).

➢ **Scale Status indicator has the following states:**

The **Scale Status** indicator shows if there are charts of larger scale for the current own ship position. The indicator operates only when in navigation mode.

The current chart is the largest scale chart for the area and the best scale mode is on (*see chapter 7.5.2, Best Scale Mode*). To turn the best scale mode off, left-click on the indicator.

The current chart is the largest scale chart for the area but the best scale mode is off. To turn the best scale mode on, left-click on the indicator.

There are larger scale charts for the area.

➢ **Navigation Mode indicator has the following states:**

The **Navigation Mode** indicator shows if the navigation mode is on or off. Left-click on the indicator to turn the Navigation mode on or off. The indicator also shows other ECDIS modes that are currently on.

The navigation mode is on.

The navigation mode is off.

The mariners' objects edit mode is on.

The route edit mode is on.

➢ **Data Display Type indicator has the following states:**

The **Data Display Type** indicator shows which data display type is currently on (*see chapter 5.6.2, Display Type*).

The Base display type is on. To switch to the Standard display type, left-click on the indicator.

In addition to Base display objects, chart presentation settings adding elements to the chart view are on (the **Chart – Chart Presentation** tab).

The Standard display type is on. To switch to the All other display type, left-click on the indicator.

In addition to Standard display objects, chart presentation settings adding elements to the chart view are on (the **Chart – Chart Presentation** tab).

The All other display type is on. All cartographic information available from the chart is displayed.

The Custom display type is on. To switch to the Standard display type, left-click on the indicator.

➢ **Navigation Info indicator has the following states:**

The **Nav Info** indicator switches the current display type to Base display, turns off chart presentation settings not required for the Base display, and removes all additional navigation information (radar, AIS targets, ARPA targets) from the chart view.

All navigation information is displayed. Left-click on the indicator to remove the information from the chart view.

No navigation information is displayed. Left-click on the indicator to restore the last display state.

➢ **Periodic Date indicator has the following states:**

The **Periodic Date** indicator shows if objects which are active only in specific periods of time during the year are displayed only in the periods when they are active (the indicator is green) or are always displayed in the chart view disregarding their activity periods (the indicator is orange); *see chapter 5.6.7, Other Settings: Periodic date*.

The **Periodic date** setting is set.

The **Periodic date** setting is not set.

➢ **Radar Display indicator has the following states:**

The **Radar Display** indicator shows if the radar image display is on or off (*see chapter 8.4, Radar Image Overlay*). Left-click on the indicator to turn the radar image display on or off.

The radar image display is on.

The radar image display is off.

➢ **AIS Targets Display indicator has the following states:**

The **AIS Targets Display** indicator shows if the AIS targets display is on or off (*see chapter 8.2.2, AIS Targets Display*). Left-click on the indicator to turn the AIS targets display on or off.

The AIS targets display is on.

The AIS targets display is off.

➢ **ARPA Targets Display indicator has the following states:**

The **ARPA Targets Display** indicator shows if the ARPA targets display is on or off (*see chapter 8.2.2, AIS Targets Display*). Left-click on the indicator to turn the ARPA targets display on or off.

The ARPA targets display is on.

The ARPA targets display is off.

➢ **Dangers and Cautions indicator has the following states:**

The **Dangers and Cautions** indicator shows if there are dangerous objects or cautions inside the Guard Zone (*see chapter 7.6.2, Antigrounding Alarm*).

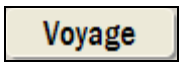
There are no dangers in the guard zone or the anti-grounding alarm function is off.

There are dangerous objects inside the guard zone. Left-click on the indicator to open the **Dangers and Cautions** panel. Dangers list is displayed in the **Dangers** tab.

There are cautions inside the guard zone. Left-click on the indicator to open the **Dangers and Cautions** panel. Cautions list is displayed in the **Cautions** tab.

➢ **Voyage indicator has the following states:**

When in the route monitoring mode (the voyage has been started), the **Voyage** indicator displays warnings regarding the own ship proceeding along the route (*see chapter 7.7, Route Monitoring*).



The route monitoring mode is off.

The own ship is on the route.

The own ship course deviates from the route course.

The deviation from the route (XTE) is more than the set value. Own ship is too far from the route.

The indicator notifies that the own ship is approaching a waypoint. Set the time before the waypoint at which the ECDIS will notify you using the **Pre-turn Warning** setting in the **Route → Start Voyage → Settings** tab.

The indicator also notifies that own ship is approaching a waypoint. The indicator is supposed to prompt the mariner to start turning. Set the time before the waypoint using the **Pre-turn Acknowledgement** setting in the **Route → Start Voyage → Settings** tab.

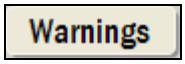
Own ship is at the waypoint and must turn to take the next leg course.

Own ship does not move or moves in the direction opposite to the direction of the route.

Own ship reached the voyage destination point.

➢ **System Warnings indicator has the following states:**

The **System Warnings** indicator notifies the user about the caution conditions (*see chapter 7.6, Alarms*).



There are no caution conditions currently.

If the cautions indicator is yellow, there is a caution condition. To view caution conditions, left-click on the indicator. The **Alarms and Cautions** panel will open.

➢ **Alarms indicator has the following states:**

The **Alarms** indicator notifies the user about the alarm conditions (*see chapter 7.6, Alarms*).

There are no alarm conditions currently. The alarm conditions indicator, where descriptions of alarms are displayed, is empty.

If the alarm indicator is flashing red, there is an alarm condition. Descriptions of alarm conditions are displayed in the alarm conditions indicator. To acknowledge a condition, left-click on the alarm conditions indicator. To open the alarms panel, left-click on the alarms indicator. In the panel, the list of all current alarms is displayed.

2.4 Chart Scale and Quick Access Buttons Panel

Move the pointer over the scale indicator to expand the **Chart Scale and Quick Access Buttons** panel:

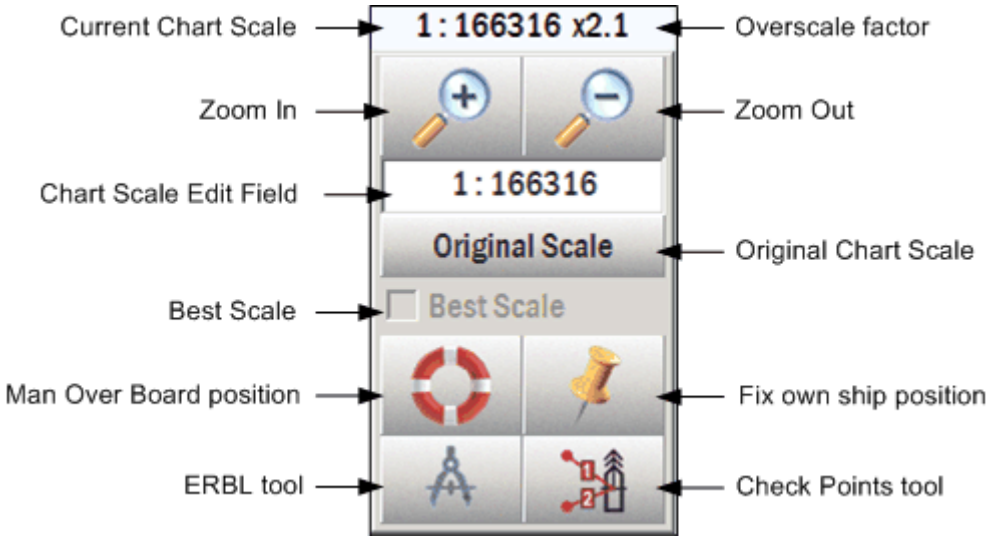


Figure 3 Quick access panel

The quick access buttons provide operative access to specific ECDIS functions.

The **Man Overboard** button plots a MOB (man overboard) position symbol on the chart at the own ship current position.

The **Fix on ship position** button plots a fix position symbol on the chart at the own ship current position.

The **ERBL tool** button launches the electronic range and bearing measurement tool (ERBL).

The **Check Points tool** button opens the Check Points tool.

2.5 Functional Buttons Menu

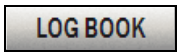
The functional buttons menu is made up of eight buttons each opening a functional panel. To open the buttons menu, move the mouse pointer over the Menu indicator in the lower right corner of the chart view. The menu stays open while the mouse pointer is hovering over the menu. When the mouse pointer is out of the menu, it is collapsed automatically.

To open a panel, press the corresponding button. Only one functional panel can be opened at a time. To switch to another panel, press the button opening the other panel. To close an opened panel, outpress its button.

Opens the **Chart** functional panel holding the following tabs: **Chart Settings**, **Chart Presentation**, **Mariner Objects**, and **Manual Update**.

Opens the **Route** functional panel holding the following tabs: **Start Voyage**, **Route Planning**, **Go To**, **Route Finder**, and **Export/Import**.

Opens the **Info** functional panel holding the following tabs: **Echo Sounder Diagram**, **AIS Monitor**, **Targets**, **Radar Image**, **System Info**, **Astro Info**, **Tides Info**, **Streams Info**, **Navi Calculator**, and **Synchronization Monitor**.



Opens the **Log Book** functional panel.

Opens the **Navi** functional panel holding the following tabs: **Navigation Data**, **Own ship past track and vector**, **Dead Reckoning**, and **LOP Position fix**.

Opens the **Data** functional panel holding the following tabs: **Chart Catalogue**, **Add/Remove Database**, **Licensing**, **Dynamic Licensing**, **Databases**, **Auto Updating**, and **Import S57**.

Opens the **Config** functional panel holding the following tabs: **System**, **Alarm Setup**, **AIS**, **Targets**, **Anti Collision Tool**, **Own ship**, **Input/Output**, and **Units and Time**.

Opens the **Weather** functional panel holding the following tabs: **Weather Presentation (Easy Mode)**, **Weather Presentation**, **Weather Alarm Area**, **Weather Time Series**, and **Weather Packages**.

2.6 Functional Panels

Functional panels hold tools used to setup and execute main ECDIS functions. To open a functional panel, use a button from the **Functional Buttons Menu**. To close a panel, outpress its button in the **Functional Buttons Menu** or use the **Close Panel** button.

Each panel may contain several tabs and sub-tabs. Each panel also has a set of buttons with general functions.

Clear Highlight – removes highlighting from the chart view. Highlighting made by any function can be removed from the chart view using the general **Clear Highlight** button.

Restore Down – restores the functional panel to its default size. To resize a panel, move the mouse pointer to the upper border of the panel and when it changes to the resize pointer , drag the panel up.

Auto Hide – pins the panel down. If the panel is not pinned down, it is reduced so that to display only its tabs names after the mouse pointer is removed from the panel. To pin the panel down, press the Auto Hide button. When the pin on the button is vertical, the panel is pinned down; when the pin is horizontal, the auto hide mode is on and the panel collapses after you move the mouse pointer out of it.

Back to previous chart view – restores the previous chart view (coordinates and scale).

Close panel – closes the panel.

The buttons are located in the upper right corner of each panel.

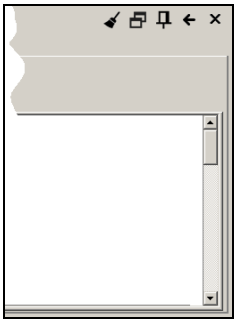


Figure 4 Clear Highlight, Restore Down, Auto Hide, Back, and Close panel buttons

2.7 On-Screen Keyboard

To turn the on-screen keyboard on do the following:

1. In the **Config → System** tab, set the **On-screen keyboard** check box. The **Keyboard** button will appear in the lower-right corner near the **Menu** button.
2. Press the **Keyboard** button. A keyboard will appear.

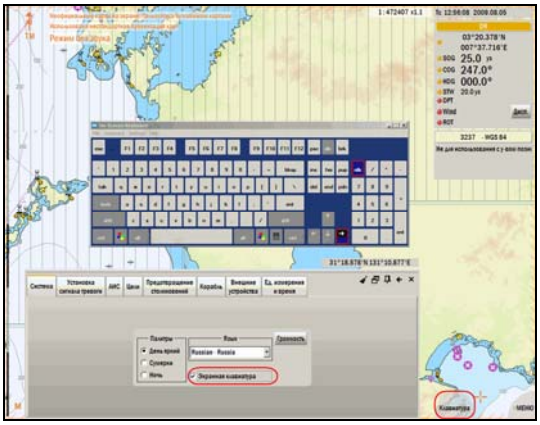


Figure 5 On screen keyboard

3. Place the insertion point to a field where you need to enter information and use the on-screen keyboard to type the text.
4. To close the on-screen keyboard, press the **Close** button in the upper-right corner of the keyboard.

2.8 Hotkeys List

The following hotkeys are used in the ECDIS:

Table 2 Hot keys

Key	Effect
F8	MOB mode On
F9	Switch Standard/All Other display types
F12	Switch palettes Night/Day
Page up	Zoom in
Page down	Zoom out

3. ECDIS SETUP

3.1 Input/Output

Data about the own vessel position, course, speed and other vessel movement characteristics, as well as the data about the surrounding conditions are received using special navigation devices such as positioning devices, gyro devices, and other sensors – input devices. The data received from the input devices is processed and presented in the ECDIS application. The data can also be transmitted to other devices such as autopilot, ARPA display and others – output devices. For the data to be received and transmitted by the ECDIS application, the input and output sensors must be connected to the system using the system COM and USB ports and registered in the ECDIS application.

3.1.1 Adding, editing and deleting input/output devices

IMPORTANT!

The input/output configuration is only available to system administrators and is protected with a password.

The input/output configuration requires separate licensing. Make sure that the ECDIS I/O license for the software module is installed on your system[1].

Registration of input and output navigation devices is carried out in the **Config → Input/Output** tab. To register a device, add it to the **Talkers** list.

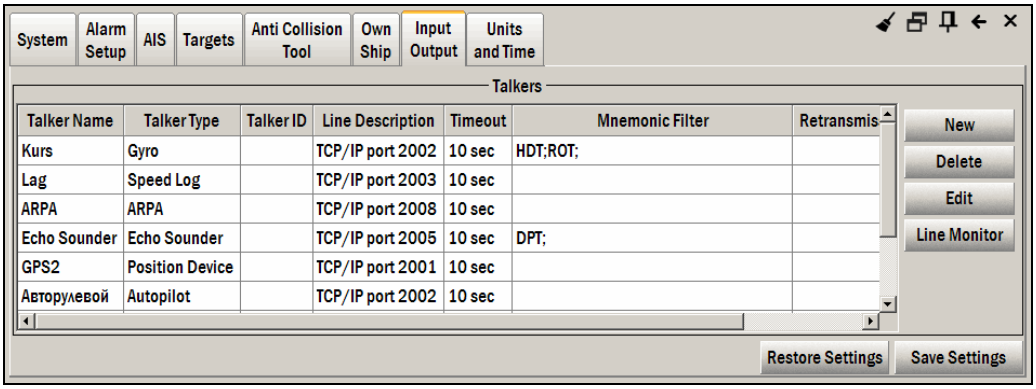


Figure 6 Config → Input/Output tab

To add a new talker, do the following:

1. To add an input/output device, press the **New** button. The **Talker Setup** dialog opens.

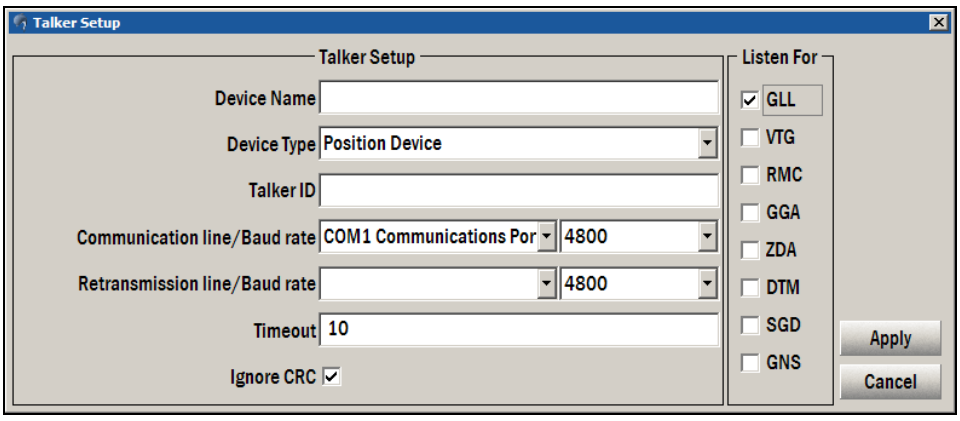


Figure 7 Talker Setup dialog

[1] A special input/output configuration file io.lines.xml may be used for input/output setup. The file contains description of communication lines and is located in the [C:\ECDISDATA\Config\] folder. If the file is used, the input/output interface is slightly different than that without the configuration file. The differences will be described as special notes in specific features descriptions.

2. Set the device parameters in the **Talker Setup** dialog.
   - **Device Name** – Name of the transmitting device.
   - **Device Type** – Choose the type of the transmitting device from the drop-down list.
   - **TalkerID** – Talker identification.
   - **Communication line/Baud rate** – Select the communication channel and the channel baud rate from the corresponding drop-down lists.
   - **Retransmission line/Baud rate** – Select the retransmission communication channel and the channel baud rate from the corresponding drop-down lists. Use the function if you want to retransmit received AIS messages to other computers connected to your computer through a network.
   - **Time Out** – The timeout before an alarm is given after the signal from the device is lost.
   - **Ignore CRC** – When receiving sentences from a device, cyclic redundancy code (CRC) is used to check the sentences checksum. If an error in checksum is detected, an alarm is given and displayed in the Alarm conditions indicator and the sentence is not received. To ignore CRC errors for a device, check the **Ignore CRC** checkbox. If the checkbox is set, an alarm is still given in case of a CRC error, but the sentence is received.

   NOTE: if an `io.lines.xml` configuration file is used, the **Communication line/Baud rate** and **Retransmission line/Baud rate** settings are replaced with the **Communication line name** and **Retransmission line name** settings. To set both of the settings, select an option from the drop-down lists.

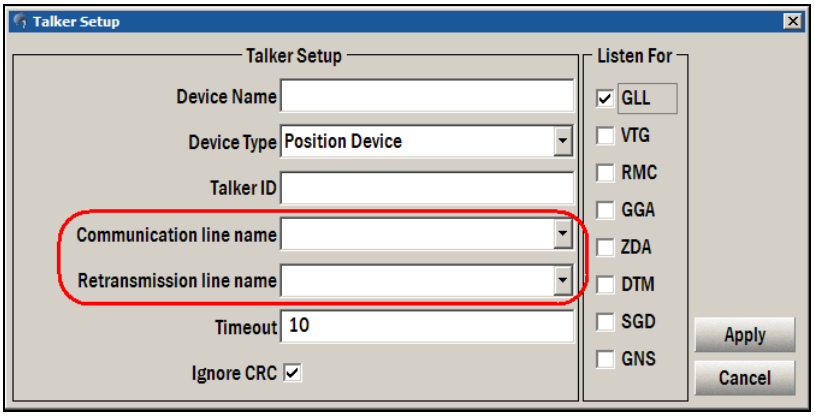


Figure 8 Talker Setup dialog, interface for the io.lines.xml configuration file

3. In the **Listen For** section, check the message types which the ECDIS application will listen to and parse. If no message type is selected, the ECDIS will parse all types of messages coming from the device.
4. Press the **Apply** button to add the device to the devices list or **Cancel** to cancel the operation[2].
5. After the device has been added to the devices list press the **Save Settings** button in the **Config → Input/Output** tab for the changes to take effect.
6. Enter the password in the **Password required** dialog and press **OK**. The changes will take effect.

To edit parameters of a device, do the following:

1. Select the device in the list and press the **Edit** button. The **Talker Setup** dialog will open.
2. In the **Talker Setup** dialog change the device parameters.
3. Press the **Apply** button to add changes to the devices list. Press the **Cancel** button to cancel the operation. The **Talker Setup** dialog will close.
4. Press the **Save Settings** button in the **Config → Input/Output** panel for the changes to take effect.

[2] You can restore previous settings unless you have pressed the **Save Settings** button in the **Config → Input/Output** tab. Once the **Save Settings** button has been pressed, previous settings cannot be restored. To restore settings, press the **Restore Settings** button.

5. Enter the password to the **Password required** dialog and press **OK**. The changes will take effect.

To delete a device, do the following:

1. Select the device in the list and press the **Delete** button. The device will be deleted from the list.
2. Press the **Save Settings** button for the changes to take effect.
3. Enter the password to the **Password required** dialog and press **OK**. The changes will take effect.

3.1.2 Monitoring serial line

You can monitor the serial line to determine if a specified communication channel and the channel baud rate are configured correctly and the system receives messages over the specified channel.

To monitor serial line, do the following:

1. Press the **Line Monitor** button in the **Config → Input/Output** tab. The **Line Monitor** window will open.

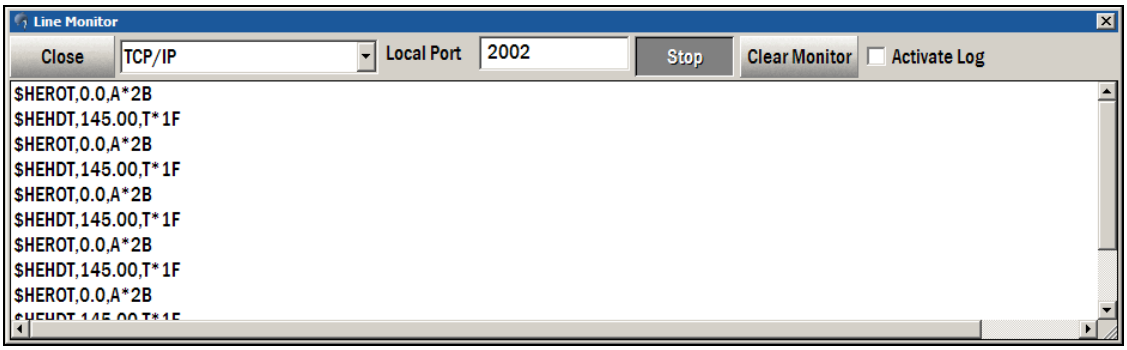


Figure 9 Line Monitor window

2. In the **Line Monitor** window, select the communication line from the drop-down list next to the **Close** button. In case the communication line is a COM port, select the line baud rate from the drop-down list next to the lines list. In case the communication line is a TCP/IP or a virtual line, enter the local port number to the **Local Port** field.

   NOTE: if an `io.lines.xml` configuration file is used, the drop-down list next to the **Close** button contains a list of communication lines described in the configuration file. Select the line to monitor in the list.

3. Check the **Activate Log** checkbox if you want all received messages to be written to a log file [`C:\ECDISDATA\Debug\LineMonitor.txt`].
4. Press the **Start** button (the button label will change to **Stop**). If messages are being received they are displayed in the window (what you see is AIS messages in the official format).
5. To clear the window, press the **Clear Monitor** button.
6. To stop monitoring press the **Stop** button.
7. To close the **Line Monitor** window, press the **Close** button.

3.2 Own Ship Data

IMPORTANT!

The own ship data configuration is only available to system administrators and is protected with a password.

*However, the own ship **current draft** can be changed without the password provided no other own ship parameter has been changed.*

Configuring operating parameters of the own ship is very important for the correct functioning of the system. The own ship parameters are configured in the **Config → Own Ship** tab. Here you can introduce parameters of the own ship and set precise location of various devices onboard.

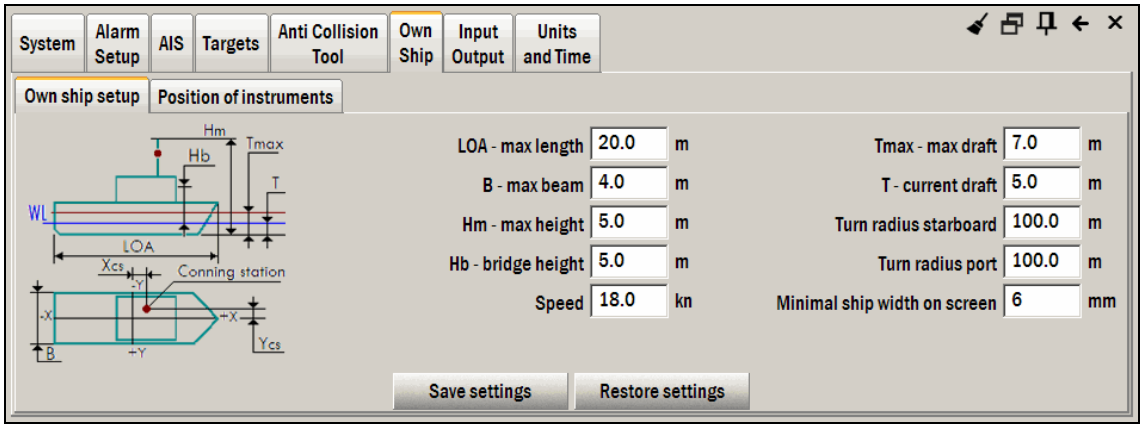


Figure 10 Config → Own ship tab, Own ship setup tab

To set the own ship parameters, do the following:

1. Open the **Config → Own Ship → Own ship setup** tab.
2. In the tab, enter values of the parameters to the fields corresponding to the parameters:
   - **LOA-max Length** – Maximum length of the vessel.
   - **B-max beam** – Maximum beam of the vessel.
   - **Hm-max height** – Maximum height of the vessel including the mast.
   - **Hb-bridge height** – Height of the bridge.
   - **Speed** – Speed in knots.
   - **Tmax-max draft** – Maximum draft of the vessel.
   - **T-current draft** – Current draft of the vessel.
   - **Turn radius starboard** – Starboard turn radius.
   - **Turn radius port** – Port turn radius.
   - **Minimal ship width on screen** – If the width of the scaled own ship symbol in the scale of the currently displayed chart is less than the parameter value, the scaled symbol changes to the point symbol.
3. After the parameters have been entered, press the **Save Settings** button, enter the password and press **OK**.
4. To restore previously saved settings, press the **Restore Settings** button. It is impossible to restore the previous settings after the new settings have been saved[3].

To set precise locations of positioning and other devices onboard the own ship, do the following:

1. Open the **Config → Own Ship → Position of instruments** tab. Here you can set the precise location for all positioning devices registered in the **Config → Input/Output** tab as well as radar and other devices onboard the own ship.

[3] Measurement units for the own ship parameters are set in the **Config → Units and Time** tab.

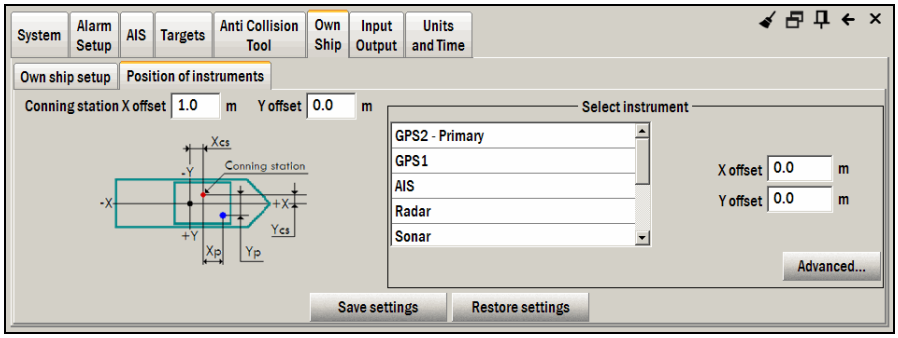


Figure 11 Config → Own ship tab, Position devices tab

2. Set the conning station offset from the center of the vessel:
   - **Conning station X offset** – Distance from the conning station to the centre of the vessel along the x- axis.
   - **Conning station Y offset** – Distance from the conning station to the centre of the vessel along the y-axis.
3. Select a device in the **Select instrument** list and set parameters for the device. The parameters are:
   - **X offset** – Distance from the vessel conning station to the device along the x-axis.
   - **Y offset** – Distance from the vessel conning station to the device along the y-axis.
4. After the parameters have been entered, press the **Save Settings** button, enter the password and press **OK**.
5. To restore previously saved settings, press the **Restore Settings** button. It is impossible to restore the previous settings after the new settings have been saved.
6. The **Advanced** button opens for editing the `MODevices.config.xml` file where you can enter values of RMS and fixed corrections for observation devices for the LOP position fix function (*see chapter 7.2.3, Manual Position Fix by Range and Bearing LOPs*)[4]

3.3 System Setup

3.3.1 Measurement Units and Time

To set the measurement units for various values such as distance, speed, depth, elevation, and various dimensions, use the options provided in the **Config → Units and Time** tab. In the tab you can also set the time parameters: select the time zone you are sailing in, set the daylight saving time if necessary, as well as select the format of the date display.

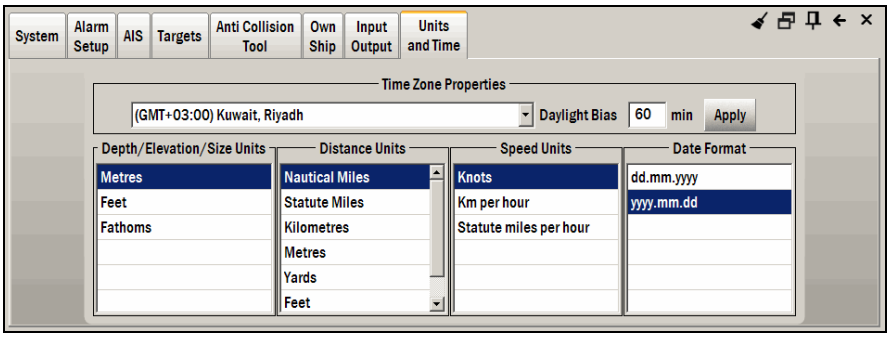


Figure 12 Config → Units and Time tab

To set measurement units, do the following:

1. To set the measurement unit for depths, elevations, and dimensions, select the unit in the **Depth/Elevation/Size Units** list. The setting is applied immediately. The selected unit is indicated by the **Depth/Elevation Unit Indicator** in the lower left corner of the chart view.

[4] Measurement units for the device offsets are set in the **Config → Units and Time** tab.

2. To set the measurement unit for distances, select the unit in the **Distance Units** list. The setting is applied immediately.
3. To set the measurement unit for speed, select the unit in the **Speed Units** list. The setting is applied immediately.

To set time parameters, do the following:

1. To set the time zone, select the time zone from the time zones drop-down list. For the setting to take effect, press the **Apply** button.
2. To set the daylight saving, enter the value in minutes to the Daylight Bias field. For the setting to take effect, press the **Apply** button.
3. To set the time format, select the format in the **Date Format** list. The setting is applied immediately[5].

3.3.2 User Interface Language Setup

ECDIS supports three languages for the user interface: English, Russian and Italian.

To set the interface language, do the following:

1. Open the **Config → System** panel, Figure 13.

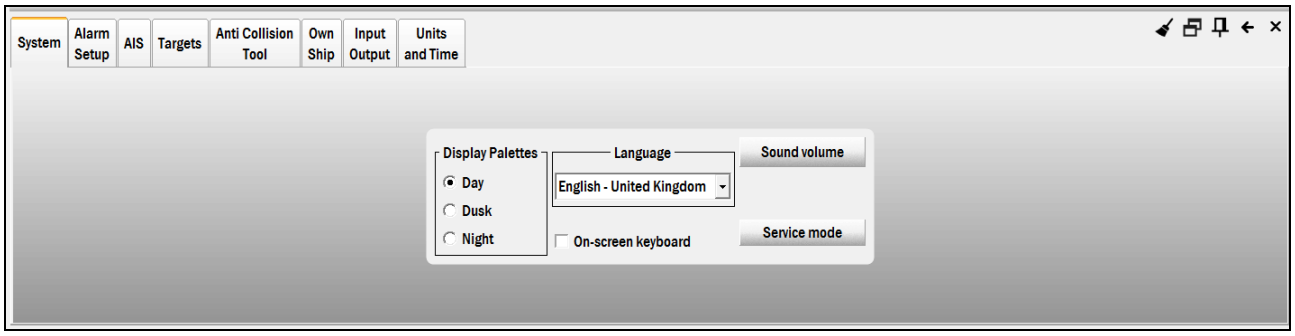


*Figure 13 The **Config-System** tab*

2. Select an interface language in the **Language** drop-down list.
3. For the changes to take effect, restart ECDIS.

3.3.3 Volume Setup

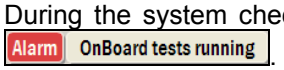
To set up the volume, go to the **Config → System** panel and press the **Volume** button. A standard **Volume Control** window will open where the system sound can be configured.

3.3.4 System Check-up

While working with the ECDIS, you need to be aware of the system current state. The access to the system check-up information is provided in the **Info → System Info** tab.

The system check-up includes checking databases status (**Databases status** tab), licenses status (**Licenses status** tab), disks status (**Disks status** tab), and talkers status (**Talkers status** tab).

To perform the system check-up at the ECDIS startup, check the **Perform check on startup** checkbox. To refresh the system check-up information, press the **Refresh info** button (while the refreshing procedure is running the button label is **Abort**).

During the system check-up the message indicating the process running appears in the Alarms indicator 

. Once acknowledged, the message is removed from the current alarms list.

In case the **Perform check on startup** checkbox is not set, the check-up is carried out automatically every seven days.

[5] The current onboard time is indicated in the **Time and Date** line of the **Navigational** panel. The time value is calculated using the UTC time value received from the positioning device plus the time zone offset. To see the UTC time, left-click on the **Time and Date** line and hold the button: the time changes to the UTC time. When you release the button, the time changes back to the onboard time.

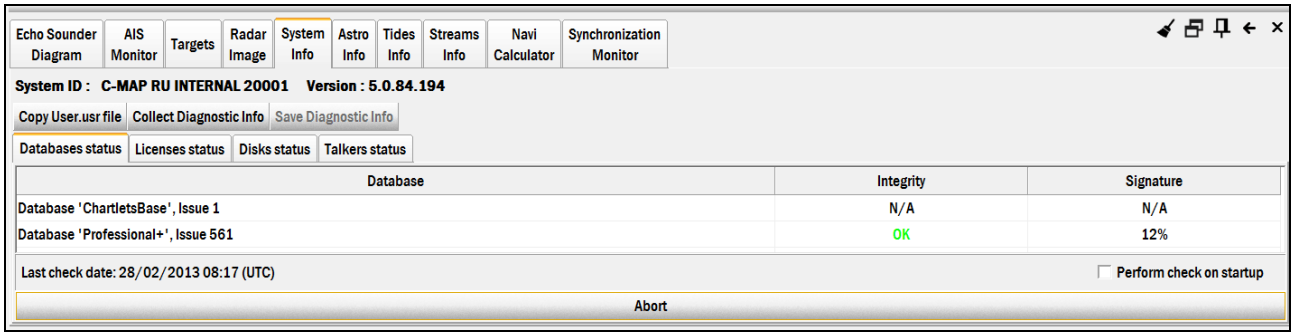


Figure 14 Info → System Info tab

3.3.5 System Information

The **Info → System Info** tab gives the user easy access to the System ID and the version of the CM-93/3 SDK installed. The system ID is a unique ID required for all systems that use CM-93/3 chart databases and should be the same as the one written on the C-MAP eToken dongle.

To save the system information to a file, do the following:

1. Press the **Copy User.usr file** button. The **Copy User.usr file** dialog will open.
2. In the **Copy User.usr file** dialog, select a folder where to save the file and press the **Export** button. The file will be saved to the specified location.

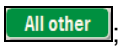
3.3.6 Color Differentiation Test

The color generating capability of any type of display screen will deteriorate with age and the Color Differentiation Test diagram is provided to enable the mariner to verify that his display screen still retains the color differentiation capability needed to distinguish between the various color-coded areas, lines and point symbols of the ECDIS display.

The Color Test should be applied on the day and dusk color palettes (*see chapter 7.5.3, Chart Display Palettes*).

Before the Color Test diagram is used, the black-adjust symbol SY(BLKADJ) should be brought up on the screen and the contrast and brightness controls (or equivalent controls for an LCD) should be adjusted in a specific way.

To bring up the black-adjust symbol, do the following:

1. Make sure that the ChartletsBase database is registered (*see chapter 4.1, Installing and* Displaying Database) and added to the view (*see chapter 4.1.2Displaying Database*).
2. Open the **Data → Chart Catalogue** tab. In the databases drop-down list, select the ChartletsBase database. Datasets included in the database will be listed in the pane below the drop-down list.
3. Double-click on the AA5C1AB2 dataset (the dataset contains the black-adjust symbol). The chart view will be scrolled and scaled so that to fully display the dataset. The black-adjust symbol will be displayed in the chart view.
4. If you can't see the black-adjust symbol, make sure the following arrangements are made:
   a. the display type is set to **All other** – the display type indicator is All other  ;
   b. the chart presentation type is set to S52 – the **S52** option is selected in the **Chart → Chart Presentation** tab, **Presentation** section;
   c. the chart view scale is larger than 1:16 500.

To adjust the contrast and brightness control, do the following:

1. First, set contrast to a maximum, brightness to a minimum. Look at the black-adjust symbol.
2. Then if the centre square is not visible, turn up the brightness until it just appears.
3. Or, if the centre square is clearly visible (with contrast at maximum, brightness at minimum), turn the contrast down until the inner square disappears, then turn contrast back up until the inner square is just visible again.
4. If the above adjustment is not successful, select a more appropriate chart display palette and repeat this procedure.

5. The "black level" is then correctly set. If a brighter display is required use the contrast control, but preferably do not adjust the controls unless lighting conditions on the bridge change.

After the “black level” has been set, you can proceed with the color test. For the test you need to display the color differentiation diagram in the chart view.

To open the color diagram, do the following:

1. Make sure that the ChartletsBase database is registered (*see chapter 4.1, Installing and* Displaying Database) and added to the view (*see chapter 4.1.2Displaying Database*).
2. Open the **Data → Chart Catalogue** tab. In the databases drop-down list, select the ChartletsBase database. Datasets included in the database will be listed in the pane below the drop-down list.
3. Double-click on the AA5C1WOO dataset (the dataset contains the color differentiation test diagram). The chart view will be scrolled and scaled so that to fully display the dataset. The color diagram will be brought up to the chart view.
4. If you can’t see the color test diagram, make sure the following arrangements are made:
   a. the display type is set to **All other** – the display type indicator is All other 

;
   b. the chart presentation type is set to S52 – the **S52** option is selected in the **Chart → Chart Presentation** tab, **Presentation** section;
   c. the chart view scale is larger than 1:16 500.
5. The diagram consists of twenty squares extending over the whole of a 350x270 mm (approx) screen. Each square is colored with one of the four main background area shades (such as shallow water blue, DEPVS), and each carries a two-pixel wide diagonal line in one of the important line or symbol foreground colors (such as planned route red, PLRTE).
6. The color differentiation test consists of being able to distinguish the background colors and to pick out the like foreground colors, i.e. to say that squares 3, 5, 11, 15, 18 and 20 all have a shallow water blue background, and that squares 3, 10 and 17 have a grey line.

3.4 Updating ECDIS Software

To update the ECDIS software you will need a CD or DVD disk with the new version.

To install the new version, do the following:

1. Insert the disk to the disk reader.
2. Installation package will launch automatically.
3. Follow the installation package instructions.
4. Updated software components will be installed in the same location, where the previously installed components are.

3.5 Data Synchronization

The ECDIS implements a data synchronization technology designed to synchronize a single set of data between all ECDIS computers connected in the cluster by automatically copying all changes introduced to the data back and forth.

Data that are synchronized are: routes, databases, updates, manual updates, mariner objects, and own ship configuration.

3.5.1 Synchronization Setup

Synchronization is carried out over the local network[6]. Computers of the network are assigned names and roles. Names uniquely define each computer in the data synchronization scheme. Roles are not unique, there can be several computers with the same role, and define the way computers participate in synchronization. The network configuration for data synchronization is defined using an `*.xml` configuration file `Network.Config.xml`. The file is located in the `[C:\ECDISDATA\Config\]` folder.

[6] Synchronization setup is done using an *.xml configuration file and is available only to system administrators.

3.5.2 Synchronization Monitor

Data synchronization is an automatic process over which the user has no control. Information about the current synchronization status is displayed in the **Info → Synchronization Monitor** tab.

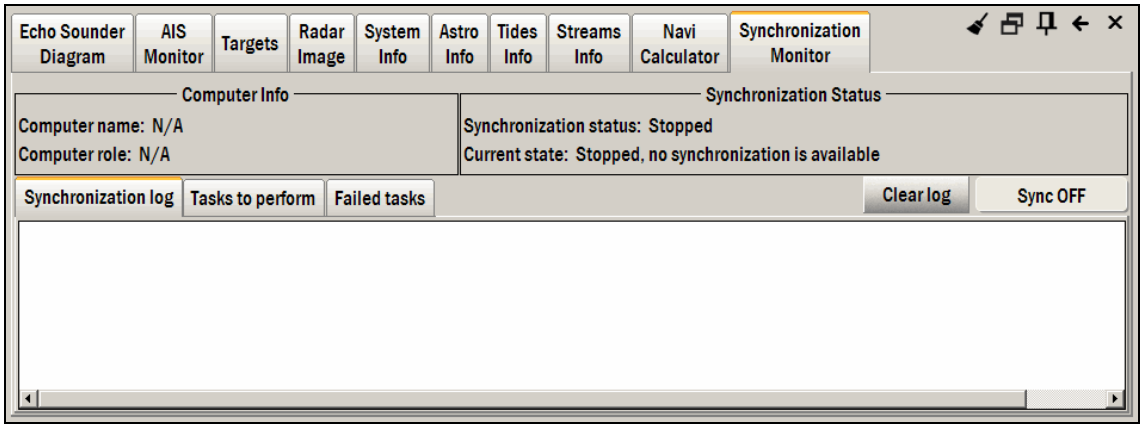


Figure 15 Info → Synchronization Monitor tab

In the **Info → Synchronization Monitor** tab, the following information is displayed:

- **Computer name** – name of the computer (unique identifier of the computer in the local network);
- **Computer role** – role of the ECDIS computer;
- **Synchronization status** – status of synchronization tool on the computer:
  - **Active** – ECDIS receives incoming synchronization data and sends outcoming synchronization data;
  - **Stopped** – ECDIS cannot receive incoming data nor can it send outcoming synchronization data;
  - **Disabled** – ECDIS receives incoming synchronization data, but cannot send outcoming synchronization data;
- **Current state** – current state of synchronization process on the computer:
  - **Disabled, able to synchronize with remote computers** – the synchronization tool is disabled, the local computer can only receive synchronization data from other local network computers and carry out synchronization; but it cannot send synchronization data to other computers;
  - **Stopped, no synchronization is available** – the synchronization tool is stopped, no synchronization data can be received or sent;
  - **Ready to start synchronization** – the local computer is ready to receive synchronization data and carry out synchronization;
  - **Waiting for remote synchronization to finish** – synchronization is in progress between remote computers of the local network and the local computer is waiting its turn for synchronization;
  - **Synchronization in progress** – synchronization is running on the computer;
- **Synchronization log** – in the **Synchronization log** tab, messages informing about the synchronization process are displayed. To clear the log window, press the **Clear log** button.
- **Tasks to perform** – the list of synchronization tasks the local computer is to perform; if the task is performed successfully, the task entry is removed from the **Tasks to perform** table and the message informing about the task completion appears in the **Synchronization log**; if the task failed, it is moved to the **Failed tasks** table and then, after 3 minutes, back to the **Tasks to perform** table;

  The **Tasks to perform** table has the following fields:
  - **Target** – the role of the target computer; all computers with the indicated role will be sent synchronization data;

- **Data type** – type of data that should be synchronized; can be Databases, Updates, Manual Updates, Mariners Objects, Routes, Own Ship Configuration, or Chart Data;
- **Manual** – indicates if the task was carried out automatically (Manual – No) or manually (Manual – Yes);
- **Clear metadata** – indicates if synchronization metadata are to be deleted (Yes) or not (No); metadata are deleted if the number of failed attempts to carry out a task has reached ten;

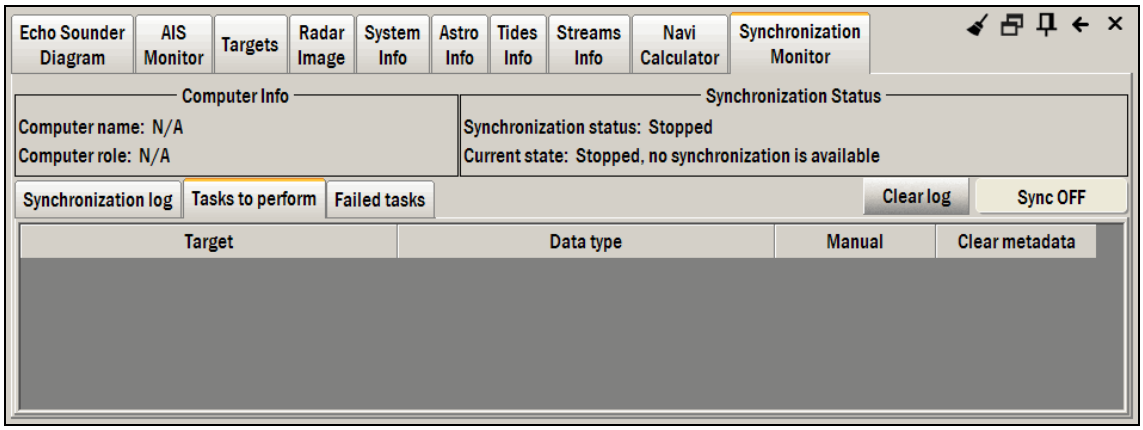


Figure 16 Info → Synchronization Monitor tab, Tasks to perform tab

- **Failed tasks** – the list of failed synchronization tasks; tasks are moved from the **Failed tasks** table back to the **Tasks to perform** table after 3 minutes with the number of attempts increased by one; after the number of attempts to perform the task reached 5, the task metadata are cleared and the number of attempts is set to zero; the task completion tries are continued.

  The **Failed tasks** table has the following fields:

  - **Target computer** – the name of the target computer: only computer with the indicated name is sent synchronization data;
  - **Data type** – type of data that should be synchronized; can be Databases, Updates, Manual Updates, Mariners Objects, Routes, Own Ship Configuration, or Chart Data;
  - **Manual** – indicates if the task was carried out automatically (Manual – No) or manually (Manual – Yes);
  - **Attempts done** – number of attempts to perform the task; when the number reaches five, the task metadata are cleared;

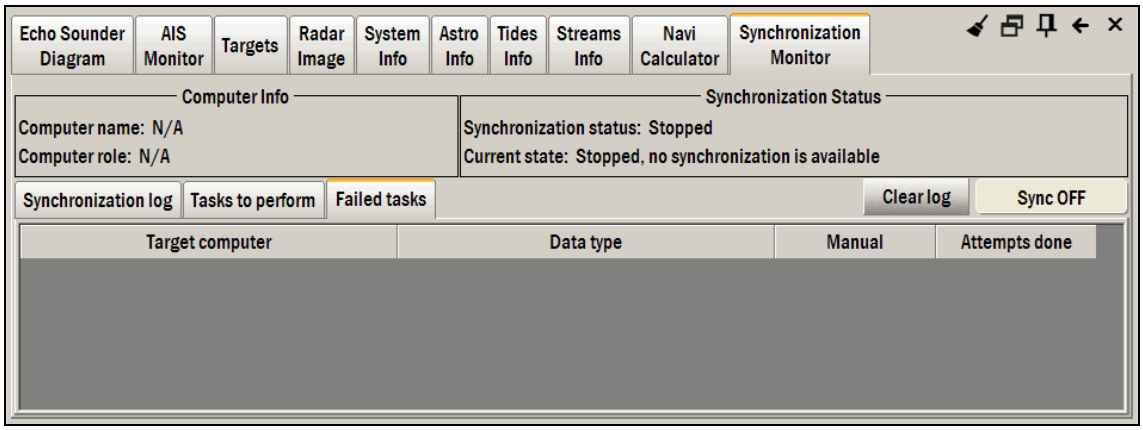


Figure 17 Info → Synchronization Monitor tab, Tasks to perform tab

In the **Info → Synchronization Monitor** tab, the **Synchronization** indicator is presented to help monitor synchronization. The indicator shows the current state of the synchronization process.

Sync OFF	Corresponds to the **Disabled, able to synchronize with remote computers** current state – the synchronization tool is disabled, the local computer can only receive synchronization data from other local network computers and carry out synchronization; but it cannot send synchronization data to other computers.
Sync ready	Corresponds to the **Ready to start synchronization** current state – the local computer is ready to receive synchronization data and carry out synchronization.
Sync run	Corresponds to the **Synchronization in progress** current state – synchronization is running on the computer.
Sync wait	Corresponds to the **Waiting for remote synchronization to finish** current state – synchronization is in progress between remote computers of the local network and the local computer is waiting its turn for synchronization.

3.5.3 Routes Synchronization

All data types are synchronized between the network computers automatically. However, synchronization of routes may require additional actions on the part of the user.

Route planning is supposed to be done on the Route Planning Station computer. Synchronization of routes between the Route Planning Station and the Master computer should be done manually.

To synchronize routes manually, do the following:

1. Open the **Route → Route Planning** tab.
2. In the **Synchronize routes with** drop-down list, select the computer to synchronize routes with, and press the **Synchronize routes with** button. A synchronization task will be created and added to the list of tasks to perform.
3. The task is performed using the same procedure as for automatic synchronization tasks[7].

3.6 System Diagnostics Tools

The new function has been implemented for complex diagnostics of the system and saving the results in the form of a report[8].

Start-up test might not be enough for exhaustive diagnostics of the system. In this case use the complex diagnostics utility by pressing the **Collect diagnostic info** on the **Info-System info** tab, Figure 14. The results will re saved to a file named report.nfo, which you can view and/ or save to an external media. To do the latter, press the save diagnostic info and specify the file directory in the standard **Browse for folders** window that will then open.

[7] Routes are synchronized automatically between Master and Backup computers. You don't have to synchronize the data manually between these computers.

If changes in routes data were made on Master or Backup computers they have to be manually synchronized with Route Planning Station.

[8] *New feature in 5.0.84 program version.*

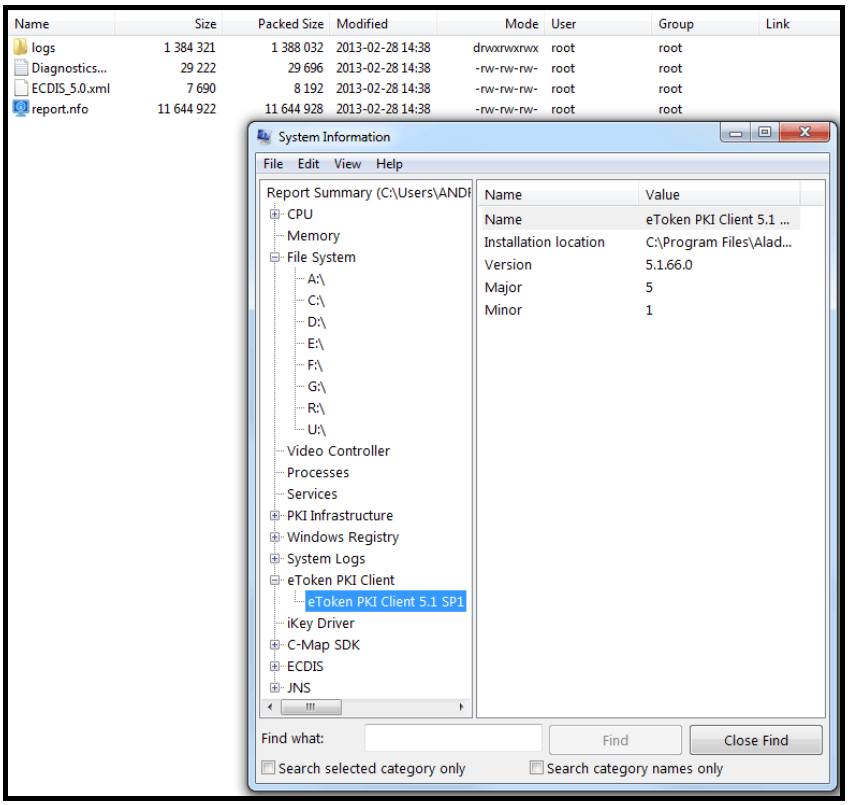


Figure 18 System diagnostic report

4. INSTALLING DATA

4.1 Installing and Displaying Databases

4.1.1 Installing Databases

Installing chart databases on your system includes copying the databases to the system hard disk and registering them in the ECDIS application. Installing can be done in the **Data → Databases** tab.

To install a database, do the following:

1. Open the **Data → Databases** tab.

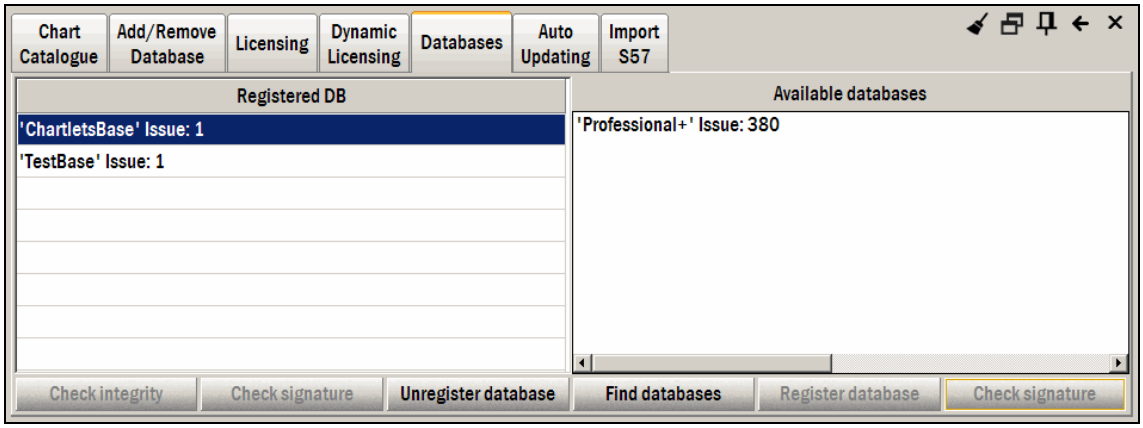


Figure 19 Data → Databases tab

2. Connect the data storage device with the database to the system and press the **Find databases** button. Databases are searched for on all removable devices connected to the system. All detected databases are listed in the **Available databases** pane (name and issue number).

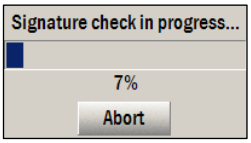


Figure 20 Signature check in progress dialog

3. Select the database name in the **Available databases** pane: the **Register database** and **Check signature** buttons become active. The **Check signature** button only becomes active if the signature check is available for the selected database.
4. To check the database signature, press the **Check signature** button. The signature check progress is displayed in the **Signature check progress** dialog. To cancel the procedure, press the **Abort** button.

   Upon the termination of the signature check a message with the information on the check results appears[9].
5. To install the database, select the database in the **Available databases** pane and press the **Register database** button: the database is copied to a pre-defined location on the system hard disk and registered automatically. The database is added to the **Registered DB** list.
6. The following operations can be carried out with registered databases: integrity check, signature check, and unregistering:

   - To check the integrity of a registered database (if available), select the database in the **Registered DB** list and press the **Check integrity** button (the button becomes active if integrity check is available for the database).

     Upon the termination of the integrity check a message with the information on the check results appears[10].
   - To check the signature of a database, select the database in the **Registered DB** list and press the **Check signature** button (the button becomes active if the signature check is available for the selected database).

[9] The signature check may help identify problems with the data authenticity and integrity. In case any problems have been identified in the course of the signature check, contact the database provider to settle them.

[10] The integrity check may help identify problems with the updates data integrity. In case any problems have been identified in the course of the integrity check procedure, contact the updates provider to settle them.

Upon the termination of the signature check a message with the information on the check results appears.

- To unregister a database, select the database in the **Registered DB** list and press the **Unregister database** button. The database will be unregistered.

IMPORTANT!

If you unregister a database, it is deleted from the system hard disk. To restore data, you will need to obtain the database saved on a removable data storage device and install the database once more.

After the database has been installed, it has to be added to view (*see chapter 4.1.2, Displaying Database*) and licensed (*see chapter 4.2, Licensing Data*) if licensing is necessary.

4.1.2 Displaying Databases

To display data from a database on the system screen, the database should be added to the view. If you have installed several databases you can hide databases you don't need at the moment and display those that you need.

To add a database to the view, do the following:

1. Open the **Data → Add/Remove Database** tab. All registered but not added to the view databases are listed in the **Registered Databases** pane; all registered and added to the view databases are listed in the **Databases in View** pane[11].

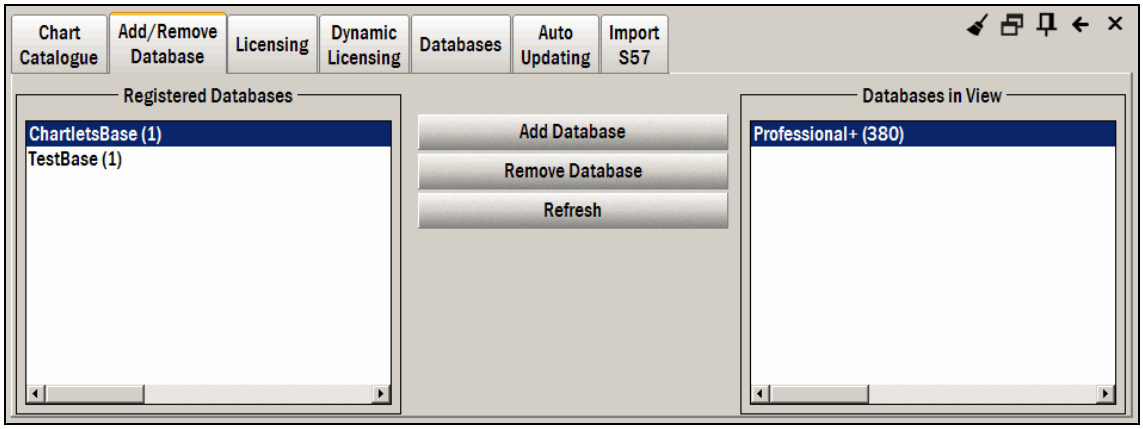


Figure 21 Data → Add/Remove Database tab

2. To add a database to the view, select the database in the **Registered Databases** list and press the **Add Database** button. The database name will be moved to the **Databases in View** list and the data from the database will be displayed in the chart view.
3. To remove a database from the view, select the database in the **Databases in View** list and press the **Remove Database** button. The database name will be moved back to the **Registered Databases** list and the data removed from the chart view.
4. To refresh the **Registered Databases** and **Databases in View** lists (in case they were modified using external tools), press the **Refresh** button.

[11] Generally, databases are automatically added to the view in the process of registration.

4.2 Licensing Data

Cartographic data stored in chart databases produced by Jeppesen are protected from unauthorized use by licenses. Licenses allow viewing all charts available for a specified area in the database: without licenses you can only view small scale charts. Licenses are available for worldwide coverage or any combination of Zones, Areas, or Cells. You have to purchase and install licenses for the coverage you have selected.

The entire world coverage is divided into 9 Zones. Each Zone is divided into several Areas. Some Zones are also divided into Cells (4X4 degrees) and special areas. You may have a license for any combination of Zones, Areas, and Cells.

Zones are specified by their numbers from Zone 0(World coverage) to Zone 10.

Areas are specified by Zones to which they belong and their numbers in the Zones, e.g. Zone 1, Area 3.

Cells are regarded as Areas and their numbering continues after the numbering of Areas in a Zone. For example, the first Cell in the Zone 2 is listed as Zone 2, Area 7. As there are six Areas in that Zone, Areas following the Zone 2, Area 6 are actually Cells.

To obtain a license for the coverage you need for a voyage, you should come to your charts supplier with your eToken and after settling purchase formalities, you will be provided with the licenses file.

You can also order licenses by e-mail or by phone. To do so, you will have to provide your System ID number to your chart suppliers.

IMPORTANT!

The System ID is necessary for issuing licenses. It is unique for your system and stored in the eToken. Each license is issued for a specified System ID. You will be able to use a license only if it is issued for your System ID and only if the correct eToken is connected to the system.

*The System ID information is available in the **Data → Licensing** tab and in the **Info → System Info** tab.*

For details about ordering and purchasing licenses, contact your charts supplier.

After the licenses have been obtained (as a licenses file or as 16-digit license codes), they must be installed on the system to enable the ECDIS application to decrypt and use the data (for the chart database, only the coverage for which you have purchased licenses can be displayed).

4.2.1 Installing Licenses Manually

You can install licenses manually if you have 16-digit license codes.

To install a license manually, do the following:

1. Open the **Data → Licensing** tab.
2. In the **Databases** drop-down list select the database for which you are applying the license.
3. Press the **Add manually** button to open the pane for manual licenses installation.

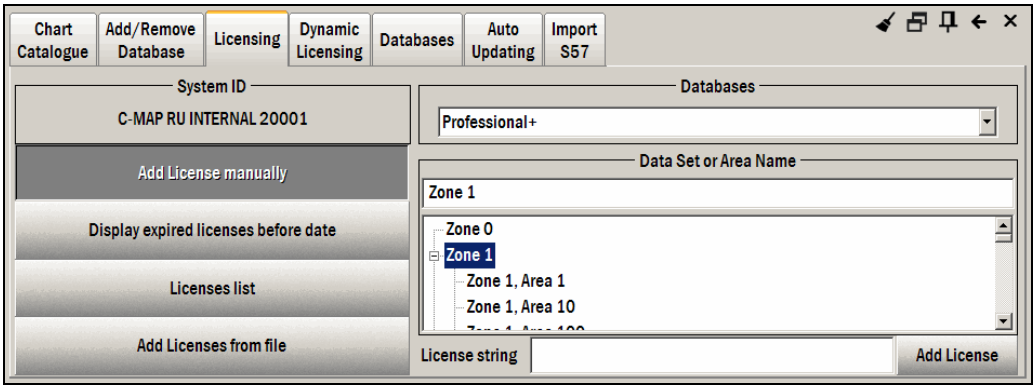


Figure 22 Data → Licensing tab, Add Licenses manually

4. In the areas list select the Zone or the Areas for which the license is generated. Your selection will be displayed in the **Data Set or Area Name** field above the list.
5. Enter manually or copy and paste the 16-digit code to the **License String** field.

6. Please ensure that you have an eToken connected to the system. The eToken must be the one used during installation.
7. Press the **Add License** button. The process will take a few seconds. Upon completion, a message *License has been added successfully* will appear. Press **OK**[12].

4.2.2 Installing Licenses from File

If you have a license file, you can install all licenses stored in the file using the **Add Licenses from File** function.

To install licenses from file, do the following:

1. Connect the removable data storage device with license file to the system. License files should be stored in a folder named `Licenses` for the ECDIS to be able to detect them.
2. Open the **Data → Licensing** tab.
3. In the **Databases** drop-down list, select the database for which you are applying the license.
4. Press the **Add Licenses from file** button to open the pane for adding licenses from file.
5. Press the **Find licenses** button to start searching for license files on all removable devices connected to the system. All detected licenses are listed in the upper window of the pane (the name and issue number of the database for which the license is issued and the license expiration date). Select a license to view the path to the license file, the license coverage and the license code in the lower window of the pane.

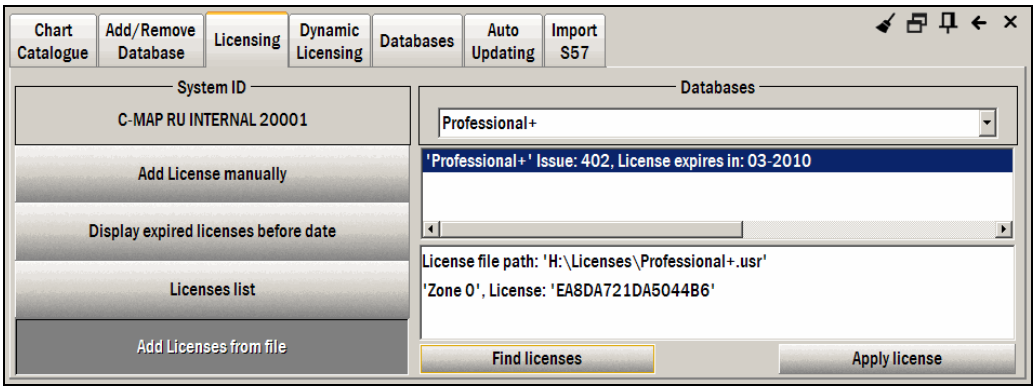


Figure 23 Data → Licensing tab, Add Licenses from file

6. To install licenses, select the license file with licenses to be installed and press the **Apply license** button. Licenses will be installed and registered automatically. The licenses installation process will take a few seconds. Upon completion, a message *Licensing completed* will appear.
7. After the license has been installed, the licensed data is displayed on the screen immediately.

4.2.3 Viewing Installed Licenses

You can view the list of all licenses applied to a specified database. To do so:

To view the list of installed licenses, do the following:

1. Open the **Data → Licensing** panel.
2. In the **Databases** drop-down list select a database.

Press the **Licenses list** button. The licenses list will be displayed in the licenses list pane. The information displayed for each license includes expiry date, coverage, and license code.

You can get a list of licenses that expire before a specified date.

To view the list of licenses expiring before a specified date, do the following:

1. Open the **Data → Licensing** tab.
2. In the **Databases** drop-down list select a database.

---

[12] Note that when you enter information in the **Data Set or Area Name field** you will only find Zones and Areas. Cells are also listed as areas in this list. All Cells, Areas and Additional Areas within a Zone have a unique number. For example the cell 94B in Zone 1 will be listed as Zone 1, Area 91.

3. Press the **Display expired licenses before date** button to open the pane where you can view the licenses expiring before a specified date.
4. In the date field enter the licenses expiry limit date and press the **Display expired licenses before date** button. In the list below all licenses that expire before the specified date will be displayed.

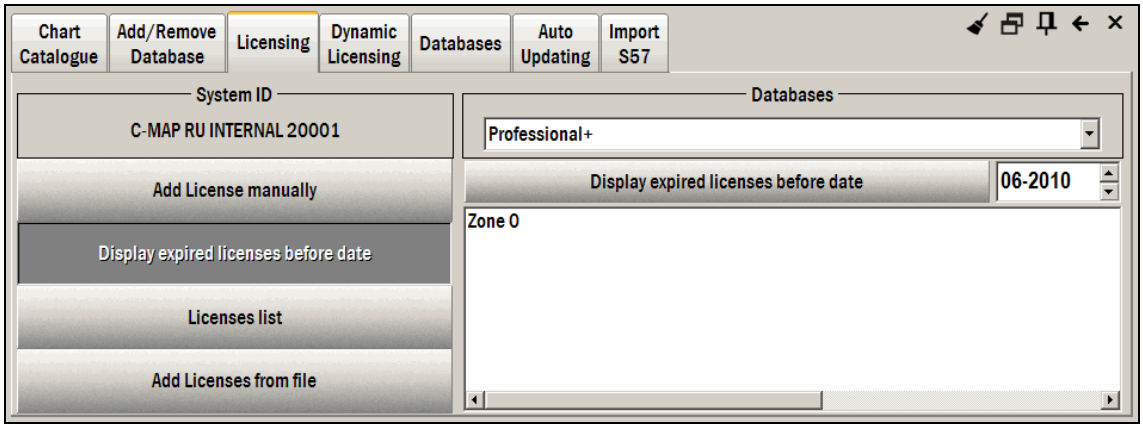


Figure 24 Data → Licensing tab, Display expired licenses before date

4.2.4 Dynamic Licensing

Jeppesen Marine provides its clients with a new service: dynamic licensing. Dynamic licensing gives clients the possibility to pay for licenses for single charts that were actually viewed rather than for licenses for a whole database or a chart collection.

➢ **To activate the dynamic licensing service, do the following:**

1. Contact Jeppesen Marine and subscribe to the dynamic licensing service. You will be registered on the server. In the subscription, databases and chart collections available to you will be specified.
2. To activate the service, send an updates request to the updates server from your computer or, in case of a local network, from the server computer (*see chapters 6.1.1, Automatic Updating and 6.1.2, Semi-automatic Updating*).
3. In response, the updates server sends updates for already licensed datasets, if there are any, and the dynamic licensing initialization answer. The initialization answer contains:
   - The System ID of the system the answer is intended for;
   - Indication of an action to be performed (Activate or Stop the service, or Change the service terms);
   - Credit value, which is a part of the overall bridge credit;
   - Mandatory report date for not reported charts; if a chart is not reported before the date, the access to all data (both reported and not reported datasets) is denied and can only be resumed after the chart use is reported and confirmed;
4. The dynamic licensing information (credit value, collection keys, and next mandatory report date) is written to the eToken.
5. In case of an ECDIS cluster, the dynamic licensing information is distributed over the network to all nodes.
6. After the subscription has been activated, the following information is displayed in the **Data → Dynamic Licensing** tab:
   - credit rest in the **Credit Rest** field, the credit rest value is sent to you each time you receive updates;
   - next mandatory report date in the **Next Report Date** field;

- last confirmation date in the **Last Confirmation Date** field;
- the list of databases available for dynamic licensing in the **Available Databases** list;
- the list of collections available for dynamic licensing in a specified database in the **Available Collections** list (the collections are listed in your subscription);

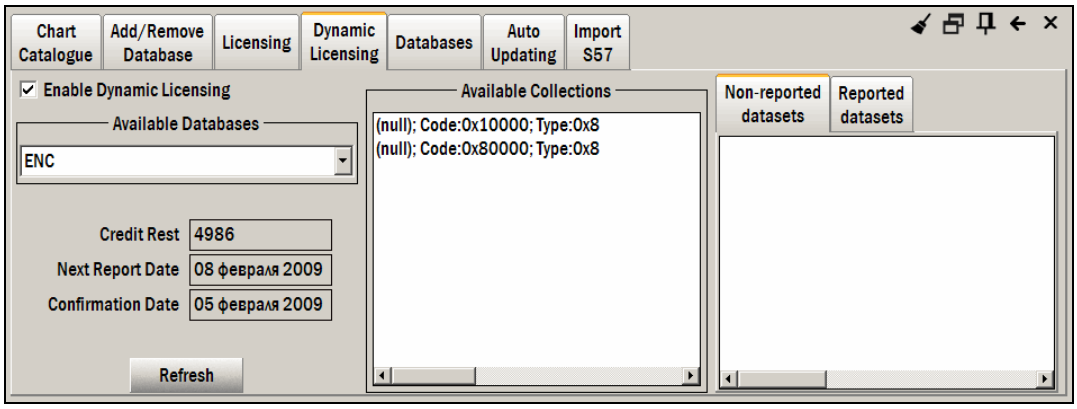


Figure 25 Data → Dynamic Licensing tab, data displayed after the service activation

➢ **To view charts using dynamic licensing, do the following:**

1. Make sure that the **Enabled Dynamic Licensing** checkbox in the **Data → Dynamic Licensing** tab is checked.
2. Scroll the chart view to the chart you want to open and zoom in. The chart will be opened and added to the non-reported charts list. The price of the chart will be deducted from the credit rest value. To view the non-reported charts list, press the **Non Reported** button; and to view the reported charts list, press the **Reported** button. In lists, names and data access expiry dates are displayed[13].
3. To refresh the data displayed in the **Data → Dynamic Licensing** tab, press the **Refresh** button.
4. The use of charts should be reported to the server within a specified time: the mandatory date of the next report. If you fail to report the charts, you will be denied access to both reported and non-reported charts. To resume the access to data all charts should be reported and confirmed.
5. To report the use of charts, request updates using automatic or semi-automatic updating functionality (*see chapters 6.1.1, Automatic Updating and 6.1.2, Semi-automatic Updating*). Reports on the use of dynamically licensed data are sent automatically together with the update request; and the confirmation answers containing new credit rest value, new date of mandatory report and expiry date for all reported charts are sent back with updates.

➢ **To change terms of the dynamic licensing service or to terminate the service, do the following:**

1. Contact Jeppesen Marine and agree on the terms changes or the service termination. The changes will be registered on the server.
2. To activate the changes, send an updates request to the updates server from your computer or, in case of a local network, from the server computer (*see chapters 6.1.1, Automatic Updating and 6.1.2, Semi-automatic Updating*). In response, the server sends updates for already licensed datasets, if there are any, and the dynamic licensing initialization answer where the action to be performed (terms changes or service termination) will be indicated.

4.3 Installing New Version of the Database

Cartographic data are likely to change often. These changes are applied to databases in the form of updates. Later the updates are included in the database as regular data and a new version of the database is issued. These issues are made regularly and if you are a Jeppesen Marine customer, you are provided with the new versions of the CM-93/3 chart database as soon as it is issued.

To install a new version of the database, do the following:

1. Open the **Data → Databases** tab.

[13] You can only view charts of the collections you are subscribed to.

2. Connect the data storage device with the new version of the database to the system and press the **Find databases** button. Databases are searched for on all removable devices connected to the system. All detected databases are listed in the **Available databases** pane (name and issue number). Currently registered databases are displayed in the **Registered DB** list.

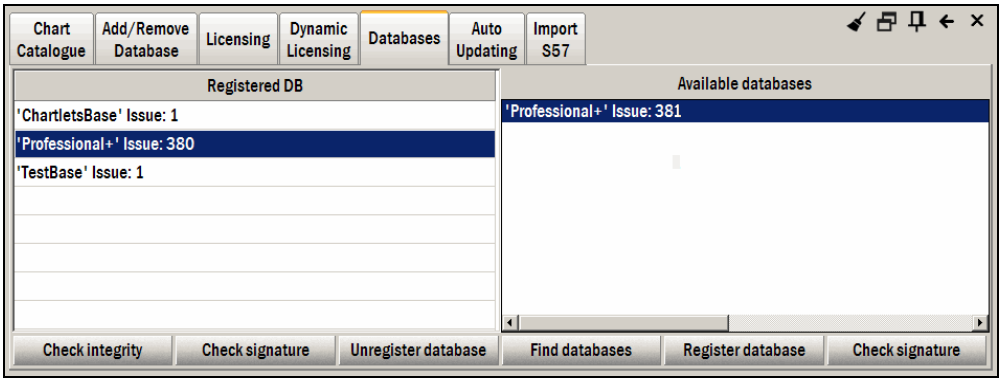


Figure 26 Data → Databases tab, current version database in the Registered DB list, new version database in the Available databases list

3. Select the new version database in the **Available databases** list and press the **Register database** button. In this example it will show the message *'The database 'Professional+', issue: 380 already registered. Do you want to update it with database 'Professional+', issue: 381?'* Press the **YES** button.

4. The old version of the database will be overwritten with the new version. The new version is registered and added to the view automatically[14].

4.4 Licensing Software Modules

The ECDIS application includes functional modules that require individual licensing. These modules are Import S-57, Anticollision, Ship Model, and ECDIS Input/Output.

- **Import S-57** – module performing import of cartographic data from the S-57 format to the CM93v3 format.
- **Anticollision** – module performing estimation of collision danger of the own ship and an AIS or ARPA target.
- **ECDIS Input/Output** – module controlling connection of input/out devices to the system and processing data coming from the devices.

Licensing of software modules is performed in the same way as licensing of cartographic data. To carry out operations with licenses of software modules, in the **Data → Licensing** tab, select **Software Modules** from the **Databases** drop-down list. After that all other operations with installing of licenses are identical to the operations for installing data licenses.

4.5 ENC Data in S-57 Format

4.5.1 S-63 Protection of ENC Data

The ECDIS fully implements the IHO data protection scheme (S-63). All elements of the scheme required on the Data Client side are available in the **Data → Import S57** tab.

To use ENC data protected with the S-63 scheme, you will need to be able to perform the following actions:

- Send your user permit written in your dongle together with data request to a Data Server to order data;
- Apply S-63 cell permits to be able to decrypt the data;
- Apply Scheme Administrator (SA) certificate to be able to verify data authenticity.

[14] It is important to note that all existing licenses will be valid after the new version of the database is installed and you will not need to request new licenses.

To copy user permit to a file, do the following:

1. Open the **Data → Import S57** tab and press the **Copy user permit** button. The **Copy S63 User Permit** dialog will open.

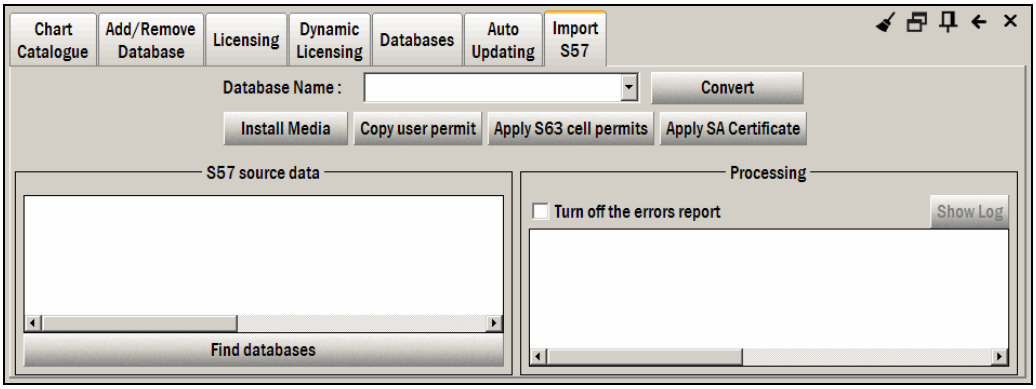


Figure 27 Data → Import S57 tab

2. In the **Copy S63 User Permit** dialog, select a folder where to save the user permit file and press the **Copy** button. The user permit will be saved to a `UserPermit.txt` file.

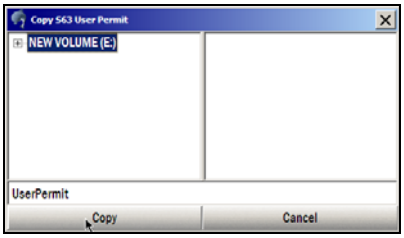


Figure 28 Copy S63 User Permit dialog

3. After the user permit is saved to a file, you can send it to a Data Server together with the data request. The Data Server generates individual data licenses using your user permit data.

To apply S-63 cell permits, do the following:

1. Open the **Data → Import S57** tab and press the **Apply S63 cell permits** button. The **Apply S63 Cell Permits** dialog will open.
2. In the folder tree, select the folder where the cell permits file is stored. The file name will be displayed in the pane to the right.

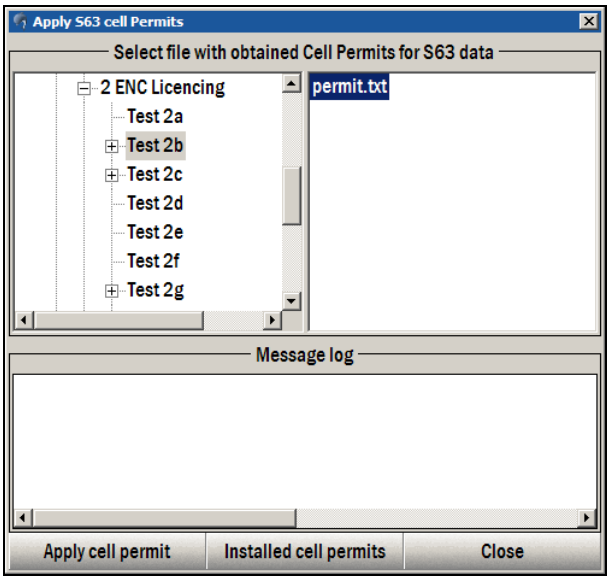


Figure 29 Apply S63 Cell Permits dialog

3. Select the permits file and press the **Apply cell permit** button. The cell permits written in the permits file will be applied. You can now decrypt the S-57 data and convert them to the CM93v3 format.

4. In case an error occurred during permits application, the error message will be displayed in the **Message log** pane.

To view all installed S-63 cell permits or uninstall a specified cell permit, do the following:

1. Open the **Data → Import S57** tab and press the **Apply S63 cell permits** button. The **Apply S63 Cell Permits** dialog will open.
2. In the **Apply S63 Cell Permits** dialog, press the **Installed cell permit** button. The **Installed cell permits** dialog will open. In the dialog window all installed cell permits together with Data Servers who provided the data and the permits expiration dates are listed.

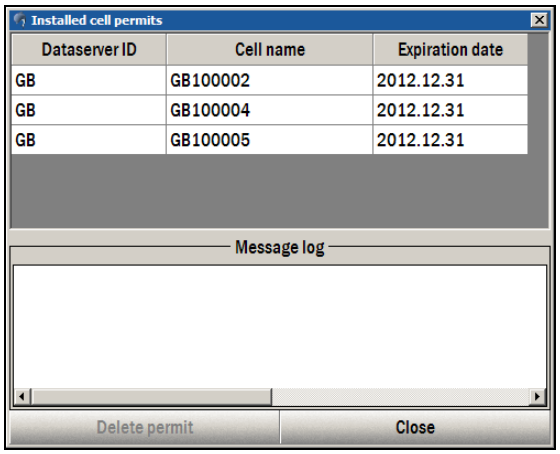


Figure 30 Installed cell permits dialog

3. To uninstall a permit, select it in the list, press the **Delete permit** button, and confirm the operation. The permit will be uninstalled.
4. In case an error occurred during uninstalling permits, the error message will be displayed in the **Message log** pane.

To apply a new SA certificate, do the following:

1. Open the **Data → Import S57** tab and press the **Apply SA Certificate** button. The **Apply SA Certificate** dialog will open.
2. In the folder tree, select the folder where the certificate is stored. The certificate file stored in the selected folder will be displayed in the pane to the right.

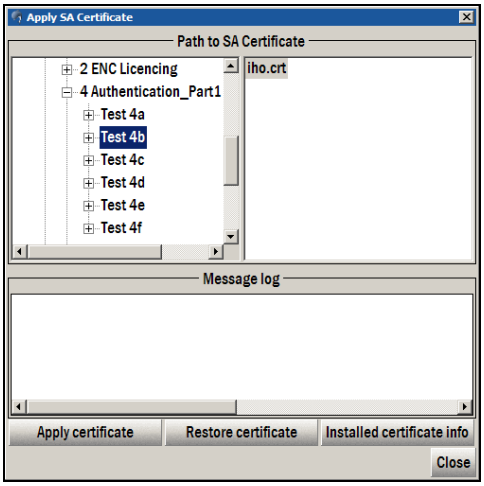


Figure 31 Apply SA Certificate dialog

3. Select the certificate file and press the **Apply certificate** button. The certificate will be applied and the message *'A new SA certificate (public key) has been installed. The certificate is valid to dd.mm.yyyy or unless the SA issues a new one for security reasons.'* will appear. In case there was an SA certificate previously installed, the new certificate will override the previous one.
4. You can restore the previous SA certificate. To do so, press the **Restore certificate** button and confirm the operation. The previous certificate will be restored.

5. To view information about the currently installed SA certificate, press the **Installed certificate info** button. The **Information about installed certificate** window will open. The following information on the current SA certificate is available: the certificate issuing organization (the **Issued by** field); the certificate requesting organization (the **Issued for** field); the certificate validity period (the **Valid from** and the **Valid till** fields). To close the window, press the **Close** button. :

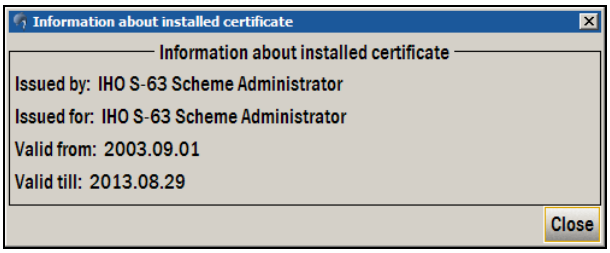


Figure 32 Information about installed certificate window

6. In case an error occurred during operations with SA certificate, the error message will be displayed in the **Message log** pane[15].

4.5.2 Large Media Support

In case S-57 data are provided using large media, you can use the large media support functionality of the ECDIS to work with the data.

To convert S-57 data to CM93v3 format using large media support, do the following:

1. Insert the large media device to the computer.
2. Open the **Data → Import S57** tab. Enter a name of the database to be created by S-57 data conversion to the **Database Name** field and press the **Install Media** button. The **Install Media** window will open.
3. Press the **Find Media** button to load media information to the system. Available media will be listed in the **Available Media** pane. The following information about media is provided: media name, media contents and media location. Select a media in the list to see additional information and installation instructions in the **Instructions** pane[16].

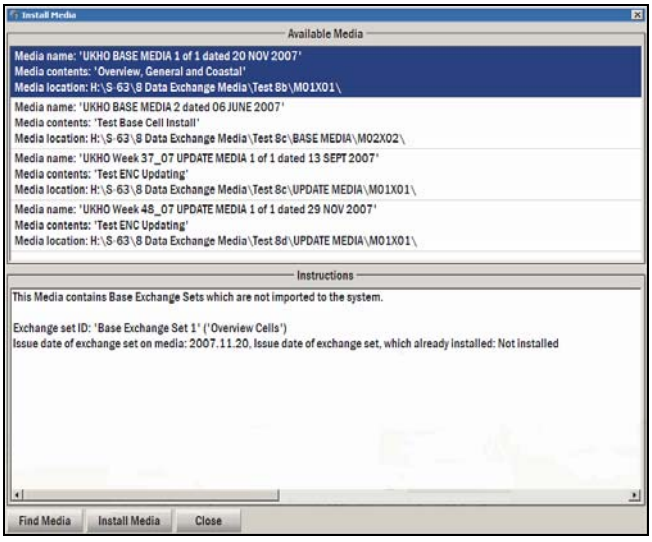


Figure 33 Install Media window

4. To convert a media to the CM93v3 format, select it in the media list and press the **Install Media** button. A CM93v3 database with the specified name (see step 2) will be compiled or updated. For details on the conversion process, see chapter *4.5.3, Import S-57 to CM93v3*.
5. To close the **Install Media** window, press the **Close** button.

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[15] The check of the validity of the SA signature against each ENC signature is done automatically when the ENC data are being converted to the CM93v3 format.

[16] To be able to convert a media to the CM93v3 format permits for the media must be installed in the system.

4.5.3 Import S-57 to CM93v3

The ECDIS provides the possibility to import data from the S-57 format to the CM93v3 format. This function can be accessed from the **Data → Import S57** tab.

In case the S-57 data are protected using IHO data protection scheme (S-63), cells permits should be installed before starting conversion of the data to the CM93v3 format.

IMPORTANT!

The S-57 Import functional module needs separate licensing. For details on installing licenses see chapter 4.4, Licensing Software Modules.

S-57 data are available to the users as exchange sets containing datasets, updates, pictures, textual descriptions, and a catalog file with the description of the exchange set.

To import S-57 data to the CM93v3 data, do the following:

1. Connect the data storage device with the S-57 data to your system and open the **Data → Import S57** tab.
2. Press the **Find databases** button. The ECDIS will search for S-57 data on all removable data storage devices connected to the system. All detected S-57 data exchange sets will be listed in the **S-57 source data** pane.

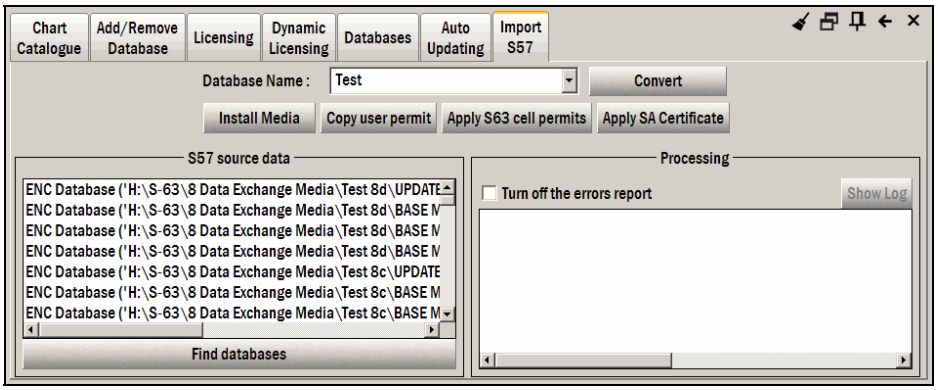


Figure 34 Data → Import S57 tab, detected S-57 exchange sets displayed in the S57 source data pane

3. In the **Database Name** field enter the name of the database that will be created during the conversion process.
4. Select an S-57 exchange set to be converted in the S-57 source data pane and press the **Convert** button. The data conversion process will start. The process is performed in two stages:
   a. At the first stage, verification of S-57 data is performed. Errors found during the verification process are recorded to a LOG file. If any critical errors are found, the conversion process is cancelled. You can turn off the display of error messages. To do so, check the **Turn off the errors report** checkbox. To turn the error messages display on, clear the **Turn off the errors report** checkbox. If the error messages display is on, the errors found by verification of a next dataset are displayed in the **Errors Report** window.

      You can do the following:

      - To continue conversion of the dataset, press the **Continue** button;
      - To cancel conversion of the dataset and go on with converting the next dataset and creating the CM93v3 database, press the **Skip** button;
      - To cancel conversion of all datasets altogether and stop creating the CM93v3 database, press the **Stop** button.

b. At the second stage S-57 data are converted to datasets of the CM93v3 database. If there is no database with the name entered to the **Database Name** field a new CM93v3 database is created during the conversion process; if there is a database with such name (you can select it from the **Database Names** drop-down list) data of this database are overwritten by the new data. At the termination of the conversion process the message *'Database was created successfully'* is displayed.

5. To view the log of all errors occurred during the data conversion; press the **Show log button** in the **Data → Import S57** tab. The **S57 conversion error log** window will open where you can view all the errors.
6. The new CM93v3 database is saved to a predefined location and is registered in the ECDIS automatically.

4.5.4 Updating Imported S-57 Data

To update a database created by conversion of S-57 data to CM93v3 data, do the following:

1. Connect the data storage device with the S-57 updates data to your system.
2. Open the **Data → Import S57** tab.
3. Press the **Find databases** button. The ECDIS will search for S-57 data on all removable data storage devices connected to the system. All detected S-57 data exchange sets will be listed in the **S-57 source data** pane.
4. In the **Database Name** drop-down list, select the name of the database that will be updated.
5. Select the S-57 exchange set with updates to the database in the **S57 source data** pane.
6. Press the **Convert** button. Converted data will be added to the data contained in the specified database[17].

[17] Databases created by conversion are encrypted for the eToken dongle inserted to your computer at the moment of conversion. These databases can only be used with this same dongle or a dongle of a dongles group to which it belongs.

5. CHARTS DISPLAY

Chart databases consist of a number of charts. These charts are electronic copies of regular paper charts. However, working with the electronic charts, you don't have to prepare a next chart and plot the own ship position on it while working with another chart at the same time, as it happens when working with paper charts.

Electronic charts are combined into Zones, Areas, and Cells. You can purchase licenses for any set of the Zones, Areas, and Cells you need.

Depending on the set of Zones, Areas, and Cells, you have a continuous coverage for a geographic area. The coverage is made up of the electronic charts joining to each other. For example, you have purchased a license for the English Channel (Zone 1, Area 10). It means you have a continuous coverage for all waters in and around the English Channel. It looks as if you have a single chart for the whole English Channel and some part of this chart is displayed on the screen.

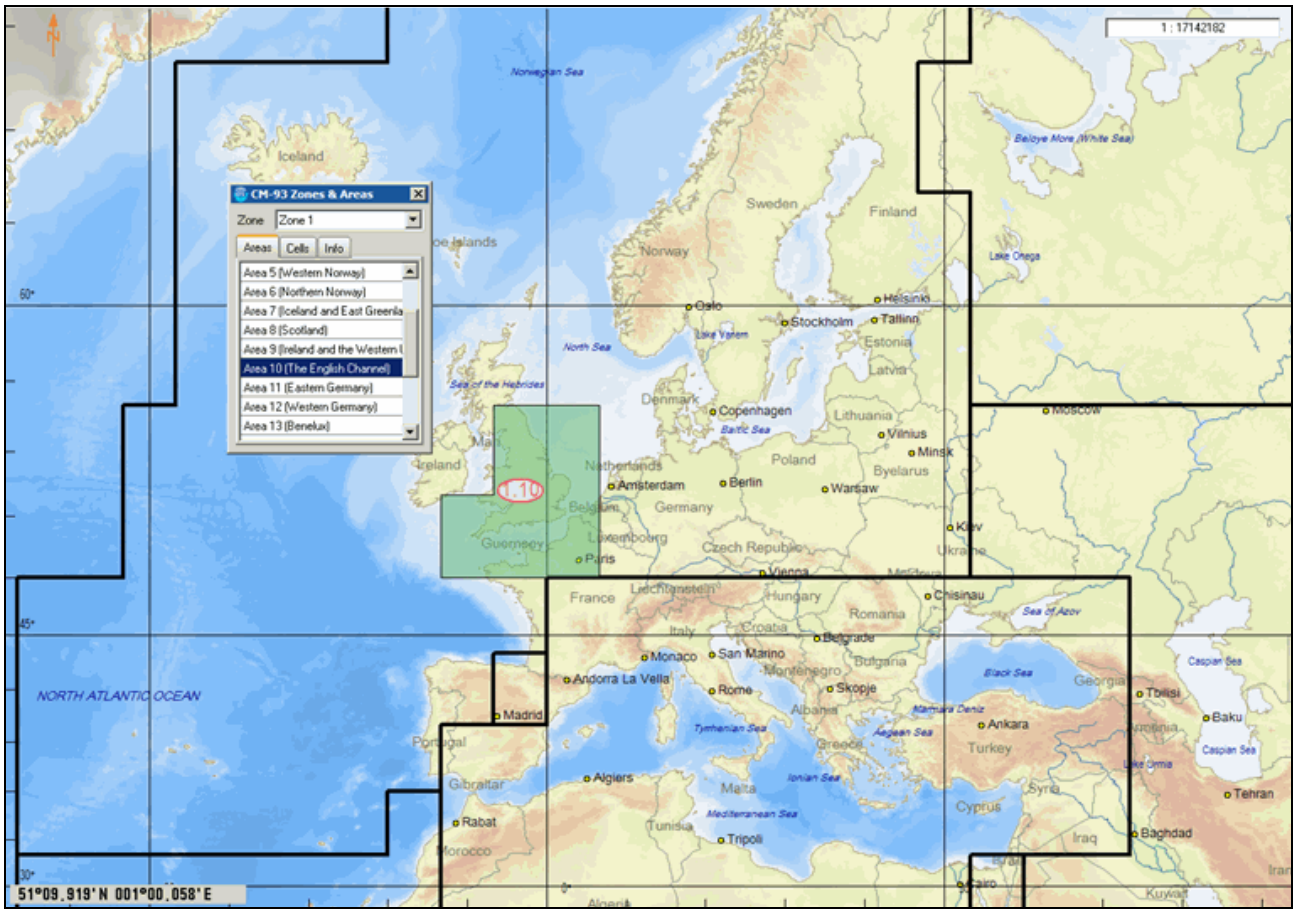


Figure 35 Chart coverage for the area of the English Channel (Zone 1, Area 10)

Each Zone, Area, and Cell is made up of a set of electronic charts (copies of paper charts) with different scales. If you wish, you may switch on the display of borders of the source paper charts. But usually it is not necessary.

5.1 Moving around the Chart View

The coverage of a geographic area with electronic charts consists of a set of charts that make up one single chart and some part of this single chart is displayed on the screen like in *Figure 36*. When moving around the chart, you are, as it were, moving the chart under the screen.

Figure 36 Electronic chart with a part of it on the screen

To move around the chart, you can use three ways:

- Left-click in a position on the chart and the chart will be scrolled so that the position becomes the center of the screen.
- Move the mouse pointer to the upper, lower, left, or right border of the screen: the pointer will change to a thick black arrow  . Left-click to move the screen in the direction of the arrow along the chart.
- The **Go to Position** function: Open the **Chart → Chart Settings** tab; in the **New Center** section, enter coordinates of the point you want to be moved to the center of the screen: the latitude to the upper field and the longitude to the lower field. Press the **Go to Position** button: the chart will be scrolled so that the indicated position becomes the center of the screen.

5.2 Scaling the Chart View

All source paper charts used for creating electronic charts have different compilation scales. The original scale of an electronic chart is the compilation scale of the paper chart digitized to create the electronic chart.

The scale at which the electronic chart is displayed on the screen usually differs from the original scale and is called the current view scale. Use the **Original Scale** option of the **Chart Viewing Tools** panel to synchronize the original and the current view scales of the chart if necessary.

The same geographical area can be covered by several charts with different scales. Which chart is displayed at the moment depends on the current view scale. All charts included in the database are divided into groups according to their scale called scale levels. The currently displayed chart belongs to the scale level corresponding to the current view scale. The levels are as follows:

Scale name	Letter symbol	Current view scale range
Background, small scale	Z (0)	1:5,000,001 – UNLIMITED
Background, medium scale	A (1)	1:1,500,001 – 1:5,000,000
Overview	B (2)	1:500,001 – 1:1,500,000
General	C (3)	1:150,001 – 1:500,000
Coastal	D (4)	1:50,001 – 1:150,000
Approach	E (5)	1:15,001 – 1:50,000
Harbor	F (6)	1:5,001 – 1:15,000
Berthing	G (7)	0 – 1:5,000

For example, when the current view scale is 1:100 000, charts of the "Coastal" level are displayed. When the current scale is 1:40 000, charts of the "Approach" level are displayed. The ECDIS application changes charts in the view automatically when you set a new current view scale corresponding to a different scale level. Besides that, an alarm may be given at the change of the scale level.

When changing the current view scale of the chart, it may differ from the original chart scale. If the current view scale is larger than the original chart scale, the view is overscaled; if the current view scale is smaller than the original chart scale, the view is underscaled. For example, the original chart scale is 1:50 000, and the current view scale is 1:20 000. The current view scale is within scale range of the Approach (E) scale level and the chart of this level is displayed. However, the scale of this chart is 1:50 000, which is 2.5 times as small as the current view scale.

Such situations may be dangerous as you are expecting more detailed information at the set current view scale, whereas the source paper chart wasn't supposed to have the expected detail level. You may be relying too much on the chart and get into an accident. The ECDIS has an indicator that informs you about the underscale or overscale of the current view to avoid accidents.

There are several methods for changing the chart view scale.

To scale the chart view using the drag-to-zoom method:

1. Press and hold down the left mouse button, while drawing the drag-to-zoom rectangle around the area you wish to zoom in.
2. Release the mouse button. The area inside the box will be shown in the whole chart window.

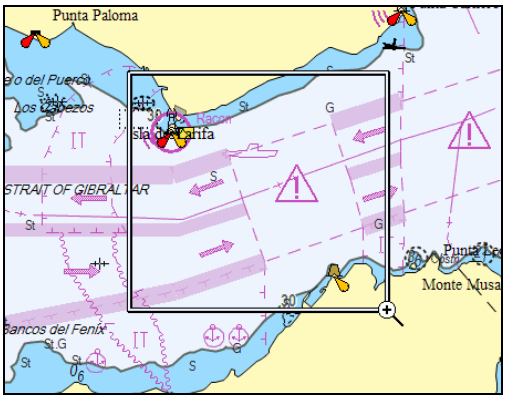


Figure 37 Zooming the chart view using the drag-to-zoom method

3. If you want to cancel this operation press the ESC key while drawing.
4. To zoom the chart out do the same holding the SHIFT key down[18].

To scale the chart view using the Chart Scale and Quick Access Buttons panel:

- Type the scale in the **Chart Scale Edit** field 1:1500000 and press ENTER.
- The **Zoom In** button  doubles the current view scale and the **Zoom Out** button  halves it.
- The **Original Scale** option changes the scale to the original scale of the chart that is currently in the view Original Scale.
- The **Best scale** option displays a chart with the largest scale available for the position of the own ship. The chart is displayed at its original scale Best Scale[19].

To scale the chart view using the mouse wheel:

[18] In the case of zooming out, the whole chart window will shrink to the size of the drag-to-zoom rectangle after releasing the mouse button.

[19] The **Best Scale** option is only available if the Navigation mode is on.

Turn the mouse wheel forward to increase the current view scale and backward to decrease the current view scale. This way the current view scale is increased/decreased by 5% with every turn of the wheel[20].

5.3 Bookmarks

The current chart view is defined by the position of the screen center, the current scale, and the current chart display settings. Using the **Bookmarks** option, you can save the current screen coordinates and chart settings to a bookmark. When this bookmark is opened later, the displayed chart will be identical.

To use bookmarks, do the following:

1. Open the **Chart → Chart Settings** tab.
2. Enter the name of the bookmark to the bookmark names field in the **Bookmarks** section.
3. Press the **Add** button. The bookmark will be saved and added to the bookmarks list.
4. To open a previously saved bookmark, select the bookmark in the **Bookmarks** drop-down list and press the **Go To** button. The chart will be scrolled to the center position saved in the bookmark and scaled accordingly.
5. To delete a bookmark, select the bookmark in the **Bookmarks** drop-down list, press the **Delete** button, and confirm the bookmark deletion.

5.4 Chart Objects Information and Chart Legend

A vector electronic chart is a part of geographic information system. An electronic chart displays data stored in a geographic database. The database stores records of geographical objects. The objects are defined by a set of attributes. These are the values of the attributes that define the way the objects are displayed on the screen.

Besides the attributes defining the appearance and the position of an object on the electronic chart, the set of attributes of the object may include additional information attributes such as for example the object name, textual information, picture, and other attributes that are not required to be displayed in the chart.

To get access to this information, use the **Object Info** function. The function displays attributes of objects in a separate panel, the **Object Info** panel. To open the panel, right-click in any position in the chart view. The Object Info panel will open with a list of all objects that were under the mouse pointer when you right-clicked in the chart.

There are different types of objects. They are point, line, and area object types. Hence a position in the chart can be shared by numerous objects of different types. All objects that share the position where you right-clicked will be listed in the **Object Info** panel. If you need information about a particular object, right-click on the object. The object will be listed in the **Object Info** panel together with all other objects under the pointer.

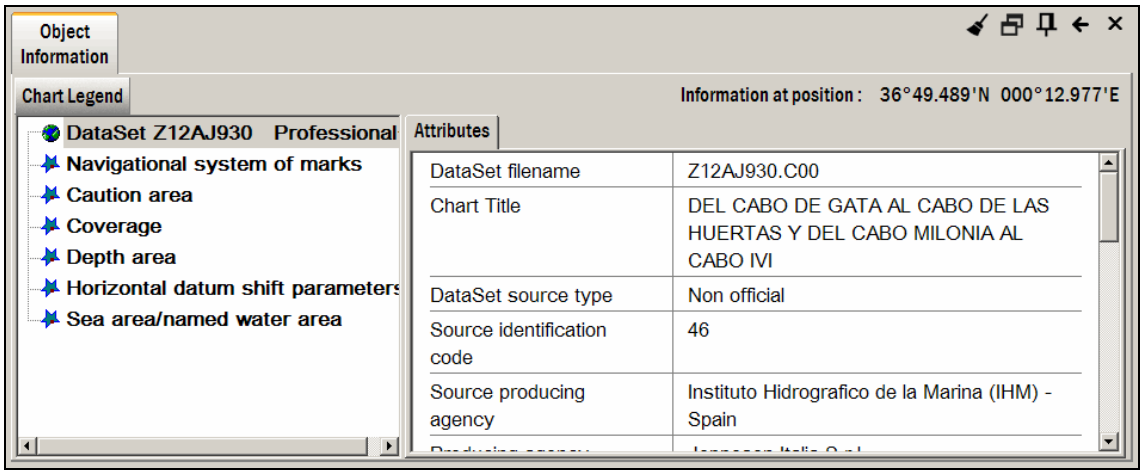


Figure 38 Object Info panel

The **Object Info** panel consists of two panes: the pane displaying the list of objects and the pane displaying the attributes of a specified object. To display attributes of an object, select it in the objects list.

[20] In the case the mouse wheel has no effect, left-click in the chart to return the active focus to the chart view.

The first object in the objects list is the dataset (the electronic chart) that was under the mouse pointer when the **Object Info** panel was opened.

Double click on the object in the list to highlight it on the chart. To clear highlighting, press the **Clear highlight** button.

If an object symbol is against a yellow background it means that the object has been updated by means of auto update (RTU).

If an object symbol is against a blue background it means that the object is a mariner object.

In the **Object Info** panel you can also open the **Chart Legend** pane. To do so, press the **Chart Legend** button. To close the chart legend and return to the objects list, outpress the **Chart Legend** button. The **Chart Legend** pane provides information about the dataset. Partially this information is the same that you get in the **Attributes** pane when you select the dataset in the objects list. However, the chart legend provides additional information: chart units in the **Chart Units** section and the current settings of the dataset display in the **Current Display** section.

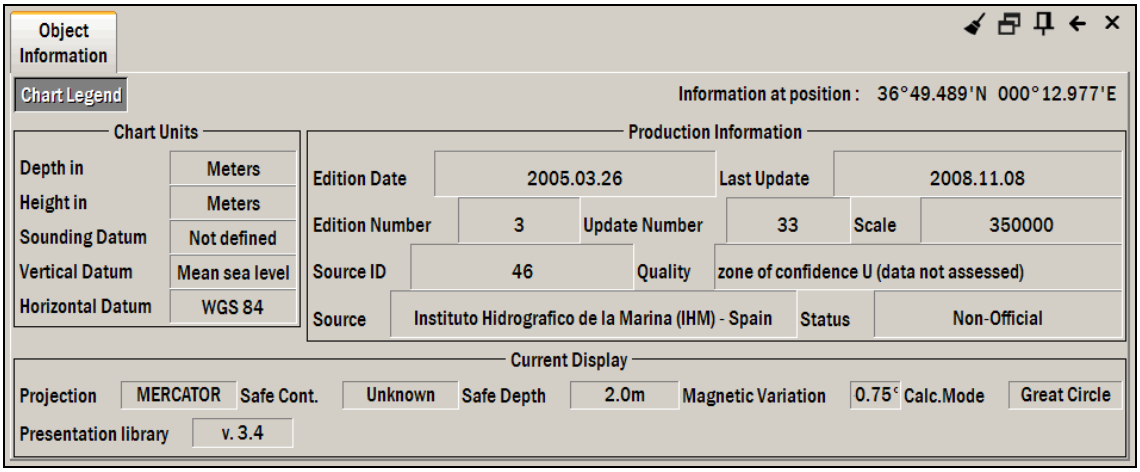


Figure 39 Object Info panel, Chart Legend

5.5 Additional Chart Windows

The ECDIS provides the possibility to use additional chart windows besides the main chart window. The additional windows are the look-ahead window and the 3D window.

5.5.1 Look-ahead Window

The look-ahead window is a chart view window. You can use it at the same time as the main chart view window and have two different views of the same area.

To open the look-ahead window, do the following:

1. Open the **Chart → Chart Settings** tab.
2. In the **New Window** section, press the **Chart** button. The **Look-ahead View** will open.

The look-ahead window properties are the same as those of the main window. The properties are set in the tabs of the **Chart** panel. The properties are set for the chart window which is currently selected. To select a chart window, use the **Look Ahead** and **Monitor** buttons that appear in the upper right corner of the panel after you have opened the look-ahead window.

The **Chart Scale** panel of the **Look-ahead View** differs from that of the main chart view.

- In the **Scale** field, the chart view scale and the over scale factor are displayed. The over scale factor shows in how many times the chart view scale is larger or smaller than the original chart scale.
- The **Zoom In** button doubles the **Look-ahead View** scale and the **Zoom Out** button halves it.

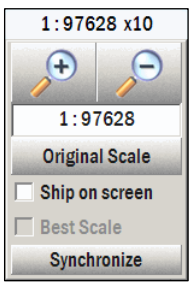


Figure 40 Chart Scale panel

- In the **Scale** edit field, the scale of the **Look-ahead View** is set: enter the scale value and press the ENTER key. The chart view scale will be changed.
- The **Original Scale** button sets the view scale to the value of the original scale of the chart that is displayed currently.
- The **Ship on screen** option scrolls the chart so that the own ship was in the view.
- The **Synchronize** button synchronizes the look-ahead view and the main chart view so that the same geographic area is displayed in both views[21].

5.5.2 3D Window

The 3D window displays the chart area that is currently on the screen as a 3-dimensional model.

To open the 3D window, do the following:

1. Open the **Chart → Chart Settings** tab.
2. In the **New Window** section, press the **3D** button. The 3D window will open.

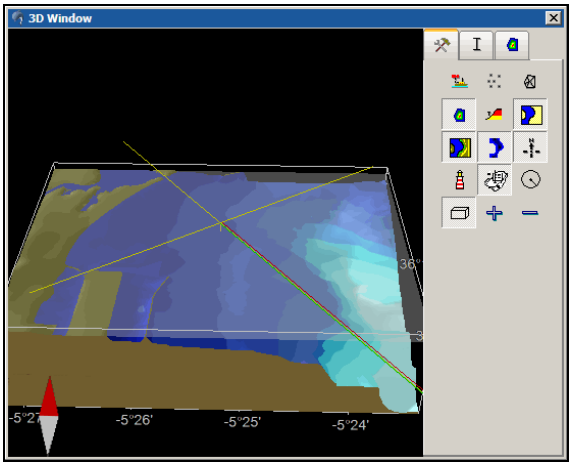


Figure 41 3D Window

The **3D Window** can be expanded for a better 3D view and, if required, shown on a separate PC monitor.

To arrange the 3D view, use the 3D window control buttons:

Set view from ship – Sets the view from the own ship. This mode is available only if the ship is inside the chart view (and the 3D window) borders.

Show/hide vertices – Displays/hides vertices, the points on which the 3D picture is built.

Show/hide wireframe – Displays/hides the lines connecting the 3D picture vertices (see above).

Show/hide colored Z layers – When this option is on, all depths are divided into 10 layers from the minimum depths to the surface. The layers are displayed in different colors. The palette for the layers presentation is selected in the **Z colors** panel (see below). When Z layers are hidden all depths are displayed in blue color (but with different shades).

Show/hide alarm area – When this option is on, all depths shallower than the safety contour are marked with red color.

Show/hide water surface – Displays/hides the water surface which is represented as a blue plane.

[21] The **Synchronize** function doesn't work together with the **Ship on screen** option on.

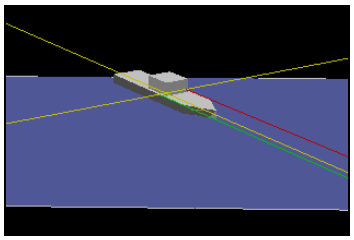
Show/hide terrain – Displays/hides the Terrain profile. When the terrain profile is hidden, the land area is always displayed flat.

Show/hide seabed – Displays/hides the seabed.

Show/hide compass – Displays/hides the compass. The compass is represented as a blue and red arrow in the lower left corner. The blue arrow points to the north and the red arrow points to the south.

Show/hide navigation – Displays/hides aids to navigation.

Show/hide vessel – Displays/hides the own ship. The ship's size in the 3D window depends on the chart scale.



Show/hide ERBL – Displays/hides the Electronic Range and Bearing Line in the 3D window.

Depth and coordinate scale frame – Displays/hides the frame with the values of the depth, latitude and longitude coordinate scales.

Zoom in – Zooms the 3D view in.

Zoom out – Zooms the 3D view out.

Z scale panel. In the **Z Scale** panel, you can adjust vertical scale for the best presentation of the surface. The land surface and seabed surface scales are configured separately.

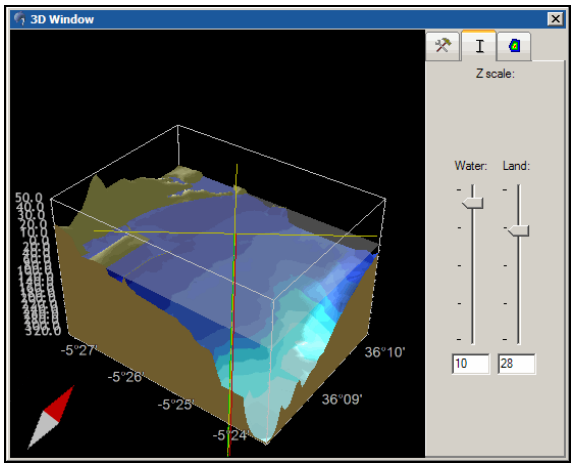


Figure 42 3D Window, Z scale panel

The vertical scale with the value of 1 displayed in the field under the scale control (slider in the highest position) means that the vertical scale of the 3D view is the same as the chart scale. The vertical scale with the value of 100 is 100 times as large as the chart scale.

Z colors panel. In the **Z colors panel**, you can select one of the three palettes for depth layers presentation. The "Show/hide colored Z layers" option (see above) must be switched on.

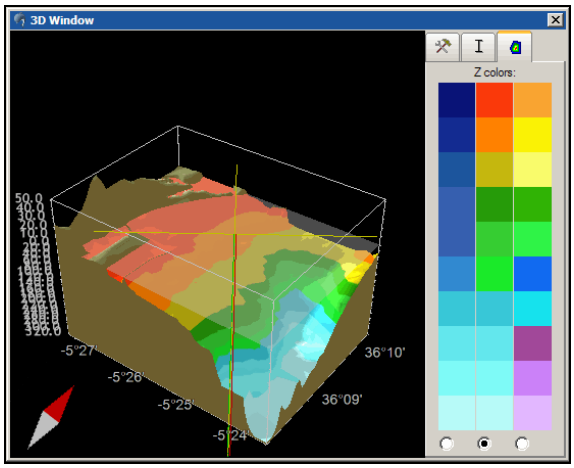


Figure 43 3D Window, Z colors panel

Besides the 3D window control buttons, you can arrange the 3D view by zooming it in, zooming it out and rotating it. To zoom the view in or out, rotate the mouse wheel forward or backward respectively. To rotate the view in the horizontal plane, hold the left mouse button and move the mouse; to rotate the view in the vertical plane, hold the right mouse button and move the mouse.

If you change the view of the chart (zoom in, zoom out, or scroll the chart), the 3D view will be changed automatically.

The 3D window can be closed and resized as a standard MS Windows window.

5.6 Setting up Chart Display

This chapter describes how to configure the chart display. The settings described here configure the chart appearance and the content displayed in the chart view.

In addition to the chart display settings, there is a set of navigational chart settings. The navigational chart settings configure the chart display so that it would be more convenient to monitor the own ship navigation. The navigational settings include chart orientation, true and relative motions modes, best scale mode, and the display of lights sectors. The settings are described in the *chapter 7.5, Navigational Chart Settings*.

5.6.1 Chart Presentation Models

There are three chart presentation models available for the presentation of the chart:

- **C-Map** – The presentation model is based on the INT1 standard.
- **S-52** – The presentation model is based on the IHO S-52 standard.
- **S-52 Simplified** – The S-52 chart presentation model with simplified symbols for buoys and beacons.

The C-Map presentation model is not based on official standards. If this model is used, in the chart view there is the *'Non-standard chart presentation is used'* notice displayed in the upper left corner.

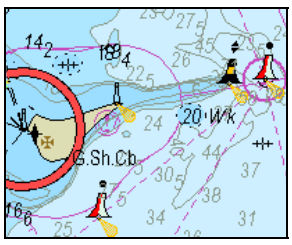


Figure 44 C-Map presentation model

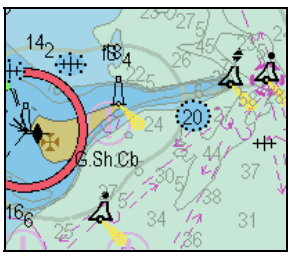


Figure 45 S-52 presentation model

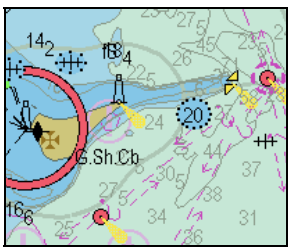


Figure 46 S-52 Simplified presentation model

The C-Map presentation model is used by default.

To set one of the presentation models, do the following:

1. Open the **Chart → Chart Presentation** tab.

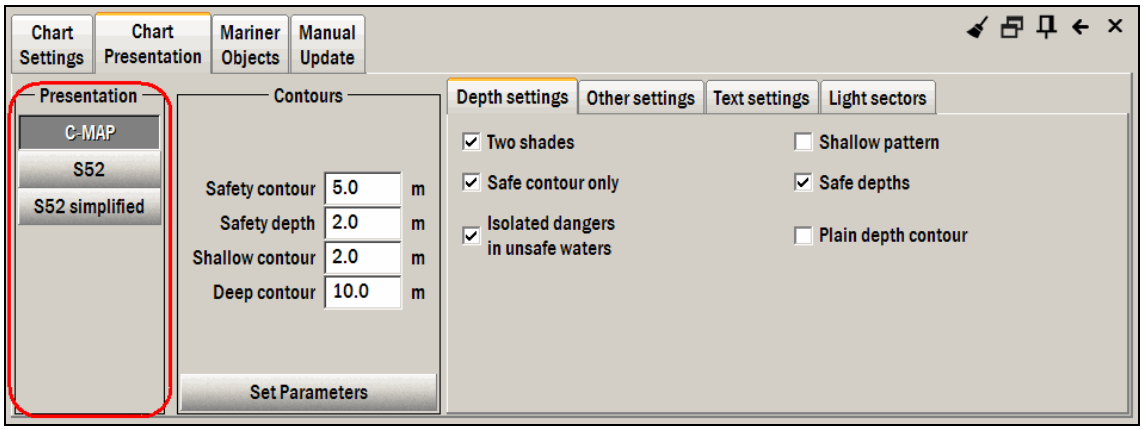


Figure 47 Chart → Chart Presentation tab, Presentation models

2. In the **Presentation** section, select one of the presentation models. The selected model will be applied to the char view immediately.

5.6.2 Display Type

The **Display Type** option is used to choose the required level of detail to be applied to the chart. The ECDIS implements four display categories:

- **Base** – The **Display Base** is that part of the **Standard Display** which should be permanently retained on the display. It consists of coastline (high water); own ship's safety contour, to be selected by the mariner; indication of isolated underwater dangers of depths less than the safety contour which lie within the safe waters defined by the safety contour; indication of isolated dangers which 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 routing systems; scale, range, orientation and display-mode; units of depth and height. In addition to the objects set, a specified set of chart presentation parameters is used.
- **Custom Base** – Additional chart presentation parameters selected by the user are added to or removed from the base set of parameters. The last chart presentation parameters settings are saved in the system.
- **Standard** – The **Standard Display** is on screen when the chart is first displayed by the ECDIS. The **Standard Display** is recalled by single operator action: press the **Data Display Type** indicator Standard in the **Indicators** panel. The **Standard display** consists of **Display Base**; drying line; indication of fixed and floating aids to navigation; boundaries of fairways, channels, etc; visual and radar conspicuous features; prohibited and restricted areas; chart scale boundaries; indication of cautionary notes. In addition to the objects set, a specified set of chart presentation parameters is used.
- **Custom Standard** – Additional chart presentation parameters selected by the user are added to or removed from the standard set of parameters. The last chart presentation parameters settings are saved in the system.
- **All other** – The **All Other Display** shows the chart information in full., the **All Other Display** type has no mandatory chart presentation parameters. The **All Other Display** is recalled by single operator action: press the **Data Display Type** indicator Standard in the **Indicators** panel.
- **Custom** – The **Custom Display** displays the **Display Base** and other chart information by class on demand.

To set one of the display types, do the following:

1. Open the **Chart → Chart Settings** tab.
2. In the **Display Type** drop-down list, select a display type. Information corresponding to the selected display type will appear on the screen immediately.

3. The **Custom Base** display type stores the set of chart presentation parameters last used for the **Base Display** type. By selecting this option you restore the parameters settings.
4. The **Custom Standard** display type stores the set of chart presentation parameters last used for the **Standard Display** or **All Other** types. By selecting this option you restore the parameters settings.

In the table below the use of chart presentation parameters for the display types is presented[22]:

Presentation parameter	Base Display	Standard Display
Depth settings		
Two shades	+	+
Safe contour only	+	+
Isolated dangers in unsafe waters	+	+
Shallow pattern	+	+
Safe depths	+	+
Plain depth contour	+	+
Other settings		
Plain borders	+	+
NOAA navaids	+	+
ENC boundary	++	++
Chart boundary	+	+
Overscale id	-	++
Scale boundary	-	+
Lat/Lon grid	+	+

[22] ++ – the parameter is mandatory for the display type; when the display type is turned on, the parameters are set automatically; setting or removing one of the parameters switches the display type to the Custom Base or Custom Standard;

+ – the parameter is not mandatory for the display type; when the display type is turned on, the parameter is not set automatically, but it remains set if it was set before; setting or removing one of the parameters doesn't change the current display type;

- – the parameter is not mandatory for the display type, when the display type is turned on the parameters are removed automatically; setting or removing one of the parameters switches the display type to the Custom Base or Custom Standard;

Presentation parameters not mentioned in the table belong to the parameters group marked with "-".

Presentation parameter	Base Display	Standard Display
Text settings		
National text	+	+
Aids to navigation tooltip	+	+

To set the **Custom Display** type, do the following:

1. Open the **Chart → Chart Settings** tab.
2. In the **Display Type** drop-down list, select the **Custom** option. The list of object classes that you can select to be displayed will open.
3. Select the object classes you want to be displayed. To select an object class, check the checkbox to the left from the object class name. All objects of the selected object classes will appear on the screen immediately.
4. To save the current configuration of the **Custom Display**, enter the name of the configuration to the drop-down list at the bottom of the **Display Type** section and press the **Save** button.
5. To set one of the previously saved **Custom Display** configurations, select the configuration name in the drop-down list.
6. To delete one of the previously saved **Custom Display** configurations, select the configuration name in the drop-down list and press the **Delete** button.

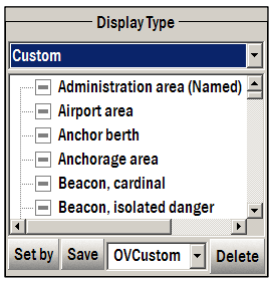


Figure 48 Chart → Data Display tab, Custom display type

7. You can set your **Custom Display** the same as the **Base**, **Standard**, or **All other** display types. To do so, press the **Set by** button and select the display type you need from the context menu.

5.6.3 Supplementary Data

The Jeppesen chart database includes supplementary data in addition to cartographic data. The supplementary data can be used in voyage planning and other navigational purposes. The supplementary data is included in the database as supplementary data layers.

The supplementary data are tides and tide currents, GMDSS areas, SAR regions, improved background and overview charts, and terrain data. You can choose to display or hide the supplementary data layers on the chart.

To display/hide the supplementary data of a specified database, do the following:

1. Open the **Chart → Chart Settings** tab. The supplementary data display is configured in the **Supplementary Chart Info** section.

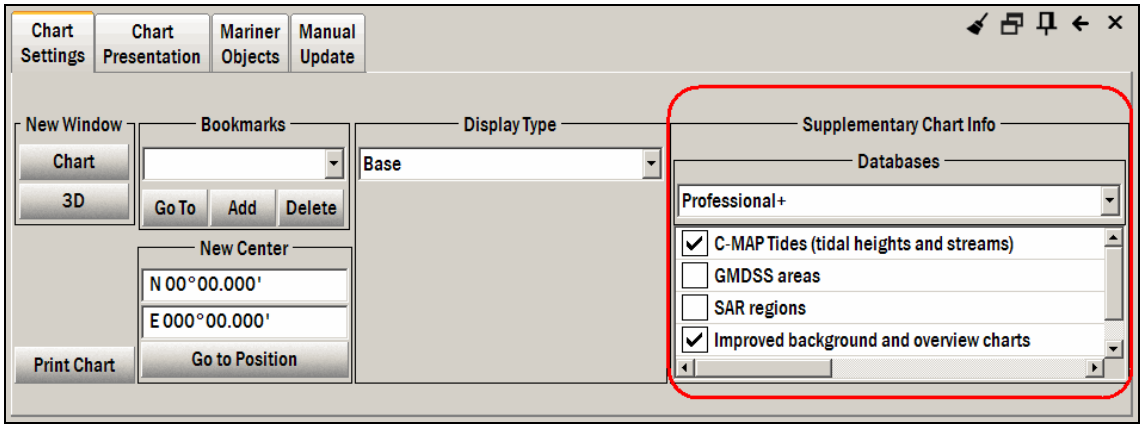


Figure 49 Chart → Data Display tab, Supplementary Chart Info

2. In the **Databases** drop-down list, select a database. If the database contains supplementary data layers, they will be listed in the pane below.

3. To display a supplementary layer data, set the checkbox to the left from the section name. The data will be displayed immediately. To hide a supplementary layer data, clear the checkbox near the data layer name.

5.6.4 Depth Areas Presentation

Depth areas presentation is configured in the **Chart → Chart Presentation** tab, in the **Contours** section. In the section values of three contours are set: the safety contour, the shallow contour, and the deep contour. The value of the safety depth is also set here. The contours values are used in the ECDIS for distinguishing on the chart display between the safe and the unsafe water and for generating anti-grounding alarms.

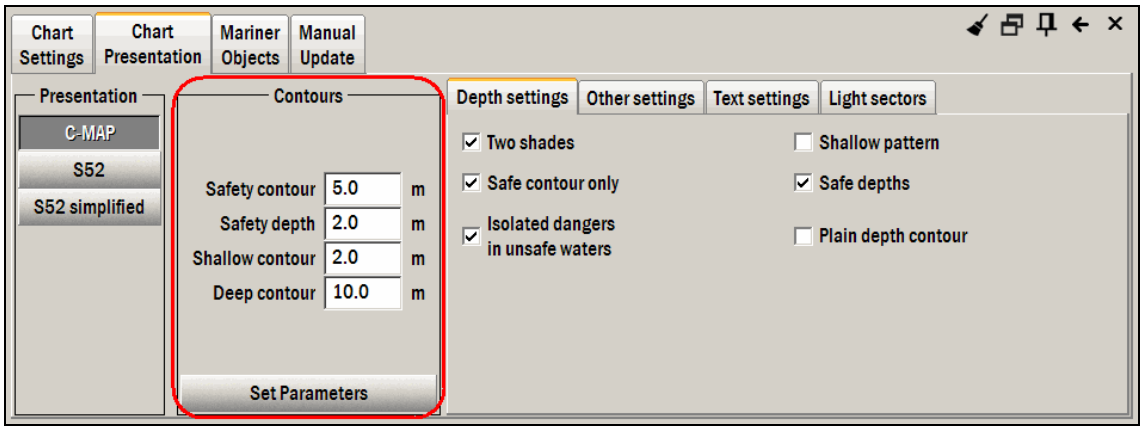


Figure 50 Chart → Chart Presentation tab, Contours section

To set the contours values, do the following:

1. Open the **Chart → Chart Presentation** tab.
2. Enter the depth values of the contours to the fields corresponding to the contours:
   - **Safety contour** is the depth contour selected by the user that should not be crossed to avoid grounding the ship. The contour is used by the ECDIS to distinguish on the display between the safe and the unsafe water, for generating anti-grounding alarms, and for checking routes[23].
   - **Safety depth** – The depth defined by the mariner, e.g. the ship's draft plus under keel clearance, to be used by the ECDIS to emphasize soundings on the display equal to or less than this value. All soundings that are deeper than the safety depth will be displayed in a light grey color, while soundings that are less than or equal to the safety depth will be displayed in black.
   - **Shallow contour** – The contour set by the mariner and used by the ECDIS to distinguish on the display between medium shallow and very shallow waters. Medium shallow water area lies between the safety contour and the shallow contour, and very shallow water area lies between the shallow contour and the zero meter contour.

     The shallow contour value should be less than that of the safety contour. The shallow contour value is not used in other ECDIS functions.
   - **Deep contour** – The contour set by the mariner and used by the ECDIS to distinguish on the display between medium deep and deep waters. Medium deep water area lies between the deep and safety contours and the deep water area is all water deeper than the deep contour. The deep contour value is not used in other ECDIS functions.
3. To apply the **Contour** settings, press the **Set Parameters** button[24].

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[23] If a particular electronic chart does not have the depth contour that is set in the Safety Contour field, the system will automatically set the nearest deeper contour as the Safety Contour. For example, the safety contour value is set to 15 meters, if there is no a 15 meters contour on the chart but there are 10 and 20 meter contours, the 20 meter contour will be considered the safety contour. In case there are no depth contours at all in the chart, the ECDIS will give the alarm *"Safety contour not available."*

[24] There is a possibility that the chart has depth contours in it, but the ECDIS doesn't recognize them. It happens because the ECDIS only recognizes contours if they bound depth areas. In case you have doubts, open the **Object Info** panel where you can see the depth contour objects and check if they bound depth areas or not (*see chapter 5.4, Chart Objects Information and Chart Legend*).

The contours values are used to distinguish on the display between depth areas that are safe or unsafe for navigation. The areas are filled with colors specified in standards. The colors are as follows[25]:

Depth Range			Color	
No.	From	To	C-Map Presentation	S-52 Presentation
1	Zero-depth contour	Shallow contour	Dark blue	Dark blue
2	Shallow contour	Safety contour	Blue	Blue
3	Safety contour	Deep contour	Light blue	Green grey
4	Deep contour	Unknown	White	Light green grey

5.6.5 Depth Settings

Sometimes the chart view may be overloaded with data. The ECDIS provides options to get rid of the overloading. One of them is selective display of chart elements in the chart view. Chart elements that can be displayed selectively are divided into four groups: depth elements, text elements, light sectors, and other elements.

To display or hide elements from the Depth settings group, do the following:

1. Open the **Chart → Chart Presentation → Depth settings** tab. In the tab, there is a list of depth elements.

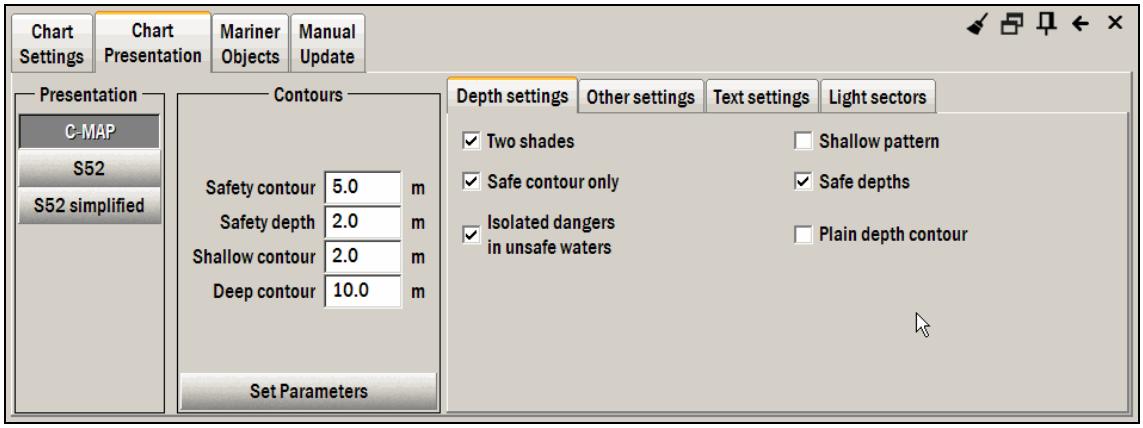


Figure 51 Chart → Chart Presentation → Depth settings tab

2. To display an element in the chart view, set the checkbox to the left from the element name; to hide the element from the chart view, clear the checkbox. There are the following chart elements in the **Depth settings** tab:
   - **Two shades** – Only two depth areas are to be highlighted in the chart view: safe and unsafe water areas. The safe water area is separated from the unsafe water area with the safety contour set in the **Contours** section of the **Chart → Chart Presentation** tab.
   - **Shallow pattern** – The depth are from the coast line to the safety contour is filled with a dedicated pattern.
   - **Safe contour only** – Turns off the display of all depth contours except for the safety contour. Used for hiding depth contours, especially in areas with complex relief, to reduce cluttering.

[25] The contours values are used to highlight four depth areas. To limit the highlighted areas to only two areas, set the **Two shades** property in the **Chart → Chart Presentation → Depth settings** tab. In this case, safe and unsafe waters are distinguished on the display.

- **Safe depths** – Turns on the display of soundings which are deeper than the safety depth set in the **Contours** section of the **Chart → Chart Presentation** tab. In S-52 presentation, unsafe soundings are black, and safe soundings are grey. In C-Map presentation, there is no difference in appearance of the safe and unsafe soundings.
- **Isolated dangers in unsafe waters** – Isolated dangers in unsafe waters are marked with a dedicated hazard symbol  .
- **Plain depth contour** – Turns off the display of depth contours labels.

3. The settings take effect immediately after they have been set.

5.6.6 Text Settings

Sometimes the chart view may be overloaded with data. The ECDIS provides options to get rid of the overloading. One of them is selective display of chart elements in the chart view. Chart elements that can be displayed selectively are divided into four groups: depth elements, text elements, light sectors, and other elements.

To display or hide chart elements from the Other Settings group, do the following:

1. Open the **Chart → Chart Presentation → Text settings** tab. In the tab, there is a list of chart text elements.

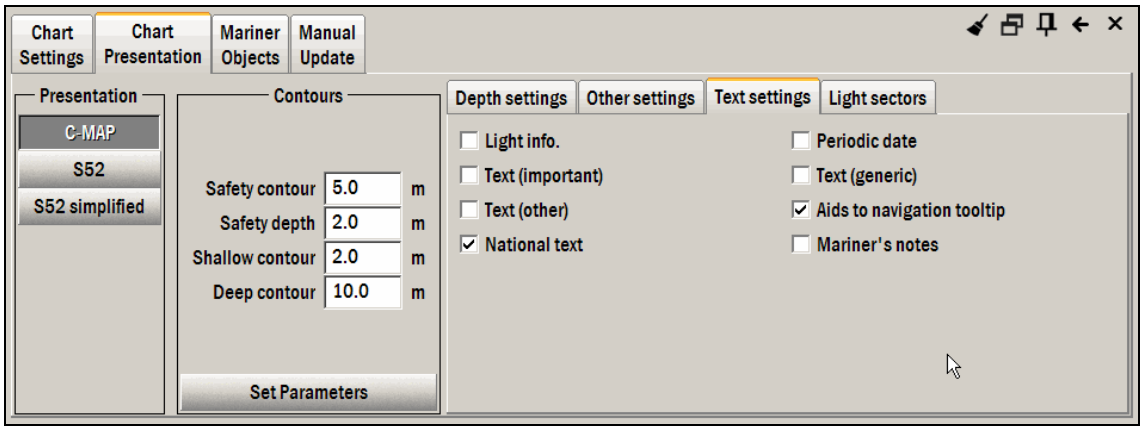


Figure 52 Chart → Chart Presentation → Text settings tab

2. To display an element in the chart view, set the checkbox to the left from the element name; to hide the element from the chart view, clear the checkbox. There are the following elements in the **Text settings** tab:
   - **Light info** – Turns on the display of characteristics of lights. The information of a light is displayed next to the light symbol. If the setting is off, the information about a light can only be obtained from the **Object Info** panel.
   - **Periodic date** – Turns on the display of objects with a periodic date of activity only during their activity period. If the setting is off, the objects with periodic date of activity are always displayed on the chart.
   - **Text (important)** – Turns on the display of texts that have the 'important' category. These texts contain the information important for navigation such as bridge clearance, depth values above point obstructions, etc.
   - **Text (generic)** – Turns on the display of texts that have the 'generic' category. These texts are names of geographic objects such as countries, cities, islands, etc.
   - **Text (other**) – Turns on the display of texts that have the 'other' category. These texts are names of lights and other aids to navigation.
   - **Aids to navigation tooltip** – Turns on the display of tooltips with information about aids to navigation. The tooltips appear when the mouse pointer is over an aids to navigation object.
   - **National text** – Turns on the display of object names in national languages in the chart if available. The setting only works for the C-Map presentation.
   - **Mariner's notes** – Turns on the display of mariner's notes (*see chapter 6.2, Mariner Objects*).

3. The settings take effect immediately after they have been set.

5.6.7 Other Settings

Sometimes the chart view may be overloaded with data. The ECDIS provides options to get rid of the overloading. One of them is selective display of chart elements in the chart view. Chart elements that can be displayed selectively are divided into four groups: depth elements, text elements, light sectors, and other elements.

To display or hide chart elements from the Other Settings group, do the following:

1. Open the **Chart → Chart Presentation → Other settings** tab. In the tab, there is a list of chart elements.

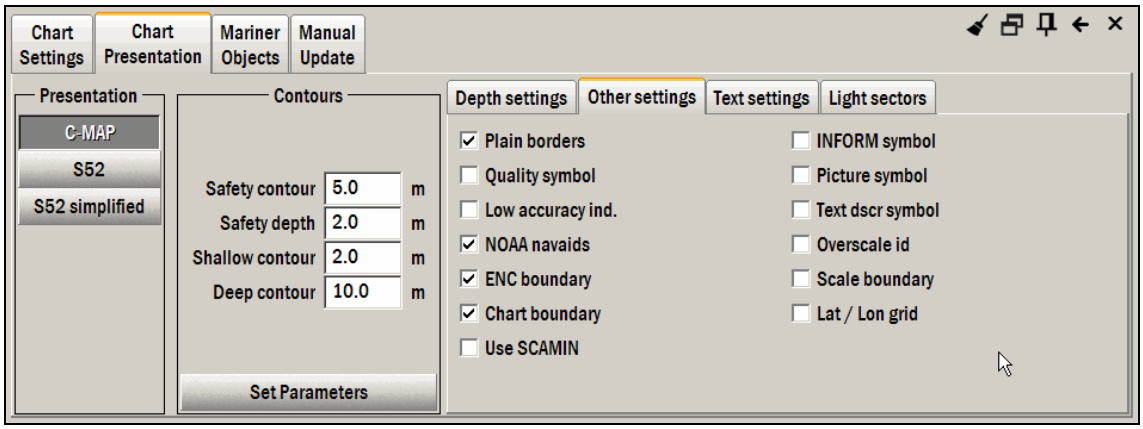


Figure 53 Chart → Chart Presentation → Other settings tab

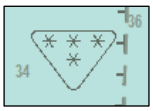
2. To display an element in the chart view, set the checkbox to the left from the element name; to hide the element from the chart view, clear the checkbox. There are the following elements in the **Other settings** tab:

   - **Plain borders** – Turns on the display of borders of various special areas (caution areas, deep water areas, etc.) as plain dashed lines. The setting only works for the S-52 presentation.
   - **INFORM symbol** – Turns on the display of special symbols indicating objects with the Information attribute.

     
   - **Quality symbol** – Turns on the display of a special symbol indicating the quality of the electronic chart. The setting only works for the All Other display type.

     The quality symbols correspond to so-called zones of confidence. There are six categories of the confidence zones. The categories are defined by the quality of survey, in particular by the positional accuracy, the depth accuracy, the seafloor coverage and typical survey characteristics. The categories are the following (in brackets the position accuracy is given as an example): A1 (5m), A2 (20m), B (50m), C (500m), D (worse than 500m) and U (data not assessed).

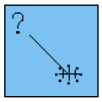
     For the S-52 presentation, the quality symbol looks as an ellipse with a 'u' letter inside if the data are not assessed, or as a triangle with the zone of confidence mark inside for other zones.

     For the C-Map presentation zones of confidence are indicated with a dashed line.

     To find out the category of the zone of confidence, open the **Object Info** panel with a right-click in the chart view and select the **Quality of Data** object in the objects list. Check the **Category of zone of confidence in data** attribute in the **Attributes** pane to the right.
   - **Picture symbol** – Turns on the display of special symbols indicating objects with the **Pictorial representation** attribute.

     
   - **Low accuracy ind.** – Turns on display of special symbols indicating that the position of an object is defined with low accuracy (the QUAPOS attribute of the object is set to any other value than 'surveyed'). The property is relevant for the following objects: point land areas, point and area wrecks, and point and area obstructions.

     
   - **Text descr. symbol** – Turns on the display of a special symbol indicating objects with the **Textual description** attribute (the description may contain for example an extraction from a

pilot book).

- **NOAA Navaids** – Turns on the display of symbols of Aids to Navigation created using the National Oceanic and Atmospheric Administration (USA) standards, rather than the INT1 standard. The setting only works for the C-Map presentation.
- **Overscale id** – Applies a dedicated vertical pattern to the chart or the part of it that is over-scaled (the chart display sale is twice more than the original scale of the chart).
- **ENC boundary** – Turns on the display of borders of the ENC coverage.
- **Scale boundary** – Turns on the display of borders of areas covered with charts of different scale levels.
- **Chart boundary** – Turns on the display of chart borders.
- **Lat/Lon grid** – Turns on the display of the Lon / Lat grid.
- **Use SCAMIN** – Turns on the use of the SCAMIN (minimum scale) attribute of objects. If the setting is on, objects with the SCAMIN attribute are removed from the chart view once the chart view scale is less than the minimum scale of the object display.

3. The settings take effect immediately after they have been set.

5.7 Printing Charts

The ECDIS provides the possibility to print the chart currently displayed on the screen out.

To print out the chart, do the following:

1. Open the **Chart → Chart Settings** tab and press the **Print Chart** button. The **Print preview** window will open.
2. To renew the chart image to be printed, press the **Renew Preview** button. The preview image will display the most recent changes in the chart view.
3. To configure the properties of the print out, pres the **Printer Setup** button. The standard **Print Setup** window will open where you can configure the print properties.
4. To print the chart out, press the **Print** button. The chart image displayed in the **Print preview** window will be printed out.

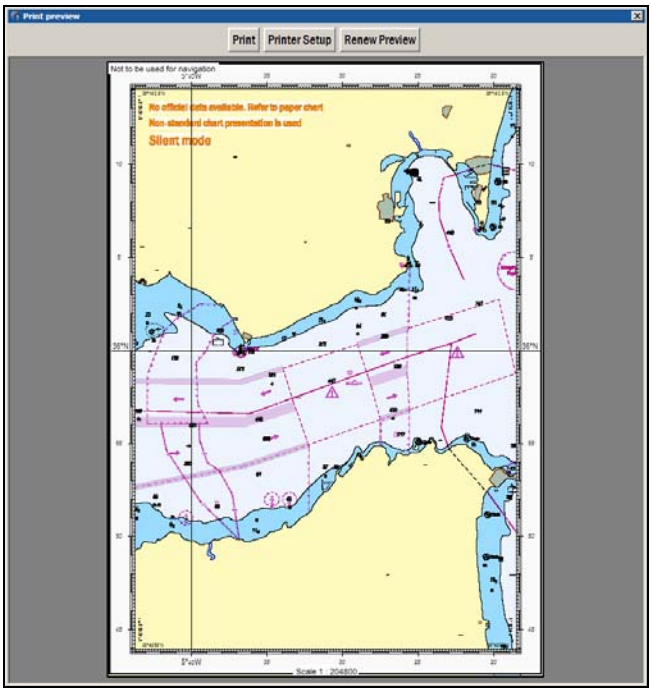


Figure 54 Print preview window

6. VOYAGE PREPARATION

6.1 Correcting the Chart

The first step in preparing the voyage is making sure that your charts have all the latest updates applied to them. You need to correct all applicable charts through the latest Notice to Mariners, Local Notice to Mariners, and Broadcast Notice to Mariners, and ensure charts to be used are the correct edition.

The ECDIS provides two methods for correcting charts: automatic updating and manual updating.

6.1.1 Automatic Updating

Using the Automatic Updating function, you can automatically log on to the Jeppesen Marine Update Server over the Internet and download updates for the currently installed database. An updates log of all chart corrections is maintained. The Automatic Updating requires the system to be logged on to the Internet over any communication channel.

To download chart updates over the Internet and to automatically register them, do the following:

1. Open the **Data → Auto Updating** tab and press the **Auto Updating** button. The **Auto Updating** pane will open.

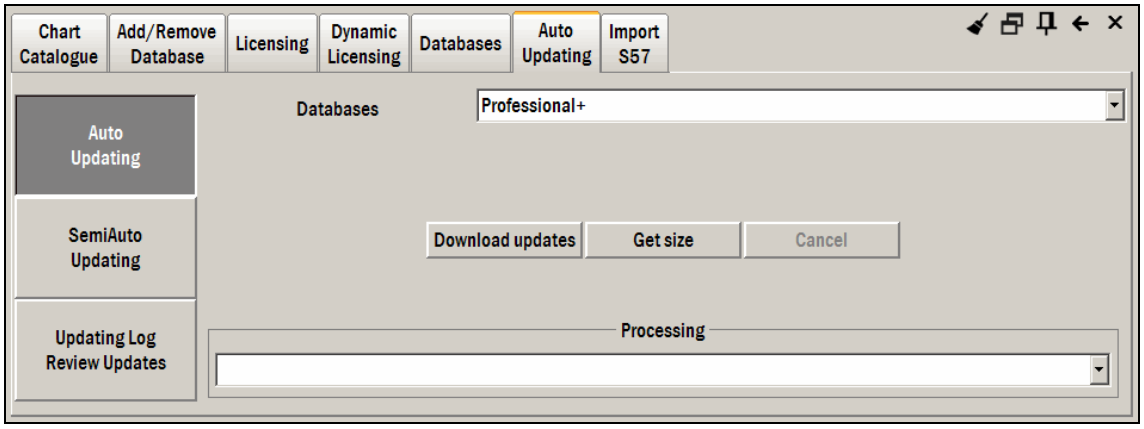


Figure 55 Data → Auto Updating tab, Automatic Updating function

2. Select the database to which you are going to download and apply updates in the **Databases** drop-down list. If only one database is in view, the **Databases** drop-down list is not displayed in the **Data → Auto Updating** tab.
3. Press the **Download updates** button to start downloading updates. You can monitor the downloading process in the Processing field. All steps of the process are shown in the **Processing** drop-down list.
4. To check the size of available updates before downloading, press the **Get size** button. The updates size will be displayed in the **Processing** field.
5. After updates have been received, they are automatically registered in the database. To see which datasets have been updated and to access the list of updates, use the **Updating Log** and **Review Updates** functions.

6.1.2 Semi-automatic Updating

Semi-automatic updating is an alternative to the fully automatic updating. When using the Semi Auto Updating function, you should create and save a request for updates, send it to the updates server by email, receive the updates by e-mail as well and apply them to the database manually[26].

To download chart updates by e-mail and to register them manually, do the following:

1. Open the **Data → Auto Updating** tab and press the **SemiAuto Updating** button. The **SemiAuto Updating** pane will open.

[26] The updating service is a fully automatic service provided by Jeppesen Marine and replies are sent within 10 minutes, unless there is some delay, over your email provider.

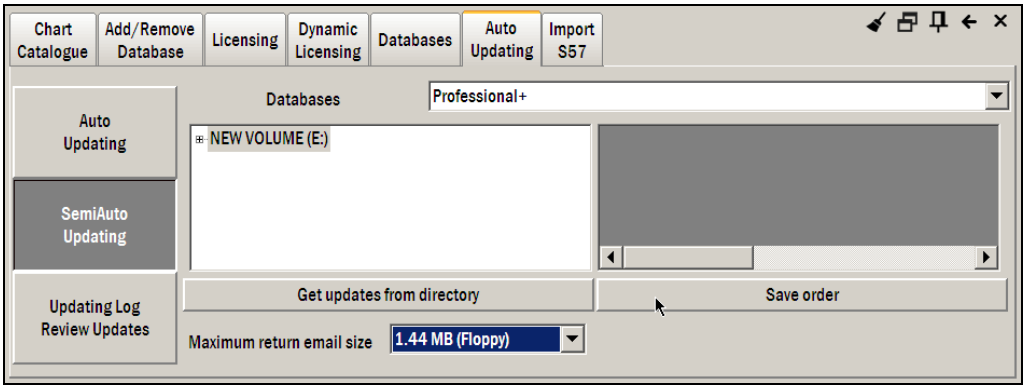


Figure 56 Data → Auto Updating tab, Semi Auto Updating function

2. Select the database to which you are going to download and apply updates in the **Databases** drop-down list. If only one database is in view, the **Databases** drop-down list is not displayed in the **Data → Auto Updating** tab.
3. Set the maximum return email size: select an option from the **Maximum return email size** drop-down list. The option should be used if there is a limitation on the email attachment size from your email provider, or the answer file needs to be stored on a floppy disk. Check with your email provider and set the required size. The updating server will then divide the replies into several emails in order to comply with these limitations.
4. Save the updates order: in the folders tree in the left-hand pane, select a directory to which the order file will be saved and press the **Save order** button. Confirm the operation. The order file will be saved in the specified directory.
5. Send the order file as an attachment to updates@c-map.no. It is very important that you send the new order file to the updates server and not the same file as before as this will result in duplicate update being received.
6. After a short period of time, you will receive the answer from the Updates Server with updates attached to it. Save the update files to a data storage device and connect the device to the system.
7. To install updates, select the folder where the updates files are stored in the folders tree and press the **Get updates from directory** button. The updates will be extracted from files and registered in the database.

6.1.3 Updating Log/Review Updates

During the updating process, the updates log is kept where the list of updated datasets is recorded, as well as the list of all changed objects. In the list of changed objects, objects are grouped by hydrographic organizations that issued the updates, by datasets to which the updates were applied, and by numbers of files in which the updates are stored. You can view the both lists in the **Data → Auto Updating → Updating Log/Review Updates** pane.

To view the list of updated charts and a complete list of updated objects, do the following:

1. Open the **Data → Auto Updating** tab and press the **Updating Log/Review Updates** button. The **Updating Log** and **Review Updates** panes will open.

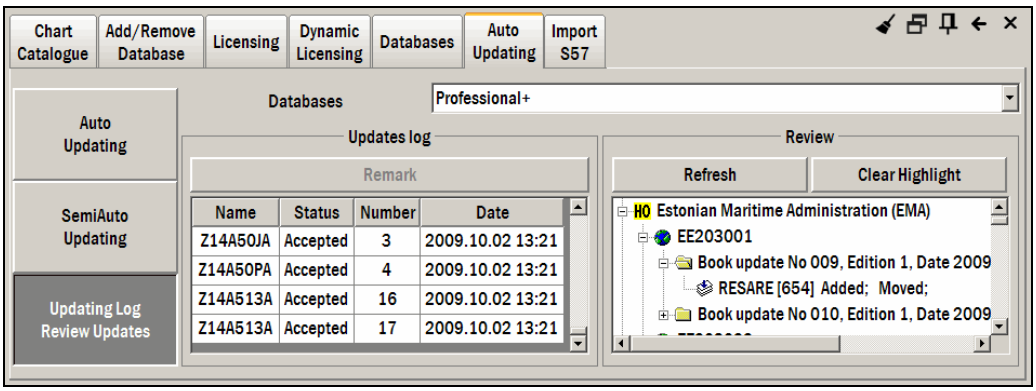


Figure 57 Data → Auto Updating tab, Updates Log and Updates Review

2. The **Updates Log** pane displays all charts (datasets) to which updates have been applied. The information relating to each dataset includes: dataset name (the **Name** column), update status – accepted or declined (the **Status** column), the number of updates applied to the dataset (the **Number** column) and the date when the updates were applied (the **Date** column).
3. When the updates are imported from the S-57 format, the import log is kept. In case there were any problems during the import process, the log file can be viewed: the **Remark** button becomes active, and to view the log, just press it. In case there were no problems during the import process, the import log is unavailable, and the **Remark** button remains dimmed.
4. The **Updates Review** list on the right part of the pane is made up of records of the updates sorted by the updates issuing hydrographic offices; by datasets to which the updates were applied, and by numbers of files in which the updates are stored. The tool tips should assist you in viewing long names and remarks. Information about each correction is given in a short form. For example, it does not contain the past and present cartographic object position but it is just written as “Modified”.
5. Double click on any correction in order to highlight it on the chart. The screen will be panned to the object position and the scale changed to the original scale of the source chart. A small arrow will point to the object that has been modified. To clear the highlight, press either the **Clear Highlight** button right above the updates list or the **Clear Highlight** button in the upper right corner of the **Data** panel[27].

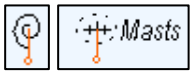
6.1.4 Manual Updating

The Manual Updating function allows you to apply updates to the chart data manually. The main source for updates is Notice to Mariners. The updates included in the Notices to Mariners are normally included in the set of automatic updates. However, information about changes in the charts is published in the periods between the issues of Notices to Mariners through various channels. The channels include NAVTEX, NAVAREA, and other navigational communications and warnings.

Using the Manual Updating, you can apply the changes reported by official navigational organizations but not issued as Notices to Mariners yet.

Using the Manual Updates function, you can add new objects to the chart data, edit and delete existing objects.

Manual updates are registered in a separate chart layer that is not connected with existing charts: it is an independent dataset called Extrascale dataset. When the chart is prepared to be displayed in the chart view, it is overlaid with data from the Extrascale dataset. However, if you, when adding objects, indicate that they are included in the Notices to Mariners, the changes are applied to the chart dataset which is currently displayed in the chart view. The changes are applied to the chart dataset if the existing dataset objects are edited.



Objects edited or added with Manual Updating are displayed in the chart view as regular cartographic objects with a special symbol. All changes made by the Manual Updating function are registered in the manual updating log. The log is displayed in the Manual Update tab in the Updates History pane where you can view all the updates modification and reject any of them.

To view manual updates history, do the following:

1. Open the **Chart → Manual Update** tab.
2. In the databases drop-down list, select a database. In the **History** pane below, the history of manual updates applied to the specified database will be displayed. The manual updates history is presented as a tree structure where the first level is the dataset to which the updates were entered, the second level is the updated object, and the third level is the list of actions applied to the object.

[27] When a new database issue is installed, updates that have been included in the new issue of the database as regular objects will be automatically removed from the hard disk.

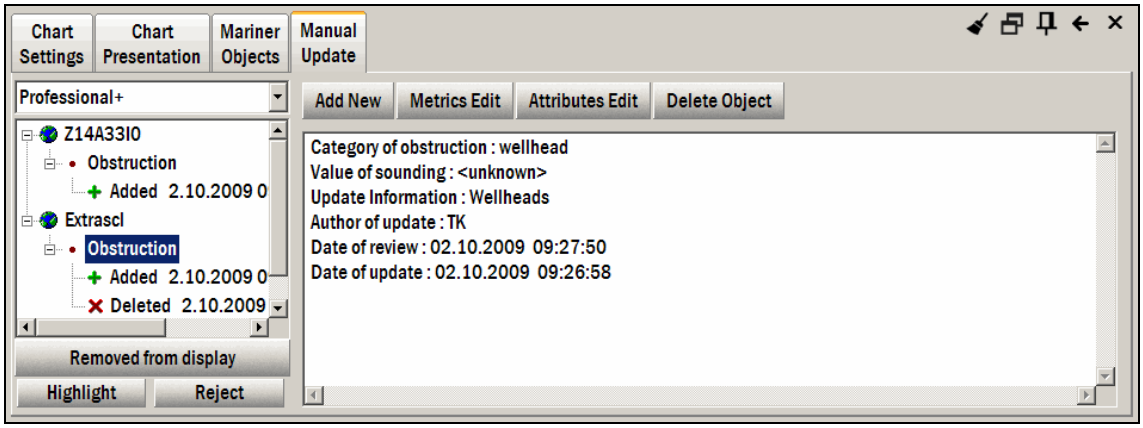


Figure 58 Chart → Manual Update tab, manual updates history

3. To expand the list of objects click on the plus '+' sign next to the dataset name. To collapse the list of objects, click on the minus '-' sign next to the dataset name.
4. To expand the list of actions performed with an object, click on the plus '+' sign next to the object name. To collapse the list of actions, click on the minus sign next to the object name.
5. To view detailed information about entries of the manual updates history tree, select the entry. The information will be displayed in the pane to the right from the **History** pane.
6. To hide a manual update object, select its entry in the updates history tree and press the **Removed from display** button. The object is hidden and the **Removed from display** button remains pressed. To display the object again, select it in the history tree and outpress the **Removed from display** button.
7. To highlight the updated object in the chart view, double-click on one of the actions that have been performed with the object or select the action in the actions list and press the **Highlight** button. The ECDIS will highlight the object in the position and the state where it was plotted after the selected action. To cleat the highlight, press the **Clear highlight** button in the upper right corner of the **Chart** panel.
8. To reject an update, select the updated object in the objects list, press the **Reject** button, and confirm the operation. The object will return to its state before the update.
9. You can reject all updates applied to a dataset. To do so, select the dataset in the datasets list, press the **Reject** button, and confirm the operation. All updates objects of the dataset will return to their initial states. If you reject all updates applied to the Extrascale dataset, the dataset will be deleted[28].

To add a manual update to the chart, do the following:

1. Open the **Chart → Manual Update** tab.
2. In the databases drop-down list, select a database to which you want to add a manual update.
3. Press the **Add New** button. The **Add New Object** dialog will open.

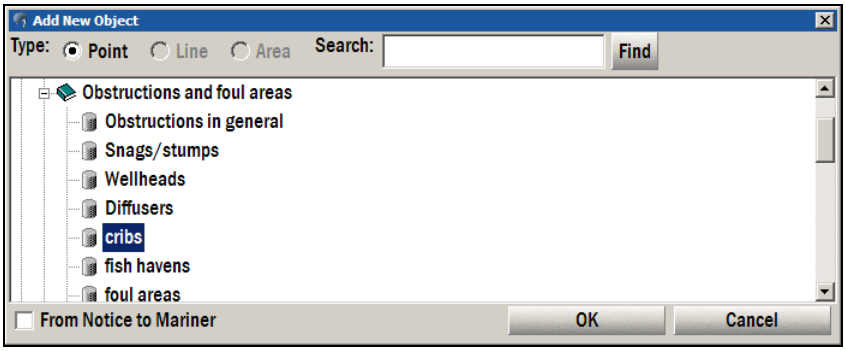


Figure 59 Chart → Manual Update tab, Add New Object dialog

[28] You can't reject a single action only all actions performed with an object or all the objects updated in a dataset.

4. Select an object from the objects list. To find an object, use the **Search** function: enter the name of the object to the **Search** field and press the **Find** button.
5. Geographic objects can have various geometry types. After selecting the object, set the object geometry type. Select a Point, Line or Area option. The geometry types that are not available for the specified object remain dimmed.
6. Clear the **From Notice to Mariner** checkbox if it is set and press the **OK** button. Adding manual updates from notices to mariners is described below. The **Attributes** pane will open where you can set the values of the new object attributes.

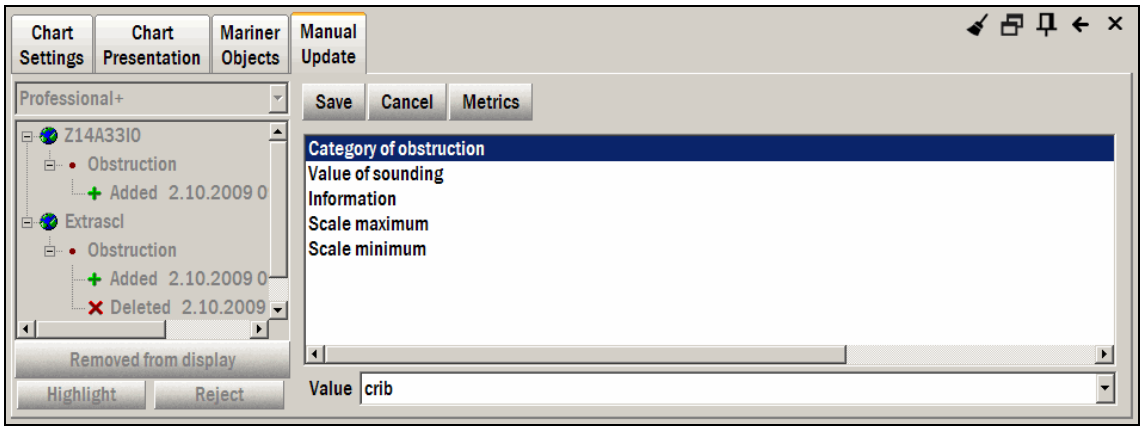


Figure 60 Chart → Manual Update tab, adding new object, editing attributes

7. To set an attribute value, select the attribute in the attributes list and enter the value to the **Value** field (or select it from the drop-down list if available).
8. Set the object coordinates: either plot the object in the chart view using the mouse pointer or set the object coordinates in the **Metrics** pane. To open the **Metrics** pane, press the **Metrics** button. To return to the **Attributes** pane, outpress the **Metrics** button.

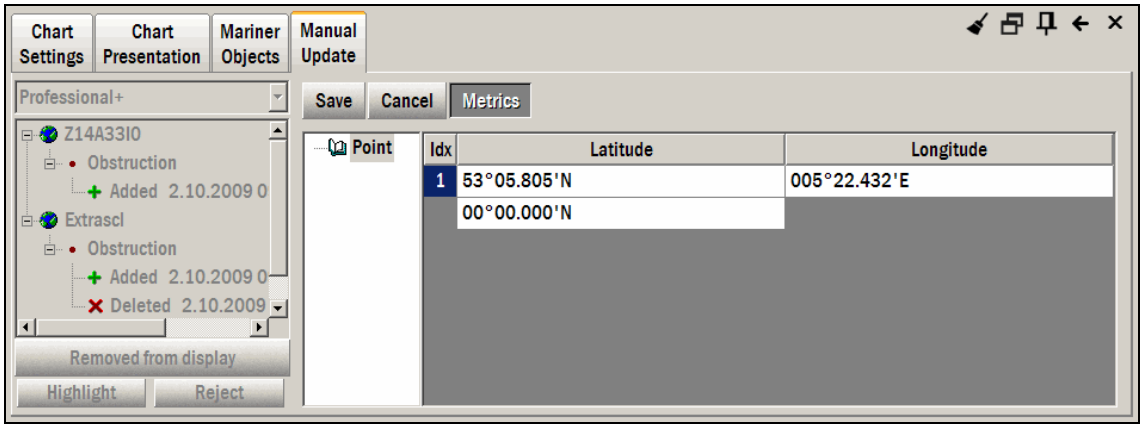


Figure 61 Chart → Manual Update tab, adding new object, editing metrics

9. Plotting the object in the chart view:
   - To plot a node, left-click in the chart view. To add a next node, left-click in the chart view once more.
   - To add a node between two nodes, move the pointer to the position on the line connecting the two nodes where you want to add a node; left-click in this position: the new node will be created and it will be attached to the pointer so that it will move with it; to plot the node left-click in the chart view once more.
   - To move a node, left-click on it to capture it with the mouse pointer, move the pointer with the node to a new position, and left-click.
   - To delete a node, right-click on it. To delete a point object while still in the add object mode, just cancel the operation: press the **Cancel** button.
10. After the object attributes and metrics have been set, press the **Save** button to save the object or the **Cancel** button to cancel the operation.

11. The **Updated by** dialog will open. Enter your name to the field – it is the name of the author of the update. Press the **OK** button. The object will be displayed in the chart and added to the **Manual Update History** list, the **Added** action [+ Added] will be added to the object actions list[29].

To add a manual update to the chart from a Notice to Mariners, do the following:

1. Open the **Chart → Manual Update** tab.
2. In the databases drop-down list, select a database to which you want to add a manual update.
3. Press the **Add New** button. The **Add New Object** dialog will open.

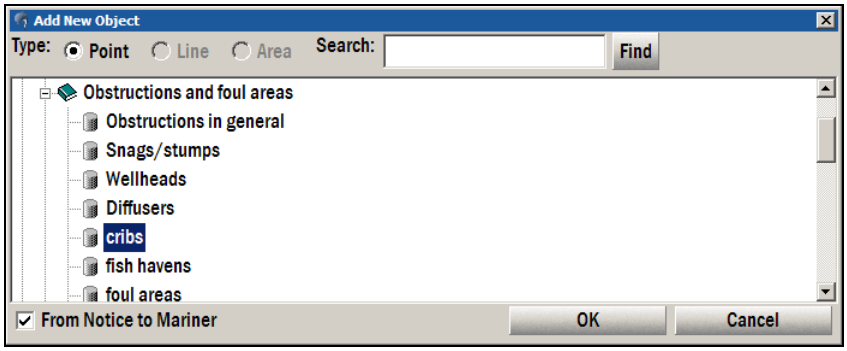


Figure 62 Chart → Manual Update tab, Add New Object dialog

4. Select an object from the objects list. To find an object, use the **Search** function: enter the name of the object to the **Search** field and press the **Find** button.
5. After selecting the object, set the object geometry type. Select a Point, Line or Area option. The geometry types that are not available for the specified object remain dimmed.
6. Set the **From Notice to Mariner** checkbox and press the **OK** button. The **Add New Object from Notice to Mariner** dialog will open.

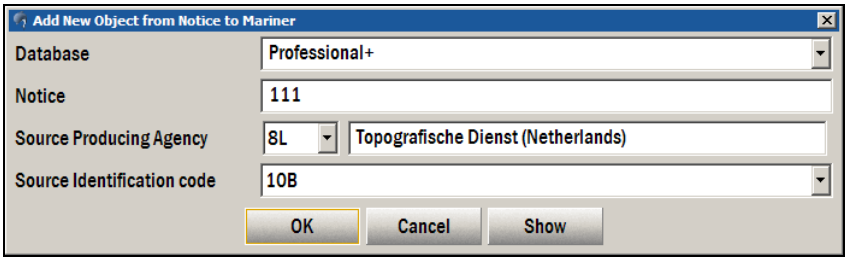


Figure 63 Add New Object from Notice to Mariner dialog

7. Select the database from the **Databases** drop-down list.
8. Enter the number of the Notice to Mariners to the **Notice** field.
9. Select the code of the data producing agency in the **Source Producing Agency** drop-down list (the name of the agency will be automatically displayed in the field to the right).
10. Select the name of the chart to which the object will be added in the **Source Identification Code** drop-down list (to view the selected chart, press the **Show** button). Press the **OK** button to continue the operation or the **Cancel** button to cancel the operation.
11. If you press the **OK** button, the chart view is scrolled so that to display the specified chart and the **Attributes** pane opens.
12. To set the object attributes and metrics, repeat steps 7 to 11 of the previous procedure[30].

[29] The new object is added to the Extrascale dataset.

[30] If you add a manual update object from a Notice to Mariners, the object is added to the chart dataset specified in the **Source Identification Code** field of the **Add New Object from Notice to Mariners** dialog.

To edit a manual update object, do the following:

1. Open the **Chart → Manual Update** tab.
2. In the databases drop-down list, select a database. In the **History** pane the list of updates applied to the specified database will be displayed.
3. Find the updated object you want to edit in the list. To select the object, double-click on the last action performed with the object or select the last action and press the **Highlight** button. The object will be selected and you can start editing it.
4. To edit the object attributes, press the **Attributes Edit** button. The **Attributes** pane will open where you can edit the object attributes. After all changes have been made press the **Save** button to save them. Enter your name to the **Updated by** window and press **OK**. The object appearance will change to reflect the attributes changes and the **Modified** action ! Modified will be added to the object actions list.
5. To edit the object metrics, press the **Metrics Edit** button. The **Metrics** pane will open where you can edit the object metrics. The metrics can be edited both directly in the chart view and in the metrics table. After all changes have been made press the **Save** button to save them. Enter your name to the **Updated by** window and press **OK**. The object will be moved to the new position and the **Moved** action → Moved will be added to the object actions list.
6. To delete an object, select it and press the **Delete** button. Enter your name to the **Updated by** window and press **OK**. The object will marked as deleted in the chart view and the **Deleted** action ✕ Deleted will be added to the object actions list[31].

To edit a chart object, do the following:

1. Select the object in the chart view. Right-click on the object to open the **Object Info** panel, find the object entry in the objects list, and double-click on the entry to highlight it in the chart view.
2. Open the **Chart → Manual Update** tab.
3. To edit the object attributes, press the **Attributes Edit** button. The **Attributes** pane will open where you can edit the object attributes. After all changes have been made press the **Save** button to save them. Enter your name to the **Updated by** window and press **OK**. The dataset to which the edited object belongs will be added to the datasets list if it is not there, the object appearance will change to reflect the attributes changes and the **Modified** action ! Modified will be added to the object actions list.
4. To edit the object metrics, press the **Metrics Edit** button. The **Metrics** pane will open where you can edit the object metrics. The metrics can be edited both directly in the chart view and in the metrics table. After all changes have been made press the **Save** button to save them. Enter your name to the **Updated by** window and press **OK**. The dataset to which the edited object belongs will be added to the datasets list if it is not there, the object will be moved to the new position, the object symbol in the previous position will be crossed with a red line, and the **Moved** action → Moved will be added to the object actions list.
5. To delete the object, press the **Delete** button. Enter your name to the **Updated by** window and press **OK**. The dataset to which the edited object belongs will be added to the datasets list if it is not there, the object will marked as deleted in the chart view and the **Deleted** action ✕ Deleted will be added to the object actions list[32].

6.2 Mariner Objects

Mariner Objects is a tool developed for the mariners to be able to plot their own notes and marks to the chart. Mariner objects are entered to an independent chart layer. Thus, they do not affect other ECDIS functionality and are used exclusively to display mariner's notes. There are seven types of mariner objects available in the ECDIS.

➢ **Mariner objects are the following:**

[31] There are chart objects that can be created using manual updating, but cannot be edited or deleted. The objects are: Unsurveyed area, Pontoon, Hulk, Floating dock, Dredged area, Depth area, Land area (line, area).

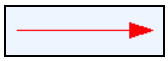
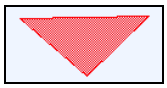
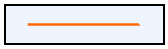
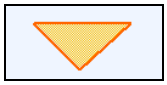
[32] If you edit a manual update object, all changes are done in the Extrascale dataset. If you edit a chart object, all changes are done in the chart dataset.

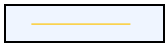
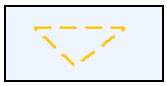
- **Clearing line** – a line object: a straight line, drawn through leading marks. A ship moving along such line will clear certain dangers or remain in the best channel. The line can be drawn though one or two marks. There are three categories of clearing lines available: Not more than (NMT), Not less than (NLT), and Not defined.

  If the category of the clearing line is NMT, the bearing from the own ship to the mark should always remain less or equal to the bearing of the clearing line for the ship to clear the danger. If the category is NLT, the bearing from the own ship should always remain more or equal to the bearing of the clearing line. The Not defined category is used if the clearing line is drawn through two marks and the own ship location control is carried out using the range line between the two marks, rather than the bearing to one of the marks.

- **Danger highlight** – a point or area object highlighting a danger.
- **Event** – a point object indicating the position of the own ship at the moment of some event.
- **Mariners' feature** – a point, line, or area object used to highlight an area on the chart that should attract attention of the mariner because of some effect it can have on navigating across it.
- **Mariners Note** – a point object presenting textual information from the mariner related to certain coordinates. Depending on the importance of the information, you can set two categories of the Mariners' note: 'information' for general information or an unimportant note and 'caution' for important information, danger, instructions, or orders.
- **Manufacturers feature** – a feature or information added by the manufacturer of the ECDIS. Examples are a caution or information symbol for cursor picking to read out the information on the alphanumeric display; additional chart information not available in the ENC; manufacturers' value-added feature; etc.
- **Position** – a point object indicating the own ship position fix. The position fix can be calculated or received from various positioning devices.
- **Tidal stream or current vector** – a point object indicating a predicted or actual tidal stream or current vector with effective time and strength.

In the table below, geometry types, attribute sets, and categories of mariners' objects are described.

Object	Geometry Type and Presentation			Attributes	Category
	point	line	area		
Clearing line	–		–	Information Scale maximum Scale minimum Category of clearing line	undefined NMT (not more than) NLT (not less than)
Danger highlight		–		Information Scale maximum Scale minimum	no
Event		–	–	Information Object name Scale maximum Scale minimum Local time User's remark	no
Mariner's feature				Information Object name Scale maximum Scale minimum Local time User's remark	no

	Geometry Type and Presentation				
Mariner's note		–	–	Information Scale maximum Scale minimum Category of mariner's note Local time User's remark	undefined information caution
Manufacturer's feature				Information Object name Scale maximum Scale minimum Local time User's remark	no
Position		–	–	Scale minimum Input identifier Local time Position finding method	undefined, dead reckoning, estimated, visual, astronomical, Radar, Decca, GPS, Glonass, Loran/Tchaika, MFDF, Omega, Transit/Tsikada, dGPS, dGlonass, dOmega, dLoran, dDecca
Tidal stream or current vector		–	–	Orientation Scale minimum Category of current and tidal stream Current strength Local time	undefined predicted actual

6.2.1 Creating and Editing Mariner Objects

To create a mariner object, do the following:

1. Open the **Chart → Mariner Objects** tab and press the **Create New** button. The **Select an Object** dialog will open.

Figure 64 Chart → Mariner Objects tab

2. In the **Select an Object** dialog, select an object type and press the **OK** button. The ECDIS will switch to the mariner object edit mode and the object editing tab will open

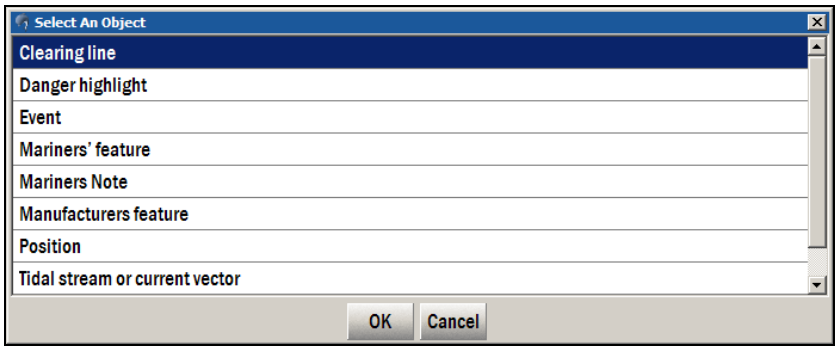


Figure 65 Chart → Mariner Objects tab, Select an Object dialog

3. In the object editing tab, select the object geometry type. To do so, check one of available options for the geometry type.

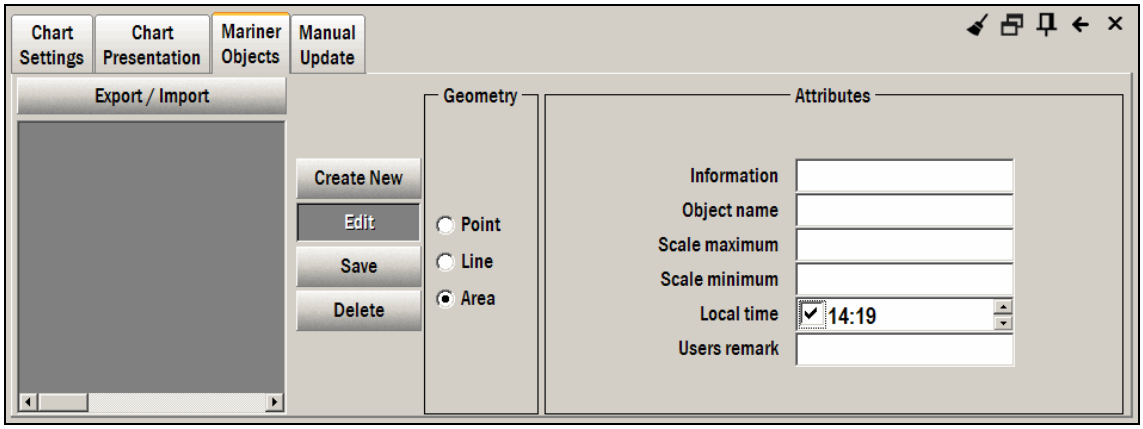


Figure 66 Chart → Mariner Objects tab, Mariners Feature object editing tab

4. Fill in the values of attributes. A mariner object can have one or several of the following attributes:
   - **Information** – information about the object, is not displayed in the chart view;
   - **Scale maximum** – the maximum scale at which the object starts to be displayed in the chart view;
   - **Scale minimum** – the minimum scale at which the object is displayed in the chart view; if the attribute is not set, the object is displayed at all scales;
   - **Category** – category of the object; often defines the object appearance;
   - **Object name** – the name or the number of the object;
   - **Local time** – time of the observation; clear the checkbox in the **Local time** field and the attribute will be ignored;
   - **User's remark** – information related to the object and entered by the user;
   - **Input identifier** – name or initials of the object author;
   - **Position finding method** – for Position only – select method of the position determination from the drop-down list;
   - **Orientation** – for currents only – direction of the current in degrees;
   - **Current strength** – fro currents only – speed of the current in knots.
5. Plot the object in the chart view:
   - **Point object** – move the mouse pointer to the chart view and left-click in the selected position to plot the object. To move the object, left-click in a different position: the object will be moved to the new position. You can also drag the object to a different position. To do so, left-click on the object to "capture" it with the mouse pointer, drag the object to a new position, and left-click once more to plot the object there.

- **Line object** – move the mouse pointer to the chart view and plot the line nodes using the left mouse button. You can perform the following operations with the nodes:
  - To add a new node, left-click in a selected position: the node will be plotted in the chart view.
  - To move a node, left-click on the node to "capture" it, move the mouse pointer with the node to a new position, and left-click to plot the note.
  - To delete a node, right-click on it.
  - To insert an intermediate node, left-click on the line between two nodes: the new node is created in the position of the pointer. The node is attached to the pointer and you can move it. Move the node to its position and left-click to plot it in the chart view.
  - To add a node in the beginning or in the end of the line – when you plot a line object adding nodes one after another, the mouse pointer and the last node are linked with a line marker that indicates the length and position of the next line section. To add a node to one of the line edges, move the mouse pointer to the edge node, the marker line will connect the pointer and the node – now you can plot new nodes.
- **Area object** – to plot an area object, plot the object nodes in the chart view. Nodes of area objects should be edited in the same way as nodes of line objects.

6. To save the new mariner object, press the **Save** button. The object will be added to the objects list. To cancel the object creation, outpress the **Edit** button and say 'no' to saving the object.

To edit a mariner object, do the following:

1. Open the **Chart → Mariner Objects** tab and select an object in the objects list. You can also select the object directly in the chart view: make sure that the **Chart → Mariner Objects** tab is open, find the object in the chart view, and right-click on it. The object will be highlighted and marked with an arrow symbol. To clear the highlight, press the **Clear highlight** button in the upper right corner of the **Chart** panel.
2. Press the **Edit** button to switch to the mariner objects edit mode and to open the object editing tab.
3. Change the object attributes and position using the same operations as when creating an object (see above).
4. To save the changes, press the Save button. To cancel changes, outpress the **Edit** button and say 'no' to saving the changes.
5. To delete an object, select it, press the **Delete** button and confirm the operation.

6.2.2 Export/Import of Mariner Objects

Mariner objects are mainly intended for the use of the mariner. However, they can be exported to an external file that can be used for various purposes. Exported objects are written to a file with the DAT extension. Mariner objects can also be imported to the ECDIS.

To export a mariner object, do the following:

1. Open the **Chart → Mariner Objects** tab and press the **Export/Import** button to switch to the export/import mode.

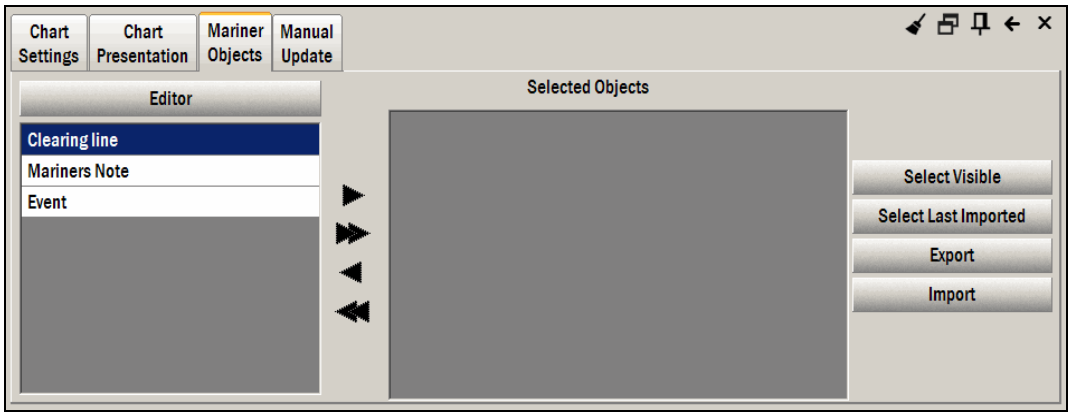
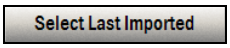


Figure 67 Chart → Mariner Objects tab, export/import mode

2. Create the list of objects to export: add mariner objects from the objects list to the **Selected Objects** list. Use the selection buttons:
   -  **Add Object** – adds a selected object to the **Selected Objects** list;  **Add All Objects** – adds all mariner objects to the **Selected Objects** list;
   -  **Remove Object** – removes a selected object from the **Selected Objects** list;  **Remove All Objects** – removes all objects from the **Selected Objects** list;
   - 

Select Visible – adds mariner objects that are currently displayed in the chart view to the **Selected Objects** list, all previously added objects are removed from the **Selected Objects** list.
   - 

Select Last Imported – adds last imported mariner objects to the **Selected Objects** list.
3. Press the **Export** button. The **Export mariner objects** dialog will open.
4. In the **Export mariner objects** dialog, indicate the folder where the file will be saved, change the file name is necessary (default file name is `mariner_objects.dat`), and press the **Export** button. Objects file will be saved in the specified folder.
5. To return to the editor, press the **Editor** button.

To import a mariner object, do the following:

1. Open the **Chart → Mariner Objects** tab and press the **Export/Import** button to switch to the export/import mode.
2. Press the **Import** button. The **Import mariner objects** dialog will open.
3. In the **Import mariner objects** dialog, select the folder where mariner objects files are stored. The list of files will be displayed in the right-hand pane of the dialog window.
4. Select the mariner objects file to import to the ECDIS and press the **Import** button.
5. The mariner objects from the file will be imported to the ECDIS and added to the list of other mariner objects.
6. To return to the editor, press the **Editor** button.

6.3 Charts Catalogue

The Chart Catalogue allows you to obtain detailed information about charts belonging to a specified database.

Using the Chart Catalogue function, you can find any chart of a specified database you are particularly interested in and view it in the chart view. You can also display boundaries of charts grouped into scale levels in the chart view.

6.3.1 Searching Charts Catalogue

In the Charts Catalogue, you can obtain information about any particular chart and view the chart on the screen.

To search the chart catalogue, do the following:

1. Open the **Data → Chart Catalogue** tab.

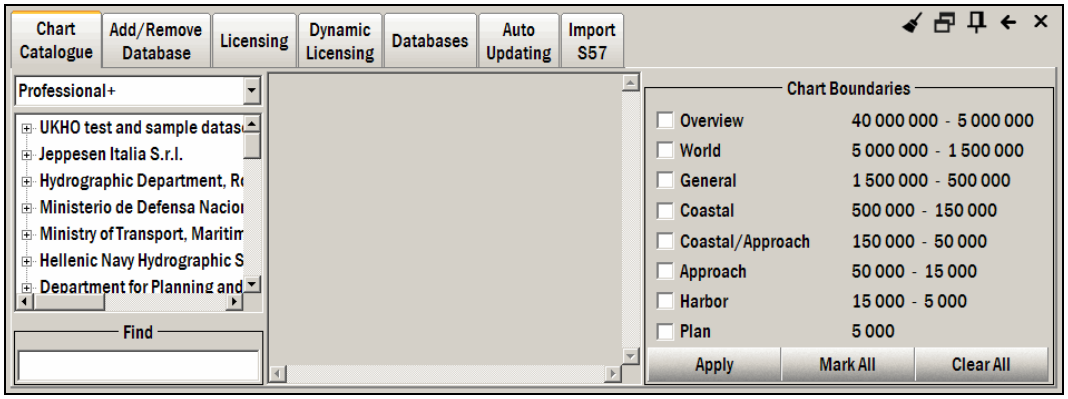


Figure 68 Data → Chart Catalogue tab

2. Select a database in the databases drop-down list. The list of charts grouped by issuing organizations will be displayed in the pane under the databases drop-down list.
3. To expand a group, click on the plus '+' sign next to the group name. In the expanded list, names of charts will be presented. To collapse the group, click on the minus '-' sign next to the group name.
4. Select a chart to view information about it in the pane to the right from the charts list. To scroll the chart view so that to display a specified chart, double-click on the chart name in the charts list.

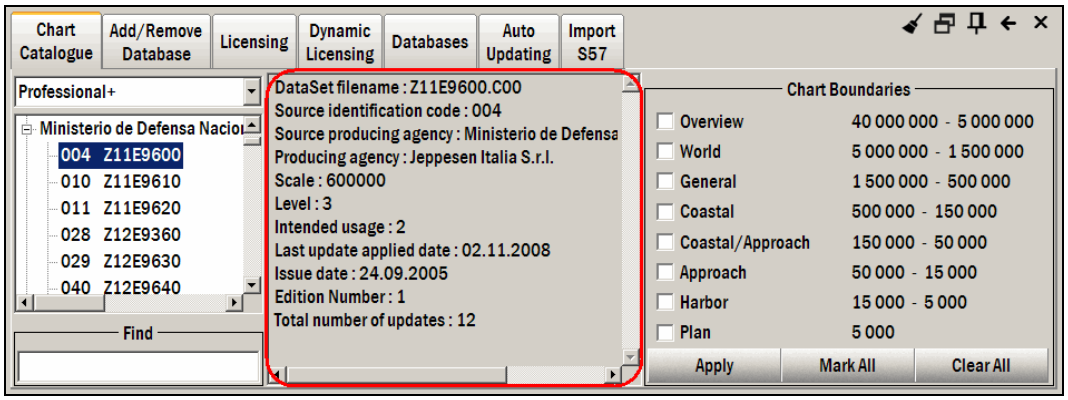


Figure 69 Data → Chart Catalogue tab, chart information pane

5. To use the **Find** option for searching charts, enter the name of the source paper chart to the **Find** field. As you are entering the name symbols, charts which have the symbols you are entering in their names will be selected in the catalogue. Keep entering the chart name symbols until you find the right chart.

6.3.2 Viewing Chart Boundaries by Scale Levels

All charts in the Jeppesen Marine chart database are divided into groups according to their scales and intended usage. The groups are called scale levels (*see chapter 5.2, Scaling the Chart View*). Using the Chart Catalogue function, you can display boundaries of charts in the chart view by scale levels.

To display chart boundaries by scale levels, do the following:

1. Open the **Data → Chat Catalogue** tab.
2. Select a database in the databases drop-down list.
3. In the **Chart Boundaries** section, check checkboxes next to the scale level names and press the **Apply** button. Boundaries of charts assigned to the selected scale levels will be displayed in the chart view.
4. Use the **Mark All** button to mark all the scale levels, and the **Clear All** button, to unmark all the scale levels.

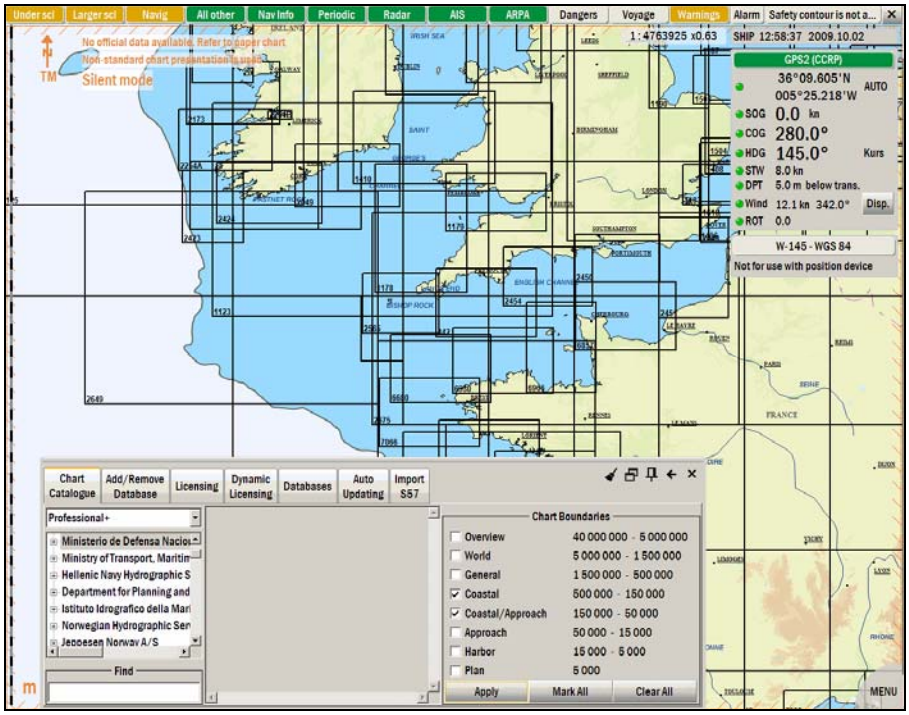


Figure 70 Data → Chart Catalogue tab, boundaries of coastal and coastal/approach charts

6.4 Route Planning and Plotting

6.4.1 Automatic Route Planning

The ECDIS provides the possibility to automatically plan and plot the route. The route is calculated using the database of pre-planned routes connecting a number of ports of the world.

To plot a route automatically, do the following:

1. Open the **Route → Route Finder** tab.

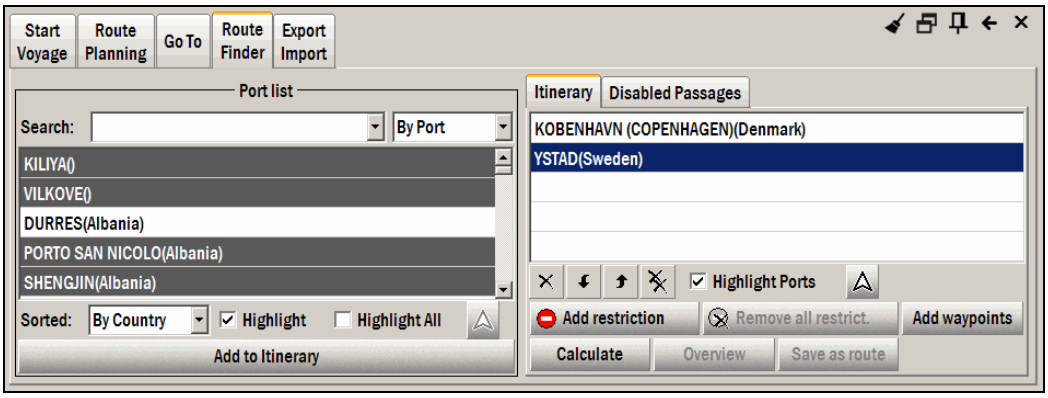


Figure 71 Route → Route finder tab

2. Add waypoints of the route to the waypoints list in the **Itinerary** tab. There are two ways of adding waypoints:
   a. add ports from the ports list to the itinerary (*see the description of the procedure below*);
   b. add waypoints by selecting them directly in the chart view (*see the description of the procedure below*).
3. Edit the waypoints list (*see the description of the procedure below*).
4. Calculate the route (*see the description of the procedure below*).
5. Apply restrictions to the route calculation in case the calculated route leads through narrows, channels or straits you do not want it to. There are two ways of applying restrictions:
   a. forbid using channels and straits for route calculation by indicating it in the **Disabled Passages** list (*see the description of the procedure below*);

b. apply restrictions directly in the chart view (*see the description of the procedure below*).

6. Recalculate if necessary and save the route (*see the description of the procedure below*).

To add a port from the ports list to the waypoints list, do the following:

1. Find the port in the ports list. Ports are sorted by port name or by country where ports are located, depending on the option selected in the **Sorted** drop-down list below the ports list. Ports that service vessels with a draft less than the current draft specified for the own ship are disabled in the list and you cannot select them for your route.
2. Select the port in the ports list (if the **Highlight** checkbox is ticked, the port will be marked with a green circle on the chart) and press the **Add to Itinerary** button. The port will be added to the waypoints list.
3. To find a port in the ports list quickly, you can use the **Search** function. Switch on the search by port (select **By Port** option in the **Search Options** drop-down list) and type the port name into the **Search** field. The first port found that begins with the typed symbols will be highlighted in the list. Continue typing until required port is highlighted.
4. If the **By Country** search option is selected, the search is carried out by country. Enter the country name to the **Search** field and the first port (alphabetically) of the country will be highlighted. When using the search by country, sorting by country is also recommended.
5. To scroll the chart view to a port, select the port in the list and press the **Go to Position**  button.
6. To highlight all ports included in the ports list, check the **Highlight All** checkbox. All ports will be marked with yellow circles in the chart view.

To add a waypoint to the waypoints list, do the following:

1. Press the **Add Waypoints** 

button in the **Itinerary** tab.
2. Move the mouse pointer to the waypoint position in the chart view and left-click holding down the SHIFT key. The waypoint will be plotted on the chart as a violet circle and added to the itinerary.
3. Outpress the **Add Waypoints** button.

To edit the waypoints list, do the following:

1. To remove a port/waypoint from the list, select the port/waypoint and press the **Remove**  button.
2. To move a port/waypoint down or up in the list, select the port/waypoint and press the **Move up**  or **Move down**  button.
3. To clear the list (remove all ports/waypoints), press the **Clear All**  button.
4. When the **Highlight Ports** 

option is checked, all ports in the list are displayed on the chart as white circles and the port selected in the list is shown as a violet circle.
5. To change the screen position so that the port selected in the list were in the screen center, press the **Go to**  button. It will also be marked with an arrow.

To calculate the route, do the following:

1. Add all ports and waypoints you want to include in the route, edit the ports/waypoints list, and press the **Calculate** button.
2. The ECDIS will calculate the shortest route of all routes available by taking into account your current draft. The calculated route will be marked on the chart as a yellow line.

To add restrictions to the route calculation by disabling passages, do the following:

1. Open the **Disabled passages** tab and check the passages you want to close for route calculation.

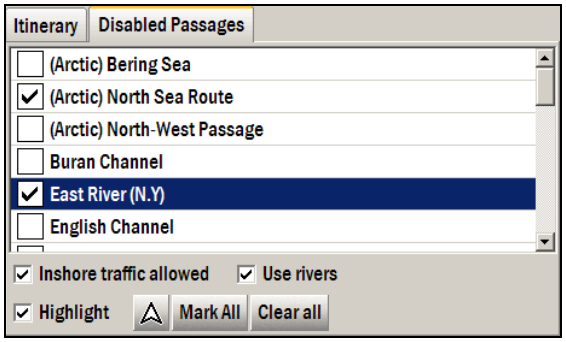


Figure 72 Route → Route Finder tab, Disabled Passages tab

2. In order to allow or forbid sailing through all passages use **Mark All** and **Clear All** buttons.
3. To allow using inshore traffic zones for route calculation, check the **Inshore traffic allowed** checkbox. The route can be calculated outside Traffic Separation Schemes but can be shorter.
4. To allow using rivers for route calculation, check the Use rivers checkbox.
5. If the **Highlight** checkbox is ticked the passage will be marked on chart when selected.
6. To scroll the screen to the selected passage, press the **Go to Position** button. The passage will also be marked with an arrow symbol.
7. Once you have added all your restrictions, recalculate the route: press the **Calculate** button. This time all added restrictions will be taken into account.

To add restrictions to the route calculation by plotting them in the chart view, do the following:

1. Press the **Add restriction** button Add restriction.
2. Draw a line or an area that will indicate the restricted zone on the chart. To plot a point, left-click in the chart view; to delete a point, right-click on the point; to move a point, left-click on the point to capture it with the mouse pointer, move the point to a new location, and left-click to release it.
3. To save the added restriction, press the **Save restriction** button Save restriction that has appeared in place of the **Add restriction** button.
4. Confirm or cancel the operation. To confirm the operation, press the Yes button, the restriction will be added. You can add as many restrictions as you like.
5. To remove all manually entered restrictions, press the **Remove all restrictions** button Remove all restrict.. You can only remove all the added restriction.
6. Once you have added all your restrictions, recalculate the route: press the **Calculate** button. This time all added restrictions will be taken into account.

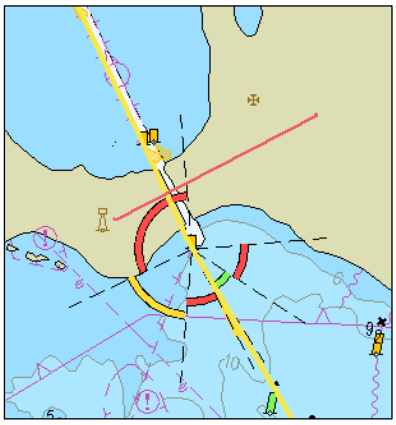


Figure 73 Adding own restriction

To save the route, do the following:

1. Press the **Save as Route** button. The **Create New Route** dialog will open.

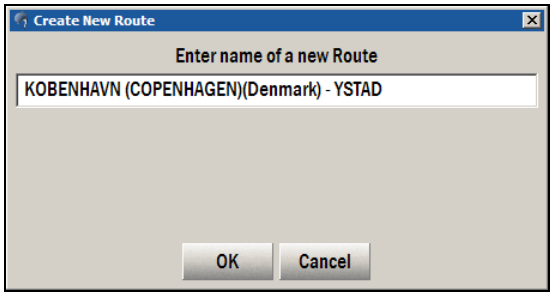


Figure 74 Create New Route dialog

2. Enter the route name and press **OK**.
3. The new route is added to the routes list in the **Route → Route Planning** panel where you can analyze, check and correct the route if necessary.

6.4.2 Manual Route Planning

If you prefer to plot routes manually from the beginning to the end or if routes created automatically require editing, use the manual route planning and editing functionality of the ECDIS. Using the functionality, you can create new routes, edit existing routes, edit route schedules, add control points, check routes, etc.

To create a new route, do the following:

1. Open the **Route → Route Planning** tab and press the **New** button. The **Create New Route** dialog will open.

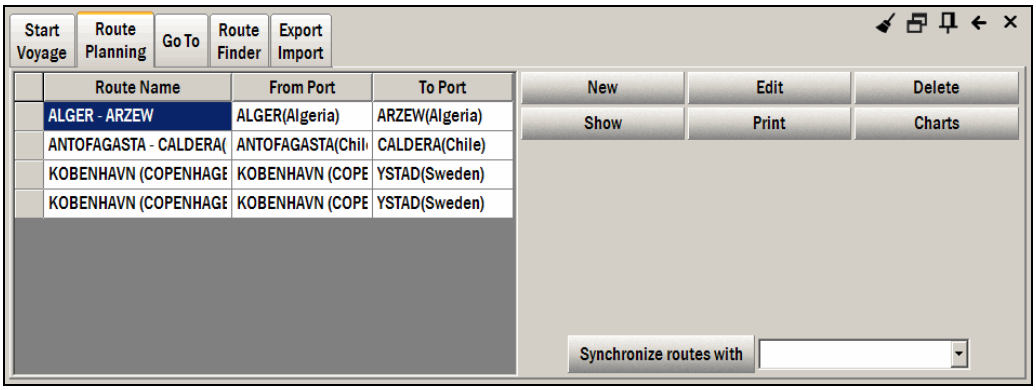


Figure 75 Route → Route Planning tab

2. In the **Create New Route** dialog enter the name of the new route to the **Enter name of a new Route** field and press **OK**.

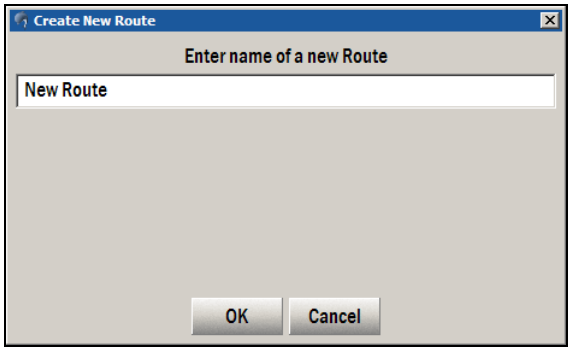


Figure 76 Create New Route dialog

3. The new route will be created and added to the routes list. The ECDIS will switch to the route edit mode. You can start plotting the route waypoints and enter other route information. More details about plotting waypoints see below.

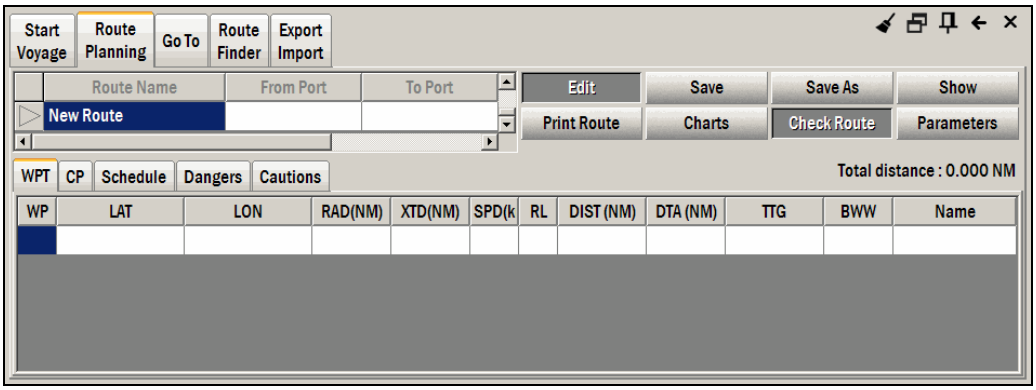


Figure 77 Route → Route Planning tab, creating a new route

4. After all waypoints and route information have been added, press the **Save** button to save the route. To save the route under a different name, press the **Save as** button, enter the new name to the **Save route as** dialog and press **OK**.

To plot waypoints of the route in the chart view, do the following:

- **Plot waypoint in the chart view** – Left-click in the chart view. A waypoint number (1) in an orange circle 

will be plotted in the chart view. Move the pointer and you will see a thin red line linking the point and the mouse pointer. The line marker can be useful for checking the leg and the second waypoint position. To plot the next waypoint, left-click in a new position in the chart view. The second waypoint (2) will appear. The next left-click will plot the next waypoint and so on.
- **Add waypoint to the waypoints table** – To add a waypoint to the route using the keyboard, enter the waypoint latitude and longitude to the **LAT** and **LON** fields of the **WPT** table. To do so, Left-click in the **LAT** field of the **WPT** table to start entering the latitude, the 00°00.000´ value will appear, enter your value for the waypoint latitude using the keyboard. Then enter the waypoint longitude to the **LON** field. The waypoint will appear in the chart view in the set coordinates[33].
- **Move waypoint** – To change the position of a plotted waypoint, click with the left mouse button on the waypoint, it will be captured by the mouse pointer. Move the waypoint to a new position and release it by clicking with the LEFT mouse button once more.
- **Insert waypoint before the first one** – Move the mouse pointer over the first waypoint. The line marker will be linked to it instead of the last waypoint. Left-click to plot a new point before the first one. The new waypoint becomes the first waypoint of the route. Move the mouse pointer over the last waypoint, wait for the line marker to link the last waypoint and the pointer, and resume adding waypoints from the last one.
- **Insert waypoint between two existing waypoints** – In order to insert a waypoint between two existing waypoints move the mouse pointer over the leg between them, a special symbol will appear  . Left-click in the new position, a new waypoint will be created, the waypoint is attached to the pointer. Choose the waypoint position and left-click to plot the waypoint.
- **Delete waypoint** – To delete a waypoint, move the mouse pointer over it. The line marker will disappear and a special symbol 

will be displayed. Right-click on the waypoint to delete it.
- **Panning and zooming in or out** – While you are in the Edit mode any left-click plots a new point. To pan the chart view, move the mouse pointer to the window border in the direction you want to move the chart view. When the pointer changes to an arrow  , left-click and the chart view will move. To zoom the chart view in or out, use the **Chart Scale** panel options or the mouse wheel if available. With the CTRL key held down, you can pan and zoom the chart view in the same way as when in the regular chart view mode (to zoom out press and hold down the CTRL and SHIFT keys simultaneously).

➢ **In the Route → Route Planning tab, the following operations with routes are available:**

- **Edit** – To open a selected route in the route edit mode, select the route in the routes list and press the **Edit** button. Only one route may be edited at a time. For more details, *see chapter 6.4.3, Route Edit Mode*.
- **Delete** – To delete a selected route, select the route in the routes list, press the **Delete** button, and confirm the operation.

  If, when editing a route, you see that the route is colored red and one of waypoints is marked with a cross, it means that the route legs are too close to each other and their deviation corridors (XTD) are overlapped too much.

[33] Waypoints are displayed in the chart view beginning with the 1:100 000 scale.

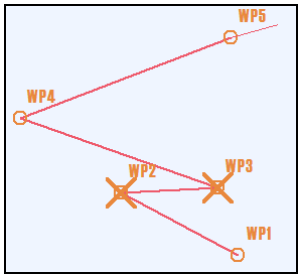


Figure 78 Warning about too close route legs position

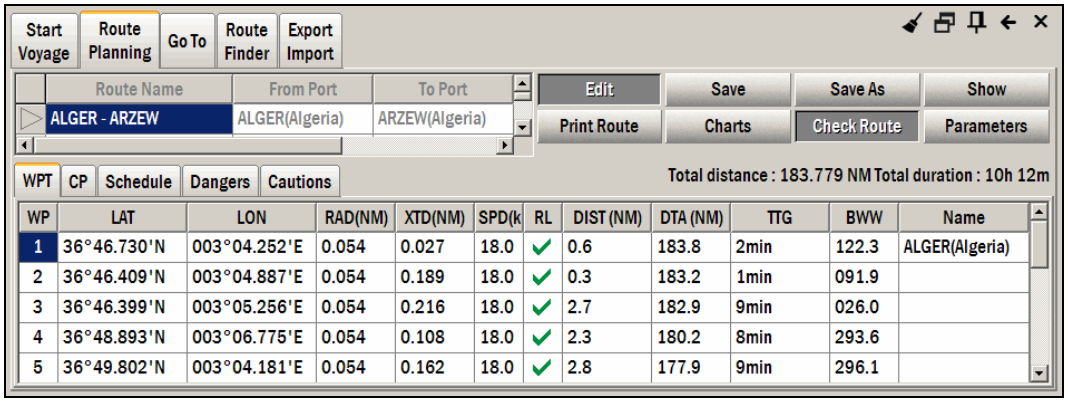
If route legs are situated too close to each other it can cause problems for autopilot use; the route legs cannot be checked for dangers and cautions. Try to avoid plotting route legs too close.

- **Show** – To show a selected route in the chart view, select the route in the routes list and press the **Show** button. The chart view will be scrolled and zoomed so that to display the whole route on the screen.
- **Print** – To print a selected route, select the route in the routes list, press the **Print** button, and select the route table to be printed out from the drop-down menu. The table will be converted to the *.doc format and opened in the Reach Text Editor (the program is installed together with ECDIS). Print the table using the Reach Text Editor printing functionality (**File → Print**).
- **Charts** – To view the set of charts covering a selected route, select the route in the routes list and press the **Charts** button. Borders of charts covering the route will be displayed in the chart view.
- **Synchronize routes** – To synchronize routes between the local and remote computers after changes have been made to one of available routes, save the changes, return to the **Route → Route Planning** tab (switch the route edit mode off), in the **Synchronize routes with** drop-down list select computer to synchronize with and press the **Synchronize routes with** button. The synchronization task will be added to the tasks list and executed in its turn (for details on the data synchronization, *see chapter 3.5.3, Routes Synchronization*).

6.4.3 Route Edit Mode

In the route edit mode you can edit the route plan, change route parameters, add control points to the route, and edit the route schedule.

To switch to the route edit mode, in the **Route → Route Planning** tab, select a route in the routes list and press the **Edit** button. The route will be loaded and opened in the route edit mode.



WP	LAT	LON	RAD(NM)	XTD(NM)	SPD(k	RL	DIST (NM)	DTA (NM)	TTG	BWW	Name
1	36°46.730'N	003°04.252'E	0.054	0.027	18.0	✓	0.6	183.8	2min	122.3	ALGER(Algeria)
2	36°46.409'N	003°04.887'E	0.054	0.189	18.0	✓	0.3	183.2	1min	091.9	
3	36°46.399'N	003°05.256'E	0.054	0.216	18.0	✓	2.7	182.9	9min	026.0	
4	36°48.893'N	003°06.775'E	0.054	0.108	18.0	✓	2.3	180.2	8min	293.6	
5	36°49.802'N	003°04.181'E	0.054	0.162	18.0	✓	2.8	177.9	9min	296.1	

Figure 79 Route → Route Planning tab, route edit mode

➢ **In the route edit mode, the following operations with the route are available:**

- Edit route plan – changes the WPT table (*see chapter 6.4.4, Route Plan*);
- Add control points – add entries to the CP table (*see chapter 6.4.5, Adding Critical Points*);
- Edit route schedule – change the Schedule table (*see chapter 6.4.6, Editing Route Schedule*);
- Save changes – to save all changes introduced to the route, press the **Save** button. Once the route has been saved, the ECDIS switches the route edit mode off and the standard **Route → Route Planning** panel opens.

- Save route under a different name – to save the route under a different name, press the **Save as** button, enter the name in the **Save Route as** dialog, and press the **OK** button. The route with the latest changes will be saved as a new route. The old route will remain in the routes list.
- View the route in the chart view – to view the route in the chart view, press the **Show** button. The chart view will be scrolled and scaled so that to display the whole route in the chart view.
- Print the route plan (the **WPT** table) out – to print the route plan out, press the **Print Route** button. The **WPT** table will be converted to the `*.doc` format and opened in the Reach Text Editor (the program is installed together with ECDIS). Print the table using the Reach Text Editor printing functionality (**File → Print**).
- View charts covering the route – to view charts that cover the route, press the **Charts** button. Charts covering the whole selected route will be highlighted in the chart view.
- Check the route for dangers – to check the route for dangers, press the **Check Route** button. The whole route is checked leg by leg and all found dangers and cautions are listed in the **Dangers** and **Cautions** tabs. The tabs are created inside the **Route Planning** panel and organized in the same way as the **Object Info** panel. Also all legs are marked with colors. These colors mean the following:
  - Blue – the **Check route** tool has not yet checked the leg;
  - Red – the **Check route** tool has found dangers along the leg; presence of cautions does not affect this highlighting;
  - Yellow – the leg is a rhumb line with the length of more than 195 Miles and the tool is unable to check it;
  - No color – the **Check route** tool has found no dangers.
- Set default route parameters – to set parameters of the route that will be used as default when the route is created, press the **Parameters** button, the **Route Parameters** window will open. Switch to the **Default Settings** tab, set necessary parameters, and press the **Apply** button for the changes to take effect. The following route parameters are available in the tab:
  - **SPD(kn)** – speed on the leg, used by the ECDIS to calculate time for navigating from one waypoint to the next one, in knots;
  - **XTD(NM)** – allowable deviation from the track along the leg from one waypoint to the next, in nautical miles;
  - **RAD(NM)** – turning radius at the waypoint, in nautical miles;
  - **Great Circle** – if the checkbox is set, route legs are considered orthodromies; if the checkbox is not set, route legs are considered loxodromes;
  - **Show WP** – turns on the display of waypoint symbols in the chart view; if the checkbox is not set, waypoint symbols are not displayed;

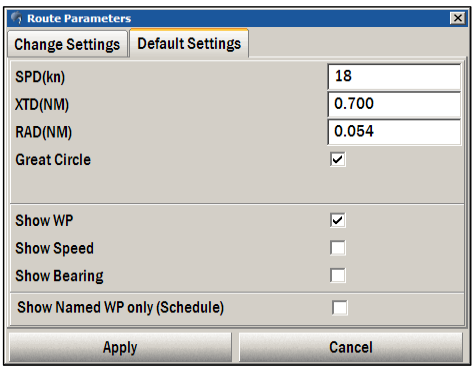


Figure 80 Route Parameters window, Default Settings tab

  - **Show Speed** – turns on the display of speed on the leg values in the chart view;
  - **Show Bearing** – turns on the display of bearing on the leg values in the chart view;
  - **Show Named WP only (Schedule)** – if the checkbox is set, only waypoints that have names are displayed in the Schedule table. This allows displaying waypoints that are especially important for the timetable.
- Change settings of several waypoints – to change settings of several waypoints at one go, press the **Parameters** button, the **Route Parameters** window will open. Switch to the **Change Settings** tab, set the waypoints, between which route parameters will be changed, set necessary parameters, and press the **Apply** button for the changes to take effect. The following route parameters are available in the tab:

- **From WP/To WP** – in the **From WP** and **To WP** drop-down lists set the range of waypoints, between which route parameters will be changed.
- **SPD(kn)** – speed on the leg, used by the ECDIS to calculate time for navigating from one waypoint to the next one, in knots;
- **XTD(NM)** – allowable deviation from the track along the leg from one waypoint to the next, in nautical miles;
- **RAD(NM)** – turning radius at the waypoint, in nautical miles;
- **Great Circle** – if the checkbox is set, route legs are considered orthodromies; if the checkbox is not set, route legs are considered loxodromes.

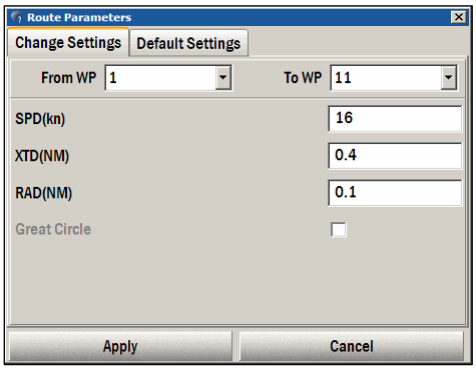


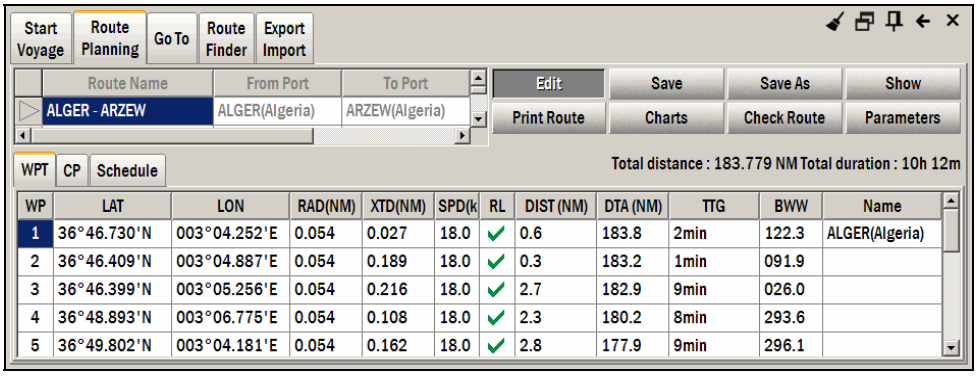
Figure 81 Route Parameters window, Change Settings tab

6.4.4 Route Plan

The route plan can be viewed only in the route edit mode.

To view the plan of a specified route, do the following:

1. Open the **Route → Route Planning** tab.
2. Select a route in the routes list and press the **Edit** button. The route edit mode will be switched on.
3. In the route edit mode the route plan (**WPT** table), control points (**CP** table), and the route schedule (**Schedule** table) are available.



WP	LAT	LON	RAD(NM)	XTD(NM)	SPD(k	RL	DIST (NM)	DTA (NM)	TTG	BWW	Name
1	36°46.730'N	003°04.252'E	0.054	0.027	18.0	✓	0.6	183.8	2min	122.3	ALGER(Algeria)
2	36°46.409'N	003°04.887'E	0.054	0.189	18.0	✓	0.3	183.2	1min	091.9	
3	36°46.399'N	003°05.256'E	0.054	0.216	18.0	✓	2.7	182.9	9min	026.0	
4	36°48.893'N	003°06.775'E	0.054	0.108	18.0	✓	2.3	180.2	8min	293.6	
5	36°49.802'N	003°04.181'E	0.054	0.162	18.0	✓	2.8	177.9	9min	296.1	

Figure 82 Route → Route Planning tab, route edit mode, Waypoints table

4. The following information is automatically entered and appears in the waypoint table as you plot waypoints on the chart:
   - **WP** – Waypoint number, cannot be changed.
   - **LAT** – Waypoint latitude.
   - **LON** – Waypoint longitude.
   - **RAD(NM)** – Assigned turning radius at the waypoint. Expressed in nautical miles. Default value is set in the **Route Parameters → Default Settings** tab (press the **Parameters** button to open the **Route Parameters** window).
   - **XTD(NM)** – Cross Track Distance (XTD) – deviation from the track along the leg from this waypoint to the next. The XTD value is used for determining dangers and cautions along the route. Expressed in nautical miles. Default value is set in the **Route Parameters → Default Settings** tab (press the **Parameters** button to open the **Route Parameters** window).
   - **SPD** – Assigned speed on the leg from this waypoint to the next. Expressed in knots. Default value is set in the **Route Parameters → Default Settings** tab (press the **Parameters** button to open the **Route Parameters** window).

- **RL** – A choice of whether Rhumb Line (✔) or Great Circle (▬) sailing will be applied from this waypoint to the next. To switch between the Rhumb Line and Great Circle sailing click in the sell. Default value is set in the **Route Parameters → Default Settings** tab (press the **Parameters** button to open the **Route Parameters** window).
- **DIST(xx)** – The distance from this waypoint to the next. Expressed in measurement units set in the **CONFIG → Units and Time** tab, **Distance Units** section. The parameter value is calculated automatically and is not editable.
- **DTA(xx)** – Distance to Arrival – distance from this waypoint to the last waypoint of the route (destination). Expressed in measurement units set in the **CONFIG → Units and Time** tab, **Distance Units** section.
- **TTG** – Estimated time that will be spent for sailing from this waypoint to the next.
- **BWW** – Bearing Between Waypoints – bearing from one waypoint to the next. Expressed in degrees.
- **Name** – The name of the waypoint, optional parameter.

5. To save changes, press the **Save** button. All changes will be saved, and the route edit mode will be switched off.

6.4.5 Adding Critical Points

You can specify a critical point on the route for the ECDIS to give an alarm if the own ship is going to reach the critical point within a specified time or distance.

To set a critical point, do the following:

1. Open the **Route → Route Planning** tab, select a route and press the **Edit** button to switch to the route edit mode.
2. In the route edit mode, switch to the **CP** table. Now you are in the control points edit mode and can add new and edit existing critical points.

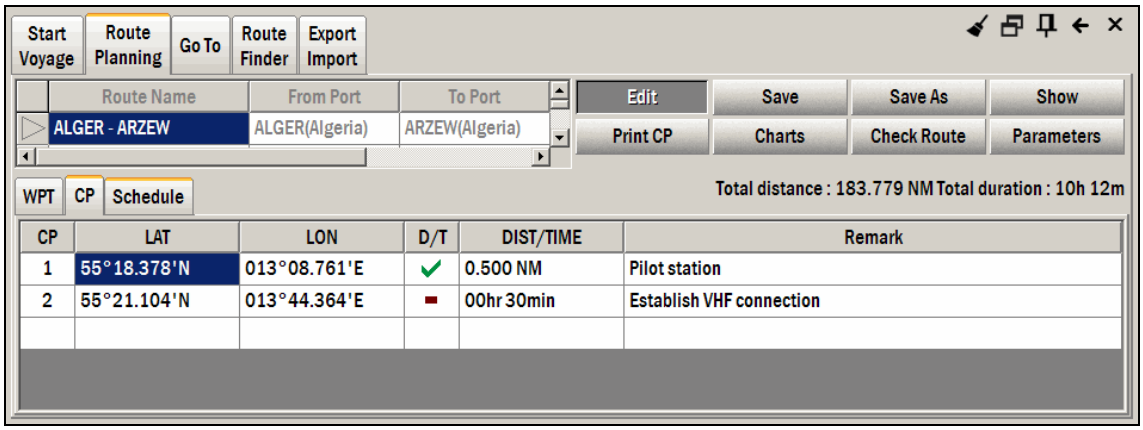


Figure 83 Route → Route planning tab, Edit mode, critical points table

3. To plot a critical point in the chart view, move the mouse pointer to the critical point location and left-click. The critical point will be added to the **CP** table. A critical point symbol is an orange circle with a cross inside .
4. The other way to add a critical point is to enter its coordinates to the **LAT** and **LON** fields of the **CP** table.
5. To move a critical point to a new position, left-click on it to "capture" the point with the mouse pointer, move the point to a new position, and left-click once more to plot it there.
6. After the coordinates of the critical point have been set, add the following information about the critical point to the **CP** table:
   - **D/T** – Indicate if the system will give alarm when approaching the critical point within a specified time or within a specified distance. For distance, you should put a tick ✔ sign in the cell and for time, a dash ▬ sign. To select a sign, click in the cell and the sign that is now displayed will change to the other.

- **DIST/TIME** – The value of the distance or the time at which the system should notify the mariner about approaching the critical point. This field depends on the **D/T** choice.
- **Remark** – Here you can enter the critical point information.

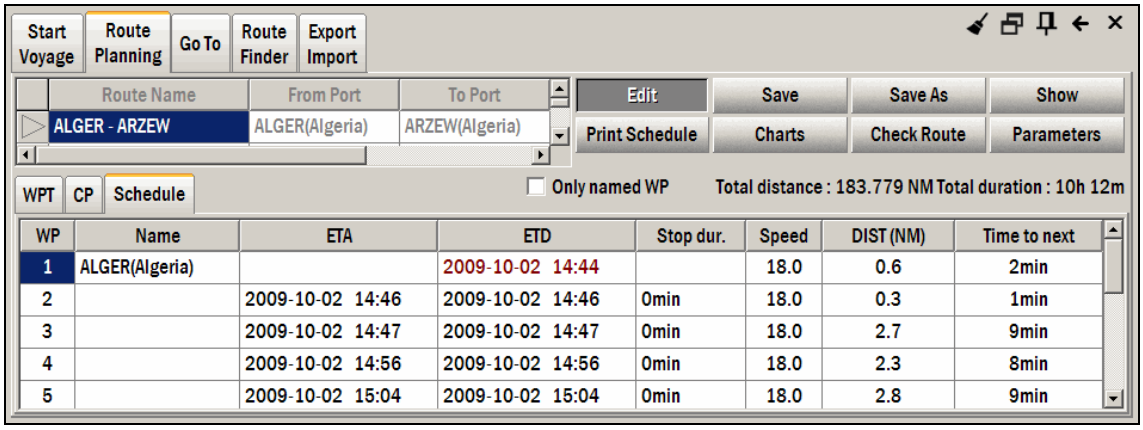
7. To delete a critical point, right-click on it.
8. To print the **CP** table out, press the **Print CP** button. The **CP** table will be converted to the `*.doc` format and opened in the Reach Text Editor (the program is installed together with ECDIS). Print the table using the Reach Text Editor printing functionality (**File → Print**).
9. To save changes, press the **Save** button. All changes will be saved, and the route edit mode will be switched off.

6.4.6 Editing Route Schedule

The route schedule is created together with the route itself. Times of navigation between waypoints are calculated using the distance between the points and the own ship speed parameters. You can edit the route schedule entries: change time of departure and allocate time for stops in waypoints.

To edit the route schedule, do the following:

1. Open the **Route → Route Planning** tab, select a route and press the **Edit** button to switch to the route edit mode.
2. In the route edit mode, switch to the **Schedule** table. Now you can edit the route schedule.



WP	Name	ETA	ETD	Stop dur.	Speed	DIST (NM)	Time to next
1	ALGER(Algeria)		2009-10-02 14:44		18.0	0.6	2min
2		2009-10-02 14:46	2009-10-02 14:46	0min	18.0	0.3	1min
3		2009-10-02 14:47	2009-10-02 14:47	0min	18.0	2.7	9min
4		2009-10-02 14:56	2009-10-02 14:56	0min	18.0	2.3	8min
5		2009-10-02 15:04	2009-10-02 15:04	0min	18.0	2.8	9min

Figure 84 Route → Route planning tab, Edit mode, Schedule table

3. The following route schedule parameters are displayed in the **Schedule** table:
   - **ETA** – Estimated Time of Arrival – Estimated date and time of arrival to the waypoint. Can be set by the user.
   - **ETD** – Estimated Time of Departure – Estimated date and time of departure from the waypoint. Can be set by the user[34].
   - **Stop dur.** – Stop duration at the waypoint. It can be applied for waypoints representing pilot stations and ports, as a route can include a number of intermediate ports of call.
   - **Speed** – Estimated speed in knots on the leg from this waypoint to the next. It is taken from the **WPT** table and can be changed here. If you change the speed value in the **Schedule** table, it is changed in the **WPT** table too.
   - **DIST** – The distance from the waypoint to the next one along the leg. Expressed in measurement units set in the **CONFIG → Units and Time** tab, the **Distance Units** section. The Distance is taken from the **Waypoints** table.
   - **Time to Next** – Time that will be spent to reach the next waypoint. It is calculated as speed divided by distance.
4. Above the table, the total distance and the total duration of the route are displayed.

[34] If you change the arrival or departure time/date, the ETA and ETD for each waypoint are changed accordingly.

5. To display only named waypoints in the **Schedule** table, check the **Only named WP** checkbox.
6. To save changes, press the **Save** button. All changes will be saved, and the route edit mode will be switched off.

6.4.7 Routes Export to and Routes Import from a File

It is possible to import and export routes to store them for future reference. This chapter explains how to exports routes to and import them from files.

To export a route to a file, do the following:

1. Open the **Route → Export/Import** tab and switch to the **From/To File** tab.

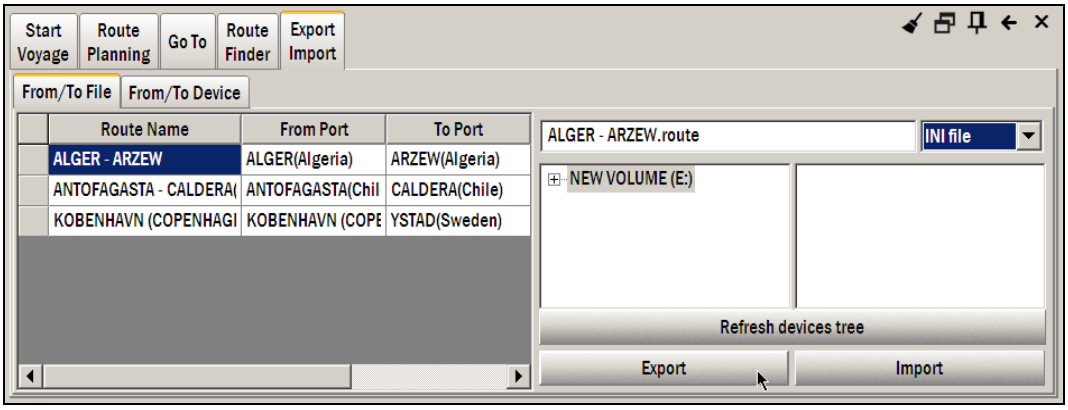


Figure 85 Route → Export/Import tab, From/To File tab

2. Select a route to export in the routes table.
3. Enter the file name to the field above the folder tree and select the file format (INI or RTE/WPL) in the file formats drop-down list.
   - INI – Routes are saved in files with the `*.route` extension.
   - RTE/WPL – Routes are saved in files with the `*.rte` extension. Unlike the `*.route` files intended for the ECDIS only, `*.rte` files can be imported to many devices.
4. In the folder tree window, select the folder where the route will be saved. If in the folder there are other route files, they will be displayed in the panel to the right from the folder tree.

   To delete a route file from the files list, select the file, press the DELETE key, and confirm the operation.
5. To export the route, press the **Export** button. If the route is exported successfully, the message *Route was exported successfully* will appear and the file name will be listed in the files list pane.

To import a route from a file, do the following:

1. Open the **Route → Export/Import** tab and switch to the **From/To File** tab.
2. In the folder tree, select the folder where the route file is stored. All route files stored in the selected folder will be listed in the pane to the right from the folder tree.

   In case the file you need is not on the list, make sure you have selected the right folder and check the file format selected in the formats drop-down list. The format set in the formats drop-down list should be the same as that of the route file you want to import.
3. Select the route file and press the **Import** button. The route from the file will be imported to the ECDIS and its name will be displayed in routes list.
4. In case there are several routes in the specified file (only for `*.route` files), you will be prompted to select one of the routes in the **Select Route Name** dialog.

   In the **Select Route Name** dialog, you can also change the output route name by entering a new name to the **Output Route Name** field; and

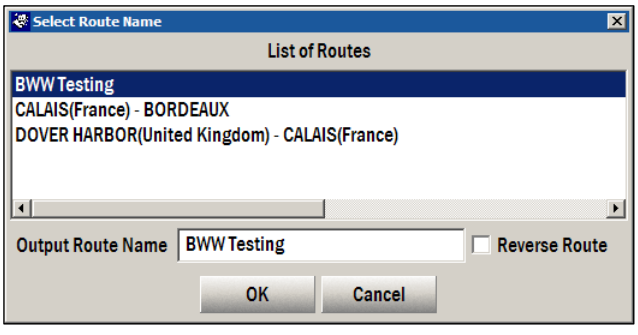


Figure 86 Route → Export/Import tab, select the route to import

reverse the output route by checking the **Reverse Route** checkbox.

After the route has been selected and other parameters set, press the **OK** button to import the route.

6.4.8 Routes Export to and Routes Import from a Device

It is possible to import and export routes to store them for future reference. This chapter explains how to exports routes to and import them from external devices.

To export a route to a device, do the following:

1. Open the **Route → Export/Import** tab and switch to the **From/To Device** tab.

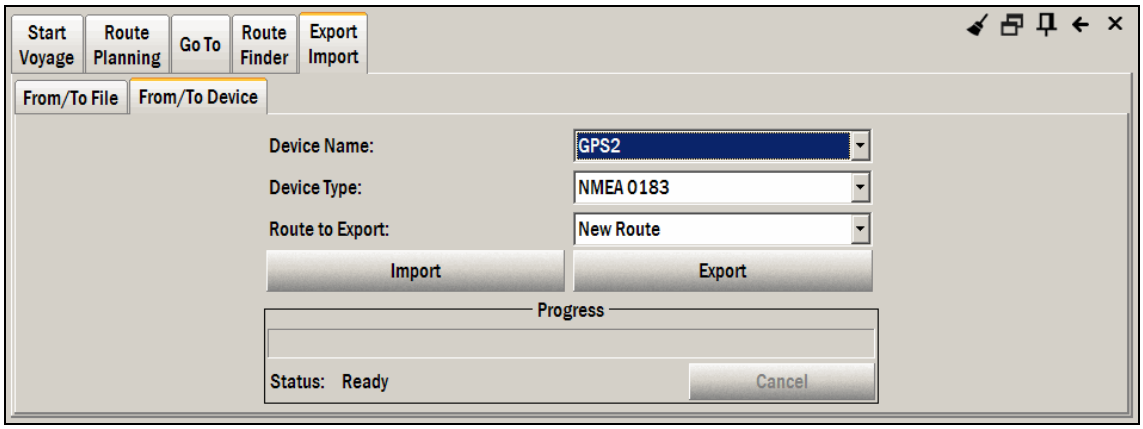


Figure 87 Route → Export/Import tab, From/To Device tab

2. In the **Device Name** drop-down list, select the name of the device to which the route will be exported. The list contains devices registered in the **Config → Input/Output** tab.
3. In the **Device Type** list, select the type of the device.
4. In the **Route to Export** drop down list, select the route to export.
5. Press the **Export** button. The route will be exported to the specified device as RTE and WPL sentences. Upon completion of the operation, the message will be displayed *The route was successfully exported*.

To import a route from a device, do the following:

1. Open the **Route → Export/Import** tab and switch to the **From/To Device** tab.
2. In the **Device Name** drop-down list, select the name of the device from which the route will be imported. The list contains devices registered in the **Config → Input/Output** tab.
3. In the **Device Type** list, select the type of the device.
4. Press the Import button. The ECDIS will start reading RTE and WPL sentences from the specified device. Progress of the route import is displayed in the **Progress** section progress bar[35].
5. Upon completion of the route import, the message will appear: *Route X is received. Would you like to import more routes?* To go on with importing routes, press the **Yes** button; to save the received route, press the **No** button.
6. To save the route, enter the route name to the **Enter new route name** dialog and press the **OK** button. If you press the **Cancel** button, the route will be saved under a default name.
7. After the route has been saved, you can edit it in the **Route → Route Planning** panel.

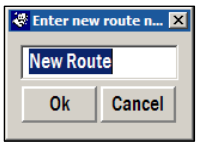


Figure 88 Enter new route name

[35] In case the ECDIS failed to start receiving the route from the very first sentence, an error message will appear. In that case close the message, cancel import by pressing the **Cancel** button in the **Progress** section, and press the **Import** button once more.

6.5 Tides and Tidal Streams Data

Tides and currents information is included in the database as a supplementary section. The data include locations of tidal and current stations, tidal ranges and other information.

You can turn on the display of tides and currents in the chart view and view information about each tide in the **Info → Tides Info** tab and about each current in the **Info → Streams Info** tab.

6.5.1 Tides Information

Information about tides is available in the **Info → Tides Info** panel.

To access tides information, do the following:

1. Open the **Info → Tides Info** panel and set the **Switch Tides On/Off** checkbox to turn on the display of tides information in the chart view. Special yellow symbols of tidal stations  and tidal stream stations  appear on the map (the symbols are displayed at scales larger than 1:5 000 000) and the list of all tidal stations is displayed in the pane below the **Switch Tides On/Off** checkbox.
2. To view information about a tide, you should select it. To select a tide, right-click on it in the chart or find it in the tidal stations list and select it there. Information about the tide is displayed in the **Tide Info** section.

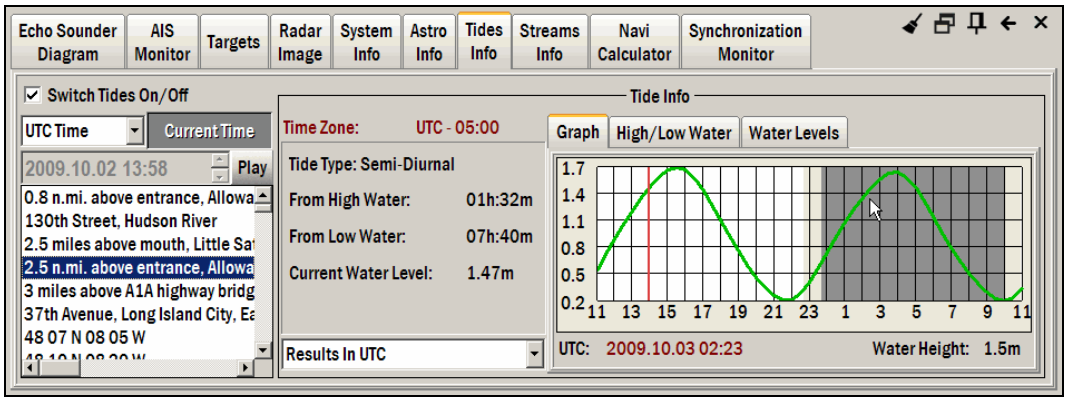


Figure 89 Info → Tides Info tab

3. After the tide has been found, information about it (as well as the information about a tidal stream) can be displayed for any date and time. To set the date and time, use the time configuration tool (the same for **Tides Info** and **Streams Info** panels). Using the tool you can do the following actions:

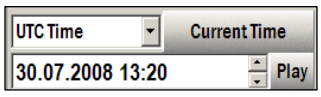


Figure 90 Time setting

- Choose the time type (UTC Time or Local Time) in the time type drop-down list (Local Time is the difference between the UTC Time and the Time Zone).
- Set the date and time for calculation of tides and streams characteristics – set the date and time in the date and time field (under the time type drop-down list).
- Make the current date and time the date and time for calculation of tides and streams characteristics. To do so, press the **Current Time** button. The date and time field will became grayed and the value in the field will change to the current date and time value.
- Results of tides and streams calculation can be presented either in UTC time or in local time formats. Select the time format for the tides information in the drop-down list in the lower left corner of the **Tide Info** section.

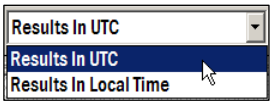


Figure 91 Selecting time type for tides information

4. To see tides and tidal streams symbols animated in the chart view press the **Play** button. Each new position of a symbol corresponds to the tide or tidal stream characteristics in a ten minute period.
5. **Tide Info** – Displays tide or stream information in the selected station. General tides information includes the following parameters:
   - **Time Zone** – The time difference between standard (local) time of tide location and UTC.
   - **Tide Type** – Can be Diurnal, Mixed Diurnal, Mixed Semi-Diurnal and Semi-Diurnal.
   - **From High Water** – Time passed from the last high water event.

- **From Low Water** – Time passed from the last low water event.
- **Current Water Level** – Shows the water level of the specified Tidal object, at the time set in the input time field.

6. Detailed information about the tidal object is represented in the **Graph**, **High/Low Water** and **Water Levels** tabs:

   - **Graph** – Tidal height (in meters) depends on time and is graphically expressed on the diagram. The diagram background consists of three color zones. These zones graphically show night time (dark grey), twilights (light grey) and daytime (white). The red vertical line on the graph marks the time entered in the date-time field. In addition there is a very useful feature within the diagram: when you move the mouse pointer over the diagram area the time and corresponding tidal heights are shown below allowing you to obtain detailed tidal information.

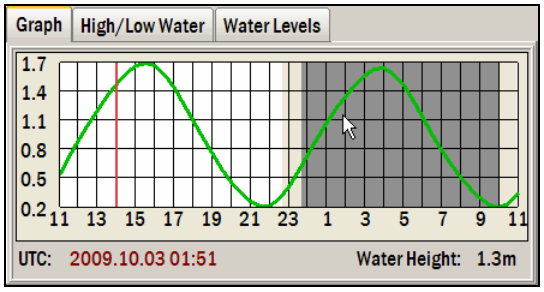


Figure 92 Tidal information, graph

   - **High/Low Water** – Summary information about time and height of high and low water is given.

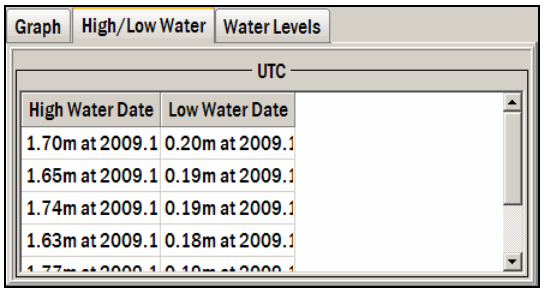


Figure 93 Tidal information, high/low water schedule

   - **Water Levels** – Provides information about water level height predictions for next three days, starting from the current day. The step of such predictions is one hour.

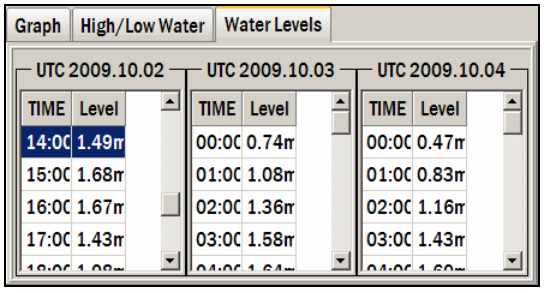


Figure 94 Tidal information, water levels plan

6.5.2 Tidal Streams Information

Information about tides is available in the **Info → Streams Info** panel.

To access tidal streams information, do the following:

1. Open the **Info → Streams Info** panel and set the **Switch Tides On/Off** checkbox to turn on the display of tides and streams information in the chart view. Special yellow symbols of tidal stations  and tidal stream stations  appear on the map (the symbols are displayed at scales larger than 1:5 000 000).
2. To view information about a tidal stream, you should select it. To select a stream, right-click on it in the chart. Information about the stream will be immediately displayed in the tab.

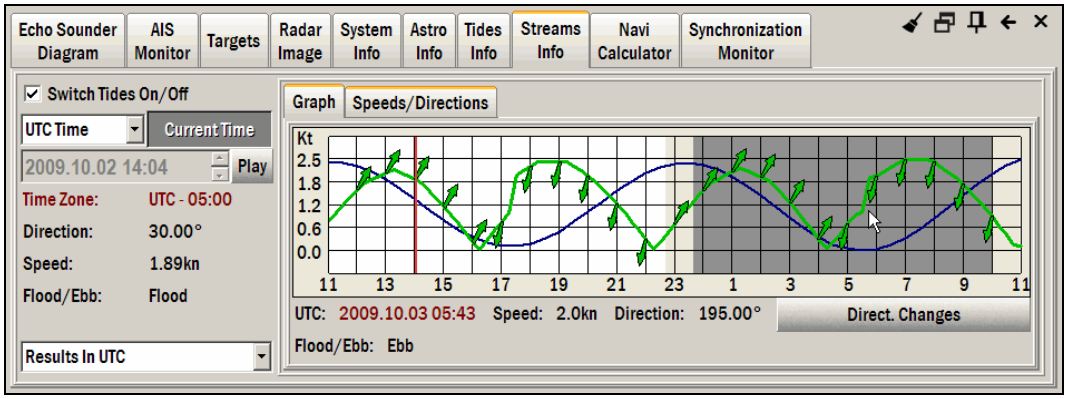


Figure 95 Info → Streams Info tab

3. After the tidal stream station has been selected, you can get information about the stream for any date and time. To set the date and time, use the date and time tool. The tool is described in detail in *chapter 6.5.1, Tides Information*.
4. To see tides and tidal streams symbols animated on the chart, press the **Play** button. Each new position of a symbol corresponds to the tide or tidal stream characteristics in a ten minute period.
5. In the left-hand part of the panel the following general information about the selected stream is displayed:
   - **Time Zone** – Time difference between standard (local) time of tidal stream and UTC.
   - **Direction** – Direction of the tidal stream.
   - **Speed** – Speed of the tidal stream.
   - **Flood/Ebb** – Shows if the current tidal stream object is in the flood or ebb state.
6. Detailed information about the tidal stream is represented in the **Graph** and **Speed/Directions** tabs:
   - **Graph** – Tidal stream speed (in knots) dependent on time is graphically expressed on the diagram. The diagram background consists of three color zones. These zones graphically show night time (dark grey), twilights (light grey) and daytime (white). The red vertical line on the graph marks the time entered in the date-time field. Two display modes are available by switching the **Direct. Changes** button:
     – Considering the stream state - the button **Direct. Changes** is pressed. The vertical diagram axis will be divided into two parts by a red horizontal line. In the top part, the speed of the tidal stream in the flood state is shown; and in the bottom part, the speed of the tidal stream in the ebb state is shown.

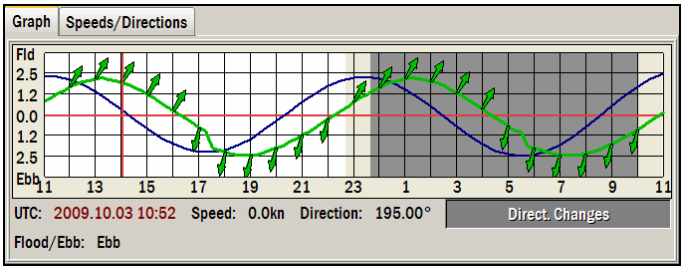


Figure 96 Tidal stream information, graph

     – Not considering the stream state - the button **Direct. Changes** is outpressed. The diagram displays absolute values of speed and direction without taking into account flood and ebb states.

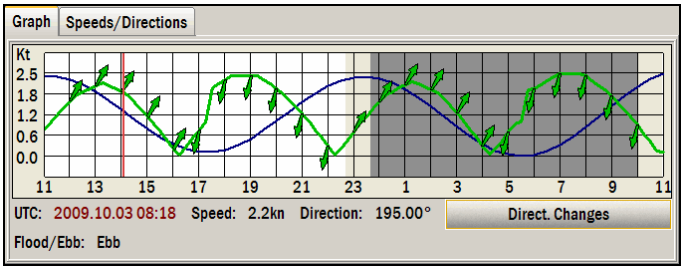


Figure 97 Tidal stream information, graph, absolute speed and direction values

The direction of the tidal stream is graphically shown for every hour as green arrows. The blue thin graph line is a graph of water height levels of the tidal High/Low station related to the tidal stream, in case the tidal stream is linked to any tidal station at all. Please note that it is only a schematically drawn graph without any level marks.

In addition there is a very useful feature within the diagram. When you move the mouse pointer over the diagram area the time and corresponding tidal stream direction and speed are shown below allowing you to obtain more detailed information[36].

- **Speeds/Directions** – summary information about time, speed and direction of a selected current stream is given.

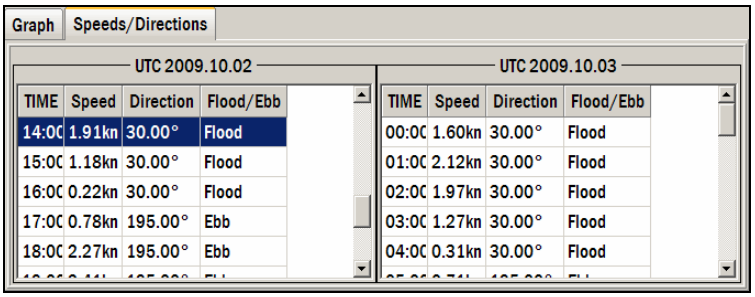


Figure 98 Tidal stream information, Speeds and Directions table

6.5.3 Astronomical Information

Information about celestial bodies is available in the **INFO → Astro Info** tab.

To access information about celestial bodies, do the following:

1. Open the **Info → Astro Info** tab.

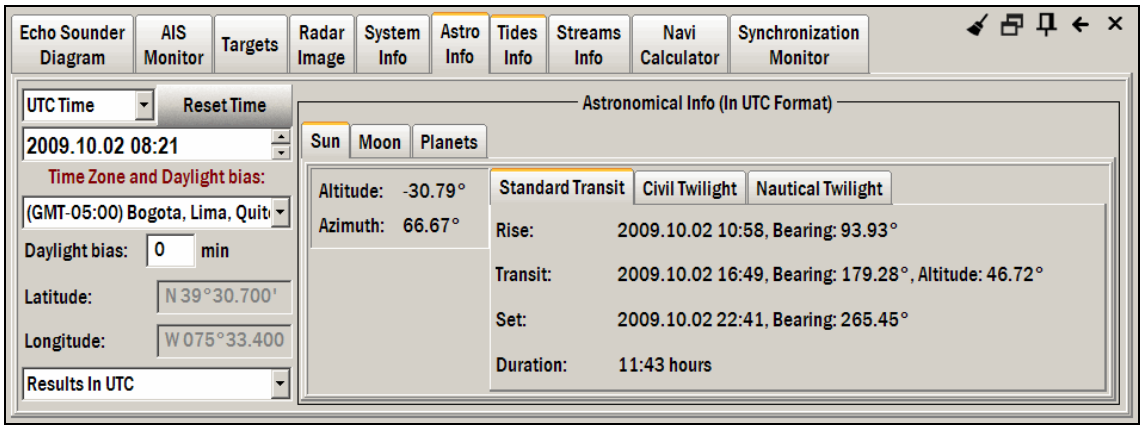


Figure 99 Info → Astro Info tab

[36] The graph can be displayed in the two modes not for all tidal streams. This option depends on the data for each tidal stream stored in the database. In case it is impossible to define ebb and flood states for a tidal stream, the graph can only be displayed in one mode, and the **Direct. Changes** button will not be displayed in the graph area at all.

2. If a tidal or a tidal stream station is currently selected, astronomical information is presented for coordinates of the selected station and the coordinates are displayed in the **Latitude** and **Longitude** fields. For calculating the local time, if this time type is selected in the drop-down list at the bottom of the time and coordinates pane, the time zone of the selected station is used (the time zone is displayed in the **Time Zone** field). The **Latitude**, **Longitude**, and **Time Zone** fields are grayed and you can only change date and time.
3. If no tidal or tidal stream station is currently selected, astronomical information is presented for coordinates of the current chart view center, the coordinates are displayed in the **Latitude** and **Longitude** fields. For calculating the local time, if this time type is selected in the drop-down list at the bottom of the time and coordinates pane, select the time zone in the **Time Zone** drop-down list.
4. Using date and time tool, set the date and time you need astronomical data for. The **Reset Time** button resets the time to the current time. The current time is displayed for the time zone selected in the **Time Zone and Daylight bias** drop-down list.

   Time format for the date and time display in the date and time field is set using the drop-down list in the upper left corner of the tab. Time format for the display of astronomical information is set using the drop-down list in the lower left corner of the tab.
5. Astronomical information is displayed in the three tabs inside the **Info → Astro Info** tab: the **Sun**, **Moon**, and **Planets** tabs.

   - **Sun** – Provides information about the current position and height of the sun above the horizon as well as about the sunrise, twilight and sunset for the input date. The information is presented in three tabs: **Standard Transit**, **Civil Twilight**, and **Nautical Twilight**.
   - **Moon** – Provides information about the current position and height of the moon above the horizon; also includes information on the rising, decline and the following phases of the moon for the input date. The information is presented in two tabs: **Moon Transit** and **Moon Phase**.
   - **Planets** – Provides information about planets selected in the planets drop-down list including the current position, the height above the horizon, the rising and the decline for the input date for the specified planet.

6.6 Weather Forecast: Download

IMPORTANT!

Weather downloading procedure can take considerable time during which other functions of ECDIS are not available. It is highly recommended to download weather data when not in operational mode.

The ECDIS implements the functionality allowing you to use Jeppesen Marine Weather service. Using the weather functionality you can download weather and cyclones forecasts, display weather data on the chart, as well as analyze routes in terms of weather conditions along them and set alarms based on specified values of weather parameters.

Weather forecasts are produced as GRIB files and cyclones forecasts as XML files. The forecasts are made for a specified period of time and you can see the weather parameters change within the time period for which the forecast was created. The forecasts include data for a number of weather parameters such as pressure, wind, precipitation, etc. The parameters can be displayed on the chart separately.

Readings of weather parameters are provided at regular intervals of time. The time for weather display can be set with a special time tool. If there is no reading of a weather parameter for the time set for the parameter display, the parameter value will be interpolated.

To get access to downloading weather data you will have to download subscription first. Subscription provides information on weather products and weather parameters available to you. You can download weather data over the Internet using the HTTP connection or by e-mail.

6.6.1 Weather Subscription

After you have subscribed to the Weather Forecast Service you should download weather subscription to the ECDIS.

Weather subscription information includes the list of products you have subscribed to. For each product the following information is provided: type of the geographical weather model, validity period, coverage, area limit, forecast period and time step, and a list of forecast elements provided for each product (pressure, temperature, and so on). You are allowed to download only those weather products that are listed in your weather subscription.

To download weather subscription, do the following:

1. Open the **Weather → Weather Packages** tab, press the **Settings** button and select the **Subscription** option from the drop-down menu. The **Weather Subscription** window will open with a message that the subscription is not found[37].

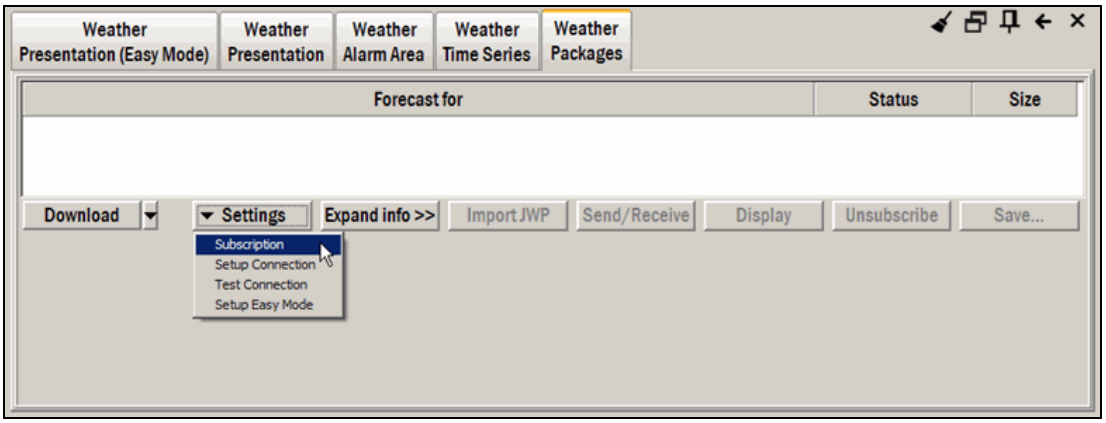


Figure 100 Weather → Weather Packages tab

2. To obtain subscription, press the **Request Subscription** button in the lower left corner of the **Weather Subscription** window.

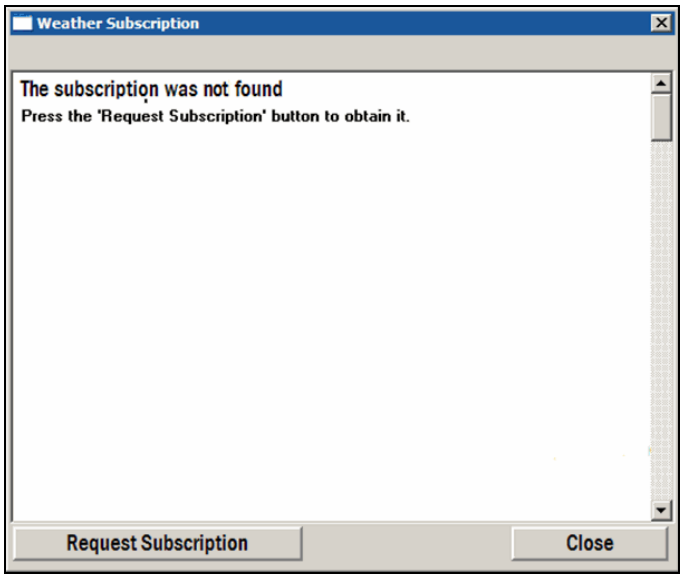


Figure 101 Weather Subscription window, "The subscription was not found" message

3. Depending on the communication type set in the **Setup Connection** parameters (*see chapter 6.6.7, Weather Download Setup*) you will have to perform the following actions:

   - **Automatic communication** – Internet (HTTP), E-mail (SMTP/POP3), E-mail (MAPI)

     1). Press the **Request Subscription** button.

     2). In case the **Automatic send/receive** parameter is set in the connection setup, subscription request will be sent and subscription received and downloaded automatically.

[37] You are asked to download subscription information when you start downloading weather data for the first time (no matter which downloading option you are using).

3). If the **Automatic send/receive** parameter is not set, the subscription request is saved in the **Weather Packages** tab in the waiting mode. To send the request, press the **Send/Receive** button in the **Weather Packages** tab. Data will be received and downloaded automatically.

- **Semi-automatic communication** – E-mail (Folder Send/Recv)

1). Press the **Request Subscription** button, the subscription request file will be generated and saved to the **Send** folder. Request files have a predefined name format '`request_xxxxx.xml`.'

2). Send the subscription file as an attachment to an e-mail to datacenterx@c-map.no.

3). You will receive the subscription file in the response e-mail, save the file to the **Receive** folder.

4). The ECDIS will load the subscription automatically.

- **Manual communication** – E-mail (Manually via Attachment)

1). Press the **Request Subscription** button.

2). Save the generated subscription file to any location on your computer. Request files have a predefined name format '`request_xxxxx.xml`.'

3). Send the file as an attachment to an e-mail letter to datacenterx@c-map.no. You will receive the subscription in the response e-mail.

4). Save the subscription to any location on your computer.

5). Download the subscription to the ECDIS. To download the data, open the **Weather → Weather Packages** tab and press the **Import JWP** button.

6). In the **Open** dialog window select the files to download and press the **Open** button. The files will be downloaded to the ECDIS. If the received data package is split into several files, download all the files of the package one by one; when the last file of the package is downloaded (the order of downloading is of no importance), the package appears in the **Weather Packages** window (for more details on the **Weather Packages** window, *see chapter 6.6.6, Weather Packages Handling*).

To view weather subscription, do the following:

1. Open the **Weather → Weather Packages** tab, press the **Settings** button and select the **Subscription** option from the drop-down menu.
2. The **Weather Subscription** window will open with subscription information displayed there.

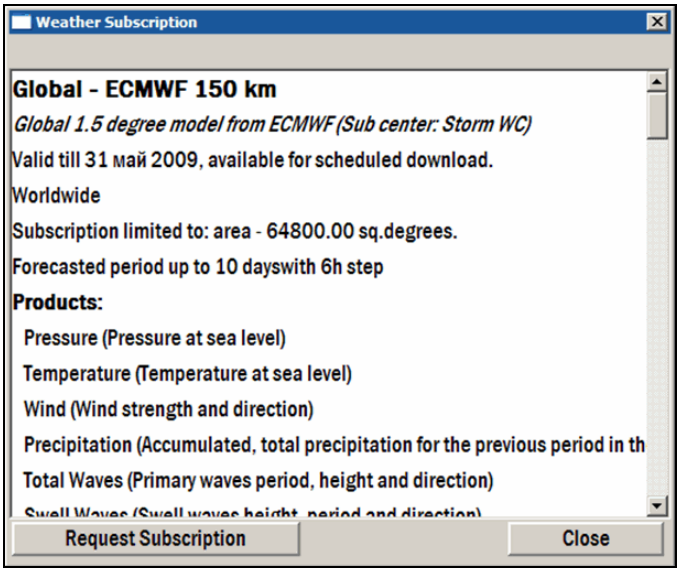


Figure 102 Weather Subscription window

In case you have changed weather data subscription terms, you will have to renew weather subscription.

To renew weather subscription, do the following:

1. Open the **Weather → Weather Packages** tab, press the **Settings** button and select the **Subscription** option from the drop-down menu.
2. The **Weather Subscription** window will open with subscription information displayed there.
3. Press the **Request Subscription** button. Your further actions on sending/receiving subscription depend on the communication type set in the **Setup Connection** parameters (for details see the downloading subscription procedure above)[38].

6.6.2 Easy Mode Setup and Download

The Easy Mode download option is a preset option and allows you downloading weather forecasts with one click.

This option allows downloading of all weather products listed in your subscription. Configure weather download request using the **Setup Easy Mode** function.

After the request is configured you can order data by simply pressing the **Download** button in the **Weather Presentation (Easy Mode)** or **Weather Packages** panels.

To download weather data using the Easy Mode option, do the following:

1. Open the **Weather → Weather Presentation (Easy Mode)** or the **Weather → Weather Packages** tab. Both these tabs have the **Download** button.

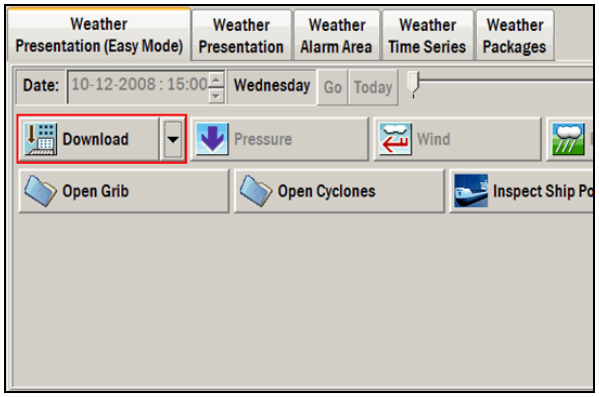


Figure 103 Weather → Weather Presentation (Easy Mode), Download button

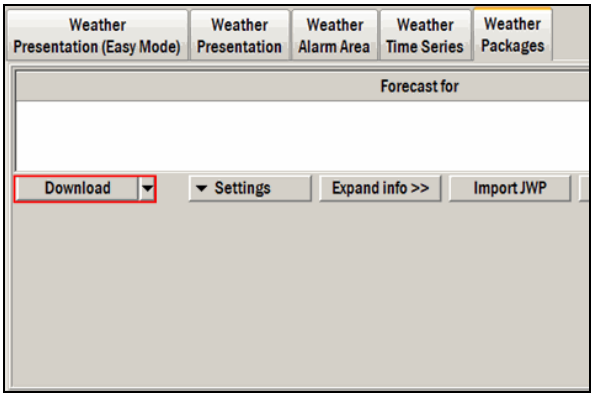


Figure 104 Weather → Weather Packages, Download button

2. Depending on the communication type set in the **Setup Connection** parameters (*see chapter 6.6.7, Weather Download Setup*) you will have to perform the following actions:
   - **Automatic communication** – Internet (HTTP), E-mail (SMTP/POP3), E-mail (MAPI)
     1). Press the **Download** button to start the download and confirm the request in the **Request confirmation** dialog.
     2). In case the **Automatic send/receive** parameter is set in the connection setup, the data request will be sent and data received and downloaded automatically.
     3). If the **Automatic send/receive** parameter is not set, the data request is saved in the **Weather Packages** tab in the waiting mode. To send the request, press the **Send/Receive** button in the **Weather Packages** tab. Data will be received and downloaded automatically.
   - **Semi-automatic communication** – E-mail (Folder Send/Recv)
     1). Press the **Download** button to start the download and confirm the request in the **Request confirmation** dialog.
     2). A data request file will be generated and saved to the **Send** folder. Request files have a predefined name format '`request_xxxxx.xml`.'
     3). Send the data request file as an attachment to an e-mail to datacenterx@c-map.no.
     4). You will receive weather data files in the response e-mail, save the files to the **Receive** folder.

[38] Weather subscription is renewed automatically every time you receive a new weather package.

5). The ECDIS will load the data automatically.

- **Manual communication** – E-mail (Manually via Attachment)

  1). Press the **Download** button to start the download and confirm the request in the **Request confirmation** dialog.

  2). A data request file will be generated. Save the file to any location on your computer.

  3). Send the file as an attachment to an e-mail letter to datacenterx@c-map.no. You will receive data files in the response e-mail.

  4). Save the files to any location on your computer.

  5). Download the weather data to the ECDIS. To download the data, open the **Weather → Weather Packages** tab and press the **Import JWP** button.

  6). In the **Open** dialog window select the files to download and press the **Open** button. The files will be downloaded to the ECDIS. If the received data package is split into several files, download all the files of the package one by one; when the last file of the package is downloaded (the order of downloading is of no importance), the package appears in the **Weather Packages** window (for more details on the **Weather Packages** window, *see chapter 6.6.6, Weather Packages Handling*).

To setup the Easy Mode option, do the following:

1. Open the **Weather → Weather Packages** panel.
2. Press the **Settings** button and select the **Setup Easy Mode** option from the drop-down menu. The **Weather Download Request** dialog will open.

   In the request dialog you can add a product to the request, set the product parameters, remove a product from the request, set a geographic area for which a forecast is required, set the period for which you need weather data, and the time step of weather parameters readings.

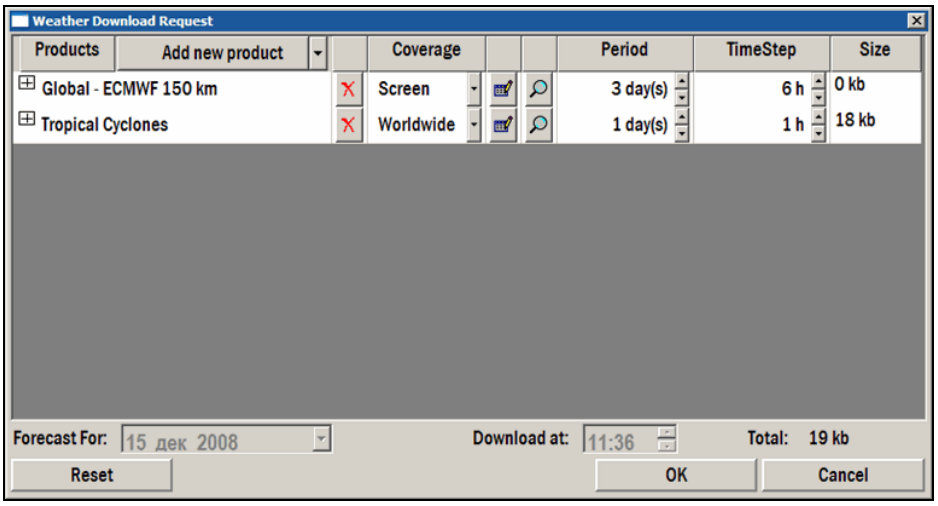


Figure 105 Weather Download Request dialog, Easy Mode Setup

3. To add a product to the request, press the **Add new product** button and select the product you want to add in the drop-down list. The product appears in the table and is removed from the **Add new product** list.
4. To set the product parameters, click on the plus '+' sign near the product name to expand the product parameters list (to collapse the list, press the minus '-' sign near the product name) and check those weather parameters you want to receive.

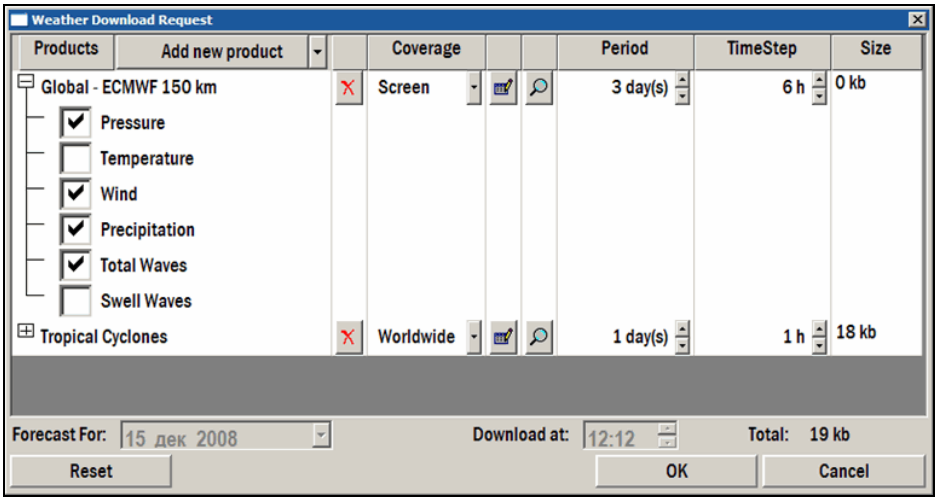


Figure 106 Weather Download Request dialog, setting a product parameters

5. To remove a product from the request, press the product **Remove** button  .
6. To set a geographic area to be covered by the forecast data, choose a predefined coverage from the drop-down list or set your own coverage. To open the list of coverage options, press the arrow near the current coverage name. To set a new coverage:
   a. Press the arrow near the current coverage name and, in the drop-down list, select the **Add New Coverage** option or press the **Add New Coverage** button  . The **Edit Coverage** window opens.

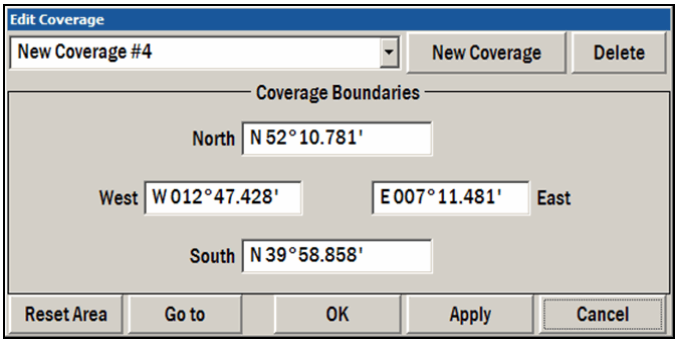


Figure 107 Edit Coverage window

   b. Initially the **New Coverage** boundaries are boundaries of your current screen view. You can set new boundaries either by entering new coordinate values to the **North**, **South**, **East**, and **West** fields (coordinate values are in degrees, minutes and fractions of minute) or by selecting a new coverage on the screen.
   c. To select a new coverage on the screen, move the mouse pointer to the edge of the coverage displayed on the screen (a red frame). When the pointer changes to the horizontal resize pointer ↔, click the right mouse button and drag the coverage boundary holding the button. Release the button when the coverage boundary is in the right place. You can also move the coverage: move the mouse inside the selected area, the pointer will change to the move pointer ✥, press the right mouse button and move the coverage. Release the button when the coverage area is in the right place. Coordinate values in the **North**, **South**, **West**, and **East** fields of the **Edit Coverage** window change in accordance with selection on the screen.
   d. After you have defined boundaries of the new coverage, press the **Apply** button to save the settings in the list of coverage areas.
   e. To restore initial coverage boundaries (the screen coverage boundaries set when the **Edit Coverage** window has just been opened), press the **Reset Area** button.
   f. To scroll the screen so that a specified coverage area was in the center of the screen, press the **Go to** button.

g. To create a new coverage, press the **New Coverage** button. The name of the new coverage will appear in the list. The default new coverage name is 'New Coverage #x,' you can change the name to any name you like.

h. To delete a coverage, select it in the list of coverage options and press the **Delete** button.

i. To return to the **Weather Request Download** window, press the **OK** button. All new coverage areas will be in the list of coverage areas. If you press the **Cancel** button, the new areas will not be preserved in the list of coverage areas.

7. You can view a selected coverage area from the **Weather Download Request** dialog. To do so, press the **Go to Coverage** button in the request table.
8. In the **Period** field, select time period for which you need weather forecast.
9. In the **TimeStep** field, select time step at which weather parameters readings from the weather package are made.
10. In the **Size** field, an approximately estimated weather package size is displayed. The total size of the request is displayed in the **Total** information panel at the lower right corner of the window.
11. The **Forecast for** box is only active for **Historical Weather** function and the **Download at** box is only active for the **Scheduled Download** function.
12. To reset the Easy Mode data request to the default settings, press the **Reset** button.
13. To save the data request for the use, press the **OK** button. The Easy Mode request configuration will be saved. The request is used each time you download data using the Easy Mode download option.

6.6.3 Overview and Coastal Download

The Overview and Coastal download options are preset options.

The Overview download option only allows downloading the Global – ECMWF 150 km weather model (the European Centre for Medium Range Weather Forecasting weather model with a 150 km grid) and Tropical Cyclones data.

The Coastal download option only allows downloading the Global – ECMWF 50 km weather model (the European Centre for Medium Range Weather Forecasting weather model with a 50 km grid) and Tropical Cyclones data.

To download weather data using the Overview or Coastal download options, do the following:

1. Open the **Weather → Weather Presentation (Easy Mode)** or the **Weather → Weather Packages** tab. Both these tabs have the **Download** button. Press the arrow near the button to open the download options menu. Select the **Overview** or **Coastal** option. The **Weather Download Request** dialog will open.

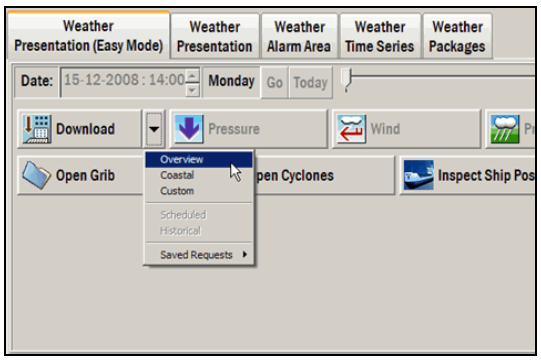


Figure 108 Weather → Weather Presentation (Easy Mode), Download button

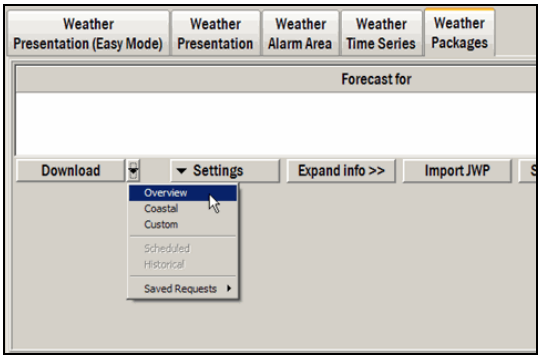


Figure 109 Weather → Weather Packages, Download button

2. In the **Weather Download Request** dialog, you can set the product parameters, remove a product from the request, set a geographic area for which a forecast is required, set the period for which you need weather data, and the time step of weather parameters readings.

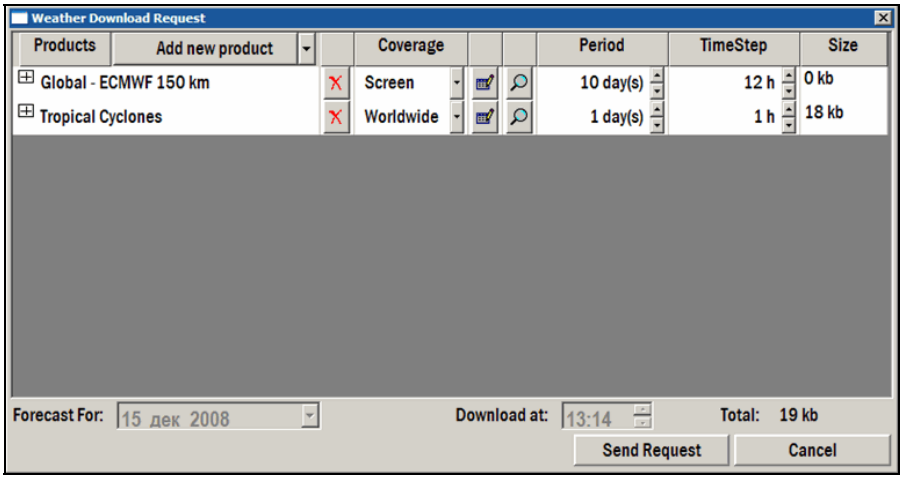


Figure 110 Weather Download Request dialog, Overview/Coastal request dialog

3. Set the data request: select product parameters in the **Products** field, set data coverage in the **Coverage** field, select the forecast period in the **Period** field, and set the forecast time step in the **TimeStep** field. Details about using the **Weather Download Request** dialog *see in the chapter 6.6.2, Easy Mode Setup and Download, the* **Setup Easy Mode** *procedure*.

4. Depending on the communication type set in the **Setup Connection** parameters (*see chapter 6.6.7, Weather Download Setup*) you will have to perform the following actions:

   - **Automatic communication** – Internet (HTTP), E-mail (SMTP/POP3), E-mail (MAPI)

     1). Press the **Send Request** button to send the request to the weather server.

     2). In case the **Automatic send/receive** parameter is set in the connection setup, the data request will be sent and the data received and downloaded automatically.

     3). If the **Automatic send/receive** parameter is not set, the data request is saved in the **Weather Packages** tab in the waiting mode. To send the request, press the **Send/Receive** button in the **Weather Packages** tab. Data will be received and downloaded automatically.

   - **Semi-automatic communication** – E-mail (Folder Send/Recv)

     1). Press the **Send Request** button. A data request file will be generated and saved to the **Send** folder. Request files have a predefined name format '`request_xxxxx.xml`.'

     2). Send the data request file as an attachment to an e-mail to datacenterx@c-map.no.

     3). You will receive weather data files in the response e-mail, save the files to the **Receive** folder.

     4). The ECDIS will load the data automatically.

   - **Manual communication** – E-mail (Manually via Attachment)

     1). Press the **Send Request** button to send the request to the weather server.

     2). A data request file will be generated. Save the file to any location on your computer.

     3). Send the file as an attachment to an e-mail letter to datacenterx@c-map.no. You will receive data files in the response e-mail.

     4). Save the files to any location on your computer.

     5). Download the weather data to the ECDIS. To download the data, open the **Weather → Weather Packages** tab and press the **Import JWP** button.

     6). In the **Open** dialog window select the files to download and press the **Open** button. The files will be downloaded to the ECDIS. If the received data package is split into several files, download all the files of the package one by one; when the last file of the package is downloaded (the order of downloading is of no importance), the package appears in the **Weather Packages** window (for more details on the **Weather Packages** window, *see chapter 6.6.7, Weather Download Setup*).

6.6.4 Custom Download

The Custom download option allows downloading all weather products listed in your subscription.

To download weather data using the Custom download option, do the following:

1. Open the **Weather → Weather Presentation (Easy Mode)** or the **Weather → Weather Packages** tab. Both these tabs have the **Download** button. Press the arrow near the button to open the download options menu. Select the **Custom** option. The **Weather Download Request** dialog will open.

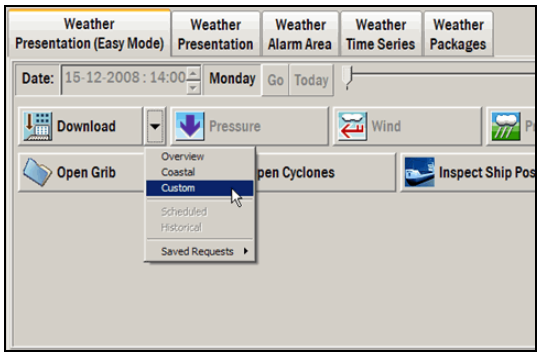


Figure 111 Weather → Weather Presentation (Easy Mode), Download button

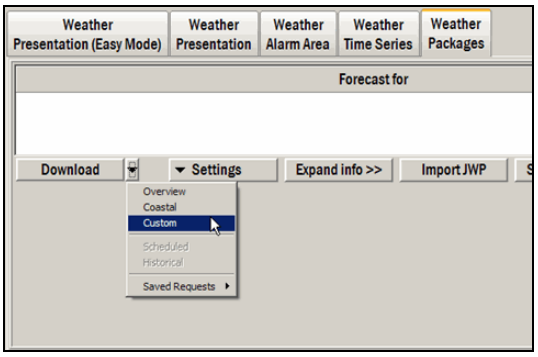


Figure 112 Weather → Weather Packages, Download button

2. In the **Weather Download Request** dialog, you can add products to the request, set products parameters, remove products from the request, set geographic areas for which forecasts are required, set periods for which you need weather data, and the time step of weather parameters readings.

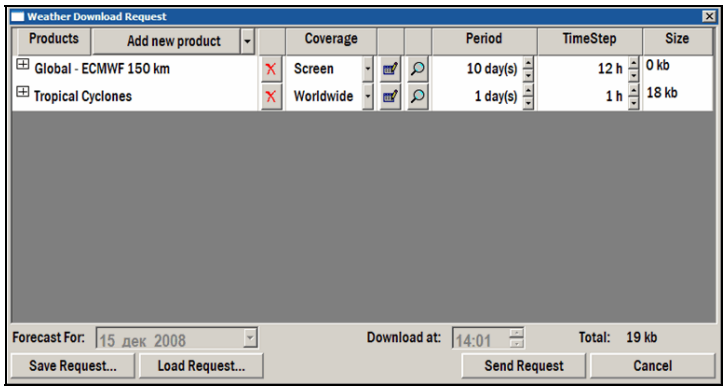


Figure 113 Weather Download Request dialog, Custom request dialog

3. Set the data request: add products from the **Add new product** drop-down list, select product parameters in the **Products** field, set data coverage in the **Coverage** field, select the forecast period in the **Period** field, and set the forecast time step in the **TimeStep** field. Details about using the **Weather Download Request** dialog *see in the chapter 6.6.2, Easy Mode Setup and Download, the* **Setup Easy Mode** *procedure*.

4. You can save the current request configuration to a file to be able to use the same configuration later. To do so, press the **Save Request** button, in the **Save As** dialog, indicate the location where the file will be saved, enter the file name, and press the **Save** button. The request configuration will be saved to an `*.xml` file.

5. To download a previously saved request configuration, press the **Load Request** button, in the **Open** dialog, select the request configuration file, and press the **Open** button. The request configuration will be loaded to the **Weather Download Request** dialog.

6. After the request has been configured, you can download data. Depending on the communication type set in the **Setup Connection** parameters (*see chapter 6.6.7, Weather Download Setup*) you will have to perform the following actions:

   - **Automatic communication** – Internet (HTTP), E-mail (SMTP/POP3), E-mail (MAPI)

     1). Press the **Send Request** button to send the request to the weather server.

2). In case the **Automatic send/receive** parameter is set in the connection setup, the data request will be sent and the data received and downloaded automatically.

3). If the **Automatic send/receive** parameter is not set, the data request is saved in the **Weather Packages** tab in the waiting mode. To send the request, press the **Send/Receive** button in the **Weather Packages** tab. Data will be received and downloaded automatically.

- **Semi-automatic communication** – E-mail (Folder Send/Recv)

1). Press the **Send Request** button. A data request file will be generated and saved to the **Send** folder. Request files have a predefined name format '`request_xxxxx.xml`.'

2). Send the data request file as an attachment to an e-mail to datacenterx@c-map.no.

3). You will receive weather data files in the response e-mail, save the files to the **Receive** folder.

4). The ECDIS will load the data automatically.

- **Manual communication** – E-mail (Manually via Attachment)

1). Press the **Send Request** button to send the request to the weather server.

2). A data request file will be generated. Save the file to any location on your computer.

3). Send the file as an attachment to an e-mail letter to datacenterx@c-map.no. You will receive data files in the response e-mail.

4). Save the files to any location on your computer.

5). Download the weather data to the ECDIS. To download the data, open the **Weather → Weather Packages** tab and press the **Import JWP** button.

6). In the **Open** dialog window select the files to download and press the **Open** button. The files will be downloaded to the ECDIS. If the received data package is split into several files, download all the files of the package one by one; when the last file of the package is downloaded (the order of downloading is of no importance), the package appears in the **Weather Packages** window (for more details on the **Weather Packages** window, *see chapter 6.6.6, Weather Packages Handling*).

6.6.5 Scheduled Download

If you would like to receive e-mails with weather package files at a given time each day, the Scheduled download is the solution. The Scheduled download option allows downloading all weather products listed in your subscription[39].

To download weather data using the Scheduled download option, do the following:

1. Open the **Weather → Weather Presentation (Easy Mode)** or the **Weather → Weather Packages** tab. Both these tabs have the **Download** button. Press the arrow near the button to open the download options menu. Select the **Scheduled** option. The **Weather Download Request** dialog will open.

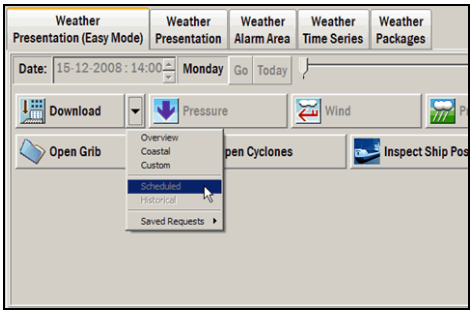


Figure 114 Weather → Weather Presentation (Easy Mode), Download button

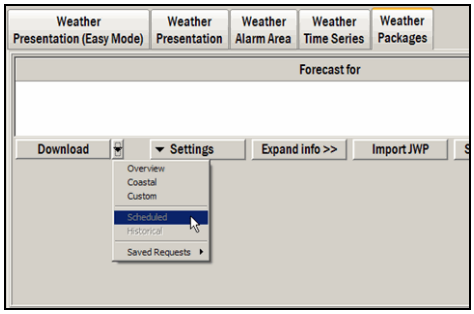


Figure 115 Weather → Weather Packages, Download button

[39] The **Scheduled download** option is available only for e-mail communication types.

2. In the **Weather Download Request** dialog, you can add products to the request, set products parameters, remove products from the request, set geographic areas for which forecasts are required, set periods for which you need weather data, and the time step of weather parameters readings.

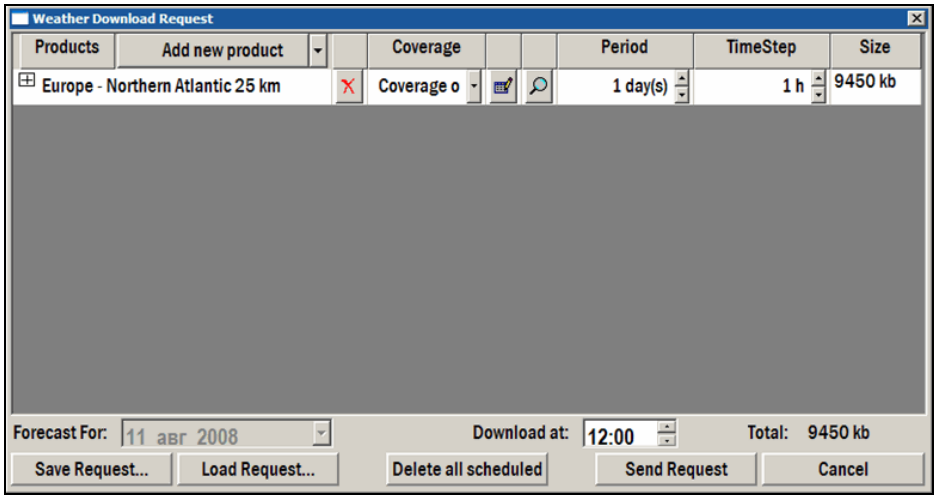


Figure 116 Weather Download Request dialog, Scheduled request dialog

3. Set the data request: add products from the **Add new product** drop-down list, select product parameters in the **Products** field, set data coverage in the **Coverage** field, select the forecast period in the **Period** field, and set the forecast time step in the **TimeStep** field. Details about using the **Weather Download Request** dialog *see in the chapter 6.6.2, Easy Mode Setup and Download, the* **Setup Easy Mode** *procedure*.

4. You can save the current request configuration to a file to be able to use the same configuration later. To do so, press the **Save Request** button, in the **Save As** dialog, indicate the location where the file will be saved, enter the file name, and press the **Save** button. The request configuration will be saved to an `*.xml` file.

5. To download a previously saved request configuration, press the **Load Request** button, in the **Open** dialog, select the request configuration file, and press the **Open** button. The request configuration will be loaded to the **Weather Download Request** dialog.

6. After the request has been configured, in the **Download at** box select or enter the time at which you want to receive weather data every day.

7. Press the **Send Request** button. Depending on the communication type set in the **Setup Connection** parameters (*see chapter 6.6.7, Weather Download Setup*) you will have to perform the following actions:

   - **Automatic communication** – E-mail (SMTP/POP3), E-mail (MAPI)
     1). Press the **Send Request** button to send the request to the weather server.
     2). In case the **Automatic send/receive** parameter is set in the connection setup, the data request will be sent and the data received and downloaded automatically.
     3). If the **Automatic send/receive** parameter is not set, the data request is saved in the **Weather Packages** tab in the waiting mode. To send the request, press the **Send/Receive** button in the **Weather Packages** tab. Data will be received and downloaded automatically.
   - **Semi-automatic communication** – E-mail (Folder Send/Recv)
     1). Press the **Send Request** button. A data request file will be generated and saved to the **Send** folder. Request files have a predefined name format '`request_xxxxx.xml`.'
     2). Send the data request file as an attachment to an e-mail to datacenterx@c-map.no.
     3). You will receive weather data files in the response e-mail, save the files to the **Receive** folder.
     4). The ECDIS will load the data automatically.
   - **Manual communication** – E-mail (Manually via Attachment)
     1). Press the **Send Request** button to send the request to the weather server.
     2). A data request file will be generated. Save the file to any location on your computer.

3). Send the file as an attachment to an e-mail letter to datacenterx@c-map.no. You will receive data files in the response e-mail.

4). Save the files to any location on your computer.

5). Download the weather data to the ECDIS. To download the data, open the **Weather → Weather Packages** tab and press the **Import JWP** button.

6). In the **Open** dialog window select the files to download and press the **Open** button. The files will be downloaded to the ECDIS. If the received data package is split into several files, download all the files of the package one by one; when the last file of the package is downloaded (the order of downloading is of no importance), the package appears in the **Weather Packages** window (for more details on the **Weather Packages** window, *see chapter 6.6.6, Weather Packages Handling*).

8. If you want to stop receiving scheduled weather data, press the **Delete all scheduled** button in the **Weather Data Request** dialog for Scheduled download. Take into account that you cannot cancel one or several scheduled requests. You can only cancel all of the requests.

6.6.6 Weather Packages Handling

Each time you order a weather forecast, the request of the forecast is listed in the **Weather → Weather Packages** tab. In the tab, you can see the progress of the request processing. After the data has been received – weather data come from the weather server as data packages – entries for weather data requests in the **Weather Packages** tab become entries for the received weather data packages. To be able to use the data, you should unpack and load them to the ECDIS.

In the **Weather → Weather Packages** tab you can display detailed information about the data requests and received data packages, download a weather package to the ECDIS in case it was received by e-mail, initiate a send/receive operation in case it is not done automatically, display weather data received in a package on the chart, delete a package, and save a package as a `*.grb` or an `*.xml` file.

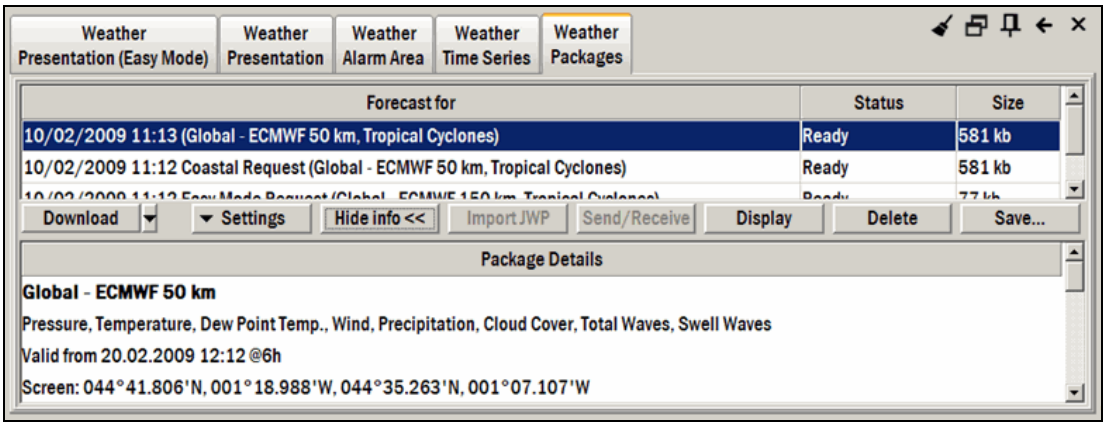


Figure 117 Weather → Weather Packages tab

➢ **The following data packages handling operations are available in the Weather Packages tab:**

- Downloading weather packages to the ECDIS: Import of weather packages is only necessary in case you are using the E-Mail (Manually via attachment) communication type.

  With the E-Mail (Manually via attachment) communication type you will have files with weather packages saved in some location on your computer. To be able to use the data you will need to load the files to the ECDIS. To load weather packages, press the **Import JWP** button, in the **Open** dialog select the packages files and press the **Open** button. The files will be loaded to the ECDIS.

- Viewing extended information about a data request or a data package: To view expanded information about a data request that is being processed or a received weather package, select the package in the packages table and press the **Expand Info** button (the button label will change to **Hide Info**). The information will be displayed in the window below. To hide the information, press the **Hide Info** button.

- Initiating the send/receive process: The **Send/Receive** button initiates the data exchange procedure for a data request in case it is not done automatically. The data exchange procedure includes sending the weather data request to the weather server and receiving and proceeding weather data packages. The automatic send/receive should be set through the **Setup Connection** function (*see chapter 6.6.7, Weather Download Setup*).
- Displaying weather data on the chart: The **Display** button displays weather data received in a specified weather package on the chart. To display weather data, select a weather package in the packages list and press the **Display** button.

IMPORTANT!

*If a package is deleted without saving data to a GRIB or XML file (the **Save** button), you will not be able to recover the data. To get the deleted weather data you will have to request and receive them once more.*

- Deleting a weather request or a weather data package: The **Delete** button deletes specified weather packages from the packages list. To delete a package select it in the packages list and press the **Delete** button.
- Saving data to a GRIB or XML file: The **Save** button allows saving a specified weather data package to your computer. The data package is saved as a GRIB or an XML file: weather forecast data are saved to a GRIB file and cyclones data are saved to an XML file. To open the files use the **Open GRIB** and **Open Cyclones** buttons on the **Weather Presentation (Easy Mode)** panel (*see chapter 6.7, Weather Forecast: Display*).

6.6.7 Weather Download Setup

Weather forecast data are transferred over the Internet. In the ECDIS, you can use either HTTP (Internet) or e-mail connection. The ECDIS uses the HTTP (Internet) connection by default and has to be connected to the Internet to be able to transfer data. The connection with the weather server has to be configured through the **Setup Connection** function.

To configure connection, do the following:

1. Open the **Weather → Weather Packages** tab, press the **Settings** button, and select the **Setup Connection** option from the drop-down menu. The **Setup Connection** dialog will open.

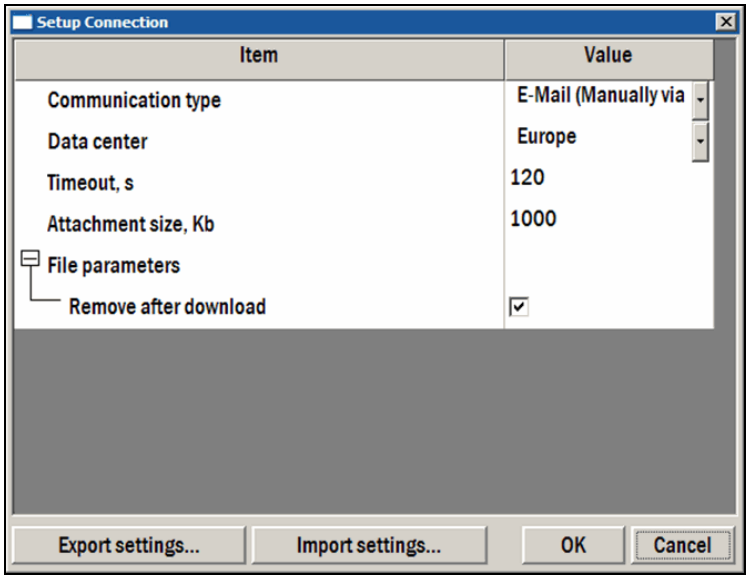


Figure 118 Setup Connection window

2. Set the communication type: select the communication type in the **Communication type** drop-down list. You can choose between HTTP (Internet) and e-mail connection. To comply with different ship or office communication set-ups, you are offered four e-mail connection types: SMTP/POP3, Inbox via MAPI, Folder Send/Recv, and Manually via Attachment. See detailed description of all communication connections further on in the manual.

3. Set the data center: set the center on the continent where you are now to have data transferred faster. Select the data center in the **Data center** drop-down list. So far, only the Europe data center is available, please check for other available centers later.
4. Set the timeout – time period during which the answer from weather data server is awaited (relevant for HTTP, SMTP/POP3, and Inbox via MAPI connections). Enter the timeout value in seconds to the **Timeout** field.
5. Set the attachment size in the **Attachment size** field. The attachment size is the maximum size of a data pack that can be attached to an e-mail sent to you (relevant for all e-mail connections). In case the set attachment size is less than the size of the ordered weather package, the package is broken down into several data packages that are sent to you in several e-mails. Set the parameter to {0} or {-1} if you want weather packages of any size to be sent to you in one e-mail.
6. Set communication parameters in the **Communication parameters** section. Depending on the type of communication you selected in the **Communication type** option, you will be given a possibility to configure a set of parameters specific for the selected communication type.
7. After you have configured connection you can save settings for further use: press the **Export settings** button, in the **Save As** dialog window, indicate location where the file with settings will be saved, enter the file name and press the **Save** button. The settings will be saved to an `*.xml` file.
8. To load previously saved settings: press the **Import settings** button, in the **Open** dialog window select the `*.xml` file with saved settings and press the **Open** button. The settings from the file will be loaded.

➢ **The following communication types are available:**

➢ **Internet (HTTP)**: Automatic connection type. If you set the **Internet (HTTP)** communication type, the ECDIS will use the standard HTTP protocol to send requests and receive weather data. You can configure HTTP parameters in the **Setup Connection** window in the **HTTP parameters** branch of the connection parameters tree.

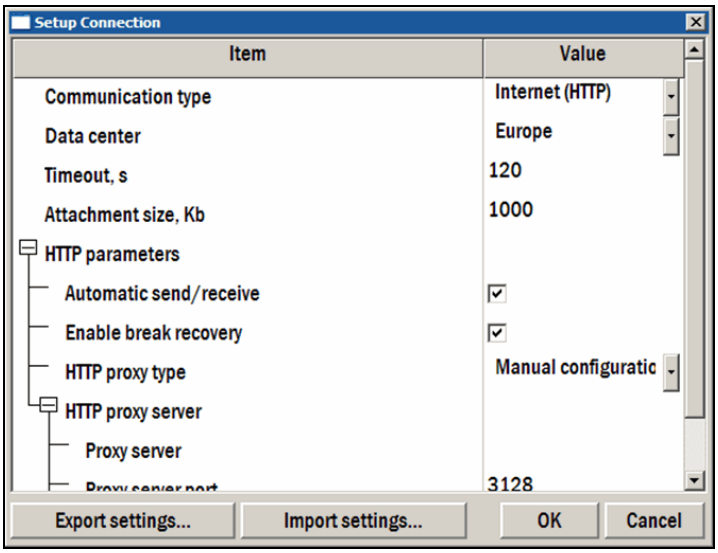


Figure 119 Setup Connection window, Internet (HTTP) communication type

- **Automatic send/receive**: if the parameter is set, data requests are sent to the weather server automatically; if the parameter is not set, data requests are put first to the waiting list in the **Weather → Weather Packages** tab, and sent to the server on the user command.
- The **HTTP proxy type** parameter can be set to the following values:
  - **Direct connection** – Use the option if you do not use proxy server to provide connection to the Internet.
  - **Automatic discovery** – Use the option if you do not know exact parameters of your proxy server, or if you are not sure that your internet connection is provided through a proxy server. Set this option and the program will find proxy server automatically.
  - **Manual configuration** – Use the option if your internet connection is provided through a proxy server and you know all parameters of the server.

- **E-Mail (SMTP/POP3)**: Automatic connection type. If you set the **E-Mail (SMTP/POP3)** e-mail connection option, the ECDIS is acting as an e-mail program and is using standard incoming and outgoing data transfer protocols. In the **Setup Connection** window you can configure protocols settings in the **E-Mail Parameters** branch of the connection parameters tree.

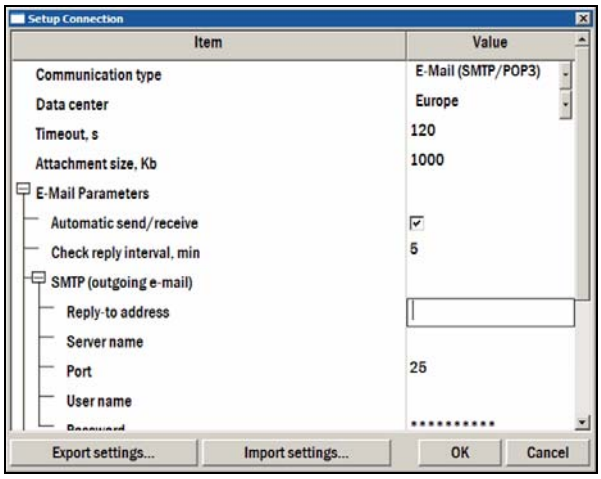


Figure 120 Setup Connection window, E-Mail (SMTP/POP3) communication type

- **E-Mail (Inbox via MAPI)**: Automatic connection type. If you set the **E-Mail (Inbox via MAPI)** connection option, the ECDIS will use the e-mail program installed on your computer to send data requests and receive weather data files. For the ECDIS to be able to use your e-mail program, the program should support MAPI (Messaging API). The ECDIS then processes received weather data and loads weather packages automatically.

- **E-Mail (Folder Send/Recv)**: Semiautomatic connection type. In case you use the **E-Mail (Folder Send/Recv)** e-mail connection option, you need to set paths to two folders: Send folder (Send path) and Receive folder (Receive path). Folders are set in the **Folder Parameters** branch of the connection parameters tree.

  - **Send folder** (Send path) is the folder where data requests are saved as `*.xml` files. The files have a predefined name format `'request_xxxxx.xml'` (you are not allowed to change request file names). After a request file is generated and saved, send it as an attachment to an e-mail to datacenterx@c-map.no. Weather data will be sent to you attached to the response e-mail.

  - **Receive folder** (Receive path) is the folder where weather data files received from the data center should be saved. The ECDIS checks the **Receive folder** periodically and when the program finds data files there, it loads the weather package automatically. The loaded weather package is added to the **Weather Packages** window.

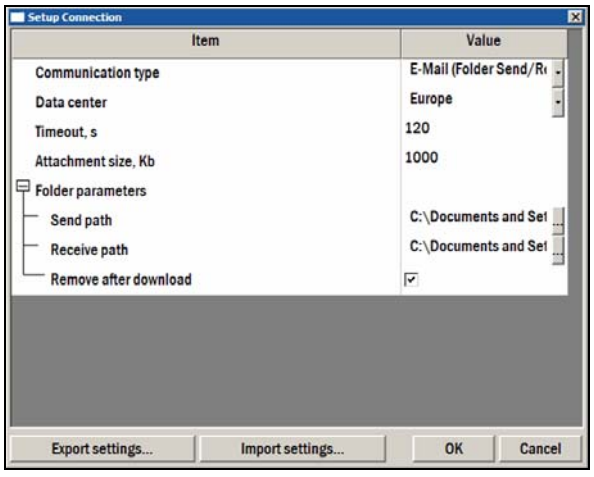


Figure 121 Setup Connection window, E-Mail (Folder Send/Receive) communication type

- **E-Mail (Manually via Attachment)**: Manual connection type. If you use the **E-Mail (Manually via Attachment)** e-mail connection option, you will have to send request files and receive and install weather packages manually. In this case request file is generated when you press the **Send Request** button in the **Weather Download Request** window. Save the file to any location on your computer and send it as an attachment to an e-mail to datacenterx@c-map.no. You will receive a response (e-mail) with weather package files attached to it. Save the files to any location on your computer. To load the weather package files, use the **Import JWP** function in the **Weather Packages** panel[40].

After you set the Internet connection up, you can test it. Testing the connection allows you to see if you have set it correctly. Testing procedure involves two operations: sending data to the server and receiving data from the server.

To test the connection with the weather server, do the following:

1. To start testing, go to the **Weather → Weather Packages** panel, press the **Settings** button and select the **Test Connection** option from the drop-down menu. The **Test Connection** window will open.

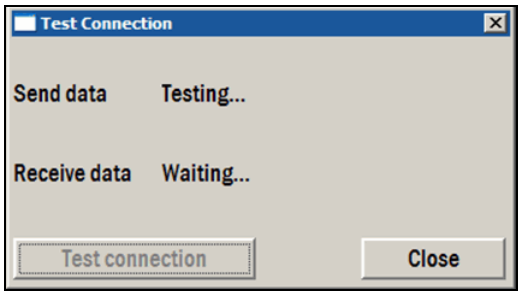


Figure 122 Test Connection window

2. Press the **Test connection** button. Testing operations status is displayed in the **Send data** and **Receive data** fields. Operation statuses can be the following:
   - **N/A** – no test was started;
   - **Waiting** – testing of the operation has not started yet;
   - **Testing** – testing of the operation is being performed at the moment;
   - **Error (error description)** – an error occurred during testing of the operation, the error description is given in brackets;
   - **Passed** – the operation was successfully terminated;
   - **Unknown** – the operation was not tested;
   - **Failed (failure reason)** – the operation testing failed due to some reason; the reason of failure is given in brackets.
3. Testing procedures depend on the communication type set in the **Connection setup**:
   - **Automatic connection types** – Internet (HTTP), E-Mail (SMTP/POP3), E-Mail (Inbox via MAPI)
     1). Press the **Test connection** button.
     2). Test request will be sent and test response received and downloaded automatically.
     3). The procedure may take time, but you can close the **Test Connection** window and proceed with your other activities. When you open the **Test Connection** window next time, you will see the status of the test.
   - **Semiautomatic connection types** – E-mail (Folder Send/Recv)
     1). Press the **Test connection** button, the test request file will be generated and saved to the **Send** folder.
     2). Send the test request file as an attachment to an e-mail to datacenterx@c-map.no.

[40] When using an e-mail connection, make sure to configure settings correctly. Connection settings configuration is a one-time job that should be done by an IT-specialist to ensure the right options and settings are used.

3). You will receive the test response file in the response e-mail, save the file to the **Receive** folder.

4). The ECDIS will load the test file automatically.

5). The procedure may take time, but you can close the **Test Connection** window and proceed with your other activities. When you open the **Test Connection** window next time, you will see the status of the test.

- **Manual connection type** – E-mail (File via Attachment)

1). Press the **Test connection** button.

2). Save the generated test request file to any location on your computer.

3). Send the file as an attachment to an e-mail letter to datacenterx@c-map.no. You will receive the test response file in the response e-mail. Save the response file to any location on your computer.

4). Download the file to the ECDIS: open the **Weather Packages** panel (**Weather → Weather Packages**) and press the **Import Weather Data File** button. In the **Open** dialog window, select the response file and press **Open**. You will see no indication of data actually being loaded, but the **Receive data** operation test will be performed.

5). The procedure may take time, but you can close the **Test Connection** window and proceed with your other activities. When you open the **Test Connection** window next time, you will see the status of the test.

6.7 Weather Forecast: Display

6.7.1 Turning on and Configuring the Display of Weather Data

Weather data can be displayed in the chart view as an additional data layer. To display the data you should turn the data display on and configure the data display parameters.

To display the data from a weather data package, do the following:

1. Load a weather data package to the ECDIS (*see chapter 6.6, Weather Forecast: Download*).
2. In the **Weather → Weather Presentation (Easy Mode)** tab, press the **Toggle Weather** button. This button is a switch which displays or hides weather data in the chart view.
3. In the **Weather → Weather Packages** tab, select the loaded data package in the packages table and press the **Display** button. The data will be displayed in the chart view.
4. If you can't see the data, make sure the current chart view is scrolled to the area covered by the weather data.
5. When the display of weather data is on, values of weather parameters under the mouse pointer are displayed in the lower left corner of the chart view.

To turn the display of data from a weather file, do the following:

1. In the **Weather → Weather Presentation (Easy Mode)** tab, press the **Toggle Weather** button. This button is a switch which displays or hides weather data in the chart view. When the button is pressed, the ECDIS opens `*.grb` or `*.xml` files that were opened last.
2. If there were no weather files opened or you need to open different files, use the **Open Grib** and **Open Cyclones** buttons. The **Open Grib** button opens `*.grb` files with weather forecasts saved there, and the **Open Cyclone** button opens `*.xml` files with cyclones data.
3. To open a file, press the **Open Grib** or **Open Cyclones** button, in the **Open** dialog select the file to open and press the **Open** button. The data from the file will be displayed in the chart view.
4. If you can't see the data, make sure the current chart view is scrolled to the area covered by the weather data.
5. When the display of weather data is on, values of weather parameters under the mouse pointer are displayed in the lower left corner of the chart view.

To configure the display of weather data, do the following:

1. Open the **Weather →Weather Presentation** tab. Using options from this tab, you can turn on/off the display of weather parameters, select the type of weather symbols (point, line, area), select measurement units that will be used to display weather parameters, set the time for the display of the weather forecast, and turn on/off animation of the weather forecast.

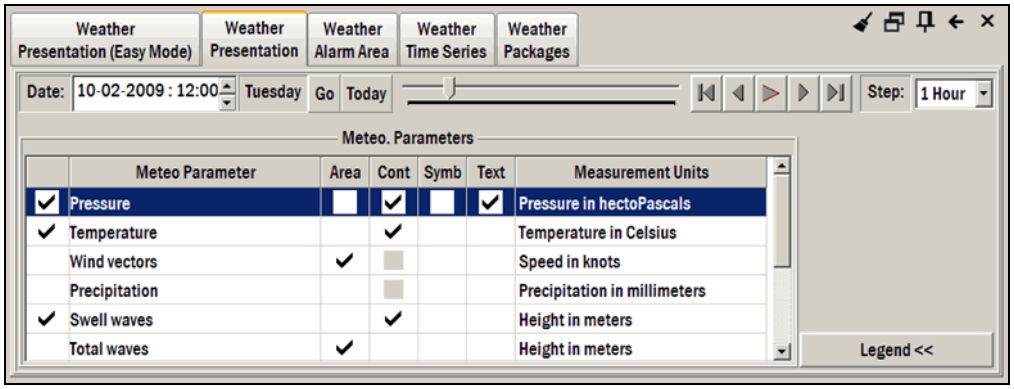


Figure 123 Weather → Weather Presentation tab

2. To turn on the display of a specified weather parameter in the chart view, tick the checkbox to the left from the parameter name in the **Meteo Parameter** column of the **Meteo Parameters** table. To turn the display of the parameter off, clear the checkbox.

   You can also use options presented in the **Weather Presentation (Easy Mode)** tab to turn the display of weather parameters on/off. To do so, open the **Weather Presentation (Easy Mode)** tab and press buttons with the names of parameters you want to display.

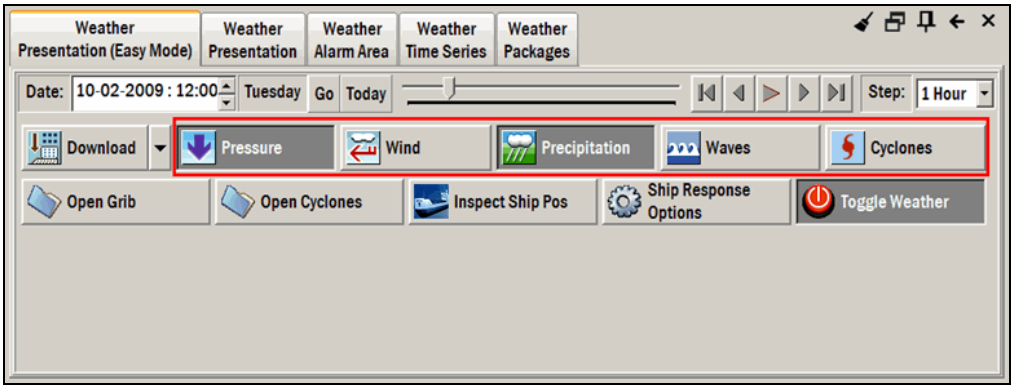


Figure 124 Weather → Weather Presentation (Easy Mode) tab, weather parameters buttons

3. The data are displayed using symbols that are described in the legend for every meteorological parameter. To open the legend of a parameter, select it in the **Meteo Parameters** table and press the **Legend** button.

4. To select the type of symbols to be used for the display of a specified weather parameter, in the **Meteo Parameters** table, tick checkboxes corresponding to the symbol types for the parameter (the **Area**, **Cont**, **Symb**, or **Text** field).

   - **Area**: tinting of areas

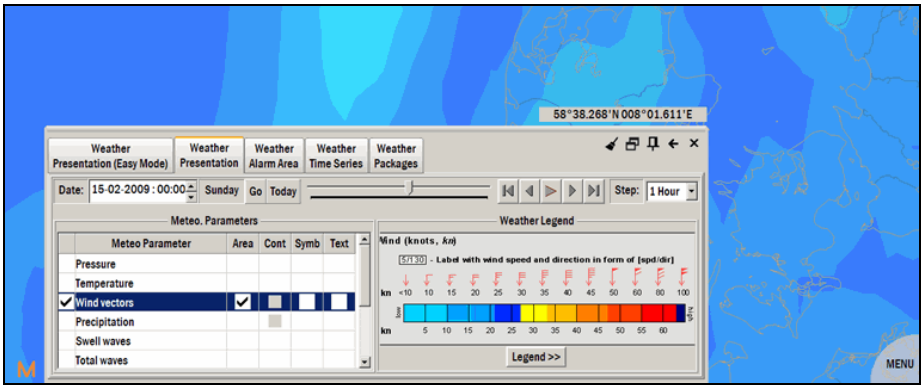


Figure 125 Display of the wind strength using the Area type symbols

- **Cont**: isolines

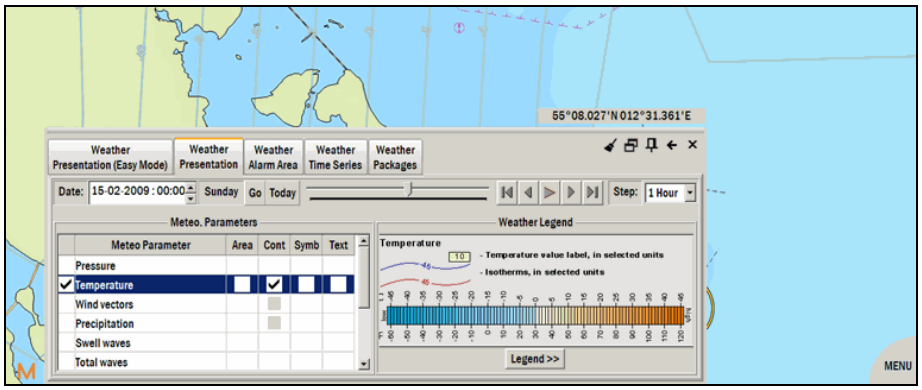


Figure 126 Display of the temperature using the Contour type symbols

- **Symb**: point symbols. Vector parameters such as wind are displayed using point symbols showing the parameter strength and direction. Numeric parameters such as temperature are displayed using the 'X' symbols plotted in the coordinates of the parameter readings.

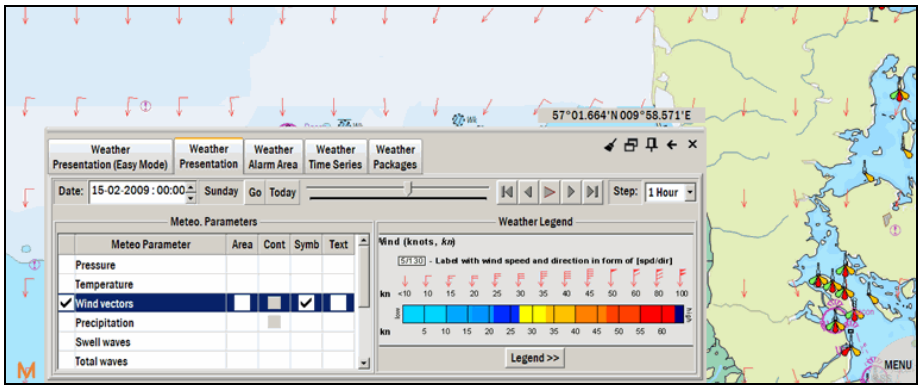


Figure 127 Display of the wind strength using the Symbol type symbols

- **Text**: point symbols. Numeric values of parameters are plotted in the coordinates where the parameters readings were done[41].

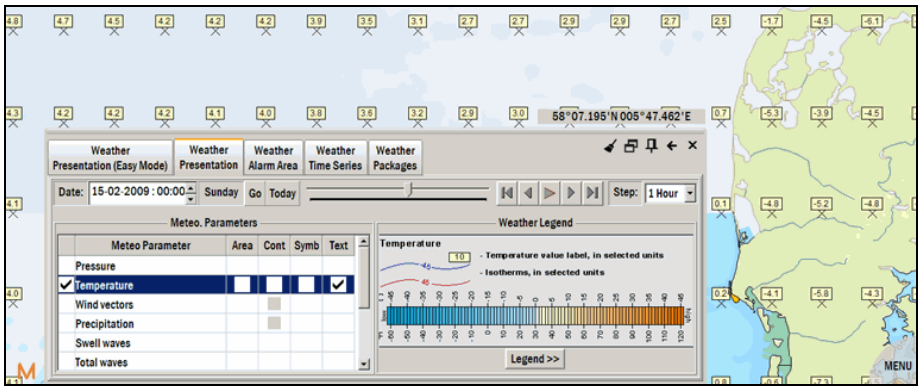


Figure 128 Display of the temperature using the Text type symbols

5. To select measurement units for the display of a weather parameter, double-click or press the ENTER key in the **Measurement Units** field of the weather parameter (when the legend is open, the **Measurement Units** column is hidden). The drop-down list with measurement unit options will appear in the cell. Open the drop-down list and select one of the measurement units.

[41] Some symbol types cannot be used to display specific weather parameters. For example, Contour type symbols cannot be used to display wind speed and direction or precipitation data. If a symbol type cannot be used for a weather parameter, it is grayed for that parameter.

All symbol types available for a parameter can be used in the chart view at the same time.

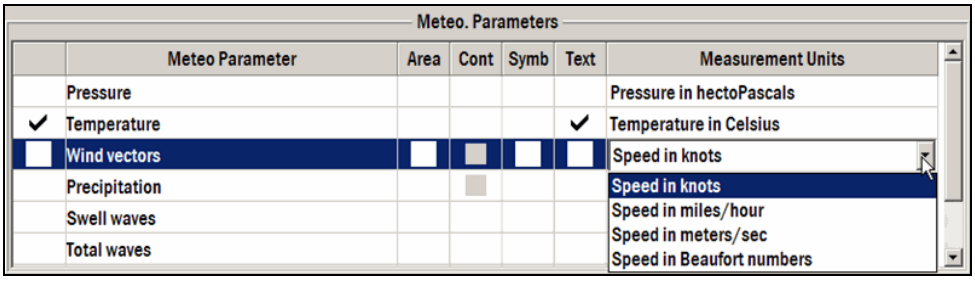


Figure 129 Selecting measurement units for the wind speed

6. To set the time for which weather data should be displayed, use the time setup tool. You can find the time setup tool both in the **Weather → Weather Presentation (Easy Mode)** tab and in the **Weather → Weather Presentation** tab.

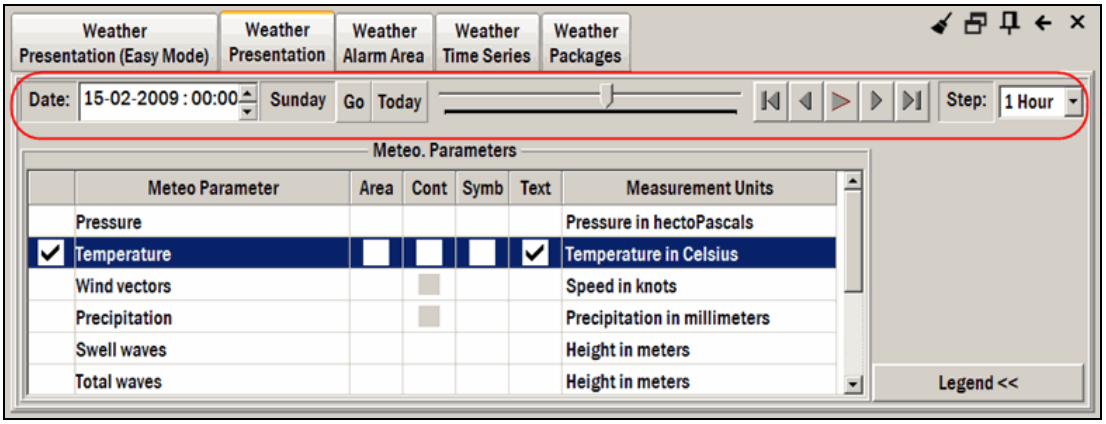


Figure 130 Weather → Weather Presentation tab, time tool

To set the time, enter the date and time value to the **Date** field and press the **Go** button or simply move the slider of the time scale. Date and time in the **Date** field change as the slider is being moved.

To change the date and time to the current date and time value, press the **Today** button[42].

7. To see the weather forecast in dynamics, use the animation buttons:  – jump to the beginning of the forecast;  – one step back (set the step value in the **Step** drop-down list);  – start/stop the forecast animation (the forecast is played from the current position to the end);  – one step forward;  -- jump to the end of the forecast[43].

6.7.2 Display of Cyclones

Tropical cyclones data that are distributed by the World Meteorological Organization are included as a separate weather product to the weather data distributed by Jeppesen.

IMPORTANT!

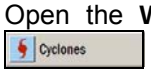
When navigating near a tropical cyclone, update cyclone data regularly and study the information very carefully[44].

[42] Weather forecast data received from the weather server are compiled for a certain period of time (the period is indicated in the data request). You can view the data for any time within this period.

[43] Weather parameters readings were made with a certain time step. The time step for the forecast animation is set in the **Step** drop-down list. The set step may differ from the actual parameter readings step. In this case weather data are interpolated in time. To distinguish the interpolated time step from the original time step, the font type of interpolated parameters will become italic in the **Meteo Parameters** window.

[44] The dangerous zone is a 50 mile zone near the current cyclone position and the zones around the forecasted cyclone positions: 100 mile zone for a 24 hour forecast, 150 mile zone for a 48 hour forecast, 200 mile zone for a 72 hour forecast, and 250 mile zone for a 96 and more hour forecast.

To display cyclones data, do the following:

1. Open the **Weather → Weather Presentation (Easy Mode)** tab and press the **Cyclones** button 

or set the **Tropical cyclone** checkbox in the **Weather → Weather Presentation** tab.
2. The ECDIS will load the last loaded cyclones file. If there was no cyclone files opened or you need to open a different file, use the **Open Cyclones** button: press the button, select the cyclones file in the **Open** dialog and press the **Open** button. The cyclones data will be loaded to the ECDIS and displayed in the chart view.

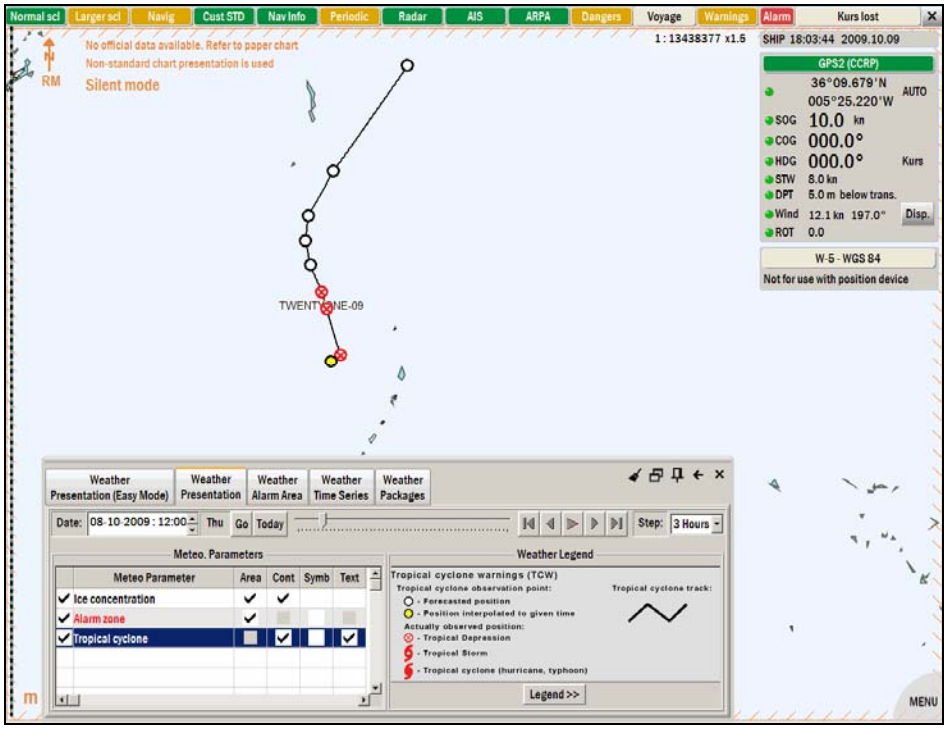


Figure 131 Weather → Weather Presentation tab, display of tropical cyclones

3. The cyclone observed positions are displayed with red-colored symbols  ; the forecasted positions are displayed with white-colored circles  . The position of the cyclone at the time set in the time setup tool in the **Weather → Weather Presentation** tab, is indicated with a yellow-colored circle  .
4. When you point with the mouse pointer at one of the cyclone positions, a tool tip appears with the cyclone name, date and time when the cyclone is expected in the position, wind speed, and wind gust speed.
5. If there is a route going near the cyclone trajectory, the dangerous route legs will be highlighted with purple color in the chart view, the same color will be used to indicate the dangerous time for navigating along the route in the **Weather → Weather Time Series** tab graphs.

6.7.3 Display of Ice Situation

Ice situation data are distributed by Jeppesen Marine as an individual weather product.

IMPORTANT!

Ice situation data are based on the information received from satellites the day before the data are available for download from the Jeppesen Marine weather server. Therefore the ice situation data can be only used as a reference and in no way can the data be used to navigate near the ice border or in the ice-covered waters.

Ice concentration and ice coverage data are displayed in the chart view in accordance with the standards of the WMO.

To display ice situation data, do the following:

1. Open the **Weather → Weather Presentation** tab and tick the Ice concentration checkbox in the **Meteo Parameters** table. The data will be displayed in the chart view.

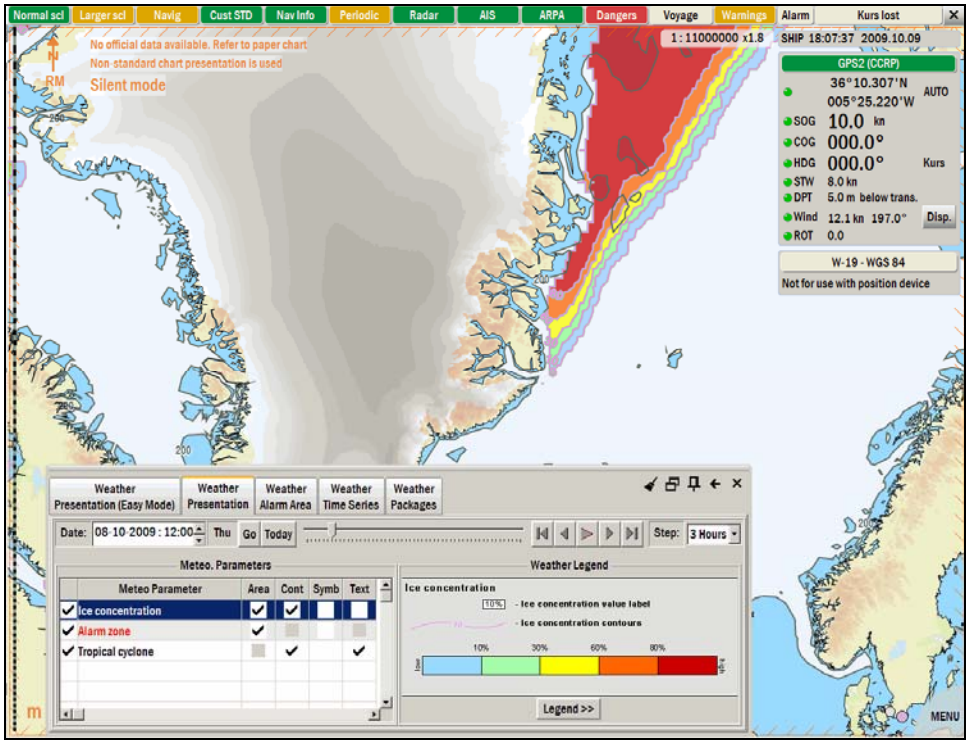


Figure 132 Weather → Weather Presentation tab, display of the ice situation

2. The ice situation data received from satellites during one day are compiled into one time period and provided for the download from the Jeppesen Marine weather server only the next day. That is why the date and time in the **Data** field are set automatically to 12 a.m. of the previous day and cannot be changed.

6.7.4 Weather Time Series

In the **Weather Time Series** panel you can see the evolution of specified weather parameters in a single point or along a specified route.

IMPORTANT!

To create time series for a specified route, weather data currently downloaded in the ECDIS should cover the geographical area along which the route goes. The time period of the weather forecast should cover the time scheduled for navigating along the route (see chapter 6.4.6, Editing Route Schedule).

To create time series for a single point, do the following:

1. Open the **Weather → Weather Time Series** tab and select the **Build for Point on Chart** option, Figure 133.

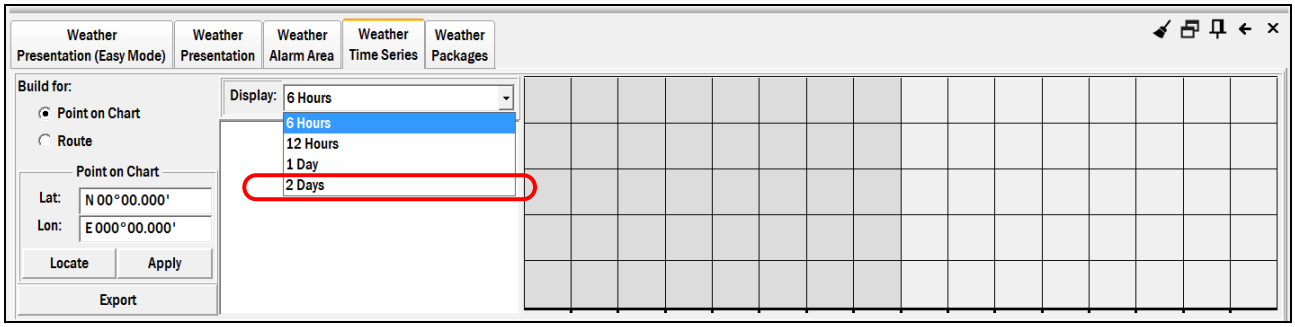


Figure 133 Weather → Weather Time Series tab, time series for a point

2. Press the **Locate Point on Chart** button and plot a point on the chart by left-clicking in the chart view. The point is highlighted with a yellow ring . The point coordinates are displayed in the **Lat** and **Lon** fields of the **Point on Chart** section. The coordinates can be edited.
3. Select a time range of the time series on the **Display** drop-down list.

   The range has been extended up to 2 days, Figure 133[45].
4. Select weather parameters to be used for creating the time series in the list of weather parameters. To select a parameter, tick the checkbox to the left from the parameter name. To unselect a weather parameter, clear the checkbox.
5. After the parameters have been checked, the graphs of the parameters development in time will be built in the graph pane. The horizontal axis of the graph is the time axis; vertical axes are different for each weather parameter and represent the parameters magnitude.
6. When moving the mouse pointer in the graph pane, the tool tip is displayed with the exact time in the pointer position. In the parameters list, the value of the parameter at that time will be shown to the right of each parameter. The current time set in the **Weather Presentation** panel is indicated by a yellow vertical line.
7. To export weather data for the selected point to a `*.csv` file, press the **Export** button, indicate the file name and folder where the file will be saved in the **Save As** dialog, and press the **Save** button.
8. To print the graph out, press the **Print** button, the graph will be automatically saved to a `*.jpg` file and opened with your default image processing program. Print the graph out using the printing functionality of the program.

To create time series for a route, do the following:

1. Open the **Weather → Weather Time Series** tab and select the **Build for Route** option. The list of all available routes will appear in the **Select Route** pane below.
2. Select one of the routes in the **Select Route** pane.
3. Select a time step of the time series in the **Step** drop-down list: 1, 3, 6 and 12 Hours options are available.
4. Select weather parameters to be used for creating the time series in the list of weather parameters. To select a parameter, tick the checkbox to the left from the parameter name. To unselect a weather parameter, clear the checkbox.
5. After the parameters have been checked, the graphs of the parameters development in time along the route will be built in the graph pane. A point on a parameter graph shows the value of the parameter at a specified time for the point on the route where the own ship is supposed to be at that time.

   The horizontal axis of the graph is the time axis; vertical axes are different for each weather parameter and represent the parameters magnitude.
6. When moving the mouse pointer in the graph pane, the tool tip is displayed with the exact time in the pointer position. In the parameters list, the value of the parameter at that time will be shown to the right of each parameter. The current time set in the **Weather Presentation** panel is indicated by a yellow vertical line.

[45] *New feature in 5.0.84 program version*

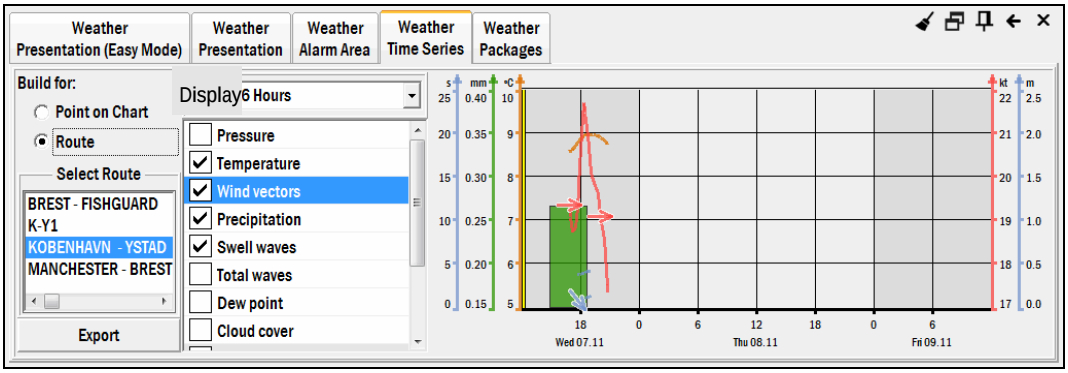


Figure 134 Weather → Weather Time Series tab, time series for a route

7. To export weather data for the route to a `*.csv` file, press the **Export** button, indicate the name of the file and the folder where the file will be saved in the **Save As** dialog, and press the **Save** button.
8. To print the graph, press the **Print** button, the graph will be automatically saved to a `*.jpg` file and opened with your default image processing program. Print the graph out using the printing functionality of the program.

6.7.5 Weather Alarm Area

In the **Weather → Weather Alarm Area** tab you can set alarm thresholds for weather forecast parameters and the ECDIS will display areas where values of parameters exceed the set thresholds as alarm areas on the chart.

To set a weather alarm condition, do the following:

1. Open the **Weather → Weather Alarm Area** tab and press the **Add condition** button to create a new line in the alarms table.
2. Double-click in the **Met Parameter** field to open the drop-down list with weather parameters. Select a parameter from the drop-down list.

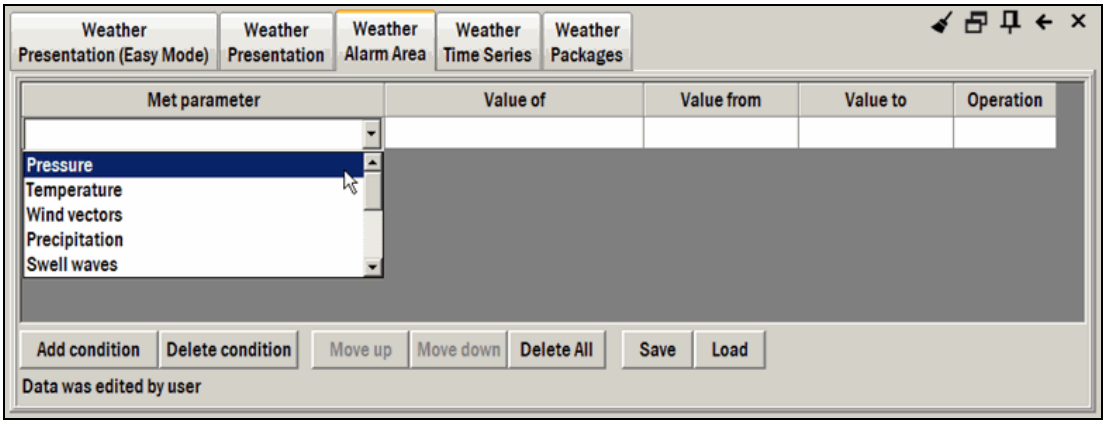


Figure 135 Weather → Weather Alarm Area tab, adding a new alarm condition

3. Double-click in the **Value of** field to open the drop-down list of attributes of the specified weather parameter. Select an attribute from the drop-down list.
4. Double-click in the **Value from** field and enter the value of the lower limit of the condition; double-click in the **Value to** field and enter the value of the upper limit.
5. Repeat the actions for other alarm conditions if necessary. To combine several alarm conditions, use operations available in the **Operation** drop-down list. The drop-down list appears after the next alarm condition has been added. The following operations are available:
   - AND – alarm area will be made for areas where both conditions are true
   - OR – alarm area will be made for areas where at least one of the conditions is true
6. To delete a condition select it in the table and press the **Delete** button. To delete all conditions from the table press the **Delete All** button.

7. To move a condition up or down in the table, select it and press the **Move up** or **Move down** button respectively.
8. To save the current conditions set to a file press the **Save** button, in the **Save as** dialog indicate the folder and the name of the conditions file and press **Save**. The conditions set will be saved to an `*.xml` file. To load a previously saved conditions set press the **Load** button, in the **Open** dialog select the file with the conditions and press **Open**. The conditions will be loaded and displayed in the **Weather Alarm Area** panel.

To display alarm areas in the chart view, do the following:

1. Open the **Weather →Weather Presentation** tab.
2. Find the **Alarm zone** entry in the **Meteo Parameter** column and tick the checkbox to the left from the entry.

6.7.6 Comparison of Routes

Alarm areas can be used to compare two routes and select the one which is safer.

To compare routes, do the following:

1. Create two or more routes (*see chapter 6.4, Route Planning and Plotting*). Display the routes in the chart view.
2. Download weather data for the region covering the routes. It is important that the time period of the weather forecast cover the time scheduled for navigating along the routes.
3. Set alarm conditions in the **Weather → Weather Alarm Area** tab (*see chapter 6.7.5, Weather Alarm Area*). The routes will be colored depending on whether they go inside or outside the alarm areas.
4. In the **Weather → Weather Presentation** tab, in the time setup tool, set the time scheduled for navigation along the route. A symbol of the own ship will appear on the route in the position where the ship is supposed to be at the indicated time (if there are several routes displayed in the chart view, the symbol of the own ship will appear on all the routes). Weather forecast parameters will be displayed for the indicated time.

   The legs of the routes will be highlighted with red if they are dangerous in terms of the alarm conditions; green if the legs are safe; and blue of there is a danger of capsizing for the ship following under given weather conditions and with the planned speed along the legs.
5. The navigation along the routes is imitated by dragging the own ship symbol from one waypoint to another using the mouse pointer. When the ship symbol is moved, the time changes to the time at which the ship is scheduled to reach the new position. The weather forecast changes together with the time. The own ship symbols on other routes are moved too.

   When dragged along the route, the own ship symbol can be moved for a distance the ship would make in the time interval set in the **Step** field in the **Weather → Weather Presentation** tab. To move the own ship symbol along the route, you can also use the animation buttons of the time setup tool.

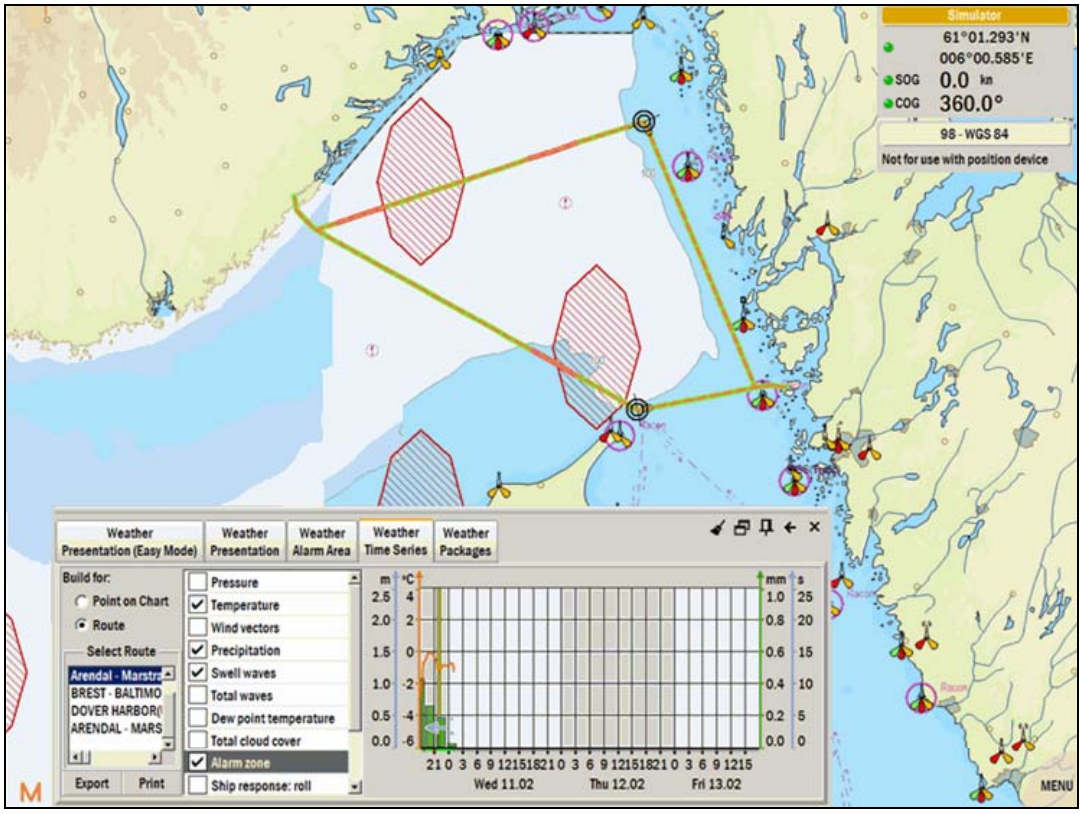


Figure 136 Weather → Weather Time Series tab, routes comparison

6.7.7 Inspect Ship Position

The **Inspect Ship Position** function allows assessing a specified position of your ship on the route in terms of weather conditions. To assess a ship position you need the time of weather forecast to be the same as the time at which the vessel will reach the specified position (route schedule).

To assess the ship position on the route, do the following:

1. Display a route in the chart view.
2. Download weather data for the region covering the route (*see chapter 6.6, Weather Forecast: Download*).
3. Make sure that the time period of the weather forecast covers the time scheduled for navigating along the route.
4. Set the own ship parameters in the **Ship Response** dialog. To open the dialog, in the **Weather → Weather Presentation (Easy Mode)** tab, press the **Ship Response Options** button (details about the **Ship Response Options** dialog see below).
5. Set the time of the weather forecast display in the time setup tool of the **Weather → Weather Presentation (Easy Mode)** tab. The time should be within the period of time scheduled for navigating along the route (**Route → Route Planning** tab, edit mode, **Schedule** table). The own ship symbol will appear on the route at the position where the own ship is supposed to be at the indicated time (the position is calculated using the route schedule data and the own ship planned speed).

   To change time schedule of the route go to the **Route → Route Planning** panel, select the route you intend to check in the **Routes** table, switch to the edit mode (the **Edit** button), and in the **Schedule** tab change the **ETD** (estimated time of departure) value so that the time period scheduled for navigating along the route overlapped with the time period for which you have weather data. Once this done, a ship symbol will appear on the route. Now you can view the results of operation of the **Inspect Ship Position** function.
6. If there are several routes and the time set in the **Weather → Weather Presentation** tab for the weather forecast display falls within the time period scheduled for navigating on the routes, the own ship symbol will appear on these routes too. To select an own ship symbol, left-click on it. The active own ship symbol will become red.

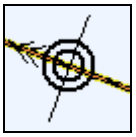


Figure 137 Non-selected own ship symbol

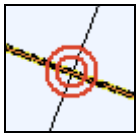


Figure 138 Selected own ship symbol

7. Open the **Inspect Ship Position** panel where the result of the analysis of the current own ship position for the weather conditions at the given time is displayed. To open the **Inspect Ship Position** panel, press the **Inspect Ship Pos** button in the **Weather → Weather Presentation (Easy Mode)** tab.
8. To change the time for the evaluation of the own ship position, move the time slider of the time setup tool in the **Weather → Weather Presentation (Easy Mode)** tab or drag the own ship symbol along the route (left-click on the symbol and, holding the mouse button). Time can be changed by the step set in the Step field in the time setup tool in the **Weather → Weather Presentation (Easy Mode)** tab.

➢ **To read the Inspect Ship Position panel, you need the following information:**

1. The **Inspect Ship Position** panel consists of two parts: the informational part and the polar diagram part.
2. In the informational part you can see the following data:
   - Date and time of the ship position – in the upper part of the panel.
   - Coordinates of the ship position – in the upper part of the panel.
   - Roll, pitch and heave values (estimated using the swell and total waves data) – in the lower part, the left column.
   - Weather parameters (values of those weather parameters are displayed that are checked in the **Weather → Weather Presentation** tab in the **Meteo. Parameters** table).
   - You can also see presentation of such weather parameters as total sea, swell and wind as special symbols. The parameters are represented as colored arrows in three corners of the panel:
     - The dark blue arrow in the upper left corner represents the direction and period of total sea.
     - The blue arrow in the lower left corner represents the direction and the period of the swell.
     - The red arrow in the upper right corner represents the direction and velocity of the wind.

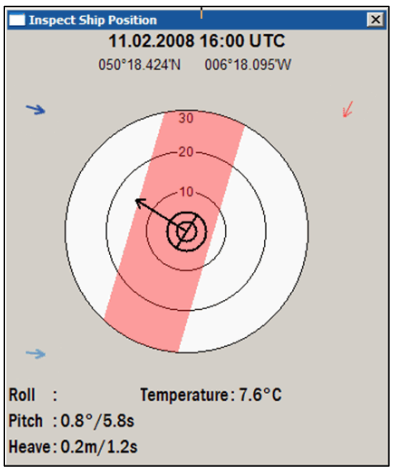
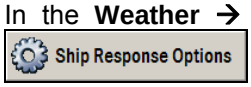


Figure 139 Inspect Ship Position panel

   To read values of the weather parameters represented by the arrows, see corresponding weather legends in the **Weather → Weather Presentation** tab (to open a weather legend relating to a weather parameter, select the weather parameter in the **Meteo. Parameters** table and the corresponding weather legend will be displayed in the **Weather Legend** part of the tab).
3. The polar diagram gives you information about the speed and course of the vessel in a specified position on the route as well as about the speed and course values combinations that can cause a risk of a sudden increase in roll amplitude. The diagram consists of the following elements:
   - Concentric circular axes representing vessel speed.
   - The vessel symbol plotted in the middle of the diagram.
   - The vessel speed and direction vector (the arrow pointing outward from the center of the vessel symbol) shows the direction and velocity of the vessel. The direction is the angle between the imaginary vertical axis of the diagram and the vessel speed and direction vector measured horizontally from North to whatever direction you are pointing. The vessel speed is defined with the help of concentric axes representing speed – the value of the speed lies in the point where the vector ends. Speed of the vessel in the current position is taken from the route characteristics (speed on the leg).

- The **Danger** (red shadow) zone covers all points representing combination of speed and course at which there is a danger of having a sudden increase in *roll amplitude* of the vessel (if the vessel speed and direction vector end lies within the red shadow zone, the vessel is in danger of capsizing). The conclusion is made from comparison of the vessel **natural roll period** with the **relative wave period**: if the difference between values is **less than 30%** the resonance can occur. This combination can in some cases be dangerous. An alarm for a given threshold of roll amplitude can be made in the **Weather Alarm Area** panel[46].

To set ship parameters for the Ship Response analysis, do the following:

1. In the **Weather → Weather Presentation (Easy Mode)** tab, press the **Ship Response Options** 

button. The **Ship Response** dialog will open.

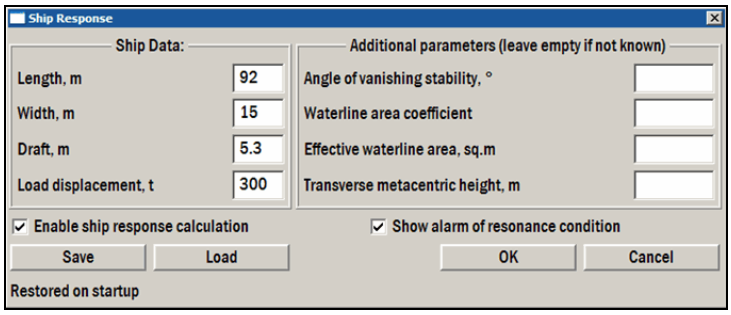


Figure 140 Ship Response window

2. Set the required parameters:
   - **Ship Data** section
     - **Length** – Length at waterline (LWL) of the vessel, meters. LWL is the length of the vessel as measured from the bow ending of the waterline to the stern ending.
     - **Width** – Beam (the widest width) of the vessel, meters.
     - **Draft** – Draft of the vessel, meters.
     - **Load Displacement** – Displacement of the vessel, tons.
   - **Additional parameters** section
     - **Angle of vanishing stability** – Sets angle of vanishing stability (AVS) of the vessel, degrees. AVS is the angle the boat can heel and still right itself.
     - **Waterline area coefficient** – Waterline area coefficient, non-dimensional quantity.
     - **Effective waterline area** – Effective waterline area, square meters.
     - **Transverse metacentric height** – Transverse metacentric height of the vessel, meters. Transverse metacentric height is the vertical separation of the center of gravity and the transverse metacenter.
3. Check the **Enable ship response** calculation checkbox so that the **Danger** zone was calculated and displayed in the **Inspect Ship Position** panel.
4. Check the **Show alarm of resonance condition** checkbox to enable the alarm in case a resonance condition occurs during navigation along the route.
5. You can save a set of parameters to a file in order to use them later. To save parameters press the **Save** button, in the **Save as** dialog indicate the location and name of the file and press **Save**. The set of ship response parameters will be saved to an `*.xml` file.
6. To load previously saved sets of parameters press the **Load** button, in the **Open** dialog select the file with parameters and press **Open**. The parameters will be loaded and displayed in the corresponding fields of the **Ship Response** window.

[46] The **Inspect Ship Position** function operates with specific ship dimensions and other parameters. The parameters are set using the **Ship Response Options** setup tool.

7. To save changed parameters and close the **Ship Response** window, press **OK**. To close the window without saving changes press **Cancel**.

6.8 Piracy Information

Use information about pirate assaults to plpan your route. Piracy information is now available in ECDIS as a database supplementary section.

➢ **The piracy information section provides the following data[47]:**

- name, type and flag state of assaulted vessels
- date and location of incidents
- description of incidents
- URL of the internet site providing additional information about incidents
- note on the latest piracy incidents

To access the Piracy Information supplementary section, you have to install a license for the data. A piracy information license is installed the same way as a data set or area license. Licenses are installed in the **Data → Licensing tab**. For more details, *see chapter 4.2, Licensing Data*.

After the license has been installed, turn on the display of the Piracy Information supplementary section. Go to the **Chart → Chart Settings** tab, select the current database in the **Supplementary Chart Info** section and check the Piracy Information data section. For more details, *see chapter 5.6.3, Supplementary Data*.

There are two types of piracy information objects: a point Piracy Attempt object (a skull and cross bones symbol ) and an area Piracy Note object. To get information about a piracy object, right-click it and find the object in the **Object Information** tab that will open[48].

➢ **The following types of Piracy Attempt objects exist:**

- Hijack – marked with a red skull and cross bones symbol 
- Armed robbery/Armed assault – marked with an orange skull and cross bones symbol 
- Attempted boarding – marked with a blue skull and cross bones symbol 
- Suspicious approach – marked with a green skull and cross bones symbol 

[47] The Piracy Information supplementary section requires separate licensing.

[48] To select a Piracy Attempt object place the mouse pointer exactly in the point where bones cross.

7. NAVIGATION

7.1 Own Ship Position and Passed Track

Position of the own ship can be monitored in the chart view. The own ship symbol is displayed in the chart view in coordinates coming from the primary position source.

The elements of the own ship presentation in the chart view include the own ship symbol, the prediction vector, and the passed track.

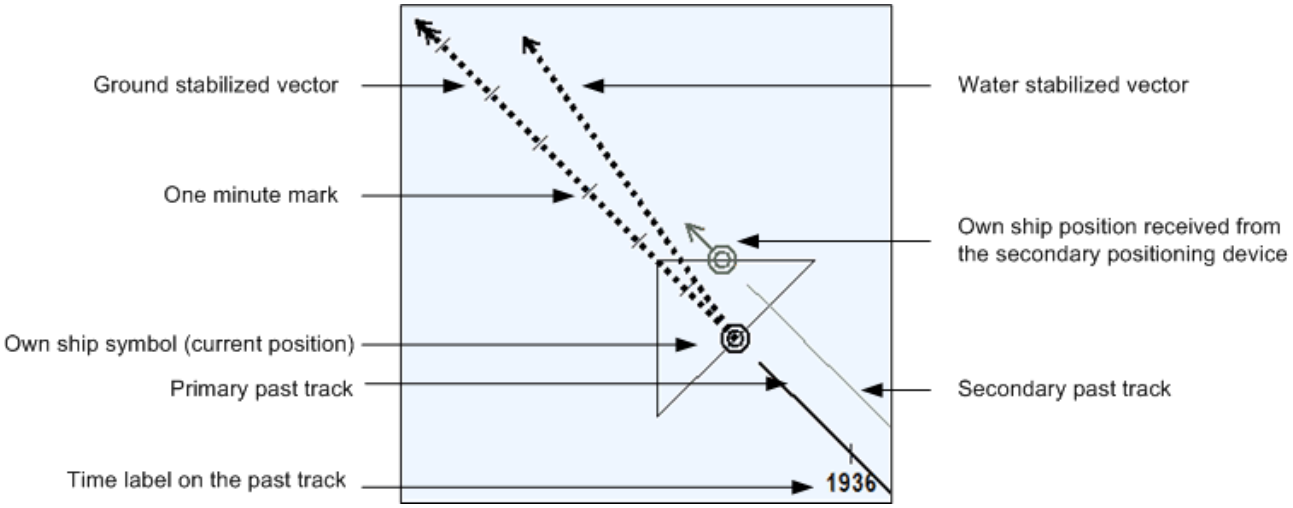


Figure 141 Own ship position and vectors, and passed track presentation

To configure the display of the own ship in the chart view, do the following:

1. Set the primary and secondary position sources in the **Navi → Navigation Data** tab, the **Position Source** section (*see chapter 7.2, Position Sources*).
2. Open the **Navi → Own Ship past track and vector** tab. In this tab you can configure the display of the own ship passed track and prediction vectors.

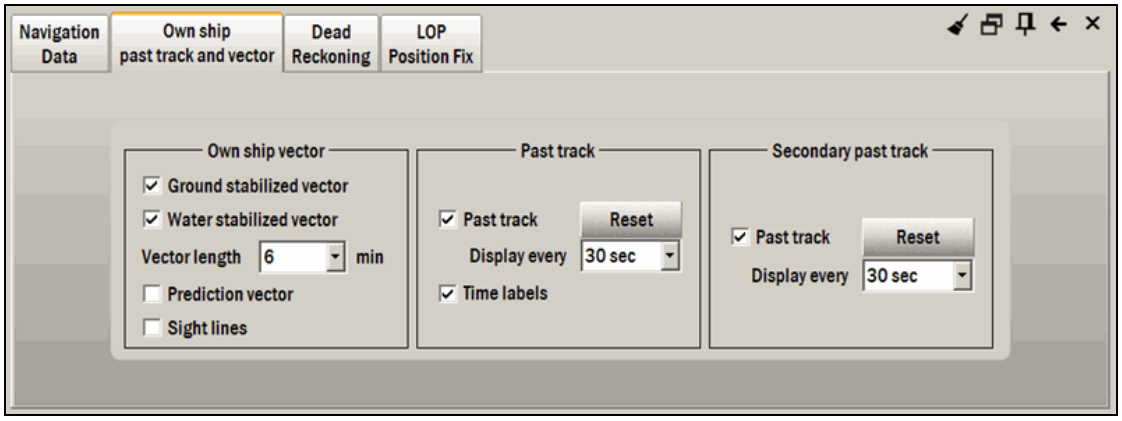
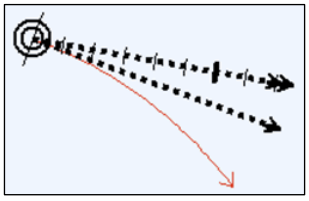


Figure 142 Config → System tab, Own Ship tab

3. To start drawing the own ship passed track, the track based on positioning data from the primary position source, tick the **Past track** checkbox in the **Past track** section. The passed track will be displayed in the chart view. The passed track is updated at the interval set in the **Display every** field. To set an interval, select a value in the **Display every** drop-down list.
4. To hide the passed track, clear the **Past track** checkbox. The passed track is removed from the display but is not deleted. To display the hidden passed track again, check the **Past track** checkbox.
5. To delete the old passed track and start drawing the new passed track, check the **Past track** checkbox and press the **Reset** button. The old passed track will be deleted and the new one will start to be drawn.
6. To delete the passed track and stop drawing the passed track altogether, clear the **Past track** checkbox and press the **Reset** button. The old passed track will be deleted.

7. You can also display the own ship secondary passed track, the track based on positioning data from the secondary positioning device. Settings for the secondary passed track are presented in the **Secondary past track** section and are the same as the settings for the primary position source passed track.
8. To turn on the display of time labels on the own ship passed track, check the **Time labels** checkbox in the **Past track** section. To turn the display of time labels off, clear the **Time labels** checkbox. Time labels are displayed with the step the same as the own ship vector length.
9. In the **Own ship vector** section you can configure properties of the ship velocity vectors. To predict the ship position over a period of time three vectors are used:
   - **Ground stabilized vector** – vector based on SOG (speed over ground) and COG (course over ground) values (the black dotted line with one minute graduation marks and a double arrow end). To display this vector, check the **Ground stabilized vector** checkbox.
   - **Water stabilized vector** – vector based on STW (speed through water) and HDG (heading) values (the black dotted line with no graduation marks and a single arrow end). To display this vector, check the **Water stabilized vector** checkbox.
   - **Prediction vector** – vector based on STW, HDG and ROT (rate of turn) values (the red line with a single arrow end). To display this vector, check the **Prediction vector** checkbox.

   
   Figure 143 Velocity vectors

   To set the time period for the ship position prediction, select a value from the **Vector length** drop-down list. (e.g. if it is set to 6 minutes, the vector length will show how far the vessel will get in 6 minutes with the current speed).
10. To be able to evaluate the ability of the own ship to pass a narrow place (through a lock, under a bridge, etc.), the **Sight lines** function is used. The **Sight lines** function turns on the display of the passage corridor of the own ship. You can see the passage corridor at the chart scale at which the own ship symbol is shown as a scaled area symbol and larger. If the own ship symbol is shown as a point symbol, the ship passage corridor is not displayed.

    The width of the passage corridor depends on the course over the ground (COG) and heading (HDG) of the ship. If the COG and HDG values are the same, the width of the own ship passage corridor equals the maximum beam of the ship set in the **Config → Own Ship** tab. If the COG and the HDG values are different the width of the own ship passage corridor is more than the maximum beam. The width of the own ship passage corridor is shown on the chart near the end of the passage corridor symbol[49].

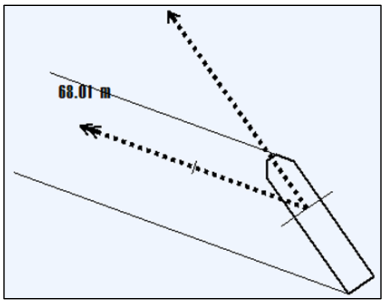
    

    Figure 144 Own ship passage corridor (Beam=10m, Length=40m)

To display the own ship symbol using the secondary position source, do the following:

Open the **Navi → Navigation Data** tab and check the **Show secondary** checkbox in the **Position Source** section.

To display the own ship symbol as a scaled area symbol, do the following:

1. Open the **Navi → Navigation Data** tab and check the **True scale ship image** checkbox.
2. The own ship point symbol will turn into an area symbol at large scales. The scale at which the transformation happens depends on overall dimensions of the own ship set in the **Config → Own Ship → Own ship setup** tab.

[49] If any of the prediction vectors is not displayed, make sure that the required data (SOG, COG, STW, HDG, ROT) are coming to the ECDIS from input devices.

7.2 Position Sources

7.2.1 Primary and Secondary Position Sources

In the ECDIS, you can use two ways to position the own ship:

- One or more GPS devices (DGPS, WAAS/EGNOS, etc.), compatible with the NMEA interface. GPS devices used for positioning should be registered in the ECDIS (*see chapter 3.1, Input/Output*).
- Dead reckoning (*see chapter 7.2.2, Dead Reckoning*).

Several positioning devices can be connected to the ECDIS at the same time. One of the devices is used as a primary position source and one as a secondary position source. Both the own ship position defined with the primary positioning device and that defined with the secondary positioning device can be displayed in the chart view (*see chapter 7.1, Own Ship Position and Passed Track*). Using the display of both primary and secondary positions of the own ship, you can monitor the reliability of various positioning devices.

To set a positioning device as a primary or a secondary position source, do the following:

*Make sure that the positioning device you want to set as a primary or secondary position source is connected to the ECIDS and registered in the **Config → Input/Output** tab (see chapter 3.1, Input/Output).*

1. Open the **Navi → Navigation Data** tab. Position sources are configured in the **Position sources** tab. All positioning devices that are connected to and registered in the ECDIS are listed in the **Secondary position source** drop-down list, dead reckoning (DR) is also on the list though it is not an external input device.

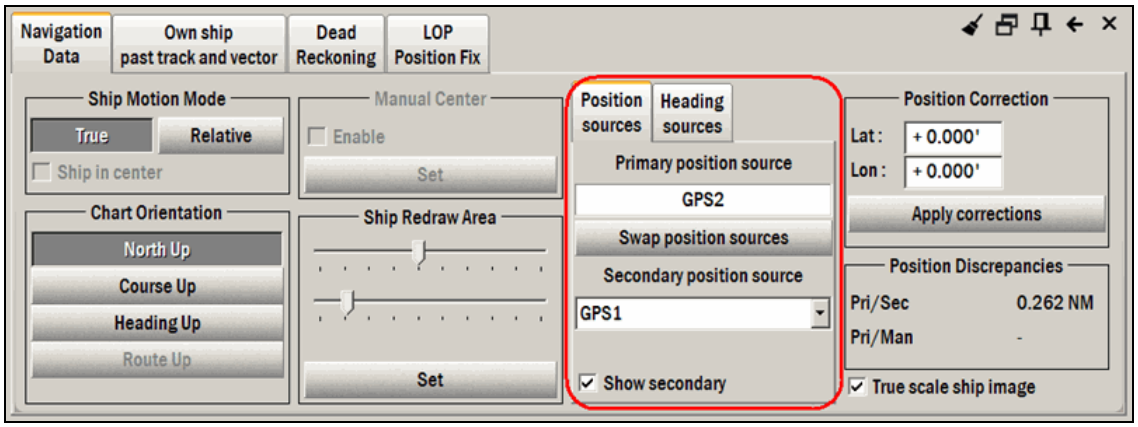


Figure 145 Navi → Navigation Data tab, Position Source section

2. You can also set position sources in the **Position, Heading and Data sources** panel. To open the panel left-click on the **Position Source** indicator. Open the **Position sources** tab. This tab is the same as the **Position sources** tab in the **Navi → Navigation Data** tab, and all actions in one are immediately repeated in the other.

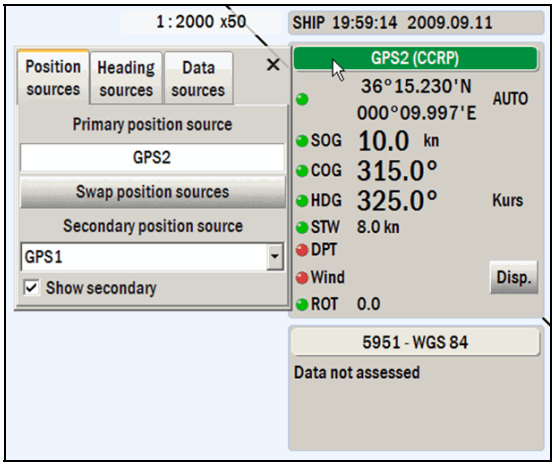


Figure 146 Position sources tab

3. In case the positioning device you want to set as a primary position source is already set so, there is no need to change anything. If the positioning device is not set as a primary position source, select it in the

Secondary position source drop-down list and press the **Swap position sources** button. The name of the primary position source is displayed in the **Position Source** indicator (*see chapter 2.3, Indicators Panel*)[50].

4. To set a positioning device as a secondary position source, just select it in the list of available positioning devices in the **Position sources** tab. To display the own ship position in the chart view using the secondary position source, check the **Show secondary** checkbox.
5. In case the primary position source fails, an alarm is triggered (*see chapter 7.6, Alarms*) and the secondary position source becomes the primary source automatically.

7.2.2 Dead Reckoning

The dead reckoning parameters can be used for the own ship positioning when communication with all other positioning devices is lost.

To use dead reckoning as position source, do the following:

1. Open the **Navi → Dead reckoning** tab. The **Position**, **Heading**, and **Speed** parameters are automatically set to the values that were last received from external output devices.

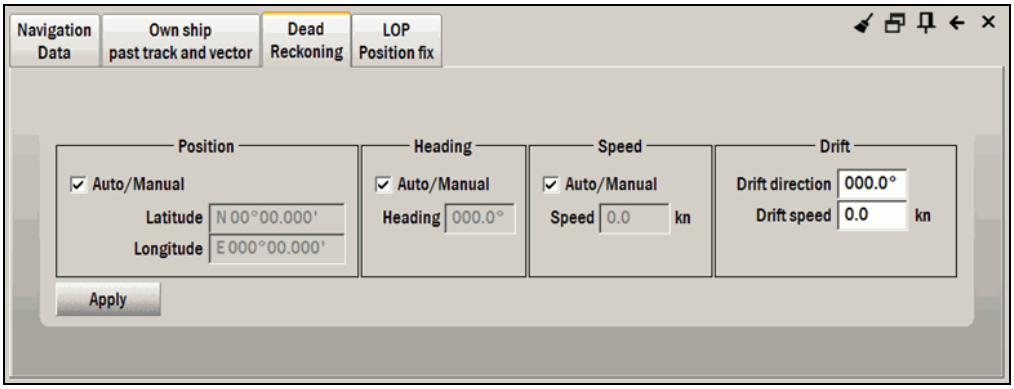


Figure 147 Config → Dead reckoning tab

2. To change the automatically set parameters, clear the **Auto/Manual** checkbox of the parameter that you are going to change and enter a new value to the edit field.
3. Enter the drift direction and speed to the **Drift direction** and **Drift speed** fields.
4. After all necessary changes have been done, press the **Apply** button for the parameters to take effect.

7.2.3 Manual Position Fix by Range and Bearing LOPs

The Manual Position Fix function is intended for fixing of the own ship position using range and bearing lines of position taken from visual or radar detected reference objects. Description of the function algorithm and examples of the manual position task are presented in the Appendix D.

To use the Manual Position Fix function, open the **Navi → LOP Position fix** tab.

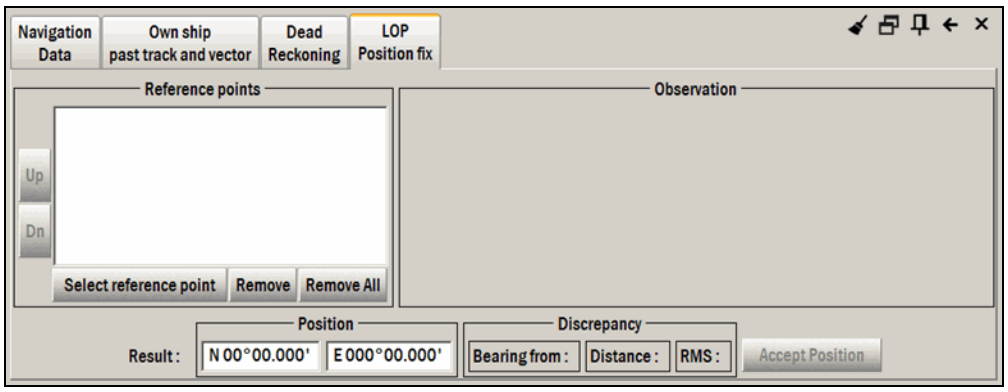


Figure 148 Navi → LOP Position fix tab

[50] The DR cannot be set as a primary position source this way. It is used for positioning only in case there is no any data available from external positioning devices.

➢ **To complete the manual position fix task, the following operations should be performed:**

1. Plotting reference points in the chart view.
2. Entering results of measuring bearings and ranges to the reference objects.
3. Calculating the position.
4. Accepting the calculated position as the new own ship position.
5. Additional parameters configuration is available: corrections for constant errors of measuring devices.

To plot reference points in the chart view, do the following:

1. Press the **Select reference point** button to switch to the object selection mode.
2. In the chart view, point the mouse pointer at the observed object and right-click on it. The window with the list of all objects under the pointer will open[51].
3. In the objects list find the observed object and double-click on it to select. The **Would you like to name the reference point?** window will open where you can enter the reference point name[52].

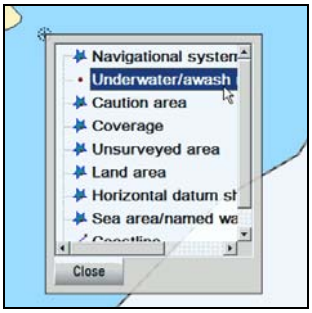


Figure 149 List of objects under the mouse pointer

4. Enter the reference point name in the **Would you like to name the observation point?** field and press the **OK** button. You may leave the point without a name, just press the **OK** button and press **Yes** in the *You did not give a name to the reference point. Would you like to proceed anyway?* message window.
5. The reference point will be added to the **Reference points** list and a reference point symbol 

will be displayed in the chart view.
6. The point coordinates are displayed in the **Position** fields below the **Observation** table. To change the reference point position, type in new coordinate values and press the **Change** button. The reference point will be moved to the new coordinates.
7. In the **Reference points** list, you can move points up and down: select a point and press the **Up** button to move the point up in the list or **Down** button to move the point down in the list. To remove a point, select it in the list and press the **Remove** button. To remove all points, press the **Remove All** button.

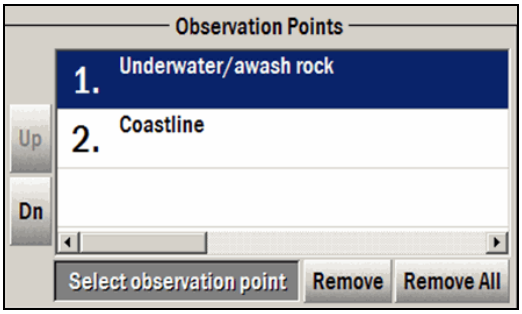


Figure 150 Navi → Manual Observation tab, Observation Points list

[51] Reference point plotting is only possible if the **Navi → Manual Observation** tab is open and the **Select reference point** button is pressed. If any other or no tab is open, right-clicking in the chart view opens the **Object Info** panel.

[52] If the reference point is a point on land, select the Land area or the Coastline object, and the reference point symbol will be plotted in the position of the mouse pointer on the land or at the coast line.

To enter observation results, do the following:

1. The observation data are entered to the **Observation** table. To enter the data for a reference point, select the point in the **Reference points** list. Now you can start entering distance and bearing data to the **Observation** table.

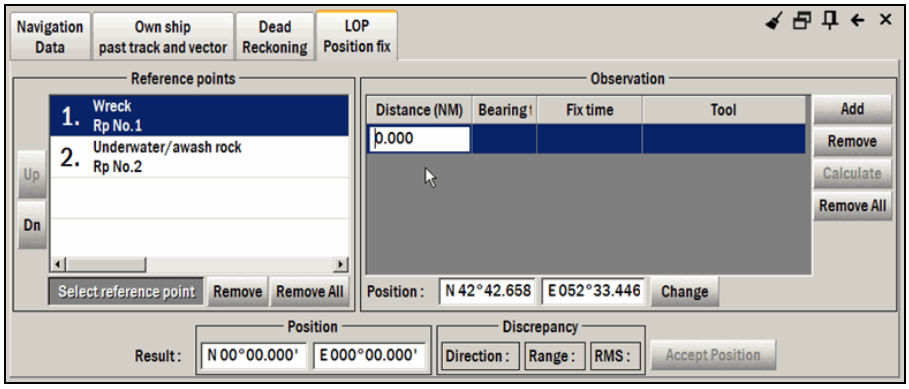


Figure 151 Navi → LOP Position fix tab, entering observation data

2. To enter the distance to the observed point, double-click in the **Distance** field to make the field editable and enter the distance value. The measurement units are set in the **Config → Units and Time** tab.
3. To enter the bearing from the own ship to the point, double-click in the **Bearing** field to make it editable and enter the bearing value.
4. To set the observation time, double-click in the **Fix time** field: the current time will be displayed. Correct the time value so that it corresponded to the observation time if necessary[53].
5. To specify the device used to make the observation, double-click in the **Tool** field to make it editable and select the device from the devices drop-down list. Depending on the specified device the error correction for the device is used in the position calculation[54].
6. To add an additional observation for a reference point, select the point in the **Reference points** list and press the **Add** button to the right from the **Observation** table: a new observation line will be added to the table. You can enter observation data to the new line.
7. To remove an observation, select it in the **Observation** table and press the **Remove** button to the right from the table.
8. After the observation data have been entered, the line of position (LOP) built using the data is plotted in the chart view with the time of observation displayed on the line. LOP's with different observation time are advanced to the time of the latest observed LOP. When advancing a LOP, the own ship course changes, speed changes, and set and drift between the two lines are accounted for. Advanced LOP's are marked with a TPL mark.

Figure 152 LOP: Range Arc

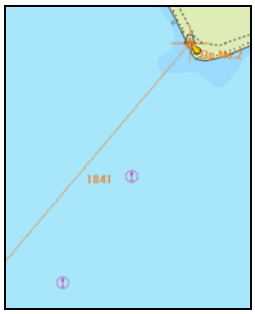


Figure 153 LOP: Bearing Line

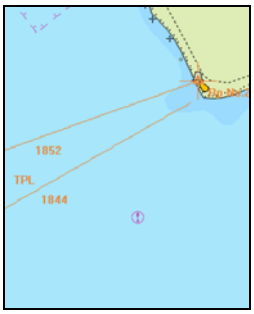


Figure 154 LOP: advanced bearing line

[53] If the time is not set, position calculation is impossible. The **Calculate** button remains dimmed.

[54] The type of position fix you are using defines which fields of the observation entry should be filled. For example, for a fix by bearings, **Bearing**, **Fix time**, and **Tool** fields should be filled; and for a fix by ranges, only **Distance**, **Fix time**, and **Tool** fields should be filled.

To calculate the observed position, do the following:

1. To calculate the own ship position, press the **Calculate** button. The position will be calculated and plotted in the chart view as a 

symbol. The position coordinates and the position offset from the current DR position of the own ship are displayed in the **Result** pane of the **Navi → LOP Position fix** tab.

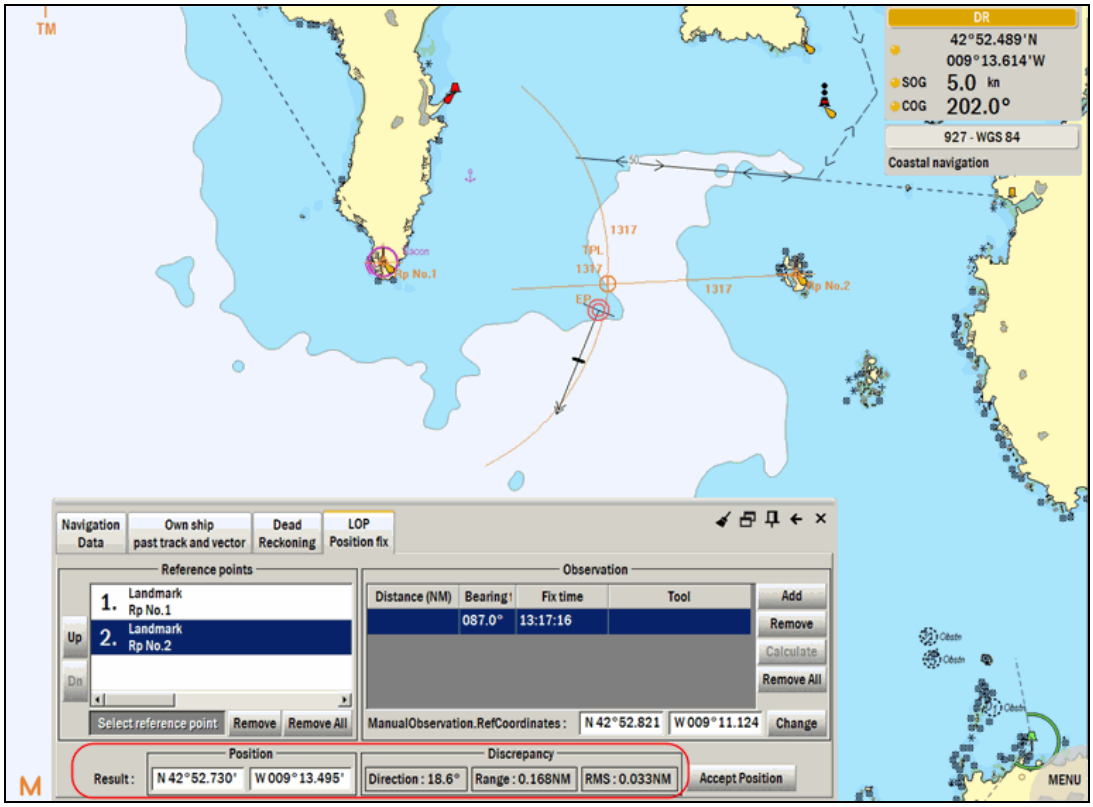


Figure 155 Calculated position in the chart view and in the Result section

2. The coordinates of the manual position fix are displayed in the **Position** section of the **Result** pane. The **Discrepancy** pane displays offset of the manual position fix from the current DR position of the own ship: distance from the own ship to the manual fix in the **Distance** field, bearing from the own ship to the manual fix in the **Bearing** field, and the root mean square error of the position fix in the **RMS** field. The RMS error is displayed in the chart view as an RMS error ellipse.

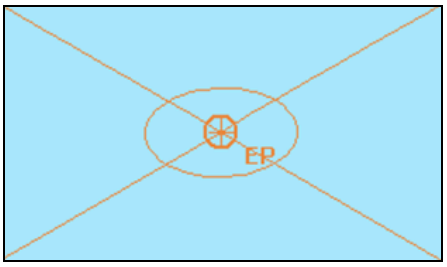


Figure 156 RMS error ellipse

To accept the observed position, do the following:

1. To accept the position fix as a new DR position of the own ship, press the **Accept Position** button. The own ship symbol will be moved to the fix and the DR will resume positioning of the own ship from the fix. If the dead reckoning is off, the own ship is not moved to the manual fix.
2. After the manual fix has been accepted, the manual fix symbol is displayed in the chart view with the time and means of observation:
   - V – the fix was made using visual bearings
   - R – the fix was made using radar ranges
   - VR – the fix was made using both visual bearings and radar ranges

3. At the moment when the manual fix is accepted, an entry about it is added to the logbook. The manual fix entry may look as follows[55]:

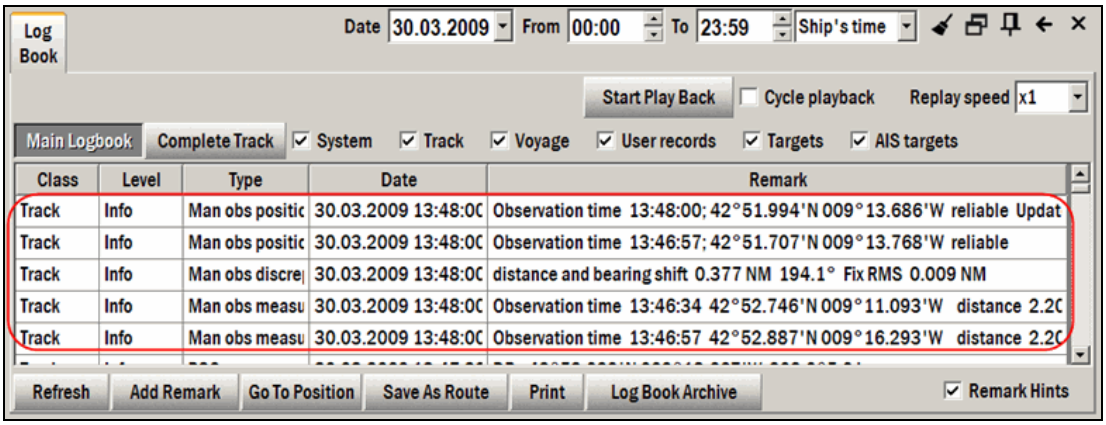


Figure 157 Log Book panel, manual fix entries

To configure additional manual position fix parameters, do the following:

1. Open the `MODevices.config.xml` file where you can enter values of RMS and fixed corrections for observation devices. To do so, open the **Config → Own ship → Position** of instruments tab and press the **Advanced** button. The *'Editing of LOP Position fix function advanced parameters. Do you wish to continue?'* message will appear. Press the **YES** button, the `MODevices.config.xml` file will be opened for editing in the **LOP Position fix advanced parameters** window.
2. Edit the file directly in the window. To save the changes, press the **Save** button; to reset the file to its initial contents, press the **Reset** button. To close the window, press the **Close** button

Figure 158 LOP Position fix advanced parameters window

[55] Before the start of a new manual position fix operation, clear all previous observations (only if the observations are not to be used in this operation). To do so, press the **Remove All** button to the right from the **Observations** table.

3. To edit the LOP Position fix advanced parameters, enter new values to the <value> fields of appropriate settings without changing the structure of the MODevices.config.xml file. In the table below sections and settings of the file are described:

Section	Setting	Default Value	Description
DRActualisation	SogRMS	0.1	Speed over ground root mean square error (RMSE), in knots. For example, if your speed over ground RMSE is 0.2 knots, set the SogRMS value to 0.2.
Radar	BrgRMS	0.3	Radar bearing RMSE, in degrees. For example, if your radar bearing RMSE is 0.5 degrees, set the BrgRMS value to 0.5.
	BrgCorrection	0.0	Radar bearing constant correction, in degrees. If the radar bearing line deviates anticlockwise, the correction should be positive; if the bearing line deviates clockwise the correction should be negative. For example, if your radar bearing is 0.5 degrees wrong clockwise, set the BrgCorrection value to -0.5.
	DistRMS	3.75	Radar distance RMSE, in nautical miles. For example, if your radar distance RMSE is 4.5 nautical miles, set the DistRMS value to 4.5.
	DistCorrection	0.0	Radar distance constant correction, in nautical miles. If the radar defined range exceeds the true range value, the correction should be negative; if the radar defined range falls behind the true range value, the correction should be positive. For example, if your radar defined ranges exceed true range values by 0.2 nautical miles, set the DistCorrection value to 0.2.
DirFinder 1	BrgRMS	0.1	Port direction finder bearing RMSE, in degrees. For example, if your port direction finder bearing RMSE is 0.5 degrees, set the BrgRMS value to 0.5.
	BrgCorrection	0.0	Port direction finder bearing constant correction, in degrees. If the port direction finder dial is constantly turned anticlockwise, the correction should be positive; if the dial is turned clockwise, the correction should be negative. For example, if your port direction finder dial is turned to 0.3 degrees anticlockwise, set the BrgCorrection value to 0.3.

Section	Setting	Default Value	Description
DirFinder 2	BrgRMS	0.1	Starboard direction finder bearing RMSE, in degrees. For example, if your starboard direction finder bearing RMSE is 0.5 degrees, set the BrgRMS value to 0.5.
	BrgCorrection	0.0	Starboard direction finder bearing constant correction, in degrees. If the starboard direction finder dial is constantly turned anticlockwise, the correction should be positive; if the dial is turned clockwise, the correction should be negative. For example, if your starboard direction finder dial is turned to 0.3 degrees anticlockwise, set the BrgCorrection value to 0.3.

4. After the file has been edited, save it (press the **Save** button) and close it (press the **Close** button).

7.2.4 Position Correction

In case the currently used positioning device provides coordinates in a coordinates system different from the chart coordinates system, a position correction is required. For example, the positioning device provides coordinates in the S-42 coordinates system (for plotting the own ship on a paper chart), and the electronic chart is made in the WGS-84 coordinates systems (usually all digital charts are made in the WGS-84 system): in this case, the own ship position in the chart view is incorrect. A coordinates correction should be provided to the ECDIS to display the own ship symbol in the correct position.

The coordinates system of the positioning device is set in the device itself; the electronic chart coordinates system is displayed in the navigational panel (*see chapter 7.7.2, Route Monitoring Panel*).

If the positioning device and the chart have different coordinates systems, a position correction should be introduced.

IMPORTANT!

The position correction is only available to system administrators and is protected with a password.

To introduce a position correction, do the following:

1. Open the **Navi → Navigation Data** tab. The position correction values are entered in the **Position Corrections** section.
2. Enter the correction for the latitude to the **Lat** field and the correction for the longitude to the **Lon** field. To add the correction value to the coordinate, enter the plus '+' sign in front of the value; to subtract the correction value, enter the minus '-' sign in front of the value.
3. After the correction has been entered or changed, press **Apply corrections**.
4. The corrections are applied to the coordinates received from the positioning device and displayed in the navigational panel. The corrections are indicated with the plus '+' and minus '-' signs depending on the sign of the correction[56].

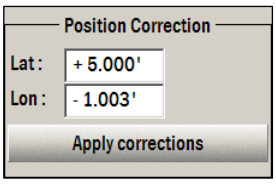


Figure 159 Position Correction section

[56] Positioning devices can transmit the DTM sentence in the NMEA format. This sentence contains indication of the coordinates system of the device. In this case check the DTM sentence checkbox when registering the device in the ECDIS. With the DTM sentence, the ECDIS receives the position correction automatically and you don't have to enter it manually.

7.2.5 Position Discrepancies

When the own ship position is defined using more than one method, there can be discrepancies between position values. The discrepancies are displayed in the **Navi → Navigation Data** tab, **Position discrepancies** section:

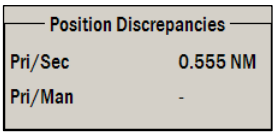


Figure 160 Position discrepancies

- **Primary/Secondary** – discrepancy between positions coming from primary and secondary position sources (displayed if the **Show secondary** checkbox in the **Navi → Navigation Data → Position sources** tab is checked);
- **Primary/Manual** – discrepancy between positions defined by primary position source and by manual observation (LOP position fix).

7.3 Heading Sources

In the ECDIS, you can use two ways to get the own ship heading:

- One or more external devices providing heading information, compatible with the NMEA interface. The devices should be registered in the ECDIS.
- Dead reckoning (*see chapter 7.2.2, Dead Reckoning*).

Several devices providing the own ship heading data can be connected to the ECDIS at the same time. One of the devices is used as a primary heading source and one as a secondary heading source.

To set a device as a primary or a secondary heading source, do the following:

1. Make sure that the device you want to set as a primary or secondary heading source is connected to the ECIDS and registered in the **Config → Input/Output** tab.
2. Open the **Navi → Navigation Data** tab. Heading sources are configured in the **Heading sources** section. All devices providing heading that are connected to and registered in the ECDIS are listed in the available heading devices list, dead reckoning (DR) is also on the list though it is not an external input device.

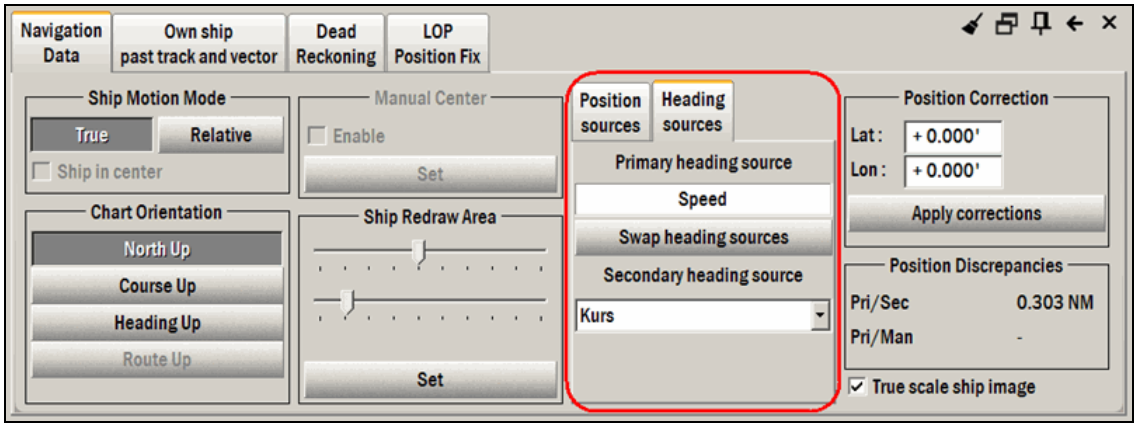


Figure 161 Navi → Navigation Data tab, Position Source section

3. You can also set heading sources in the **Position, Heading and Data sources** panel. To open the panel left-click on the **Position Source** indicator. Open the **Heading sources** tab. This tab is the same as the **Heading sources** tab in the **Navi → Navigation Data**, and all actions in one are immediately repeated in the other.

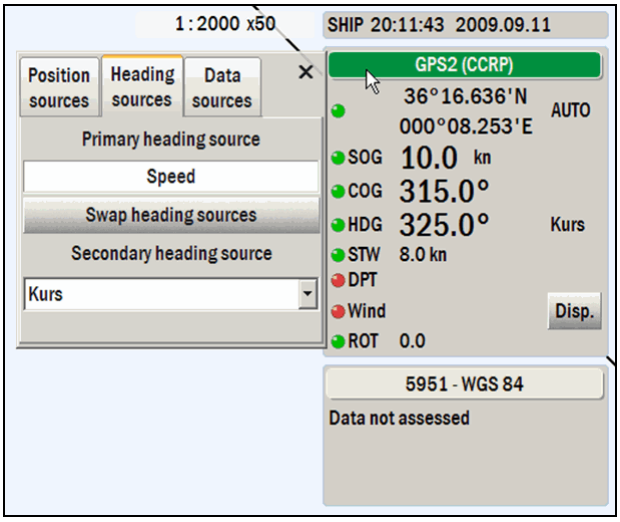


Figure 162 Heading sources tab

4. In case the device you want to set as a primary heading source is already set so, there is no need to change anything. If this device is not set as a primary position source, select it in the **Secondary heading source** drop-down list of available devices and press the **Swap heading sources** button. The name of the primary heading source is displayed in the heading line of the **Navigational panel**[57].
5. To set a device as a secondary heading source, just select it in the **Secondary heading source** drop-down list in the **Heading sources** tab.
6. In case the primary heading source fails, an alarm is triggered (*see chapter 7.6, Alarms*) and the secondary heading source becomes the primary source automatically.

7.4 Navigational Data Display and Sources

7.4.1 Navigational Panel

Information about the own ship position, current speed and course and other navigational data coming from external devices registered in the **Config → Input/Output** tab, is displayed in the Navigational panel in the upper right corner of the screen.

➢ **In the Navigational panel, the following data are displayed:**

- **SHIP** – The local (ship) time and date. To display the UTC time, left-click on the date and time line and hold the mouse button. When the button is released, the local time is displayed again. The offset between the local and the UTC time is set in the **Config → Units and Time** tab.
- **Position source indicator** – The position source indicator shows which position source is being currently used to define the own ship position (*see chapter 7.2, Position Sources*). If the primary position source is used, the indicator is green; if the secondary position source is used, the indicator is orange. In the brackets near the device name reference position is indicated (CCRP – conning station; POS – the positioning device itself).
- **Own ship coordinates** – Latitude and longitude of the own ship received from the positioning device. The AUTO mark near the coordinates indicates that the position is received from an external positioning device.
- **SOG** – Speed over ground received from the positioning device.
- **COG** – Course over ground received from the positioning device.

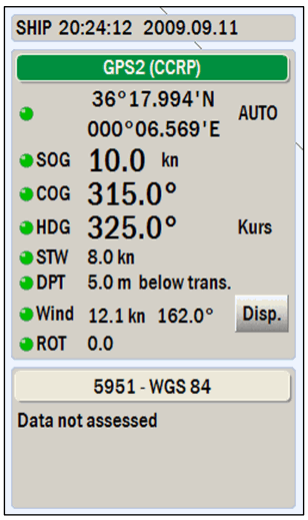


Figure 163 Navigational panel

[57] The DR cannot be set as a primary heading source this way. It is used as a heading source only in case there is no any data available from external devices.

- **HDG** – Heading received from the gyrocompass. Near the heading value the name of the device providing heading info is indicated. If heading is received from dead reckoning, the MAN mark is displayed.
- **STW** – Speed through water received from the log.
- **DPT** – Depth received from the echo sounder. The first value is the depth from the transducer to the sea bottom and the second value is the depth from the water line to the transducer. The **DPT** line is not on the panel if no echo sounder is registered in the **Config → Input/Output** tab.
- **Wind** – Wind speed and direction received from the wind sensor. The **Wind** line is not on the panel if no wind sensor is registered in the **Config → Input/Output** tab. The Disp. button opens the **Anemometer** window where the true and relative wind directions are depicted graphically.
- **ROT** – Rate of turn received from the gyrocompass. The **ROT** line is not on the panel if no gyrocompass is registered in the **Config → Input/Output** tab.
- **5951 – WGS 84** – The number of the source chart for the chart under the own ship or under the chart view center if the own ship is out of coverage and the chart coordinates system. In the frame lower, the suitability indicator is displayed. The indicator shows if the chart under the own ship (or under the chart view center if the own ship is out of coverage) is suitable for navigation.

  The indicators color means the following:

  - SOG Green – the values are received from the primary positioning device and other external devices;
  - SOG Orange – the values are received from the secondary positioning device.
  - ROT Red – the external device providing the data fails and no data is coming to the ECDIS.

7.4.2 Navigational Data Sources

The same navigational data can come from various external devices. In ECDIS only one source of data can be used.

To view navigational data sources, do the following:

1. Left-click on the **Position Source** indicator in the Navigational panel. The **Position, Heading and Data sources** panel will open.
2. Open the **Data sources** tab. The list with navigational data in the left column and their sources in the right is displayed in the tab.
3. To close the panel, press the **Close** button in the upper right corner of the panel.

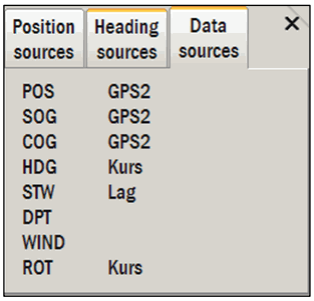


Figure 164 Position and Data sources panel, Data sources tab

7.4.3 Wind Sensor Data

If a wind sensor is connected to the system and registered in it, a **Wind** entry is displayed in the **Navigational** panel. In the entry data coming from the wind sensor are displayed. Wind direction can also be presented in a graphical form.

To view the graphical representation of the wind direction, do the following:

1. Press the **Disp.** button in the **Wind** entry of the **Navigational** panel. The **Anemometer** window will open. In the window you can see the true and relative wind direction display.
2. To switch to the true wind direction display, press the **True** button.

3. To switch to the **Relative** wind direction display, press the **Relative** button.

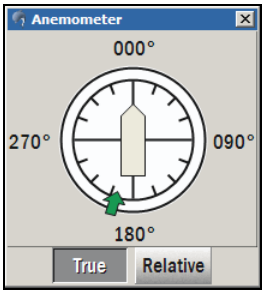


Figure 165 Anemometer, true wind

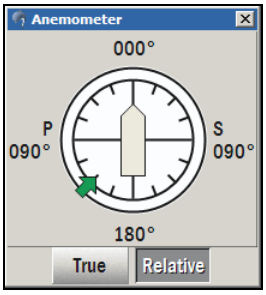


Figure 166 Anemometer, relative wind

(STW=10kn, HDG=0°, relative wind speed=5kn, relative wind direction=225°)

4. To drag the **Anemometer** window to a different position, move the pointer to the title bar, press the left mouse button and drag the window to a new position holding the button.
5. To close the window, press the **Close** button in the upper right corner of the window[58].

7.5 Navigational Chart Settings

7.5.1 Navigation Mode

When in the navigation mode, the ECDIS monitors the own ship position and moves the chart so that the own ship stayed in the chart view.

The navigation mode status is indicated with the **Navigation mode** indicator (*see chapter 2.3, Indicators Panel*): when the navigation mode is on, the indicator is green, when the navigation mode is off, the indicator is orange.

To turn the navigation mode on/off, do the following:

1. To turn the navigation mode on, left-click on the **Navigation mode** indicator. The indicator should become green 

. The chart view is scrolled so that to display the own ship symbol in the chart view.
2. To turn the navigation mode off, left-click on the **Navigation mode** indicator. The indicator should become orange 

. The navigation mode turns off if you left-click in the chart view while the navigation mode is on.

7.5.2 Best Scale Mode

When in the best scale mode, the ECDIS displays the chart with the largest scale existing for the given region. The best scale mode works only together with the navigation mode.

To turn the best scale mode on/off, do the following:

1. To turn the best scale mode on, left-click on the **Scale state** indicator (*see chapter 2.3, Indicators Panel*). The indicator should become green and the indicator label should change to the Best scale; in the chart view the chart with the best scale will be displayed.
2. You can also turn the best scale mode on by ticking the **Best Scale** checkbox on the **Chart Scale and Quick Access Buttons** panel.
3. To turn the best scale mode off, left-click on the **Scale state** indicator. The indicator should become orange.
4. You can also turn the best scale mode off by clearing the **Best Scale** checkbox on the **Chart Scale and Quick Access Buttons** panel.

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[58] The true wind is wind relative to a fixed point on the earth.

The relative or apparent wind is the speed and true direction from which the wind appears to blow with reference to a moving point.

7.5.3 Chart Display Palettes

The ECDIS implements three color palettes. The palettes are set to provide better conditions for viewing charts under various illumination conditions. The palettes are:

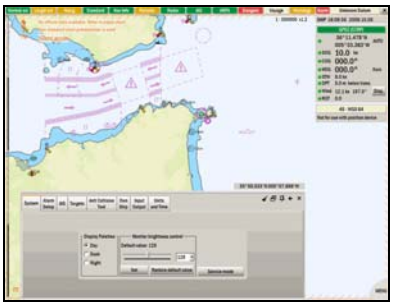

Figure 167 Day palette

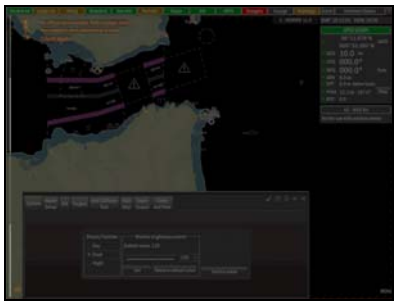

Figure 168 Dusk palette

Figure 169 Night palette

To set one of the palettes, do the following:

1. Open the **Config → System** tab.

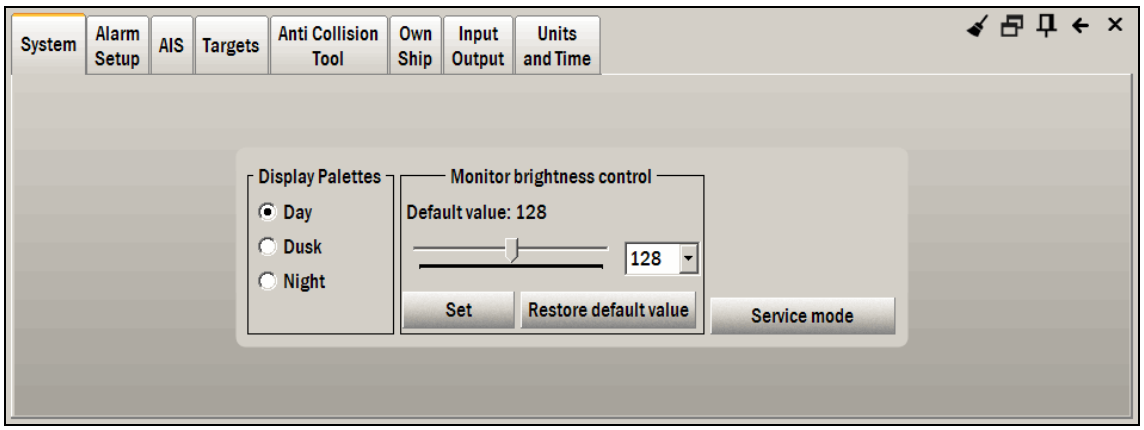

Figure 170 Config → System tab, Display palettes

2. In the **Display** palettes section, select one of the palettes. The selected palette will be applied to the chart view immediately[59].

7.5.4 Chart Orientation

The chart view can be oriented to the true North up, to the own ship course up, or to the route up.

To set the chart view orientation, do the following:

1. Open the **Navi → Navigation Data** tab.
2. In the **Chart Orientation** section select one of the four orientation options:
   a. To orient the chart to the North up, press the **North Up** button. The chart will be oriented to the North up. This option is available in all modes.
   b. To orient the chart to the own ship course up, press the **Course Up** button. The chart will be oriented to the own ship course up. This option is only available if the Navigation mode is on.
   c. To orient the chart to the own ship heading up, press the **Heading Up** button. The chart will be oriented to the own ship heading up. This option is only available if the Navigation mode is on.
   d. To orient the chart to the route up, press the **Route Up** button. The chart will be oriented to the route which is being monitored. This option is only available is the Route Monitoring mode is on.

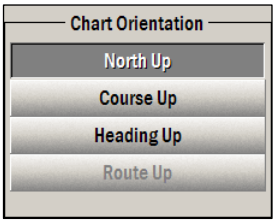

Figure 171 Navi → Navigation Data tab, Chart Orientation section

[59] To switch between the night and the day palettes, press the F12 key.

7.5.5 True and Relative Motion

There are two motion modes for the chart display: true motion mode and relative motion mode. In the true motion mode, the own ship symbol moves across the chart view and the chart stays in the same position. As soon as the own ship reaches a predefined distance from the chart view center, the chart is redrawn and the ship symbol is moved to the initial position in the chart view.

In the relative motion mode, the own ship symbol stays in the same position in the chart view, and the chart moves as the own ship position changes[60].

To turn on and setup the true motion mode, do the following:

1. In the **Navi → Navigation Data** tab, press the **True** button in the **Ship motion mode** section. In the true motion mode the chart is stationary and the own ship symbol is moving. When the ship reaches a pre-defined point inside the chart view, it "jumps" backwards and the chart is redrawn.

   The own ship redraw area in the **True motion** mode is defined automatically. However, you can set your own ship redraw area using the **Ship Redraw Area** function.

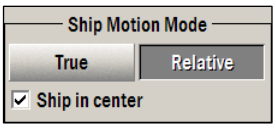

Figure 172 Navi → Navigation Data tab, Ship Motion Mode section

2. To set a new ship redraw area, press the **Set** button in the **Ship Redraw Area** section. An initial pre-defined redraw area will appear in the chart view. The area is indicated with a green internal and a red external boundary circles.
3. The red boundary is the boundary where the ship will appear each time the screen is redrawn. To configure the external red boundary, use the upper slider in the **Ship Redraw Area** section.
4. The green boundary is the internal limit of the ship redraw area. When the ship reaches the boundary, the screen is redrawn and the ship is brought back to the external boundary. To configure the internal green boundary, use the lower slider in the **Ship Redraw Area** section.
5. After the ship redraw area has been set, outpress the **Set** button, to exit the ship redraw area setup mode.

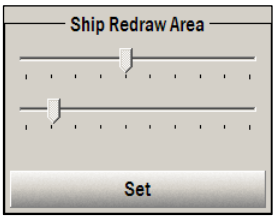

Figure 173 Navi → Navigation data tab, Ship Redraw Area section

To turn on and setup the relative motion mode, do the following:

1. In the **Navi → Navigation Data** tab, press the **Relative** button in the **Ship Motion Mode** section. In the relative motion mode, the own ship symbol is stationary and the chart is moving.
2. The own ship position can be set in the following ways:
   a. In the center – tick the **Ship in centre** checkbox and the ship will always be in the center of the screen.
   b. Manually – in the **Manual Center** panel check the **Enable** box to activate the manual selection of the fixed ship position. Then press the **Set** button and in the chart view select the fixed ship position by left-clicking in the selected position (the selection mode is indicated by a red frame around the chart view).
   c. Automatically – if the **Ship in center** or the **Enable** manual center checkboxes are clear, the own ship position in the chart view is set on the outer boundary of the own ship redraw area.

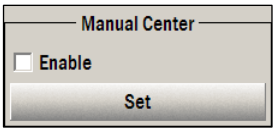

Figure 174 Navi → Navigation Data tab, Manual Center section

7.5.6 Light Sectors

The ECDIS allows displaying lights sectors and their visibility distances in the chart view.

To turn on and setup the lights sectors display, do the following:

[60] Both true motion and relative motion modes work only together with the navigation mode on.

1. Open the **Chart → Chart Presentation** tab and switch to the **Light sectors** tab.

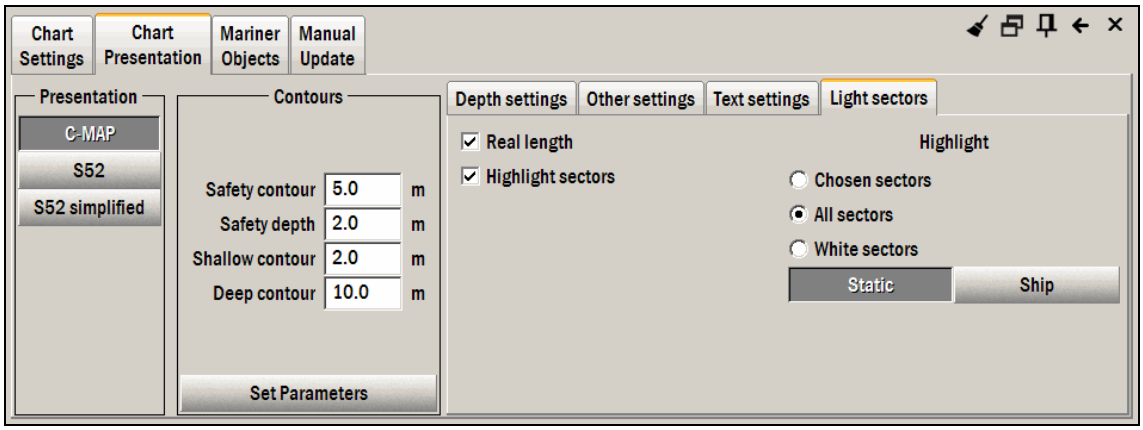

Figure 175 Chart → Chart Presentation tab, Light sectors tab

2. To turn on the display of the limits of light sectors with the length corresponding to the actual visibility distance of the lights, check the **Real length** checkbox. The visibility distance is not calculated; it is taken from the light attributes and corresponds to the bridge height of 5 meters.
3. To turn on the highlight of light sectors in the chart view, check the **Highlight sectors** checkbox. Sectors display is limited with the sectors visibility distance.
4. Select the sectors to be highlighted in the **Highlight** section.
   a. To highlight sectors of user-specified lights, select the **Chosen sectors** option. To specify a light in the chart view, move the mouse pointer to the light (the pointer will change to the 'target' ⊞ pointer with a tip Select light sectors) and right-click on it. The sectors of the light will be highlighted. To unselect the light, move the mouse pointer to the selected light (the pointer will change to the 'target' ⊞ pointer with a tip Unselect light sectors) and right-click on it. The highlight of the light will be cleared.
   b. To highlight sectors of all lights, select the **All sectors** option.
   c. To highlight only white sectors, select the **White sectors** option.
   d. To highlight all light sectors in the area, press the **Static** button.
   e. To highlight only sectors visible from the own ship, press the **Ship** button. Display of lights sectors covering the own ship position only works in the navigation mode. When the navigation mode is off, this function is automatically switched to the static mode.

7.6 Alarms

The ECDIS provides the system of alarms which announces by audible and visual means conditions requiring attention.

When an alarm is activated, it is displayed in the **Alarms** panel and the **Alarm** button starts flashing red Alarm.

IMPORTANT!

No use of the Silent Mode is allowed while the own ship is underway as it may affect safety of navigation.

The audible indication can be enabled or disabled only for all alarm conditions: there is a general alarm buzzer control in the **Config → Alarm Setup** tab. To allow using audible alarm indication for all alarm conditions, check the **Buzzer On/Off** checkbox. To switch to the Silent Mode, clear the checkbox and confirm the operation. The silent mode is indicated in the chart view: the *Silent mode* notice is displayed in the upper left corner of the chart view.

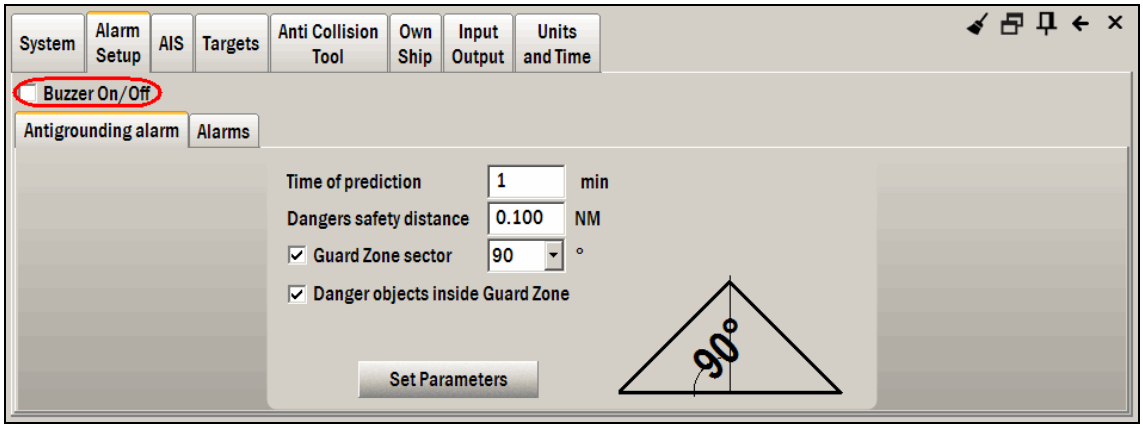

Figure 176 Config → Alarm Setup tab, Buzzer On/Off checkbox

7.6.1 Alarms and Warnings Panel

When an alarm is activated, a message describing the alarm is displayed in the **Alarm Conditions** indicator and the **Alarms** indicator starts flashing red to attract attention. If the message is not displayed completely because of the lack of space, move the mouse pointer over it to open a tool tip with the complete message text.

Figure 177 Alarms and Alarm Conditions indicators with the alarm message tooltip

The alarm is added to the alarms list. To open the alarms list and view all alarms activated at the moment, click on the **Alarm** indicator.

Figure 178 Alarms and Cautions panel, Alarms tab

Activated alarm triggers sound indication and **Alarms** indicator flashing. To stop the sound indication and indicator flashing, the alarm should be acknowledged. There are several ways to acknowledge an alarm.

To acknowledge an alarm, do the following:

1. Click on the alarm message in the **Alarms** panel.
2. Open the alarms list (click on the **Alarms** indicator) and left-click on the alarm entry. The loud-speaker symbol is removed and the entry is moved to the last position in the list; the next alarm entry is highlighted.
3. To acknowledge other alarms, use UP and DOWN arrow keys to select alarm entries and ENTER or SPACE keys to confirm the acknowledgement.

After it has been acknowledged, the alarm is deactivated and its entry is deleted from the alarms list if the alarm condition is not true anymore; otherwise the alarm is deactivated but its entry remains in the alarms list. In some cases alarms are deactivated automatically after the alarm condition disappeared.

Besides alarms, there is another category of situations demanding attention on the part of the user: warnings. Warnings are notices to the user which do not require acknowledgement and do not trigger the alarm buzzer.

In case there are active warnings, the **Warnings** indicator becomes yellow. Click on the indicator to open the **Alarms and Warnings** panel. In the **Warnings** tab there is a list of all currently active warnings. Warnings are removed from the list as soon as the warning condition is cleared.

In the **Alarms and Warnings** panel you can also acknowledge all AIS and ARPA targets. To acknowledge AIS targets, press the **Ack all AIS** button; to acknowledge all ARPA targets, press the **Ack all Targets** button.

7.6.2 Antigrounding Alarm

The ECDIS allows to set an anti-grounding guard zone ahead the own ship. All objects entering the guard zone and considered to be dangerous activate the alarm.

To turn on and setup the anti-grounding alarm, do the following:

1. Open the **Config → Alarm Setup** tab and switch to the **Antigrounding alarm** tab.

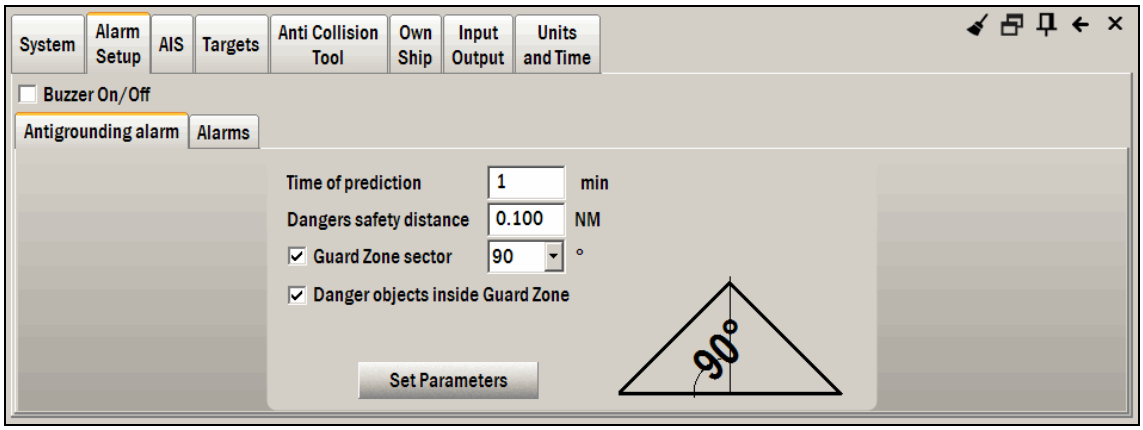

Figure 179 Config → Alarm Setup tab, Antigrounding alarm tab

2. Set the anti-grounding guard zone area: it can be defined either by the time of prediction value or by the dangers safety distance – the zone with the bigger area is considered as the anti-grounding guard zone.
   a. Time of prediction: enter a time value to the **Time of prediction field** (default time is 5 minutes). The time of prediction defines the length of the anti-grounding guard zone which is the distance the own ship will cover for the specified time proceeding with the current speed.
   b. Dangers safety distance: enter a distance value to the **Dangers safety distance** (measurement units are set in the **Config → Units and Time** tab). The guard-zone will be build using the set distance.
3. To turn the display of the guard zone in the chart view on, check the **Guard Zone Sector** checkbox. To turn the guard zone display off, clear the checkbox.
4. Select the guard zone angle in the drop-down list to the right from the **Guard Zone Sector** checkbox. The angle of the guard zone can be set between 5 and 90 degrees. By reducing the angle to 5 degrees, you will only have warnings of danger objects in front of the vessel.
5. To enable highlighting of danger objects located inside the guard zone, check the **Danger Objects Inside Guard Zone** checkbox.
6. After you have set the anti-grounding alarm parameters, press the Set Parameters button for the parameters to take effect.

When the anti-grounding alarm with the guard zone and highlighting of danger objects inside the zone are activated, all objects with depths less than the set safety contour value will be highlighted in red inside the guard zone. The danger objects are also added to the dangers and cautions lists. If a danger object is found in the guard zone, the **Dangers and Cautions** indicator becomes red and is called **Dangers**. If a caution object is found in the guard zone, the **Dangers and Cautions** indicator becomes orange and is called **Cautions**. To view the **Dangers and Cautions** lists, click on the **Dangers and Cautions** indicator: the **Dangers/Cautions** tab will open with the **Dangers** and **Cautions** tabs in it[61].

[61] In order to use the anti-grounding functionality efficiently, it is important to set the **Safety Contour** correctly in the chart presentation (see chapter 5.6.5, Depth Settings).

The anti-grounding function uses the safety contour value and the own ship draft to determine anti-grounding warnings.

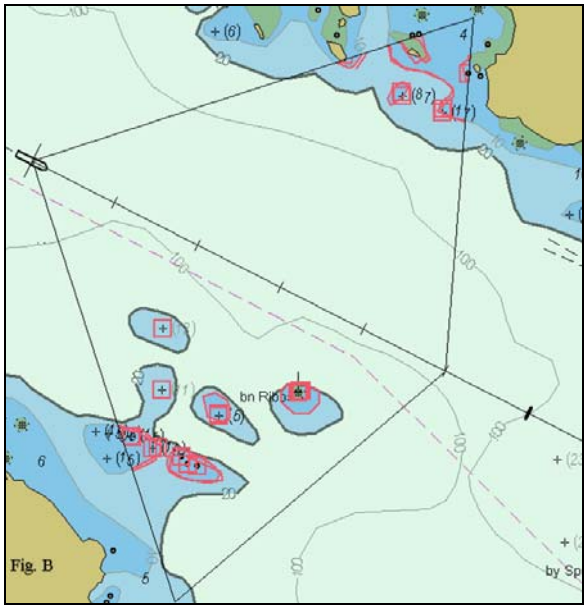

Figure 180 Display of the Guard Zone and danger objects inside the zone

7.6.3 Alarms

The ECDIS provides the possibility to set a depth alarm activated when the depth below keel is more or less of the set depth limit as well as alarms when a detected AIS or ARPA target is lost.

To set the depth alarm, do the following:

1. Open the **Config → Alarm Setup** tab and switch to the **Alarms** tab.

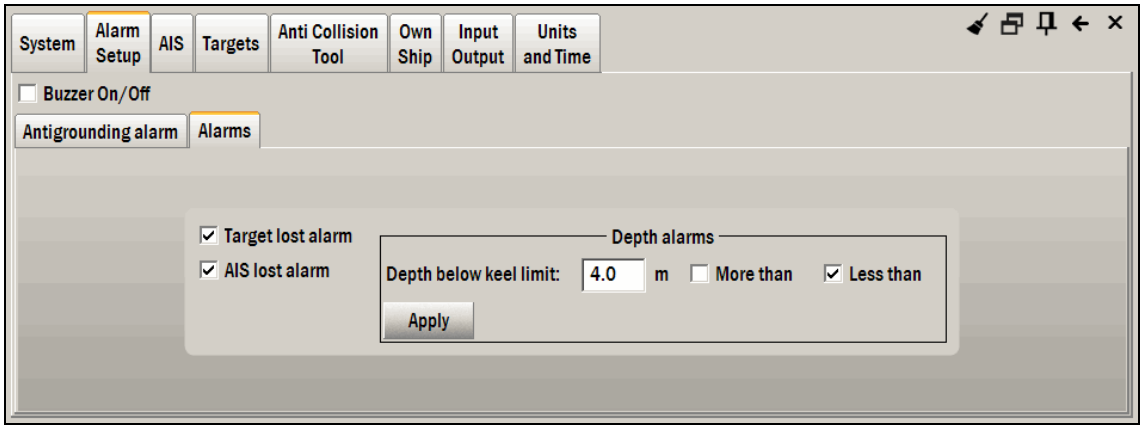

Figure 181 Config → Alarm Setup tab, Alarms tab

2. Enter the value of the depth below keel limit to the **Depth below keel limit** field. The measurement unit for the depth is set in the **Config → Units and Time** tab.
3. Check the **More than** or the **Less than** checkboxes (both options can be set at the same time):
   - **More than** – the alarm is activated if the depth below keel value received from an input device is more than the set depth limit;
   - **Less than** – the alarm is activated if the depth below keel value received from an input device is less than the set depth limit.
4. After the depth alarms parameters have been set, press the **Apply** button[62].

To set a target lost alarm, do the following:

[62] The depth value received from an input device is displayed in the navigational panel in the following format: 'DPT 30.0m', where "30m" is the depth from the transducer to the sea bottom.

Depth information is displayed in the graph in the **Info → Echo Sounder Diagram** tab.

1. Open the **Config → Alarm Setup** tab and switch to the **Alarms** tab.
2. Check the **Target lost alarm** checkbox to set an alarm for loss of ARPA targets and the **AIS lost alarm** checkbox for loss of AIS targets.
3. Settings are applied immediately/

7.6.4 Alarm Conditions List

➢ **The following alarm conditions are processed in ECDIS:**

- **Position device is lost** – The signal from the positioning device is not being received. To deactivate the alarm, click on the alarm message.
- **Ship is out of coverage** – The own ship is not in the chart view. The alarm is deactivated when the own ship is in the chart view again. To avoid the own ship out of the chart view, use the navigation mode (*see chapter 7.5.1, Navigation Mode*). In this mode, the ECDIS holds the own ship in the chart view automatically.
- **Chart level changing** – An alarm is activated when the chart under the own ship symbol or under the chart view center in case the own ship symbol is out of coverage is scaled to a chart with a different scale level. The alarm is given to notify you that the ECDIS is working with a more or a less detailed chart. To deactivate the alarm, click on the alarm message. The alarm is active for at least 30 seconds.
- **Dangerous AIS** – A dangerous AIS target is detected.
- **Alert messages** – An ALR (alert) message is received from an input device.
- **Input device is lost** – Signals from one of the external devices registered in the **Config → Input/Output** tab are lost. The name of the device is indicated in the alarm message. To deactivate the alarm, click on the alarm message.
- **Safety contour is not available** – The safety contour cannot be defined by the ECDIS in the current chart view. If the safety contour is not defined the ECDIS is not able to notify you about such dangerous situations as crossing the safety contour or danger of grounding. In this situation, you should pay special attention to the chart data and aids to navigation. The alarm is deactivated when the ECDIS defines the safety contour.
- **Not for use with Position device** – A small-scale chart is currently displayed in the chart view and it cannot be used for offshore navigation. To deactivate the alarm, click on the alarm message.
- **Destination approached** – The alarm notifies that a control point on the route is being approached (*see chapter 6.4.5, Adding Critical Points*). The alarm message will indicate the number and the name of the control point. To deactivate the alarm, click on the alarm message.
- **Man Over Board** – An alarm is activated when the **MOB** button is pressed. The alarm is deactivated after the click on the alarm message, but the message is displayed for 20 seconds in any case.
- **Exceed deviation** – The deviation of the own ship from the route exceeds the XTE (cross track error) set for the route in the route plan (*see chapter 6.4.4, Route Plan*). The alarm is deactivated when the own ship returns to the XTE limits.
- **Invalid sensor data** – Data coming from one of external sensors are invalid.
- **Non-WGS 84 Datums** – The chart currently displayed in the chart view has other than WGS-84 coordinates system. If the positioning device defines the own ship position in WGS-84 coordinates and the chart has a different coordinates system, the own ship position in the chart view may be wrong. If the alarm is activated, it is recommended to introduce a position correction in the **Config → Input/Output** tab (*see chapter 7.2.4, Position Correction*). The alarm is deactivated when a WGS-84 chart will be displayed in the chart view.
- **Target lost** – An ARPA target is lost. The alarm is generated if the target was lost while inside the set Lost Target Alarm Range. If the target was lost while outside the range, no alarm is generated.
- **AIS lost** – An AIS target is lost.
- **Dangerous target** – A dangerous ARPA target is detected.
- **Hardware errors** – A hardware error occurred.

7.7 Route Monitoring

7.7.1 Route Monitoring Mode

The route monitoring mode is switched on automatically when the voyage on a specified route is started. When in the route monitoring mode, the ECDIS monitors the proceeding of the own ship along the route and notifies you in case the own ship deviates from the route, approaches a waypoint or a control point, etc.

Before you can start a voyage along a route, the route should be created and edited using the route planning tools in the **Route → Route Finder** and **Route → Route Planning** tabs (*see chapter 6.4, Route Planning and Plotting*).

To switch on the route monitoring mode, do the following:

1. Open the **Route → Start Voyage** tab.

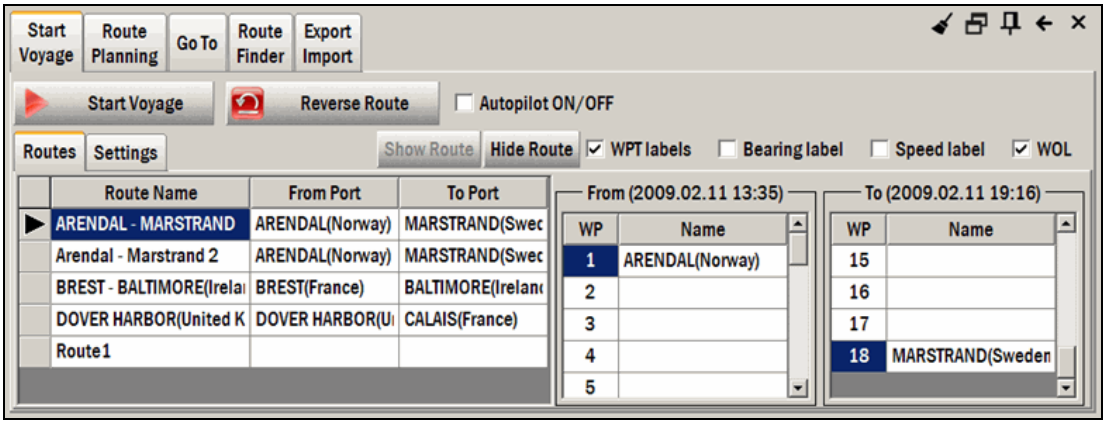

Figure 182 Route → Start Voyage tab

2. Select a route in the table of routes in the left-hand part of the tab. To show the route in the chart view, press the **Show Route** button. To hide the route, press the **Hide Route** button.
3. Indicate the waypoints of the route between which route will be monitored. In the **From** table select the start waypoint and in the **To** table select the end waypoint. Table headers will display the time of departure from the start waypoint and the time of arrival to the end waypoint (in the brackets).
4. If the system is connected to an autopilot, check the **Autopilot ON/OFF** checkbox, and the ECDIS will start sending NMEA sentences in the APB format (autopilot sentence "B") to your autopilot.
5. To switch to the route monitoring mode, press the **Start Voyage** button. The ECDIS will start monitoring the own ship on the route. In the route monitoring mode, the route is shown in red; the voyage information panel is displayed under the navigational panel and the **Voyage** indicator state changes according to the current voyage situation. Also when in the route monitoring mode, the 'Destination approached' and 'Exceed deviation' alarms can be activated if set in the **Config → Alarm Setup → Alarms** tab.
6. To quit the route monitoring mode, outpress the **Start Voyage** button and confirm the operation.

➢ **The following route monitoring options can be set in the Route → Start Voyage tab:**

- To set a pre-turn warning, switch to the **Settings** tab and enter time values to the **Pre-turn warning** field. Within the specified time from the course shift point, the **Voyage** indicator in the indicators panel (*see chapter 2.3, Indicators Panel*) will switch to the **WOP Warn** state (the indicator color will become orange).
- To set a pre-turn acknowledgement, switch to the **Settings** tab and enter time values to the **Pre-turn acknowledgement** field. Within the specified time from the wheel over position, the **Voyage** indicator in the indicators panel (*see chapter 2.3, Indicators Panel*) will switch to the **WOP Ack** state (the indicator color will become red).
- To be able to see tooltips when moving the mouse pointer over a waypoint in the chart view, switch to the **Settings** tab and check the **WPT tooltips** checkbox.
- To reverse the route so that the end point becomes the start point, press the **Reverse Route** button and confirm the operation. To restore the route initial direction, outpress the **Reverse route** button and confirm the operation.

- If the **WPT labels** checkbox is set, waypoint labels are displayed on the route in the route monitoring mode. If the checkbox is not set, the **Bearing label** and the **Speed label** options are not available.
- If the **Bearing label** checkbox is set the planned bearing to the next waypoint will be displayed on each leg of the route.
- If the **Speed label** checkbox is set the planned speed to the next waypoint will be displayed on each leg.
- If the **WOL** checkbox is set the wheel-over line is displayed at the next waypoint. The wheel-over line marks the position of the course change. The WOL line is only displayed in the next waypoint and is parallel to the next leg.

7.7.2 Route Monitoring Panel

After the voyage start the Route Monitoring panel opens. In the panel, information about the route is displayed.

➢ **The following route monitoring data are displayed in the Route Monitoring panel:**

- **Route name** –Name of the route that is being monitored;
- **WPT** – Number of the next waypoint and number of waypoints in the route;
- **Name** – Name of the next waypoint;
- **TTG** – Time to go from the current own ship position to the next waypoint:
  - If the indicator is green, the own ship proceeds in the direction of the next waypoint;
  - If the indicator is red, the own ship proceeds in the direction inverse to the direction of the next waypoint or does not move at all;
- **TTA** – Time to arrival from the current own ship position to the end waypoint;
- **ETA** – Estimated time and date of arrival to the end waypoint;
- **DTG** – Distance to go from the current waypoint to the end waypoint;
- **BTW** – Bearing to the next waypoint from the own ship (depends on the own ship current position);

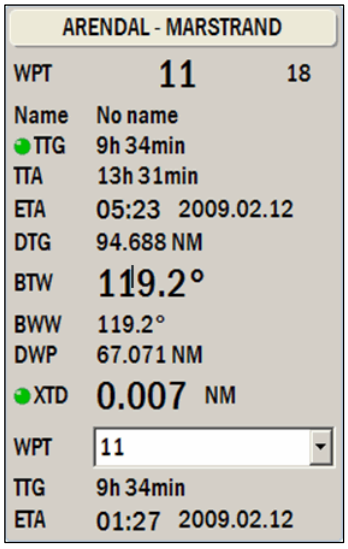

Figure 183 Route Monitoring panel

- **BWW** – Bearing from the current waypoint to the next waypoint;
- **DWP** – Distance from the current own ship position to the next waypoint;
- **XTD** – Cross track distance on the leg; the value is positive if the own ship is to the left from the route, and negative is the own ship is to the right from the route;
  - If the indicator is green, the actual XTD is less than the planned XTD on the leg;
  - If the indicator is red, the actual XTD exceeds the planned XTD on the leg;
- **WPT** – List of waypoints that are not passed yet; select a waypoint in the list and in the TTG and ETA lines below the time to go to and the estimated time of arrival to the selected waypoint are displayed respectively;
- **TTG** – Time to go from the current own ship position to the waypoint selected in the waypoints list;
- **ETA** – Estimated time and date of arrival to the waypoint selected in the waypoints list.

7.7.3 Go to Waypoint Function

The **Go to Waypoint** function allows you to plot one waypoint that will be your destination. For example if you are approaching a pilot station and port control suggests you drop anchor at some position and wait for the pilot there, you may use the **Go to waypoint** function to set the required point and proceed there without the full route planning procedure.

To use the Go to Waypoint function, do the following:

1. Stop the voyage if you are in the route monitoring mode.
2. Open the **Route → Go To** tab.

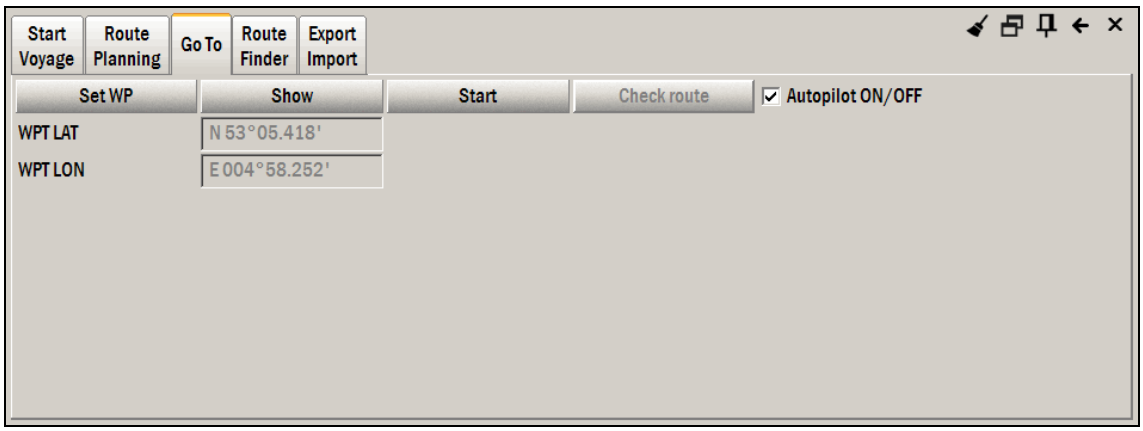

Figure 184 Route → Go To tab

3. Press the **Set WP** button to switch to the waypoint plotting mode. Plot the waypoint in the chart window or enter the waypoint coordinates in the **WPT LAT** and **WPT LON** fields.
4. Release the **Set WP** button (when pressed, its name changes to **Save**) to quit the waypoint plotting mode.
5. If the system is connected to an autopilot, check the **Autopilot ON/OFF** checkbox, and the ECDIS will start sending sentences in the APB format (autopilot sentence "B") to your autopilot.
6. To switch to the route monitoring mode (monitoring of the route to the waypoint), press the **Start** button. To quit the route monitoring mode, outpress the **Start** button (when pressed, its name changes to **Stop**).
7. To check the route from the own ship to the waypoint, press the Check route button. The route from your vessel to the waypoint will be checked in the same way as in the **Route Planning** tool (two additional panels will appear: the **Dangers** and the **Cautions** panels). The check route function only works in the route monitoring mode.

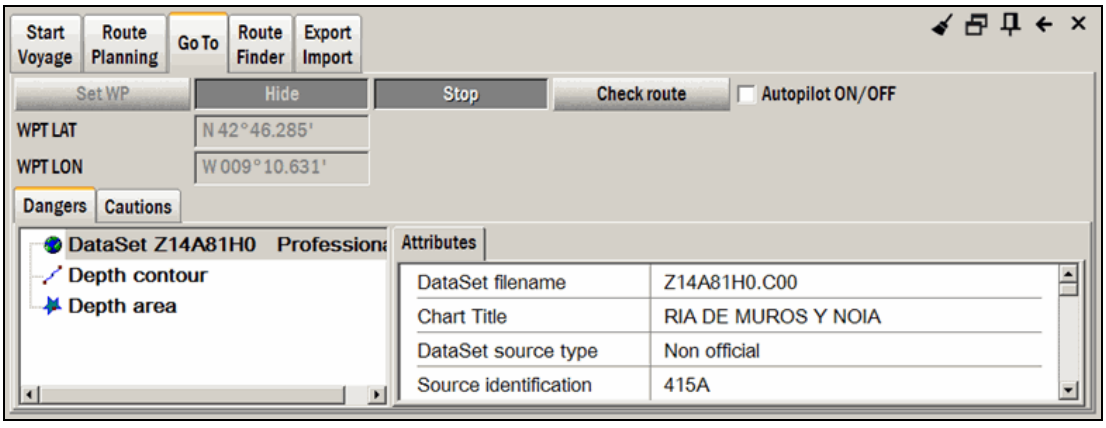

Figure 185 Route → Go to Waypoint tab, Dangers and Cautions tabs

8. To view the waypoint in the chart view, press the **Show** button; to hide the waypoint, outpress the **Show** button (when pressed, its name changes to **Hide**).

8. NAVIGATIONAL INFORMATION TOOLS

8.1 Echo Sounder

If an echo sounder is registered in the ECDIS in the **Config → Input/Output** tab, the own ship depth data are coming to the system. The depth data are displayed in the navigational panel in the **DPT** line as well as in the **Info → Echo Sounder Diagram** tab.

The **DPT** line in the navigational panel contains two values separated by a slash: the first value is the depth from the water line to the transducer and the second value is the depth from the transducer to the sea bottom.

➢ **The echo sounder diagram is made up of the following elements:**

1. Time and depth axes: the time axis is the horizontal axis, and the depth axis is the vertical axis. The time is measured in minutes, the depth measurement units are set in the **Config → Units and Time** tab, in the **Depth/Elevation/Size units** section.

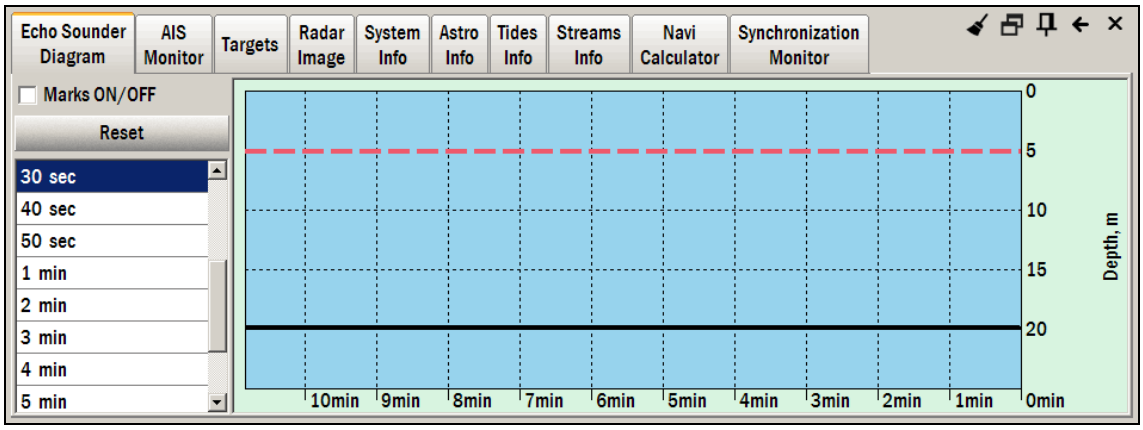

Figure 186 Info → Echo Sounder Diagram tab

2. The diagram field: double-click in any position in the diagram field and the own ship position corresponding to the time and depth values in the identified diagram position will be marked in the chart view with an arrow mark (to clear the highlight, press the **Clear highlight** button). Using this option, you can mark such things as special places or fish echoes.
3. The current draft graph: the red dashed graph represents the current draft of the own ship. The data for building the graph come from the **Config → Own ship** tab.
4. The depth below keel graph: the black solid graph represents the depth from the transducer to the sea bottom. The data for building the graph come from the external echo sounder.

To display sounding marks in the chart view, do the following:

1. Open the **Info → Echo Sounder Diagram** tab.
2. Check the **Marks ON/OFF** checkbox. The sounding marks will be plotted in the chart view as the own ship proceeds.
3. Select the interval of the marks plotting in the intervals list.
4. To delete all previously plotted sounding marks from the chart view, press the **Reset** button.

For the depth to be more precise, set the echo sounder sensor offset from the own ship keel. To do so:

1. Open the **Config** panel and go to the **Own Ship** tab and then to the **Position of Instruments** tab.
2. Select the **Echosounder** in the instruments list.

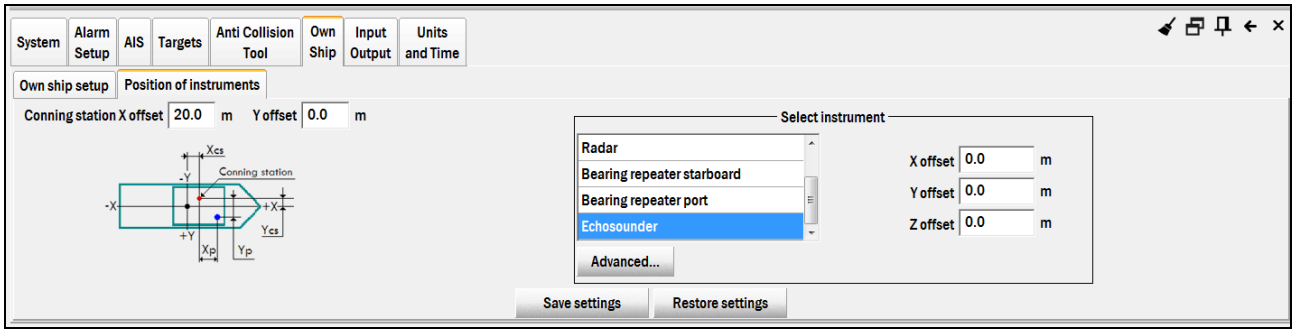

Figure 187 Config → Own Ship → Position of Instruments tab

3. Set the offset of the instrument along the X, Y and Z axis in the **… offset** fields. NOTE that the password is required to save the settings.
4. Save the settings by pressing the **Save settings** button.

8.2 AIS

The ECDIS implements the full support for the Automatic Identification System. Using the AIS functionality, you can receive and view AIS data of the AIS targets located at a specified distance from the own ship and display the data in the chart view. You can also receive messages from the AIS targets and send the own ship AIS data and other messages to other vessels.

IMPORTANT!

*For the ECDIS to be able to receive AIS data, the AIS receiver should be registered in the ECDIS. The registration is carried out in the **Config → Input/Output** tab. This can only be done by the installer.*

8.2.1 AIS Targets Data

Information of all AIS targets with which the contact has been established is displayed in the **Info → AIS Monitor** tab. The tab is made up of two panes: one of the panes contains the list of all AIS targets, and the other displays detailed information about a specified target.

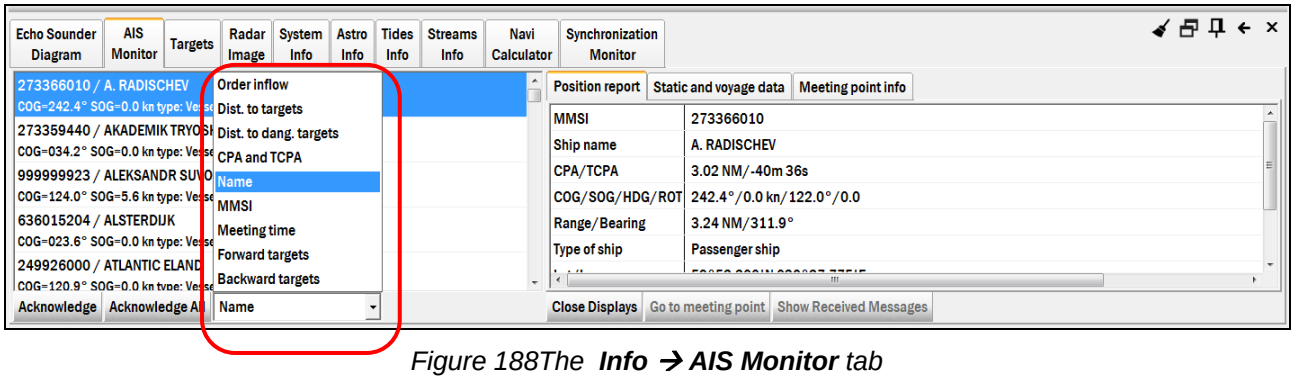

*Figure 188The **Info → AIS Monitor** tab*

To view a target's information, select the target in the targets list. The information is displayed in two tabs: the **Position Report** tab and the **Static and Voyage Related Data** tab.

On the **Position Report** tab, the following target information is displayed:

- **MMSI** – A unique 9-digit number that is assigned to a DSC radio station;
- **Ship Name** – Name of the AIS target (in case the target has any name);
- **CPA** – Closest point of approach to the own ship;
- **TCPA** – Time to the closest point of approach;
- **Type of ship** – Type of the AIS target;
- **Lat/Lon** – Latitude and longitude of the AIS target;
- **Position accuracy** – accuracy of the AIS target positioning;
- **COG** – Course over ground;

- **SOG** – Speed over ground;
- **HDG** – Heading of the AIS target;
- **ROT** – Rate of turn;
- **Nav Status** – Navigation status of the target e.g. *Under way using engine*;
- **Range/Bearing** – distance and bearing from the own ship to the target.

In the **Static and Voyage Related Data** tab, the following target information is displayed:

- **IMO Number** – the IMO assigned target number;
- **Call Sign** – a unique designation for the transmitting station;
- **Ship dimensions** – length and width of the target;
- **Position ref. point**– defines the precise location of the positioning device on the target; four parameters are used: A, B, C, and D (Figure 189);
- **Type of pos. device** – the type of the device defining the target position;
- **ETA** – estimated time of arrival of the target to its destination;
- **Draught** – draught of the target;
- **Destination** – destination of the target;
- **Messages** – the last received message (if no messages were received, the field is not displayed).

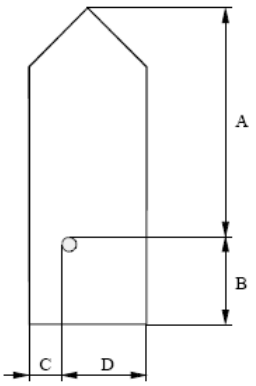

Figure 189 Parameters defining the location of the positioning device

➢ Meeting point information and display

On the **Meeting point info** tab, Figure 190, coordinates of the meeting point, time to go to the meeting point, etc. (calculated under the assumption that own ship will keep on going along the route) are shown for targets within the pre-defined corridor around the route, see step 12 in "AIS Targets Display Settings" on page 142[63].

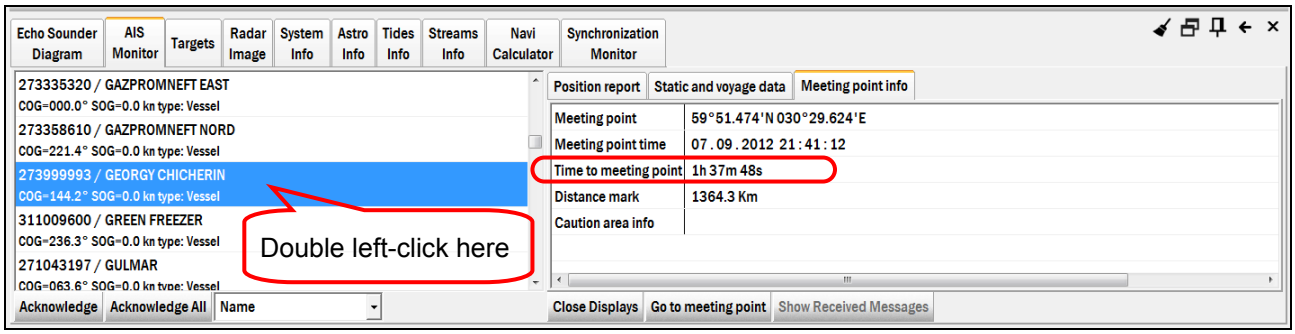

*Figure 190 The **Meeting point info** tab*

The meeting pont is in blue on the chart, *Figure 191*.

The program might not be able to calculate parameters of the meeting point. Then the explanation will be shown on the Meeting point info tab saying one of these:

- "Calculation failed"

  Might be because there is no current route at the moment.
- "Own ship far away from route"
- "AIS far away from route"

[63] *New feature in 5.0.84 program version*

Own ship/ target is outside the pre-defined corridor around the route.

- "Meeting point far away from route"

  The meeting point exists but lies outside the pre-defined corridor around the route.

- "Meeting point does not exist".

  Own ship has already met the target or cannot catch it up.

- Meeting point calculations might be impossible due to own ship motion "backwards", invalid AIS data, etc.

The same information about the meeting point with an AIS target can be shown in an independent window. To do so, double left-click as shown in *Figure 190* or right-click the symbol of a target in the chart view, *Figure 191*.

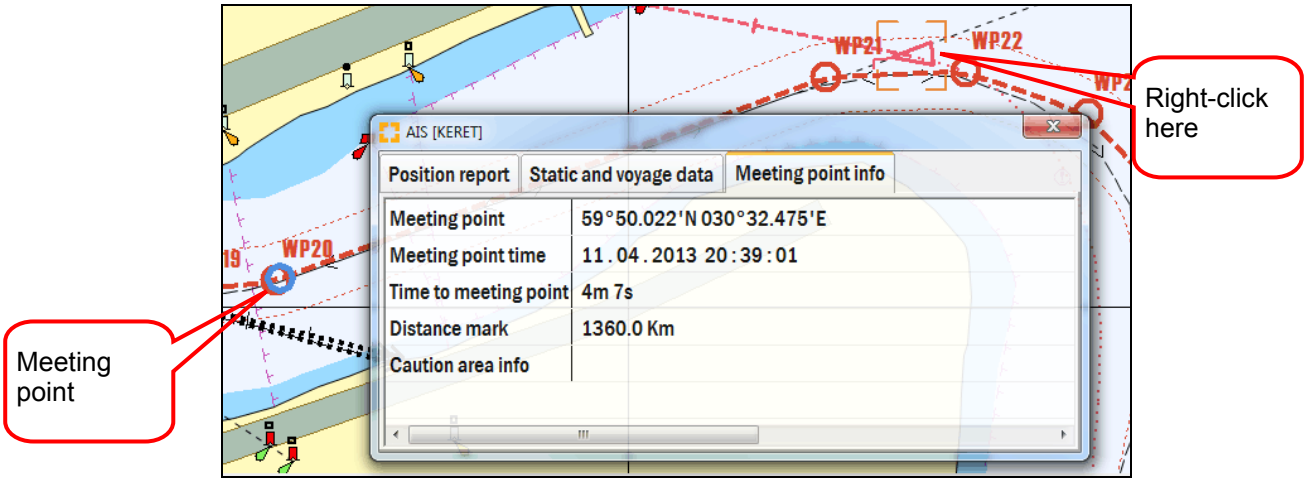

Figure 191 Meeting point information window and point indicator on the chart

An arbitrary number of windows can be opened in this way[64], The last of them stays marked with orange frame on the title bar and on the chart.

To close all open windows at a time, press the **Close displays**, Figure 190.

➢ Dangerous target indication

When the distance between an AIS target and the own ship becomes less than the distance to dangerous approach set in the **Config → AIS** tab, the target is assigned the dangerous target status and changes its style: it becomes red and starts flashing. To stop the target flashing, select it in the targets table in the **Info → AIS Monitor** tab and press the **Acknowledge** button. The target still has the dangerous target style, but stops flashing. To acknowledge all dangerous targets, press the **Acknowledge all** button.

➢ Sorting AIS targets on the target list

The function has been implemented to sort AIS targets on the list on the **Info-AIS monitor** tab according to a user-defined criterion[65].

To do so, select a criterion on the list as shown in Figure 188:

- Order inflow

Targets are sorted by the first incoming message time.

- Dist to target/
- Dist to dangerous target

Dangerous targets stand higher on the list than safe ones.

- CPA/ TCPA

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[64] *New feature in 5.0.84 program version*

[65] *New feature in 5.0.84 program version*

Targets are sorted by the value of:

$$CPA_{current}/CPA_{min} + TCPA_{current}/TCPA_{min}$$

Attention!

Use of this criterion is a mere recommendation. Consider whether or not it is really applicable to evaluation of navigation safety under the current conditions, since there is no guarantee that really dangerous targets will stand higher on the list.

- Name
- MMSI
- Meeting time

  Targets are sorted in an increasing **Meeting time** order.
- Forward/ Backward targets

Targets ahead/ back on the route stand higher on the list.

Attention!

Targets to which the selected criterion does not apply are typed in grey on the list.

➢ **Viewing messages from a target**

To view messages received from an AIS target, do the following:

1. Select an AIS target in the targets list. If there were any messages from the target, the **Show Received Messages** button becomes active (otherwise it's grayed).
2. To view messages, press the **Show Received Messages** button. The **Received Messages** window will open where all messages from the AIS target are displayed.

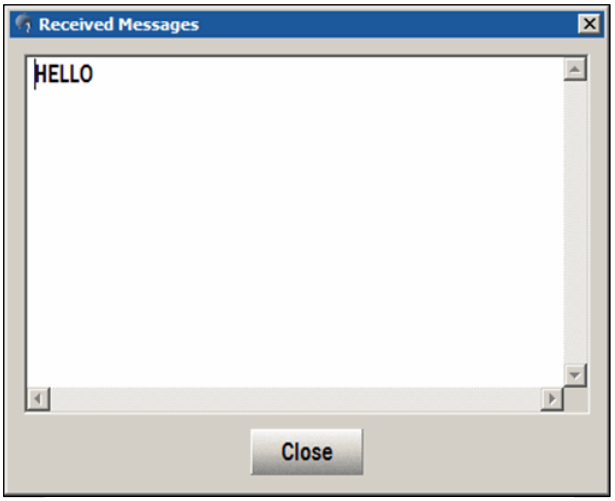


Figure 192 AIS messages, Received Messages window

8.2.2 AIS Targets Display Settings

AIS targets can be displayed in the chart view. Using the AIS targets display functionality, you can evaluate the current situation at one glance.

To turn the display of AIS targets on or off, left-click on the AIS indicator. If the display of AIS targets is off, the AIS indicator is orange AIS; if the display of AIS targets is on, the AIS indicator is green AIS.

The activation of the AIS targets display depends on the targets distance and time from the own ship. The activation distances and time are configured in the **Config → AIS** tab.

To configure the activation distances and time for AIS targets, do the following:

1. Open the **Config → AIS** tab, Figure 193.

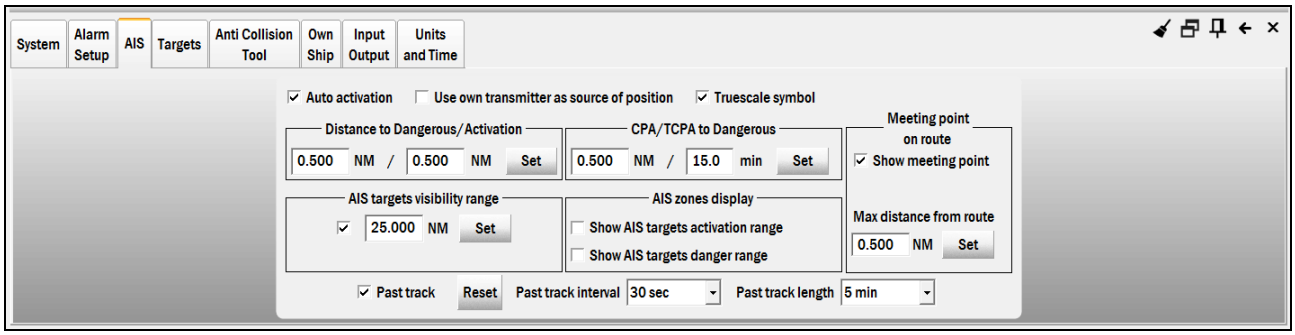


Figure 193 Config → AIS tab, activation distances and time settings

2. Check or uncheck the **Auto activation** checkbox: if the checkbox is checked, the **Distance to Activation** field becomes editable and you can set the value of the distance to activation different from the distance to dangerous approach value; if the checkbox is unchecked, the value of the distance to activation is set the same as the value of the distance to dangerous approach.
3. To be able to use the own ship AIS transmitter as a positioning device, check the **Use own transmitter as source of position** checkbox. The transmitter will be added to the position sources list in the **Position Source** section of the **Navi → Navigation Data** tab (*see chapter 7.2.1, Primary and Secondary Position Sources*).
4. To view AIS symbols in true scale, set the **True scale symbol** checkbox. AIS targets are displayed in true scale if the following conditions are met:
   a. width of the own ship true scale symbol is more than 7.5mm;
   b. the AIS target is within the activation distance;
   c. the AIS target heading (HDG) and position reference point data are available.
5. Set the **Distance to Dangerous**: the distance from the own ship at which all AIS targets are displayed as dangerous. Press the **Set** button for the changes to take effect.
6. Set the **Distance to Activation**: the distance from the own ship at which all AIS targets are displayed as active. This value should be more than the distance to dangerous approach. If the **Distance to Activation** field is inactive, and you want to change the value, check the **Automatic Activation** checkbox. Press the **Set** button for the changes to take effect.
7. Set the CPA and TCPA limits in the **CPA/TCPA to Dangerous** section: if the actual CPA or TCPA of the own ship and an AIS target are less than the set values, the target is displayed as dangerous. Press the **Set** button for the changes to take effect.
8. Set the **AIS targets visibility range**: the distance from the own ship at which AIS targets become visible. When targets cross the distance limit they are displayed on the chart. Turn the function on (check the checkbox), enter the value to the edit field, and press the **Set** button. When the checkbox is checked, the visibility range is displayed in the chart view as a circle with a blue dashed boundary (*see **Error! Reference source not found.***).

   If you want all AIS targets to be displayed irrespective of their distance from the own ship, turn the AIS targets visibility range function off altogether (clear the checkbox); the **AIS targets visibility range** section will become grayed and all AIS targets in contact with the own ship will become visible.

9. Turn the display of AIS zones on or off: check or clear options in the **AIS zones display** section. AIS zones are displayed as circles with the center in the own ship position and with radiuses corresponding to AIS targets activation distances. The AIS targets activation range is displayed as a blue circle and the AIS targets danger range is displayed as a red circle. If the display of AIS targets is off, the AIS zones are not displayed either.
10. To turn on the display of AIS targets past track, check the **Past track** checkbox. The past track is updated with the interval set in **the Past track interval** drop-down list.

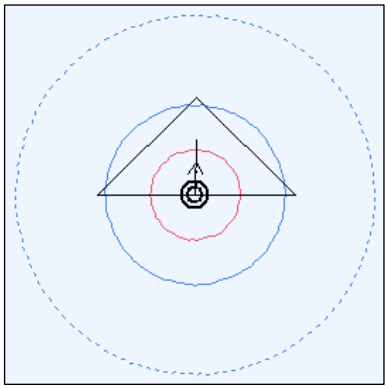
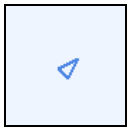
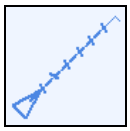
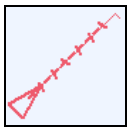
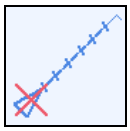
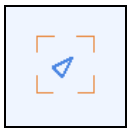


Figure 194 AIS zones display

11. Switch on the **Show meeting point** option to activate the target motion prediction function and indication of the meeting point on the chart, see “AIS Targets Data” on page 139.
12. Enter the corridor width value into the **Min distance from route** filed within which the prediction function will be effective.

Depending on the presence of the AIS target signal and the distance between the target and the own ship, there are the following types of AIS targets:

Table 3 AIS target types

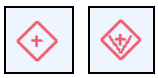
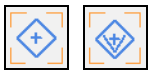
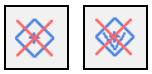
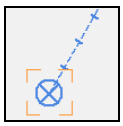
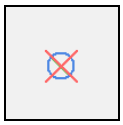
Symbol name and description	Signal	Distance to the Own Ship	Display
AIS Targets			
Sleeping target A target symbol indicating the presence and orientation of an object equipped with an AIS in a certain location.	Yes	AIS targets visibility range	
Active target A symbol representing the automatic or manual activation of a sleeping target for the display of additional graphically presented information including a vector (speed and course over ground), the heading, and ROT or direction of turn indicator (if available) to display actual initiated course changes.	Yes	distance to activation	
Dangerous target A symbol representing an AIS target (activated or not) which has approached the own ship closer than the specified distance to the dangerous approach.	Yes	distance to dangerous approach; CPA < CPA to Dangerous; TCPA < TCPA to Dangerous	
Lost target A symbol representing the last valid position of an AIS target before reception of data was interrupted.	No	AIS targets visibility range	
Selected target A symbol representing the manual selection of any AIS target for the display of detailed information in a separate data panel.	Yes	AIS targets visibility range	

Symbol name and description	Signal	Distance to the Own Ship	Display

NOTE:

All AIS target symbols are oriented to the targets course. Active and dangerous target symbols have additional features: heading lines and velocity vectors. Heading line is a solid line with the turn indicator at the tip; it only shows the targets heading and does not give any information on the targets speed. Velocity vector is a dashed line with minute marks on it; it is extending in the direction of the target course for a length representing the distance the target will travel in the time interval used for own ship's velocity vector.

Symbols of AIS targets with available CPA are drawn with solid lines  *, if CPA is not available symbols are drawn with dotted lines*  .

AIS Aids to Navigation (ATON)			
Active ATON (real/virtual) on position A symbol representing an active ATON on position.	Yes	AIS targets visibility range	
Active ATON (real/virtual) off position A symbol representing an active ATON off position.	Yes	AIS targets visibility range	
Selected ATON (real/virtual) A symbol representing manual selection of any AIS target for the display of detailed information in a separate data panel.	Yes	AIS targets visibility range	
Lost ATON (real/virtual) A symbol representing the last valid position of an ATON before reception of data was interrupted.	No	AIS targets visibility range	
AIS Search and Rescue Transmitters (AIS SART)			
Active AIS SART A symbol representing an active AIS SART, length of the velocity vector shows the distance the target will travel in the time interval used for own ship's velocity vector.	Yes	distance to activation	
Selected AIS SART A symbol representing manual selection of any AIS target for the display of detailed information in a separate data panel.	Yes	AIS targets visibility range	
Lost AIS SART A symbol representing the last valid position of an AIS SART before reception of data was interrupted.	No	AIS targets visibility range	
All AIS Targets			
The target is not displayed Targets are displayed only if they approach to the own ship closer than the AIS targets visibility range to avoid cluttering.	Yes	out of the AIS targets visibility range	no display
The target is not displayed no comments	No	any distance	no display

The program can recognize AIS targets of the «S&R aircraft» type. Targets like these are indicated on the chart as  [66].

8.3 ARPA

The ECDIS implements the full support for the ARPA data. Using the ARPA functionality, you can receive and view data of targets located by ARPA and display the data in the chart view.

IMPORTANT!

*For the ECDIS to be able to receive ARPA data, ARPA should be registered in the ECDIS. The registration is carried out in the **Config → Input/Output** tab.*

8.3.1 ARPA Targets Data

When ARPA equipment is connected and configured in the **Config → Input/Output** tab, ARPA targets can be monitored in the ECDIS. Target information can be viewed in the **Info → Targets** tab. The **ARPA Targets** tab displays information about targets located and monitored with ARPA.

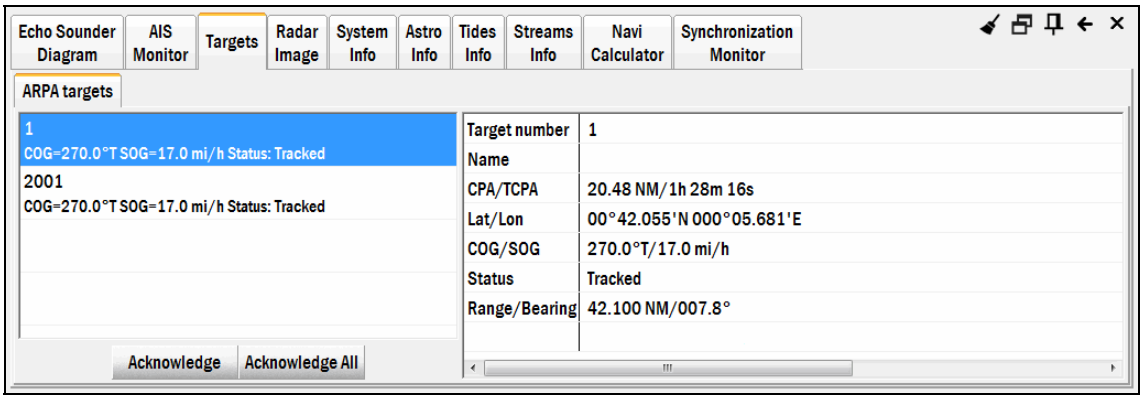


Figure 195 Info → Targets tab, ARPA Targets tab

To view a target information, select the target in the targets list.

➢ **In the ARPA Targets tab, the following target information is displayed:**

- **Target number** – Target number
- **Name** – Target name
- **CPA** – Closest point of approach
- **TCPA** – Time to closest point of approach
- **Lat/Lon** – The latitude and longitude of the target
- **COG** – Course over ground
- **SOG** – Speed over ground
- **Status** – Status of the target (lost, tracking etc.)
- **Range** – Distance from the own ship to the target
- **Bearing** – Bearing to the target from own ship
- **True/Relative** – Indicates if the target heading vector is true or relative. If the vector is measured in relation to the North direction, it is true; and if it is measured in relation to the own ship course, it is relative.

[66] *New feature in 5.0.84 program version*

To scroll the chart view so that to display a target in the chart view center, double-click on a target entry.

When the distance between an ARPA target and the own ship becomes less than the distance to dangerous approach set in the **Config → Targets** tab, the target is assigned the dangerous target status and changes its style: it becomes red and starts flashing. To stop the target flashing, select it in the targets table in the **Info → Targets** tab and press the **Acknowledge** button. The target will still have the dangerous target style, but will cease flashing. To acknowledge all dangerous targets, press the **Acknowledge all** button.

8.3.2 ARPA Targets Display

To turn the display of ARPA targets on or off, left-click on the ARPA indicator. If the display of ARPA targets is off, the ARPA indicator is orange 

; if the display of ARPA targets is on, the ARPA indicator is green 

.

To configure the display of ARPA targets and tracks, do the following:

1. Open the **Config → Targets** tab. The display of ARPA targets is configured in the **ARPA** sub-tab.

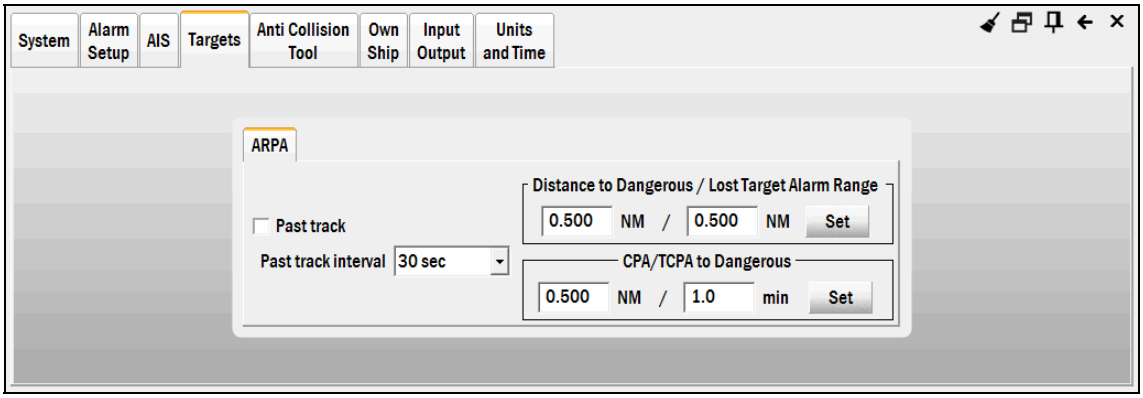
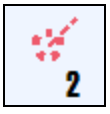


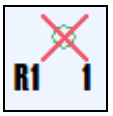
Figure 196 Config → Targets tab, ARPA sub-tab

2. To turn on the display of the track passed by targets, check the **Past track** checkbox. Select the interval of the track update in the **Past track interval** drop-down list (the interval value ranges from 1 second to 30 minutes).
3. Set the distance to dangerous approach in the **Distance to Dangerous** field: enter a value in nautical miles to the field and press the **Set** button for the setting to take effect. When a target approaches the own ship to the distance closer than the distance to dangerous, the target symbol changes to the dangerous target symbol and starts flashing.

   For the symbol to cease flashing, acknowledge the target. To acknowledge a target, open the **Info → Targets** tab, **ARPA** sub-tab, select the target in the targets table and press the **Acknowledge** button; to acknowledge all targets, press the **Acknowledge all** button. The target symbol will stop flashing.
4. Set the lost target alarm range: enter a value in nautical miles to the **Lost Target Alarm Range** and press the **Set** button for the setting to take effect. If a target was lost while inside the set range, a **Target Lost** alarm is generated; if outside the set range, no alarm is generated.
5. Set the CPA and TCPA limits in the **CPA/TCPA to Dangerous** section and press the **Set** button for the changes to take effect. If the actual CPA or TCPA of the own ship and a target are less than the set values, the target is displayed as dangerous.

Depending on the presence of signal from targets and the distance between the targets and the own ship, there are the following types of ARPA targets:

Symbol name and description	Signal	Distance	ARPA targets display
Target in acquisition state The target detected in an acquisition area is displayed as a flashing dashed red circle. It flashes until it is acknowledged in the **Info → Targets** tab. If the target is dangerous its color stays red; if it is not dangerous its color changes to green.	Yes	any distance	

Symbol name and description	Signal	Distance	ARPA targets display
Tracked target	Yes	any distance	
Dangerous target If a target approaches the own ship to the distance closer than the distance to dangerous approach set in the **Config → Targets** tab, it is designated the dangerous status and the target symbol becomes red and starts flashing. The target flashes until it is acknowledged. Once acknowledged, targets remain red until not dangerous anymore.	Yes	distance to dangerous approach; or CPA < CPA to Dangerous; or TCPA < TCPA to dangerous	
Selected target Target selected in the chart view is automatically selected in the targets table in the **Info → Targets** tab.	Yes	any distance	
Lost target A symbol representing the last valid position of a target before reception of data was interrupted.	No	any distance	
Reference target Tracked radar targets designated as reference targets are labeled with the letter "R".	Yes	any distance	
no display	No	any distance	no display

All target symbols are oriented to the targets course. The target symbols have speed vectors extended in the direction of the targets course for a length representing the distance the target will travel in the time interval used for own ship's prediction vector  (COG = 90°, SOG = 10kn, prediction time interval = 3min).

8.4 Radar Image Overlay

The ECDIS provides the possibility to display data received from radar in the chart view as a radar image overlaying the chart.

To turn the display of the radar image on or off, left-click on the Radar indicator. If the display of the radar image is off, the Radar indicator is orange  ; if the display of the radar image is on, the Radar indicator is green  .

To configure the display of the radar image, do the following:

1. Open the **Info →Radar Image** tab. If no radar board is connected to the ECDIS, all controls of the **Radar Image** tab are inactive.

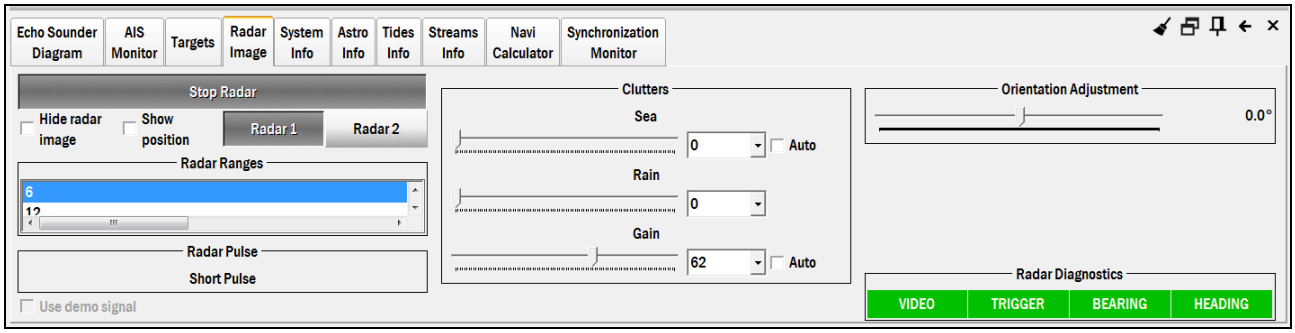


Figure 197 Info → Radar Image tab

The option has been implemented to select an image from one of the two radars registered with the system[67].

2. To select a radar, click the **Radar 1**/ **Radar 2** button.
3. To start reading radar signal, press the **Start Radar** button; when pressed the name is **Stop Radar**.
4. To turn the display of the radar image on or off, use the **Hide radar image** checkbox (it works in the same way as the Radar indicator described above). To hide the radar image, check the checkbox; to display the radar image, clear the checkbox.
5. To turn on the display of a special symbol indicating the position of the radar on board the own ship, check the **Show position** checkbox. The radar position is set in the **Config → Own Ship → Radar** tab.
6. Set a radar range: select a value in the **Radar Ranges** list.
7. In the informational **Radar Pulse** section, the radar pulse duration is displayed.
8. To set values of different clutters to optimize the radar picture, use options from the **Clutters** section: the **Sea**, the **Rain**, and the **Gain** clutters. When setting values to clutters you can either use sliders or select a value from drop-down lists. For **Sea** and **Gain** clutters there is a possibility to set them to auto configuring; to do so check the **Auto** checkboxes.
9. To adjust the radar image orientation, use the **Orientation Adjustment** scale.
10. In case there are failures in transmission of one of radar pulses (video, synchro, bearing or heading), indicator of this pulse in the **Radar Diagnostics** section is colored red. If there are no failures, indicators are green.

To use the radar image overlay functionality the ECDIS has to be connected to a PCI radar processor board.

8.5 Anti-collision Display

IMPORTANT!

Official anti-collision tools that must be used for decision making are type approved Radar/ARPA, or ATA, or EPA. This anti-collision tool may only be used as a supplementary tool.

IMPORTANT!

The Anti-collision display module requires individual licensing.

The anti-collision display functionality is implemented to make it easier for you to evaluate the danger of collision of the own ship with other vessels located with external input devices. The functionality is also meant to help you to calculate and carry out maneuvers for passing the vessels at safe distances.

The anti-collision display functionality has two functions:

[67] *New feature in 5.0.84 program version*

- To indicate that the own ship has approached another vessel to the user-specified distance and time (*see chapter 8.5.4, Indication of Approach of Targets to Specified Time and Distance Limits*);
- To indicate the possibility of collision (*see chapter 8.5.5, Indication of Collision Risk*).

8.5.1 Theoretical Principles of the Anti-collision Display

Consider a collision scenario between own ship and an external target. The vessels' encounter geometry is plotted in Figure 198. The OOW can easily verify that the vessels have a potential point of collision (PPC) from visual observation (i.e. aspect angle to target is unchanged) or from radar observation (i.e. relative motion of target echo towards the centre of own ship).

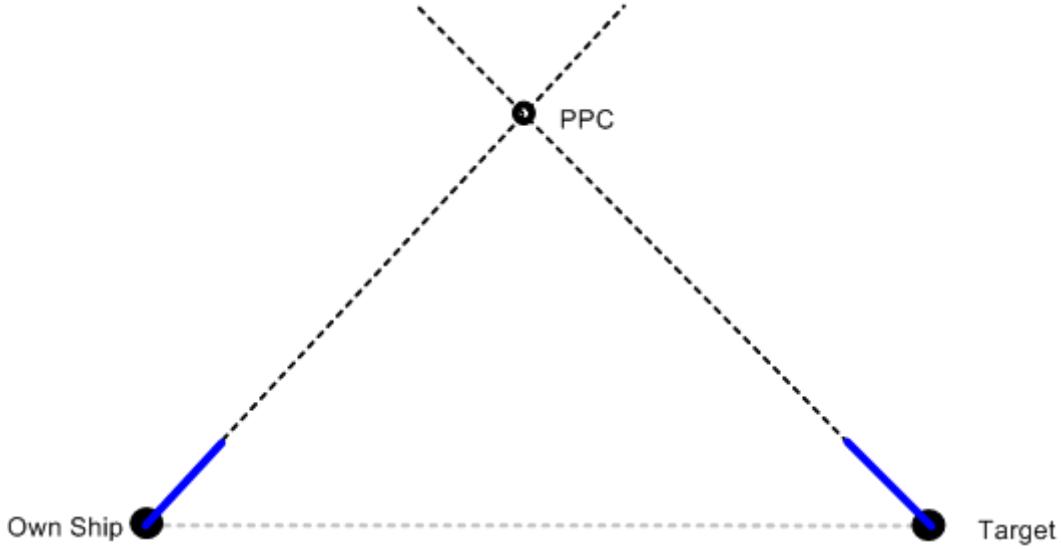


Figure 198 Example of encounter geometry for own ship and a target on collision course

It is easy to see graphically that the PPC can be moved along the predicted track line of target if own ship changes course to starboard and simultaneously increase speed, Figure 199.

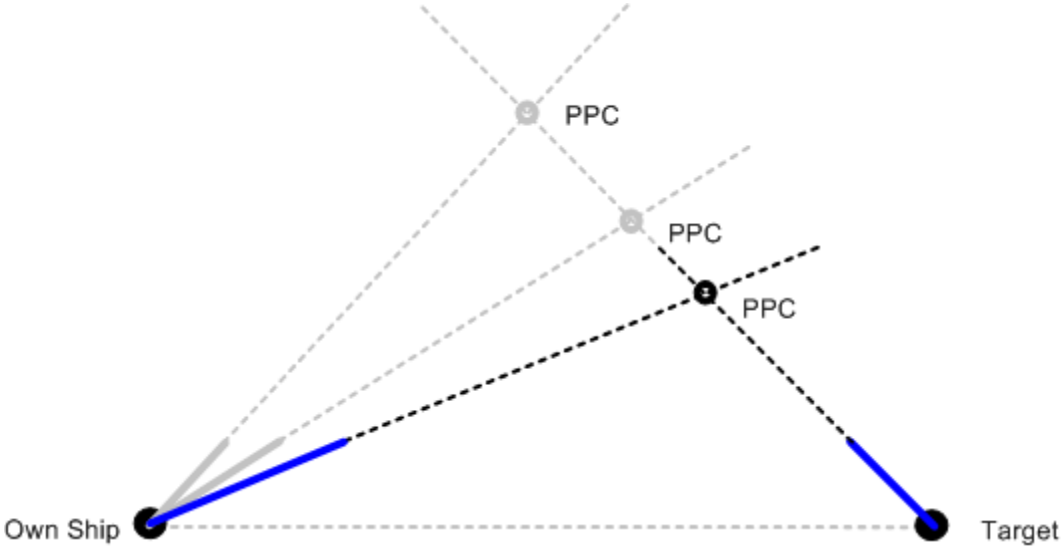


Figure 199 Movement of PPC due to change of own ship course and speed

The vessels' encounter geometry in different collision scenarios shows that a line displaced parallel to the in-sight line between the vessels and drawn from the tip of target's true vector can be regarded as a collision danger line (CDL) in true motion, Figure 200.

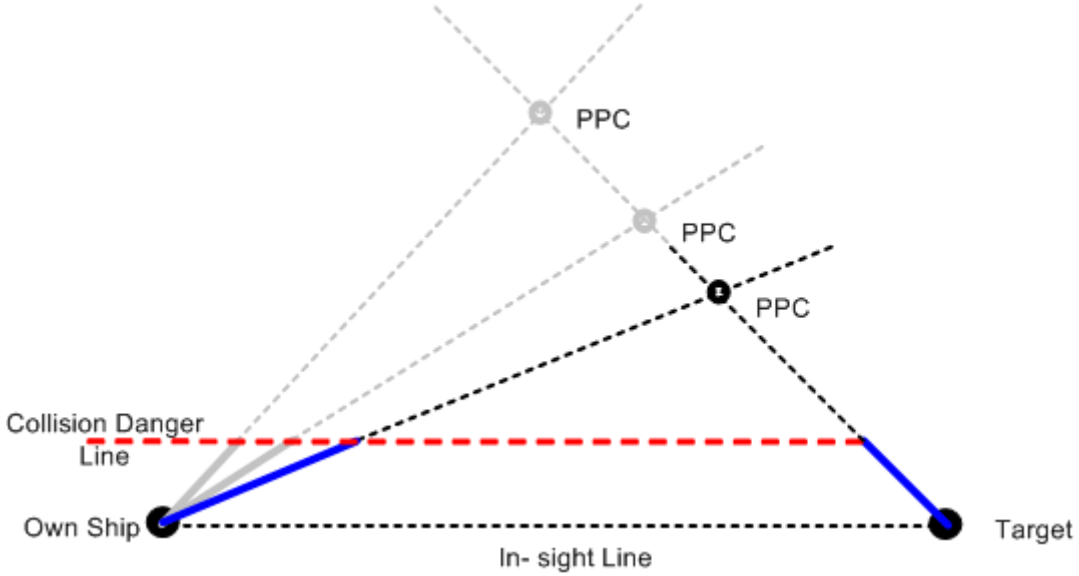


Figure 200 Collision danger line in true motion display

The CDL has a very simple interpretation: if the tip of own ship's vector touches the CDL, then a direct collision threat exists and the vessels will collide if the speed and course are maintained. Likewise, any maneuver (change of course and/or speed) that deflects the end of own ship's velocity vector away from the CDL is a potential evasive maneuver, Figure 201 - Figure 203.

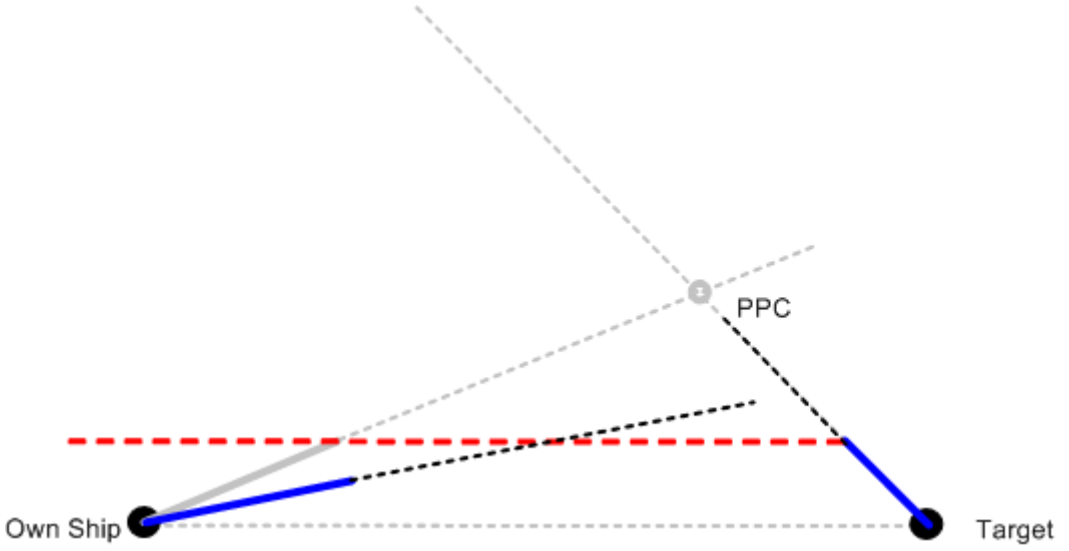


Figure 201 Evasive action by change of own ship's course to starboard in order to pass astern of target

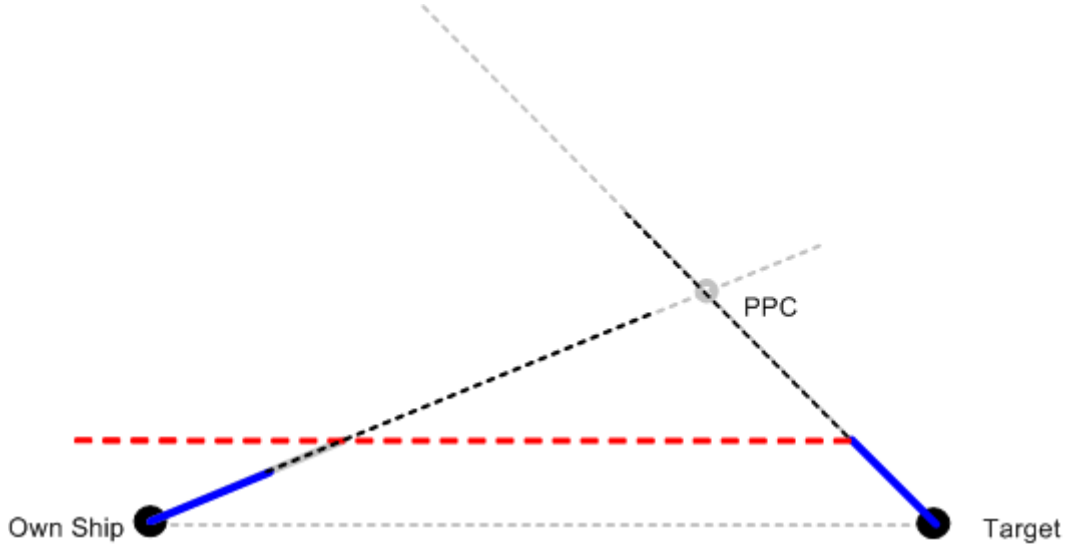


Figure 202 Evasive action by decrease of own ship's speed in order to pass astern of target

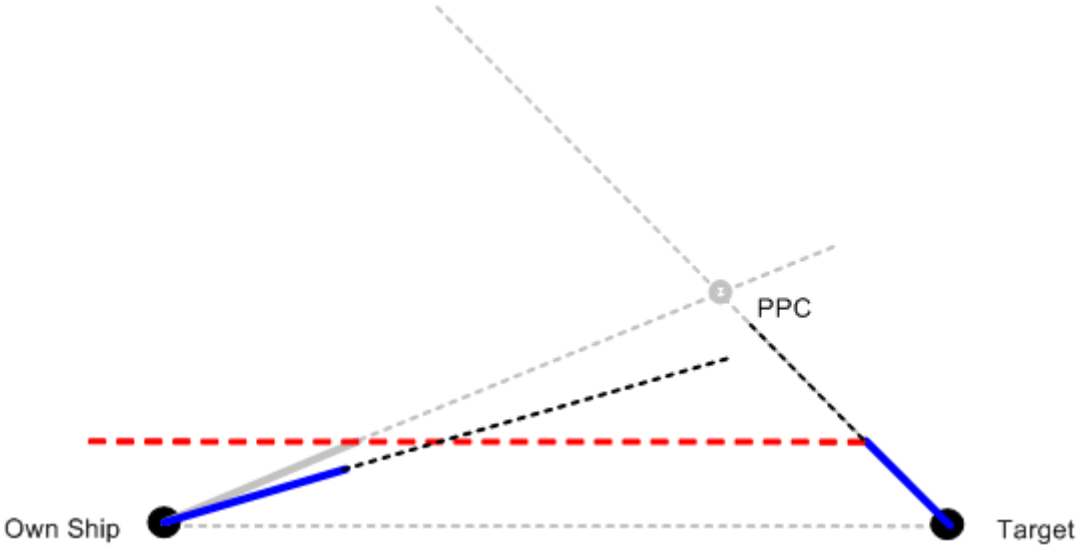


Figure 203 Evasive action by a combination of change of own ship's course and decrease of speed in order to pass astern of target

The CDL can be displayed to any acquired target in a true motion overview because it is completely independent of own ship's speed and course. It is only depending on the target's relative position, speed and course. This means that collision risk can be judged simultaneously to all acquired targets in a true motion overview with easy identification of possible evasive maneuvers, Figure 204 and Figure 205.

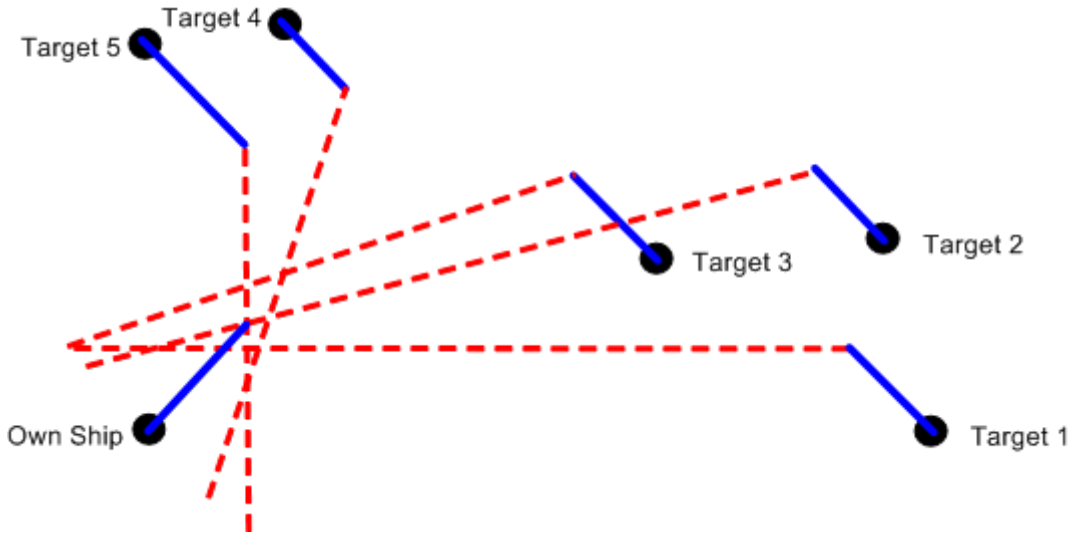


Figure 204 From judging the tip of own ship's vector in relation to the CDLs it follows that there is a direct collision threat to targets 2 and 5. Target 1 will pass slightly astern and targets 3 and 4 will pass ahead of own ship if the motion parameters (speed and course) are maintained

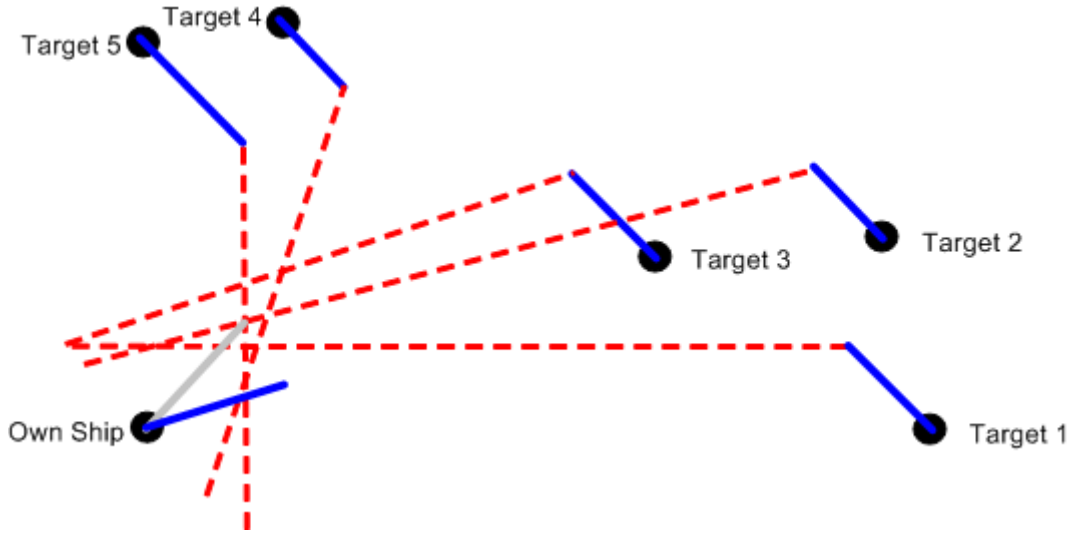


Figure 205 A change of course to starboard is a potential evasive action by own ship. Targets 1, 2 and 3 will pass well ahead, while targets 4 and 5 will pass astern of own ship if their course and speed are maintained

The CDL represents the situation where CPA = 0.0 n. miles. The general solution is an actual collision danger sector (CDS) which can be found by introducing a safety margin (CPA limit) with respect to minimum passing distance. Figure 206 shows the collision scenario (Figure 198) with simultaneous display of CDL and relative vector (as it can be imagined from radar display).

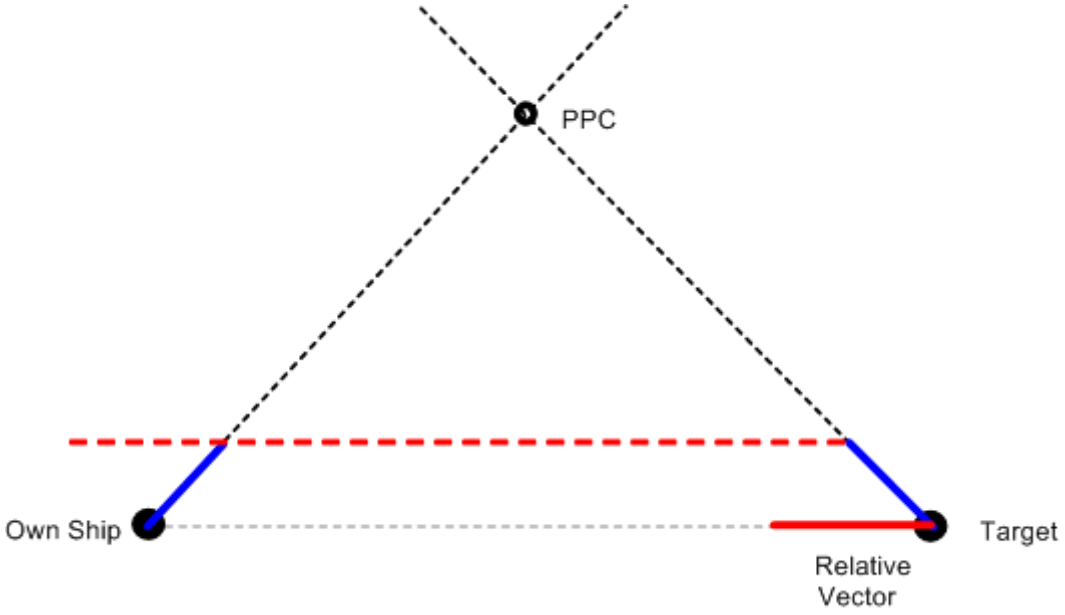


Figure 206 Collision risk interpretation in: 1) true motion: Tip of own ship's vector touches the collision danger line to target. 2) relative motion: The relative vector has direction towards centre of own ship

Figure 207 shows that the safety margin can be introduced by a circle that is located at the centre of own ship with radius equal the user-selected CPA limit. In the relative motion display of an ARPA radar the safety margin is usually set by utilizing the variable range marker (VRM).

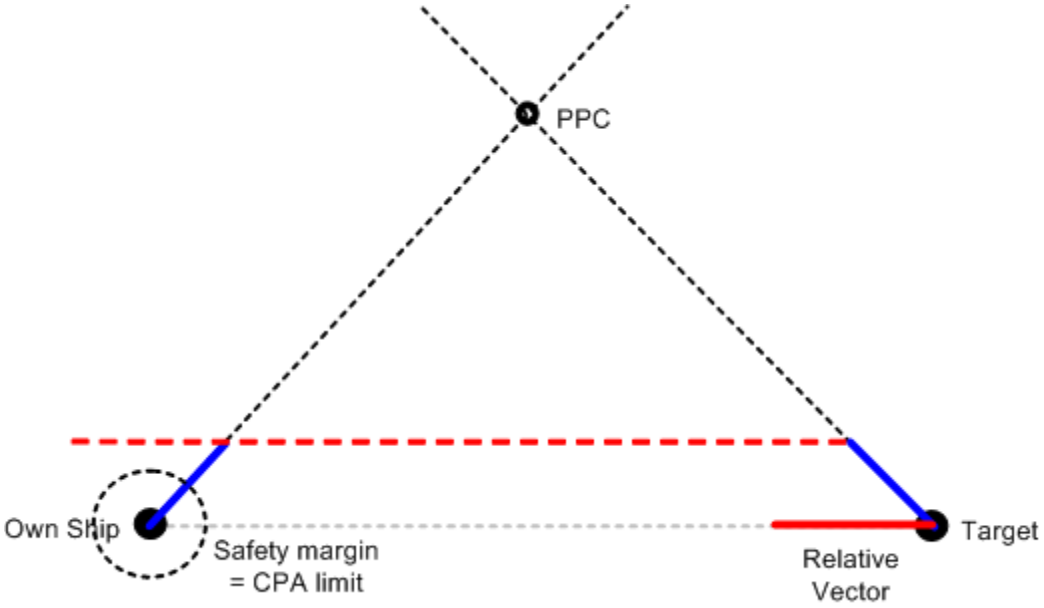


Figure 207 Introduction of safety margin representing a minimum passing distance at closest point of approach

The solution to pass a distance equal to the selected safety margin (CPA limit) astern of target is shown by a course change to starboard, which deflects the relative vector so its extension becomes a tangent to the CPA limit circle, Figure 208. (This solution can be found by utilizing the ARPA Trial Maneuver functionality.)

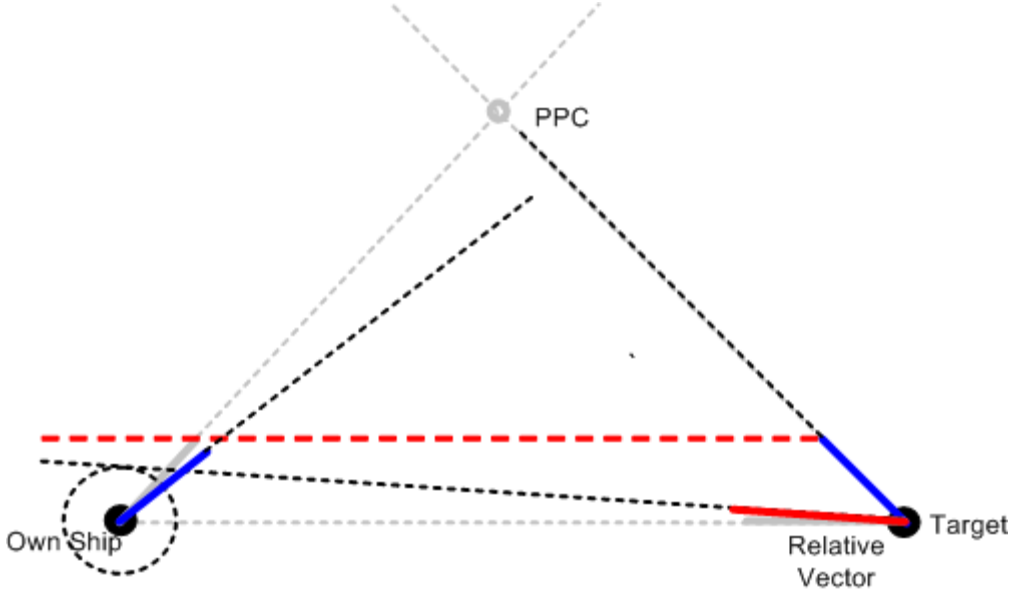


Figure 208 Introduction of safety margin CPA limit: Change of own ship's course in order to pass astern of target with selected CPA limit (i.e. extension of relative vector touches the CPA limit circle)

The solution to pass a distance equal selected safety margin (CPA limit) ahead of target is shown by a course change to port, Figure 209.

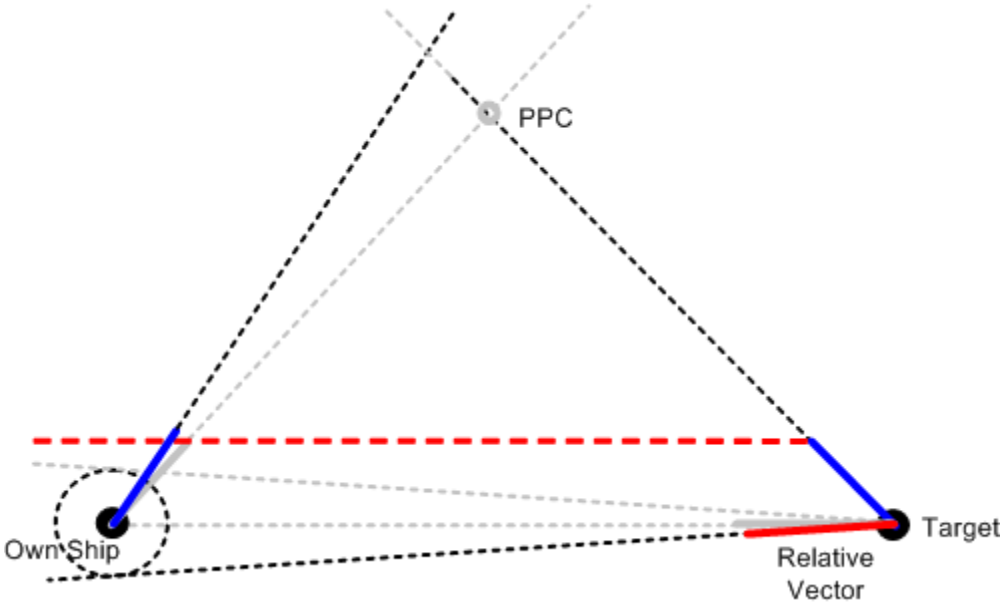


Figure 209 Introduction of safety margin CPA limit: Change of own ship's course in order to pass ahead of target with selected CPA limit (i.e. extension of relative vector touches the CPA limit circle)

Figure 208 and Figure 209 show that a sector-shaped region can be imagined in the relative motion display, Figure 210.

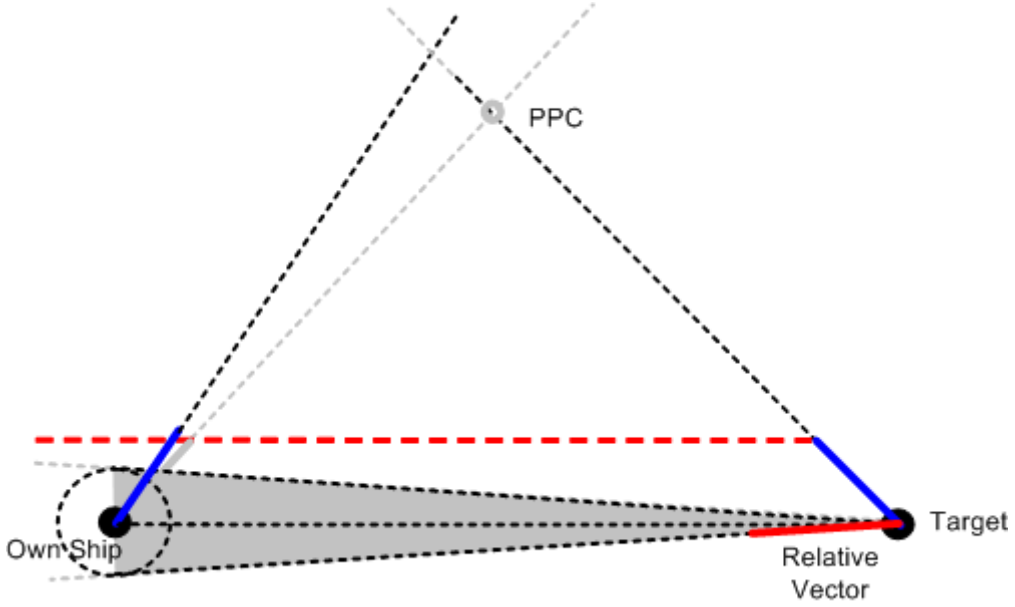


Figure 210 Sector shaped collision danger region as it can be imagined in relative motion display on an ARPA radar with safe passing distance set by the VRM radius from centre of own ship

This imagined region in the relative display can be regarded as a cone-shaped collision danger region in which the user-selected safety margin is violated if the relative vector terminates inside the sector. It can be transformed to appear in the true motion display as shown in Figure 211 and is hereinafter referred to as the Collision Danger Sector (CDS).

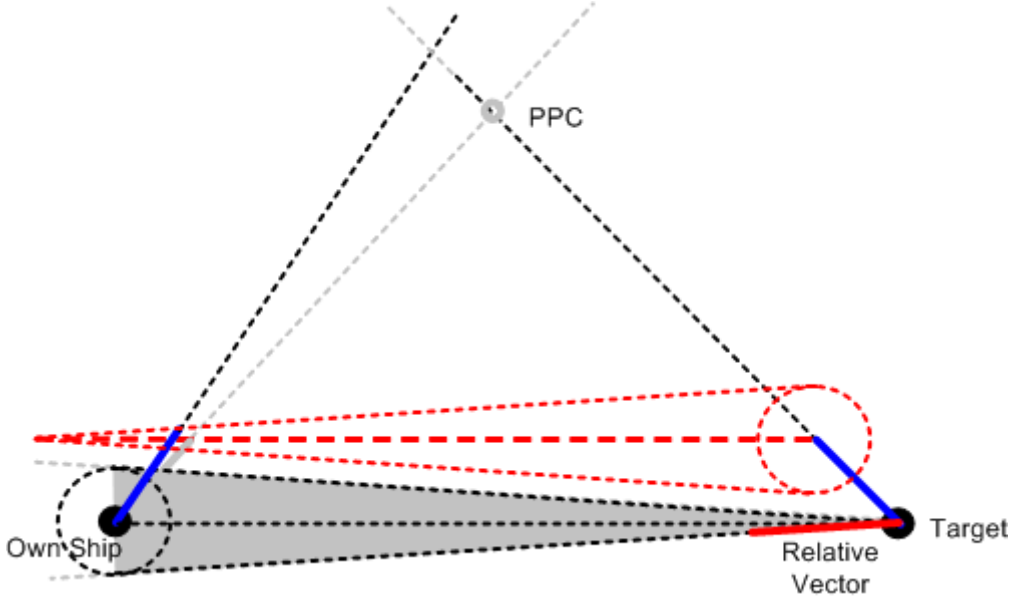


Figure 211 Collision danger sector (CDS) (red) in true motion display as it appears from transformation of collision danger sector as it can be imagined in relative motion display on an ARPA radar

The CDS has identical properties as the CDL and can thus be displayed to any acquired target in a true motion overview. Figure 212 and Figure 213 show how the OOW easily can identify the exact amount of evasive action required to pass with a minimum safety distance equal selected CPA limit. Traffic scenario identical to Figure 204 and Figure 205.

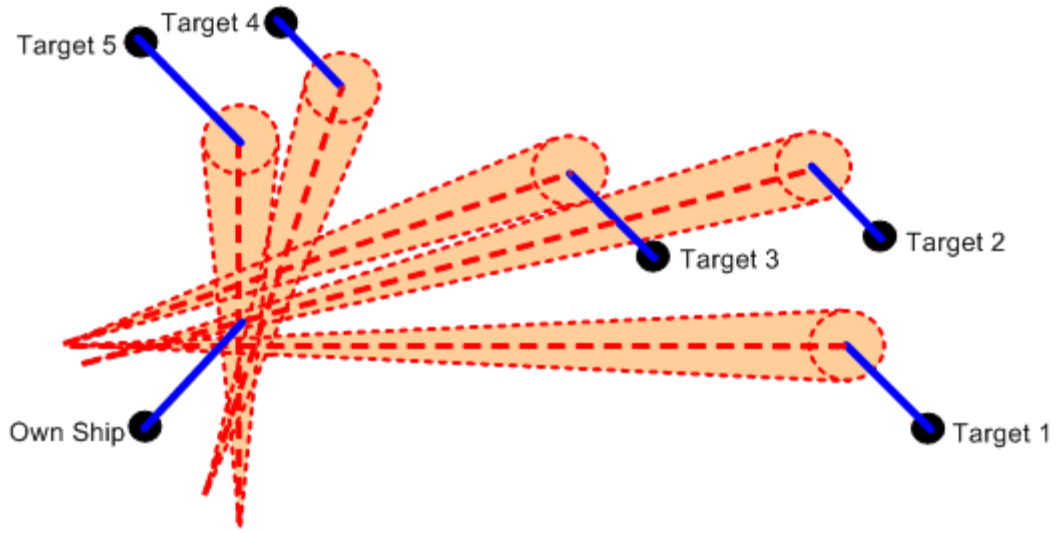


Figure 212 Display of CDL/CDS to the acquired targets from Figure 204 and Figure 205. Safe areas are easily identified in true motion overview

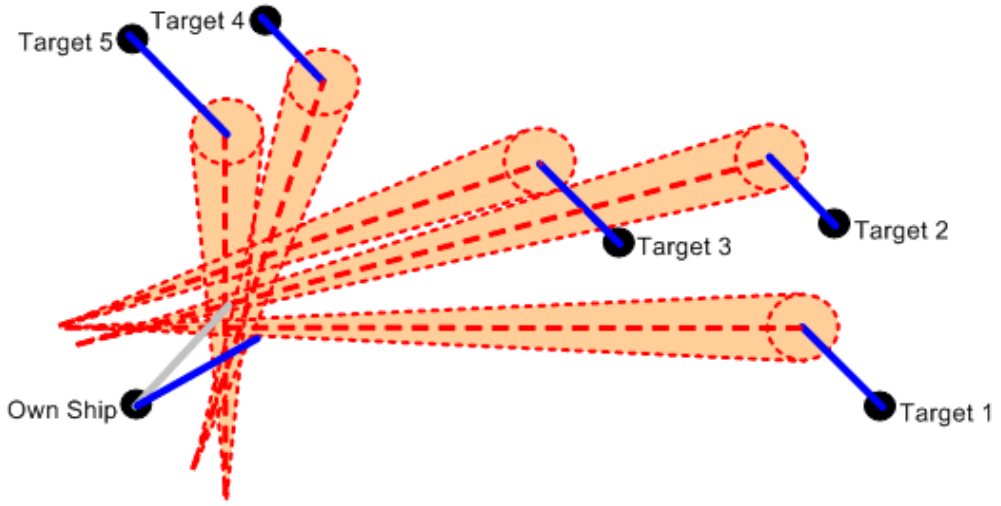


Figure 213 A change of course to starboard to pass ahead of target 4 and astern of target 1 with a safety distance margin equal selected CPA limit

8.5.2 Graphic Elements of the Anti-collision Display

The anti-collision display functionality is based on visualization of potentially dangerous situations that can result in collision. The anti-collision image is built of collision danger lines and sectors built in true motion between the own ship and the targets surrounding it. If there is a danger of collision of the own ship and any of the targets, or if the distance or the time to closest point of approach between the own ship and a target are less than the user-specified limits, color indication is introduced in the anti-collision image. In the figure below all main features of the anti-collision image are displayed.

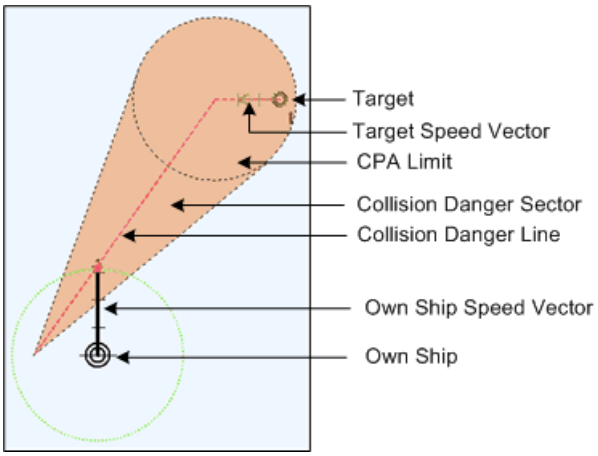


Figure 214 Graphic elements of the anti-collision display

➢ **The following graphic elements are used for the anti-collision display:**

- **Own Ship** – the symbol of the own ship displayed in the position, received from the primary positioning device;
- **Target** – the symbol of a target displayed in the position received from the target detection device;
- **Own Ship Speed Vector/Target Speed Vector** – vector predicting the position of the own ship/target where the own ship/target will be in a specified time, proceeding at the current course and velocity. For your convenience, the own ship speed vector is highlighted with a thick line and a green circle;
- **CPA limit** – (Closest Point of Approach) – a circle with a radius equal to the minimum CPA set in the **Config → System → Anti-collision** tab. If the own ship symbol enters the circle, the distance between the own ship and the target is less than the set CPA limit.
- **Collision danger sector (CDS)** – if the end of the own ship speed vector lies inside the collision danger sector, the own ship is going to pass the target at a distance less than the set CPA limit.
- **Collision danger line (CDL)** – if the end of the own ship speed vector lies on the collision danger line, the own ship and the target are on a collision course.

8.5.3 Configuration of the Anti-collision Display

The Anti-collision display is configured in the **Config → Anti Collision Tool** tab.

To configure the anti-collision display, do the following:

1. Open the **Config → Anti Collision Tool** tab.

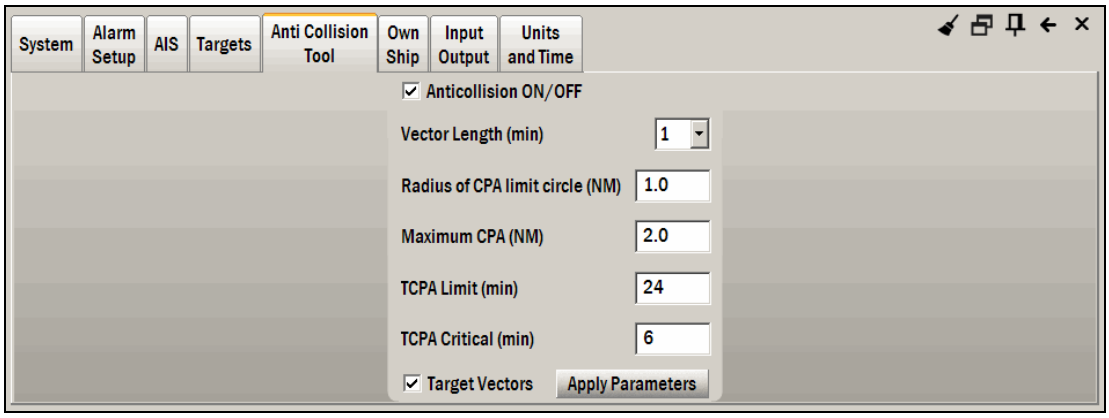


Figure 215 Config → Anti Collision Tool tab

2. To turn the anti-collision display on, check the **Anticollision ON/OFF** checkbox. To turn the anti-collision display off, clear the checkbox.
3. Set the time for prediction of the own ship position: select a value in the **Vector Length** drop-down list. The time value defines the length of the own ship speed vector: the end of the vector points to the position at which the own ship will be in the specified time.
4. Set the minimum CPA distance: enter a value to the **Radius of CPA limit circle** field. The minimum CPA distance determines the safe passing distance between the own ship and a target. The allowable input range is 0.0 to 5.0 nautical miles.
5. Set the maximum CPA distance: enter a value to the **Maximum CPA** field. If a target is at a distance to the own ship equal or less than the maximum CPA distance, the target is relevant for the collision risk evaluation. Targets with the CPA distance to the own ship larger than the maximum CPA are not considered dangerous and are not included in the anti-collision display. The allowable input range is from the specified CPA limit to 20.0 nautical miles.
6. Set the TCPA limit: enter a value to the **TCPA limit** field. If the target will reach the CPA to the own ship in time equal or less than the TCPA limit, the target is relevant for the collision risk evaluation. The allowable input range is 1.0 to 30.0 minutes. For the anti-collision display functionality to start processing the target, the TCPA between the own ship and the target should be less than the specified TCPA limit, and the distance between the target and the own ship should be less than the specified maximum CPA.
7. Set the critical TCPA: enter a value to the **TCPA Critical** field. The critical TCPA is the minimum time needed for the own ship to carry out a maneuver for safe passing the target. The TCPA critical is only used if the distance between the target and the own ship is less than the minimum CPA distance. The allowable input range is 1.0 to the specified TCPA limit value.
8. To turn on the display of speed vectors of all activated targets, check the **Target Vectors** checkbox.
9. To activate all selections or any changes which are made after the initial selection, press the **Apply Parameters** button.

8.5.4 Indication of Approach of Targets to Specified Time and Distance Limits

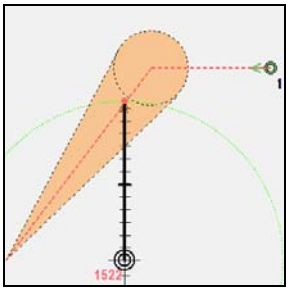
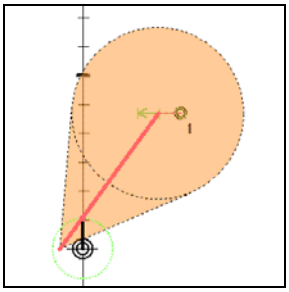
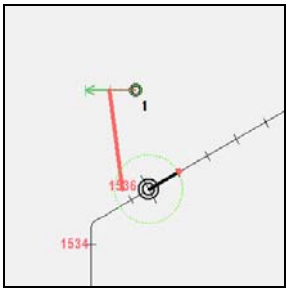
The indication of the approach of targets to the own ship to the specified time and distance limits is used to warn the user that the distance and time between the own ship and the target have reached a critical value.

➢ **The anti-collision functionality requires setting the following limits:**

- The distance (maximum CPA) and time (TCPA limit) between the own ship and a target at which the target is activated in the anti-collision display; and the user is recommended to start evaluating, calculating and carrying out collision avoidance actions in case the collision risk exists;
- The critical distance (minimum CPA distance or radius of CPA limit circle) and time (TCPA critical) at which the user has the minimum time to take decisions on collision avoidance actions.

The above described parameters are set in the **Config → Anti Collision Tool** tab.

The table below describes changes in graphic elements of the anti-collision display brought about by changes in time and distance between the own ship and targets. The user-set minimum and maximum limits of distance and time are compared to the actual CPA and TCPA of the own ship and targets and the distance and time between the own ship and targets. Actual CPA and TCPA, and time and distance values are displayed in the **Info → AIS tab** for AIS targetsa and in the **Info → ARPA targets → ARPA targets** tab for ARPA targets.

Change	Condition	Image
Anti-collision display on	(CPA_{actual} < CPA_{max}) AND ($TCPA_{actual}$ < $TCPA_{max}$)	
CDL is highlighted with red	$TCPA_{actual}$ < $TCPA_{min}$	
CDS is off, CDL is displayed	Distance < CPA_{min}	

8.5.5 Indication of Collision Risk

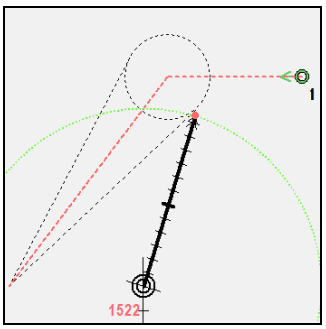
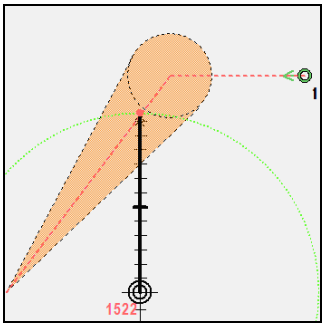
The risk of collision of the own ship with a target is defined in the anti-collision display functionality by the position of the own ship speed vector in relation to the CDS and CDL:

- If the end of the own ship speed vector lies inside the CDS, the distance at the CPA will be less than the specified minimum CPA distance;
- If the end of the own ship speed vector lies directly on the CDL, the distance at the CPA will equal zero, which means that the vessels will collide.

In both cases there is a risk of collision. To indicate the collision risk, the CDS is shaded orange.

If the own ship speed vector lies outside the CDS, there is no collision risk, and the CDS is not shaded.

The table below shows how graphic elements of the anti-collision display change depending on the collision risk.

Change	Condition	Image
CDS is not shaded	The own ship speed vector lies outside the CDS.	
CDS is shaded orange	The own ship speed vector lies inside the CDS.	

8.5.6 Example and Recommendations for the Anti-collision Display Use

Consider two vessels, own ship and a target, on collision course. The range from the own ship to the target is 7.5 nautical miles and the bearing from the own ship to the target is 037º. The target speed is 15 knots and the course is 270º. The own ship speed is 20 knots and the course is 000º.

1. The Figure 216 shows the display of the cone-shaped collision danger sector (CDS) and the collision danger line (CDL) to the target in true motion. The user-defined target selection criteria are:
    - CPA Limit = 1.0 NM
    - Maximum CPA = 2.0 NM
    - TCPA Limit = 24 min
    - TCPA Critical = 6 min

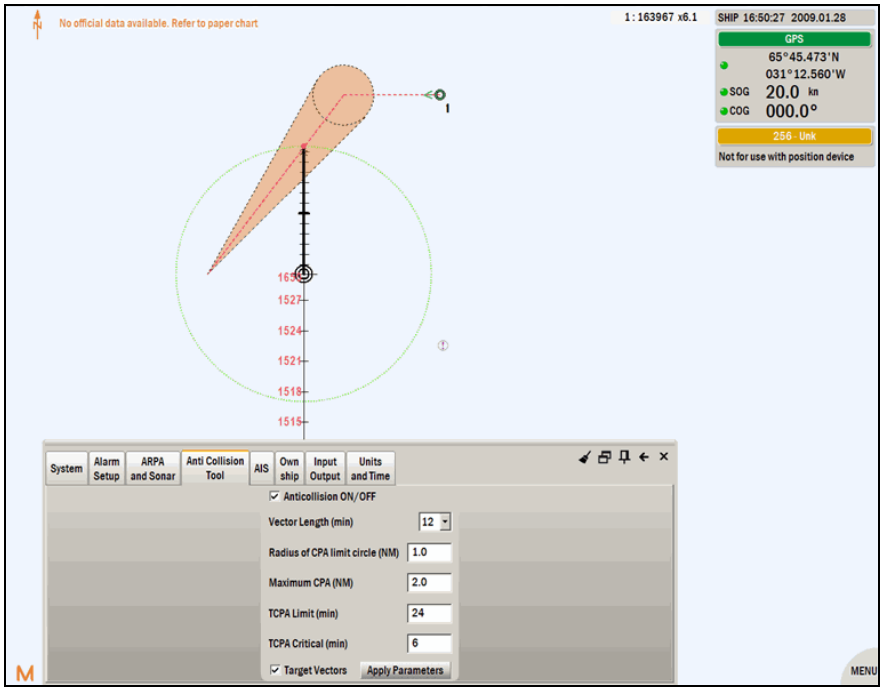


Figure 216 The display of the cone-shaped collision danger region and line to the target in true motion

The green circle with the centre at the own ship position shows the tip of the own ship speed vector. This is in order to make it visually easy for the user to determine the amount of evasive action needed to satisfy the selected CPA limit.

When the tip of the own ship speed vector lies inside the CDS the sector is shaded orange color to highlight the importance of the target for the collision risk evaluation. The Figure 216 shows a traffic situation when own ship is on a direct collision course with the target as the tip of the speed vector lies on the CDL (the red dashed line in the centre of the CDS).

2. When the tip of the own ship speed vector lies outside the CDS, there is no collision risk and the CDS is not shaded. The Figure 217 shows that own ship has made a course change to starboard and will therefore pass astern of the target with a distance slightly above the specified CPA limit.

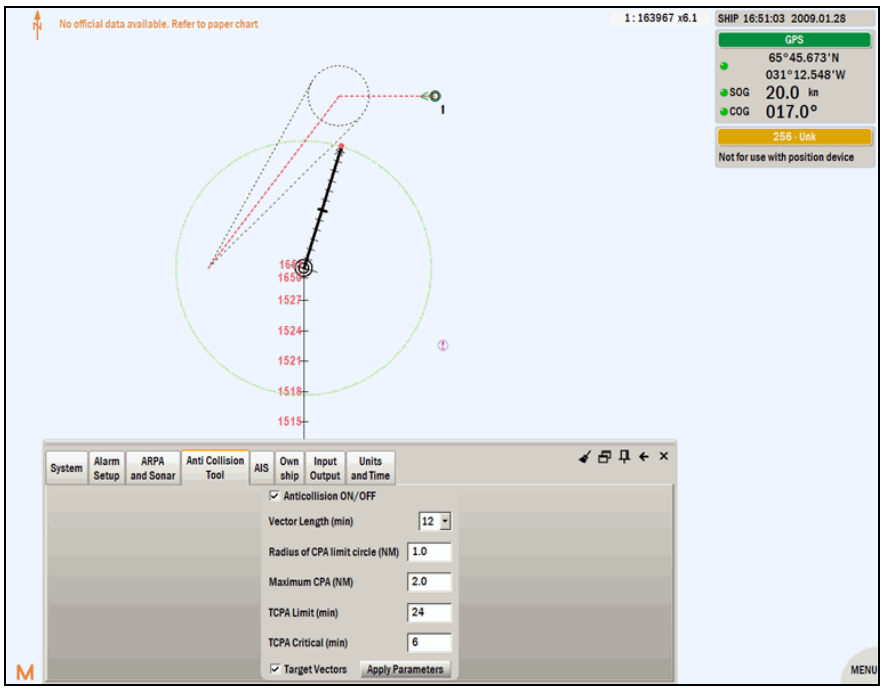


Figure 217 Course change by the own ship to avoid collision

3. An alternative evasive action by the own ship is a speed reduction (here, from 20 to 14 knots (Figure 218)) in order to achieve the specified minimum CPA distance with a minimum deviation from the original track line. The third alternative is a combination of course and speed change.

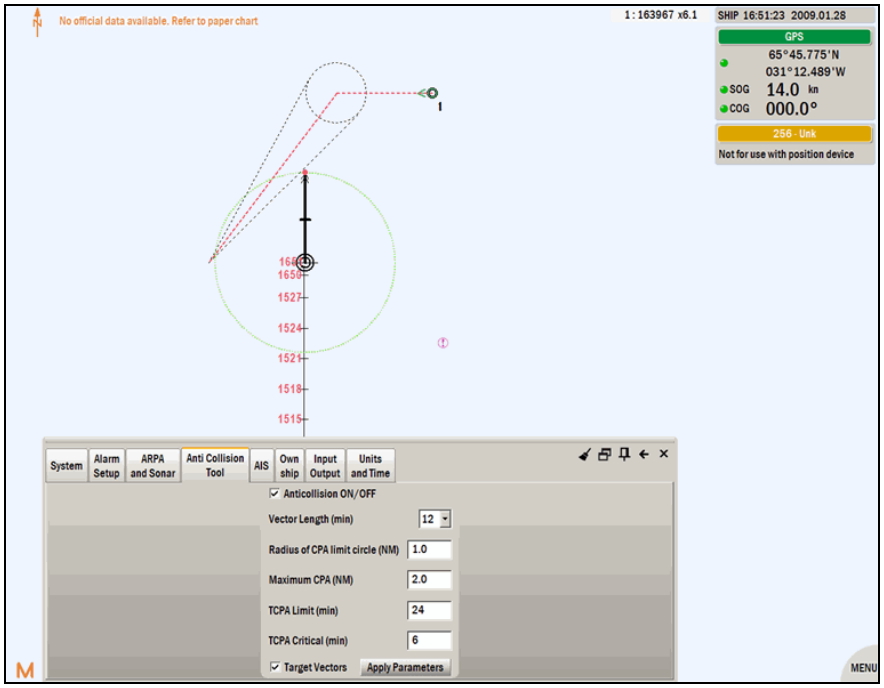


Figure 218 Speed change by the own ship to avoid collision

4. As the relative distance is decreasing, the own ship speed vector length has to be adjusted in order to still be able to judge the collision risk and the potential evasive action. The Figure 219 shows that the own ship speed vector length should be decreased below the present 12 minutes by using the **Vector Length** option.

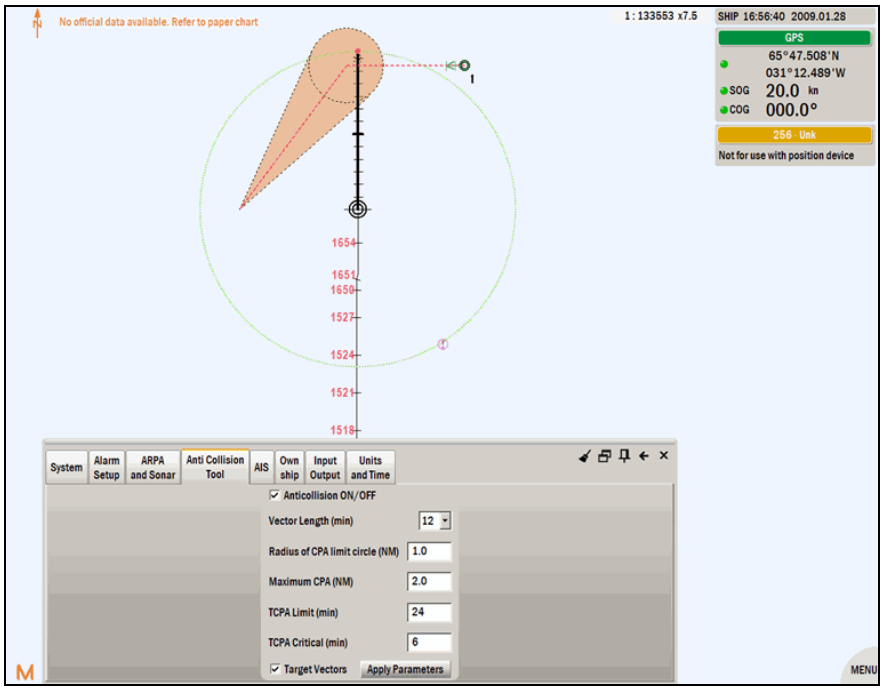


Figure 219 Adjust the vector length

5. The vector length is now decreased to 3 minutes and the OOW can still judge collision risk. The collision danger sector and line are scaled accordingly.

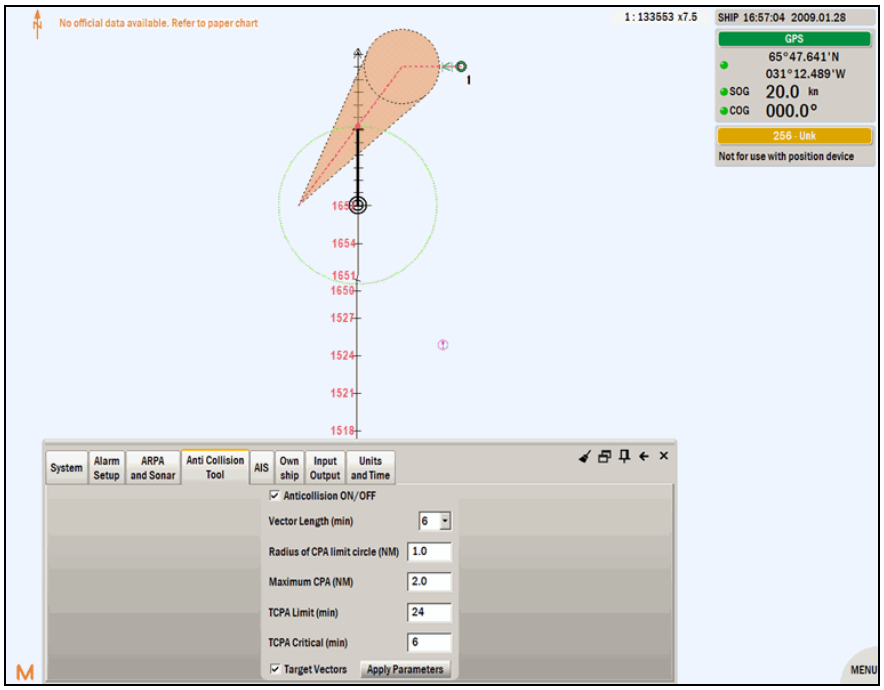


Figure 220 The length of the own ship speed vector is changed to 3 minutes

6. When the actual TCPA is less than the specified minimum TCPA, the CDL is highlighted in red bold to attract the attention of the user. Further decrease in the length of the own ship speed vector is required. An evasive/escape action should be urgently considered by the user.

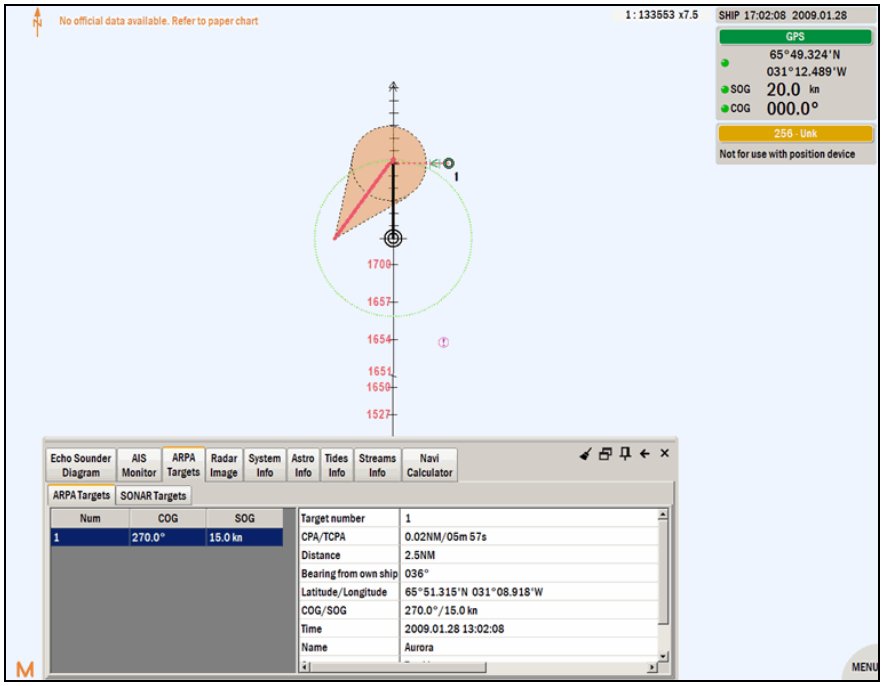


Figure 221 The TCPA is violating the TCPA Critical value – the collision danger line gets bold red

7. Vector length is decreased to 1 minute and ECS display is zoomed in to see more details.

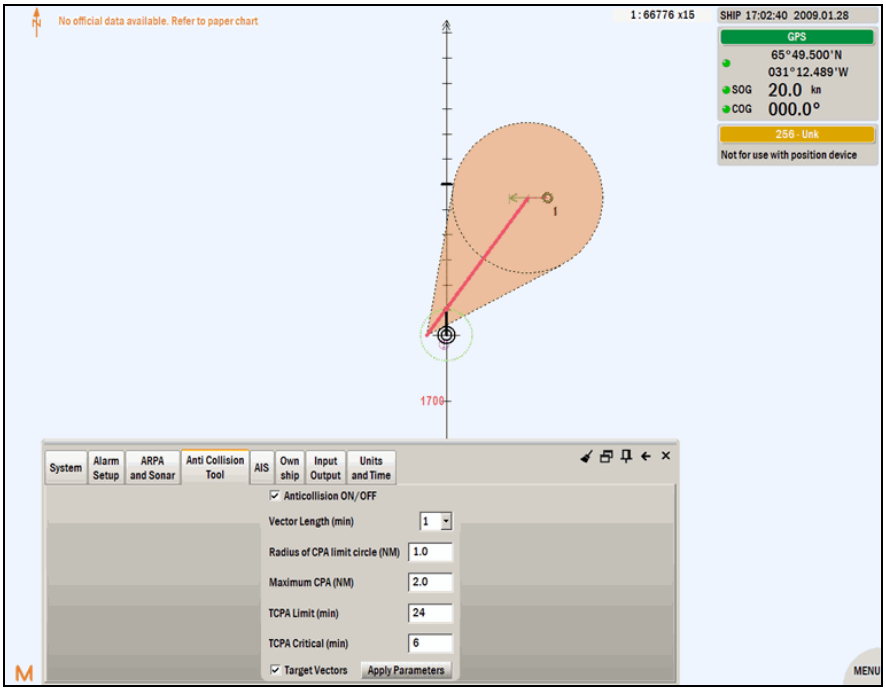


Figure 222 Further decrease of vector length

8. By using the ERBL the user can easily determine the amount of escape action necessary to pass astern of the target with the required safety margin (1.0 NM), i.e. 60 degrees to starboard. The TCPA Critical parameter must reflect the maneuvering characteristics of the ship: VLCC will need more time to change its course than a HSC.

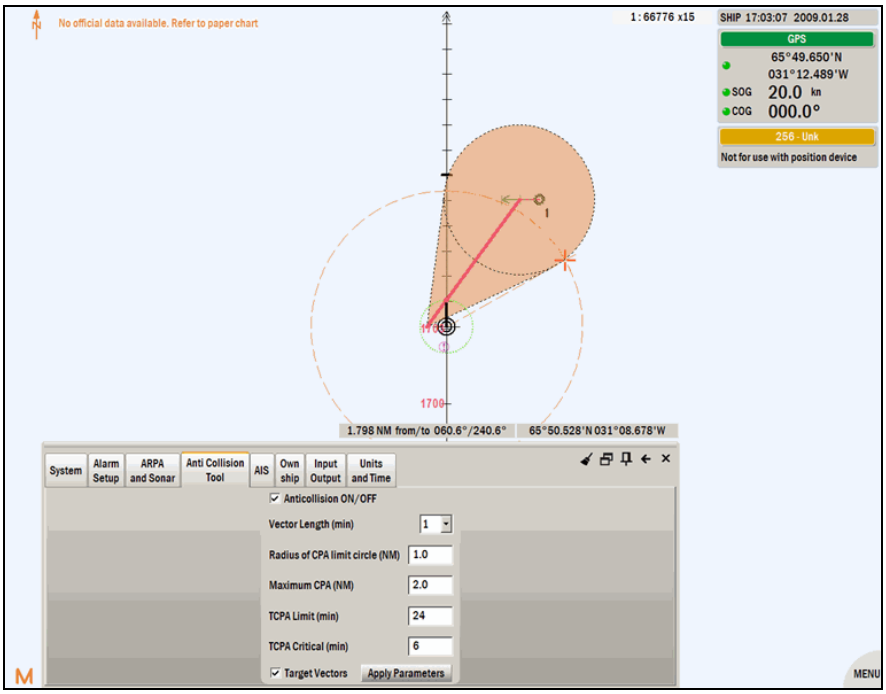


Figure 223 Use of the ERBL tool to assess the maneuver

9. Own ship has now changed course so that it will pass astern the target at a slightly less distance than the CPA limit.

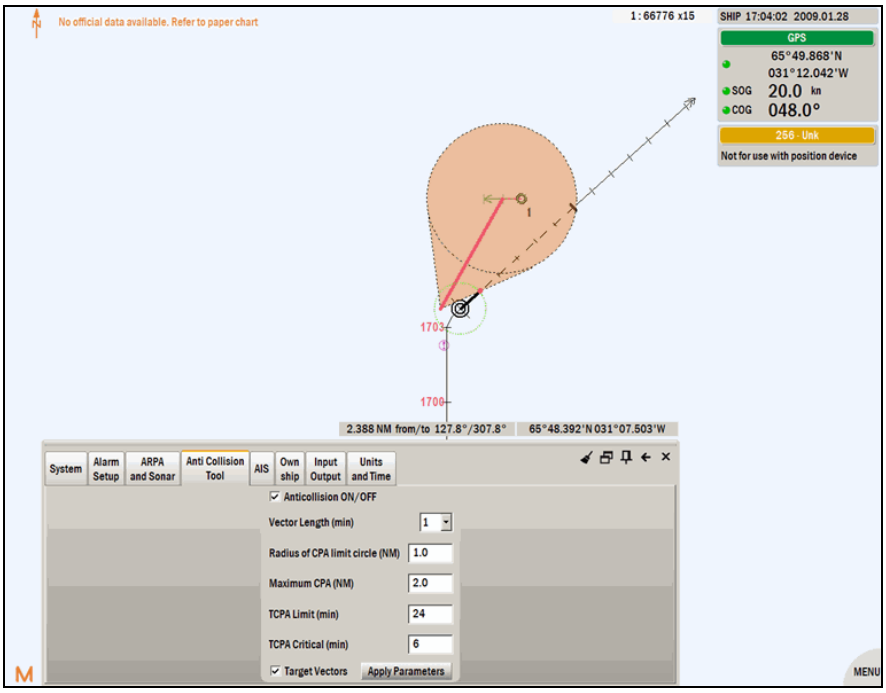


Figure 224 The change of course by the own ship to avoid collision (CPA is close to the set CPA Limit)

10. It is important to maintain the evasive maneuver until the target has been passed (the TCPA value in the **Info → Targets → ARPA Targets** tab is 'unreachable').

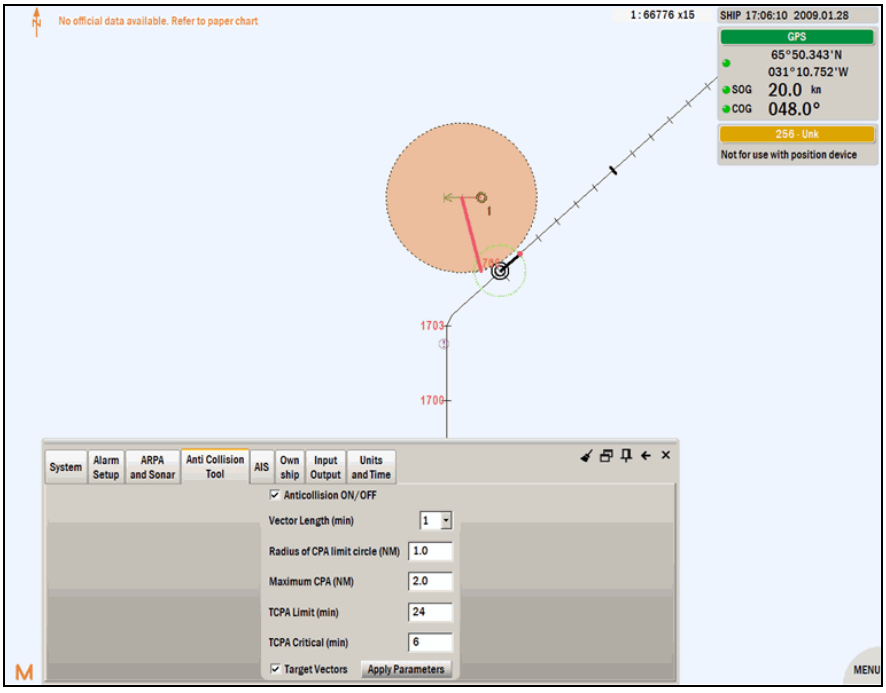


Figure 225 Evasive action is maintained until TCPA is unavailable

11. When the relative distance to the target is equal to, or less than, the CPA limit, the collision danger sector disappears and the collision danger line only is displayed.

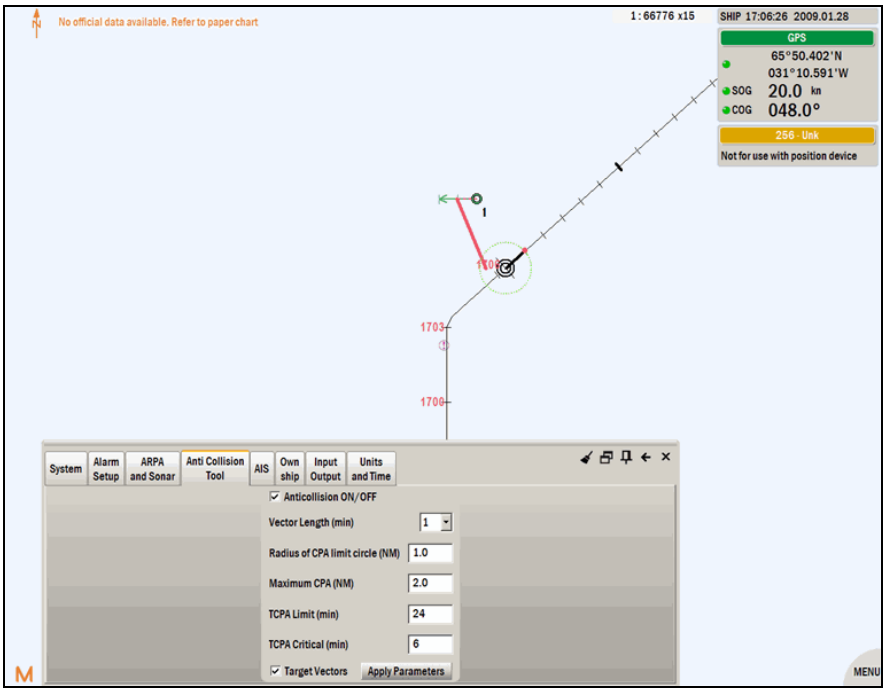


Figure 226 The distance to target is equal or less than the CPA limit – only collision danger line is displayed

12. The collision danger line disappears from the screen when the target's closest point of approach has been passed, i.e. the TCPA value in the **Info → ARPA Targets → ARPA targets** tab is 'unreachable'.

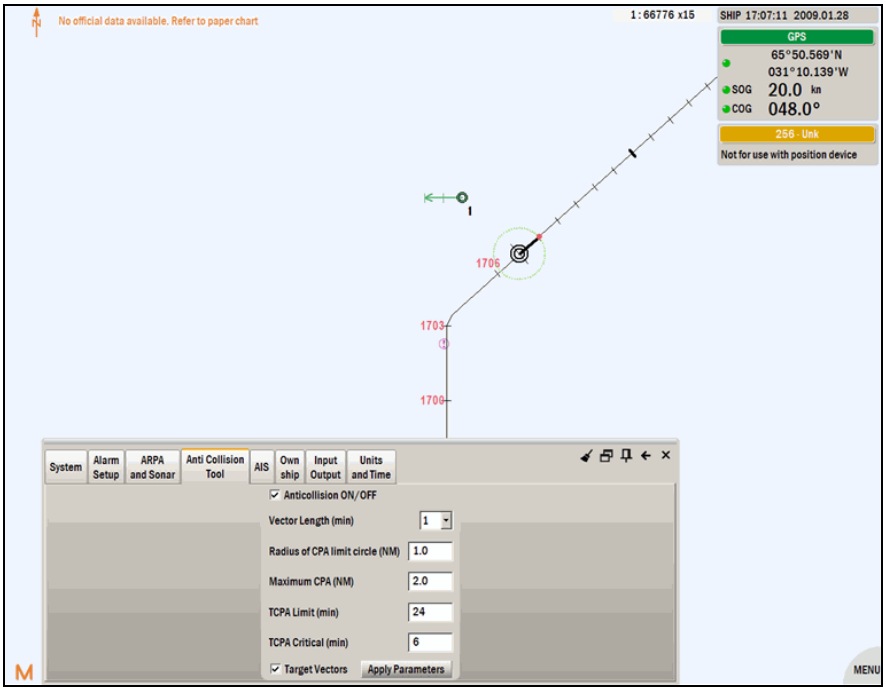


Figure 227 The collision danger line disappears

13. The own ship can now change the course to come back to its original track line.

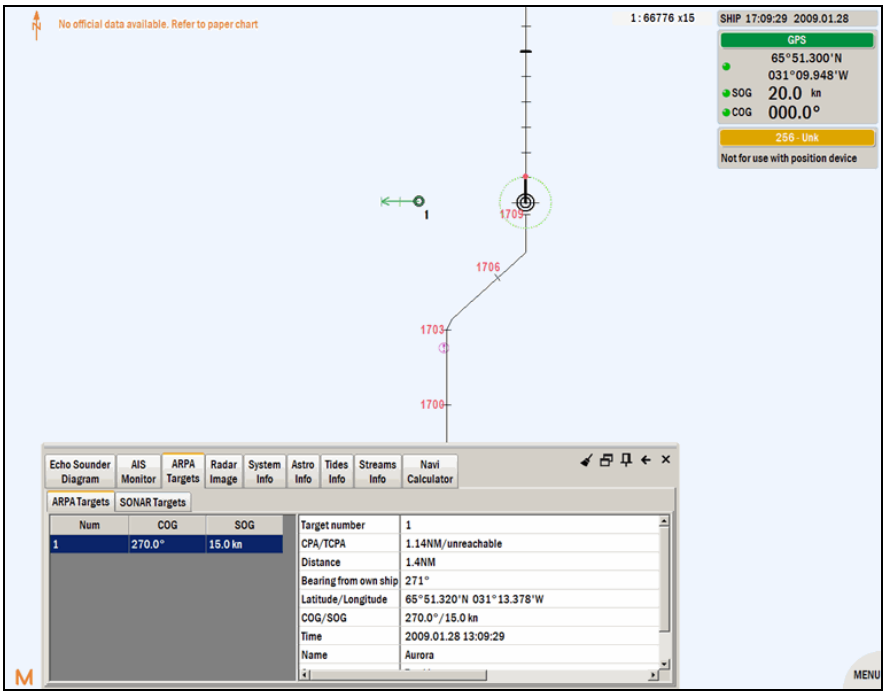


Figure 228 Own ship returns to its original course

9. OTHER NAVIGATIONAL TOOLS

9.1 Range and Bearing from Own Ship to Other Objects

9.1.1 ERBL

Electronic range and bearing line tool is intended for easy measuring of ranges and bearings between objects in the chart view. With the tool you can measure ranges and bearings between the own ship and any point in the chart view, as well as between any two points in the chart view; you can also fix a range as a circle around the own ship to monitor objects within the range[68].

To turn on the ERBL mode, press the **ERBL** button in the **Chart Scale and Quick Access Buttons** panel (to open the panel move the mouse pointer over the scale indicator). To turn the ERBL mode off, outpress the **ERBL** button.

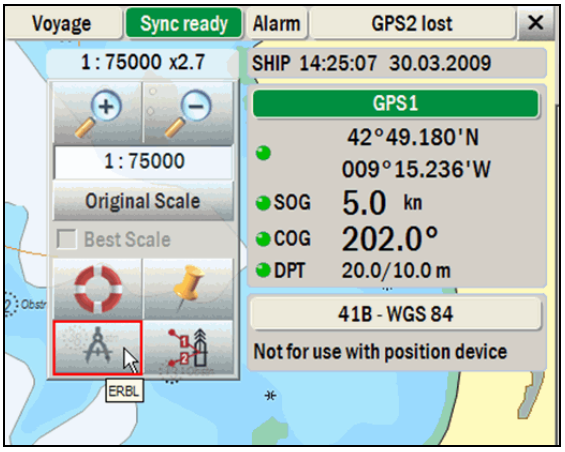


Figure 229 Chart Scale and Quick Access Buttons panel, ERBL button

To measure the range and bearing between the own ship and a point in the chart, do the following:

1. Turn the ERBL mode on. In the chart view, range and bearing indication lines will be displayed as orange dashed lines. The ERBL center is in the own ship position.
2. Point the mouse pointer to any object in the chart view. The range and bearing to and from values are displayed in the mouse pointer range and bearing indicators at the bottom of the chart view.
3. Turn the ERBL mode off.

To measure the range and bearing between any two points in the chart, do the following:

1. Turn the ERBL mode on. In the chart view, range and bearing indication lines will be displayed as orange dashed lines. The ERBL center is in the own ship position.
2. Point the mouse pointer to the first point and left-click: the ERBL center will be fixed in this point.
3. Point the mouse pointer to the second point. The range and bearing to and from values are displayed in the mouse pointer range and bearing indicators at the bottom of the chart view.
4. To release the ERBL center, left-click in the chart view: the center will be fixed in the own ship position again.
5. Turn the ERBL mode off[69].

To fix a range around the own ship, do the following:

1. Turn the ERBL mode on. In the chart view, range and bearing indication lines will be displayed as orange dashed lines. The ERBL center is in the own ship position.
2. Measure the required distance from the own ship using the range and bearing indicators at the bottom of the chart view and right-click. The range will be fixed around the own ship and will move as the own ship moves.

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[68] Measurement units for ranges are set in the **Config → Units and Time** tab.

[69] Ranges can be measured as great circle arcs or as rhumb lines. The calculation mode is set in the Check points panel (*see chapter 9.1.2, Check Points*).

3. To release the ERBL, right-click in the chart view.
4. Turn the ERBL mode off.

9.1.2 Check Points

The check points functionality allows you setting up to three checkpoints. Check points are the points to which the distance and bearing from the own ship are constantly displayed in the chart view. The values of the distances and bearings are updated as the ship moves.

To set a check point, do the following:

1. Open the **Check points** panel: move the mouse pointer over the scale indicator to open the **Scale and Quick Access Buttons** panel and press the **Check points** button.
2. Choose whether the bearing from the own ship to check points should be true (angle between the direction to the north and the direction to the object) or relative (angle between the ship course and the direction to the object). To set the true bearing, check the **True/Relative** checkbox to the right from the check point name, to set the relative bearing, clear the **True/Relative** checkbox.
3. Select the calculation mode for distances in the **Calculation Mode** drop-down list: distances can be calculated as great circle arcs or as rhumb lines.

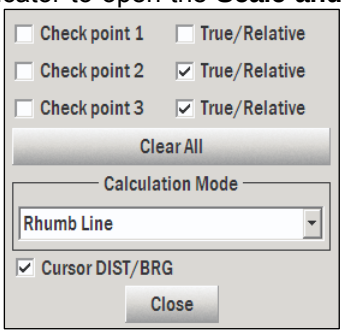

Figure 230 Check points panel

4. To plot a check point in the chart view, check one of the **Check point** checkboxes. The **Check points** panel will close and the check points editing mode will turn on.
5. Plot the checkbox in the chart view: point the mouse pointer to the reference object and left-click. The check point will be plotted in the chart view. The check point is connected with the own ship with a range and bearing line. The values of the range and bearing are displayed in the range and bearing indicators at the bottom of the chart view. The 'T' letter near the bearing value means true bearing and the 'R' letter means relative bearing.

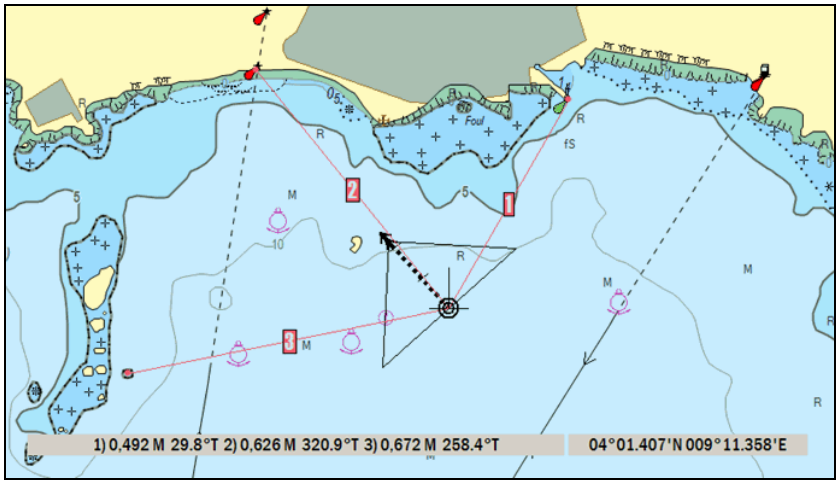

Figure 231 Control points in the chart view

6. To remove a check point, open the **Check points** panel and clear the checkbox corresponding to the check point you want to remove. To remove all check points, press the **Clear All** button.

9.1.3 Range and Bearing to the Mouse Pointer

To turn on the display of the range and bearing from the own ship to the mouse pointer, open the **Check points** panel and check the **Cursor DIST/BRG** checkbox. The range and bearing are displayed in the range and bearing indicators at the bottom of the chart view[70].

[70] Ranges can be measured as great circle arcs or as rhumb lines. The calculation mode is set in the Check points panel (*see chapter 9.1.2, Check Points*).

9.2 Man Overboard and Position Fix

9.2.1 Man Overboard Functionality

In case someone or something has fallen over board, you can use the Man Overboard functionality. Using the functionality, you can plot a symbol in the accident position and monitor it as the own ship moves.

To use the MOB functionality, do the following:

1. Open the **Scale and Quick Access Buttons** panel (move the mouse pointer over the scale indicator) and press the **MOB**  button. The Man Overboard mode is turned on: a Man Overboard symbol is plotted in the current own ship position and the position coordinates are recorded as a MOB entry in the logbook. As the own ship sails, the range and bearing to the MOB position are constantly updated and shown on the range and bearing line.
2. The MOB symbol is being updated until the **MOB** button is pressed. To stop updating the MOB position and delete the symbol outpress the **MOB** button.

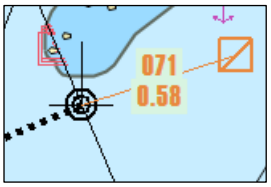

Figure 232 MOB symbol

9.2.2 Position Fix Functionality

The position fix functionality allows plotting a symbol in the own ship current position to mark this position.

To use the Position Fix functionality, do the following:

1. Open the **Scale and Quick Access Buttons** panel (move the mouse pointer over the scale indicator) and press the **Fix position**  button.
2. A Fix Position symbol is plotted in the current own ship position and the position object is added to the mariner objects database (*see chapter 6.2, Mariner Objects*).

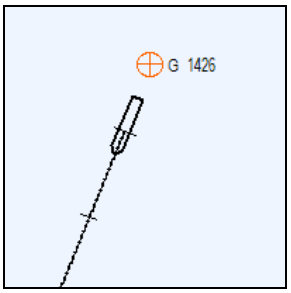

Figure 233 Fix symbol

9.3 Log Book

The ECDIS contains an automatic log book function. The log book records all events that occur during a voyage as well as the own ship positions and configuration changes. The log book also has a playback feature to allow a voyage to be recreated in a controlled environment.

Together with the main ship log book the ECDIS keeps the ship track log. The main log book contains entries of all classes (System, Track, Voyage, User records, ARPA targets, and AIS targets), whereas the track log only contains entries of the Track class. The difference between the main log and the track log is that in the main log records Track entries at regular intervals, and the track log records all Track entries coming from the primary and secondary position sources.

9.3.1 Viewing Log Book Entries

To view the log books, do the following:

1. Open the **Log Book** panel.
2. To view the main log press the **Main Logbook** toggle button, and to view the track log press the **Complete Track** toggle button. Both logs share the same user interface. If there are differences in functioning of an interface element for the main log and the track log, it will be mentioned in the element description.

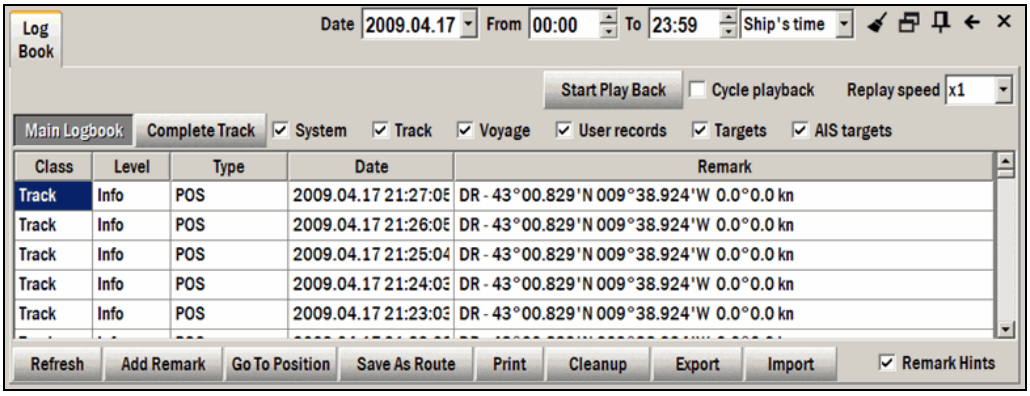

Figure 234 Log Book panel

3. Set the date and time period at which you want to view log book records: select the date in the **Date** drop-down list and set the beginning time in the **From** field and the end time in the **To** field. By default the log book is opened at the date that was viewed last. For example, to view today's log book, the date has to be reset.
4. Set the time system for the time display: select the **Ship's Time** or the **UTC Time** option in the drop-down list to the right from the **To** field.
5. After the time has been set, log book entries for the specified date and time will be displayed in the entries table. Every entry in the log book contains the following information:
   - **Class** – Describes the type of information (see below);
   - **Level** – Describes the importance of the entry: information, warning or alarm;
   - **Type** – A general description of the entry (e.g. POS (Position), User Remark, Chart Scale and Angle);
   - **Date** – The date and time of the entry (UTC or Ship's depending of the time system setting);
   - **Remark** – Recorded information itself. It contains detailed information on what has been added to the logbook: coordinates, course, echo sounder depth, etc;
6. To set a filter and display entries of selected classes only, check those entry classes you want to be displayed. Select the classes in the classes list in the left part of the panel. In order to deselect a class clear its checkbox. The option is not available for the track log. The record classes are the following:
   - **System** – Changes made to the system configurations;
   - **Track** – Logging position / changing chart scale;
   - **Voyage** – Logging events when sailing a route;
   - **User records** – Entry added by the operator;
   - **Targets** – ARPA activity;
   - **AIS targets** – AIS activity;
7. To refresh the log book data, press the **Refresh** button. Usually this is not required as the log book data are refreshed automatically at regular intervals.
8. To add a remark, press the **Add Remark** button, the **Add Remark** window will open. Enter the remark in the window and press the **OK** button. A **User records** class entry will be added to the log book. If you add a user remark when the track log is on, it still will be added to the main log.
9. To scroll the chart view to the coordinates of a log book entry, select the entry in the entries table and press the **Go to position** button. The position will be displayed in the center of the chart view and marked with an arrow symbol. Please note that it is required that the selected log book entry had position information in the remark field; otherwise an error message will appear.
10. To create a route using the current log book entries, press the **Save as Route** button. The **Select Route Name** window will open: enter the route name to the **Output Route Name** field and press the **OK** button.

The route will be created and added to the existing routes. You can edit the route in the **Route → Route Planning** tab[71].

11. To print the log book out, press the **Print** button. The log book will be converted to the `*.doc` format and opened in the Reach Text Editor (the program is installed together with ECDIS). Print the log book using the Reach Text Editor printing functionality (**File → Print**).
12. Sometimes user remarks can be too long and not fit in the log book **Remark** field. To view the remark tip when pointing the mouse pointer at the remark, check the **Remark Hints** checkbox.
13. To delete a log book page, press the **Cleanup** button, the **Cleanup logbook** window will open. In the **Cleanup logbook** window, select pages you want to delete, press the **Delete selected** button and confirm the operation. The selected log book pages will be deleted[72].
14. To export a log book page to a file, display the page in the **Log Book** panel and press the **Export** button, the **Export day log book** dialog will open. In the dialog, select the folder where to save the log book page and press the **OK** button. In the selected folder a Logbook folder is created and the log book page is saved to this folder. The log book page is saved as two files: the name of the files is the date of the page and extensions are `*.lbk` and `*.lbt`.

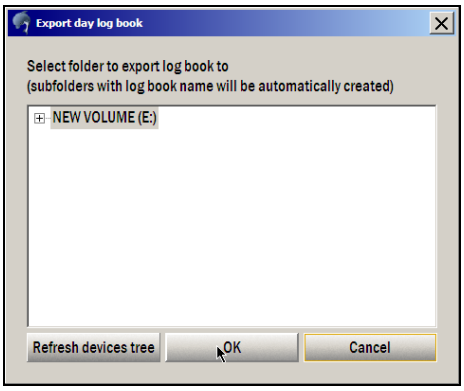

Figure 235 Export day log book dialog

15. To import a log book page, press the **Import** button. The **Import day log book** dialog will open. In the dialog, select the folder where the log book file is stored. In the pane next to the folder tree pane, the list of all log book pages in the selected folder will be displayed. Select a page, press the **OK** button, and confirm the operation. The log book page will be imported to the log book and available for display and playback.

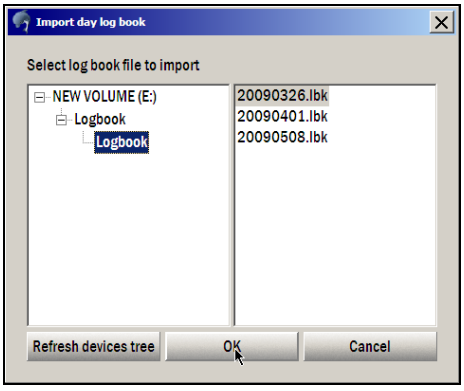

Figure 236 Import day log book dialog

[71] This function creates a route from all the recorded own ship positions of the log book in view. Each point of the track will become a waypoint in the created route. This may be useful in order to sail the same route later or to export the route to another system. This function, when used in the track log, provides the possibility to set time interval for the track points to be recorded to the route.

[72] The page currently displayed in the **Log Book** panel cannot be deleted as well as pages for the day before and the day after.

IMPORTANT!

Imported log book page overwrites the page with the same date.

9.3.2 Log Book Play-Back

Using the play-back functionality of the log book, you can view the log book entries animated in the chart view.

To play-back the log book, do the following:

1. Open the **Log Book** panel.

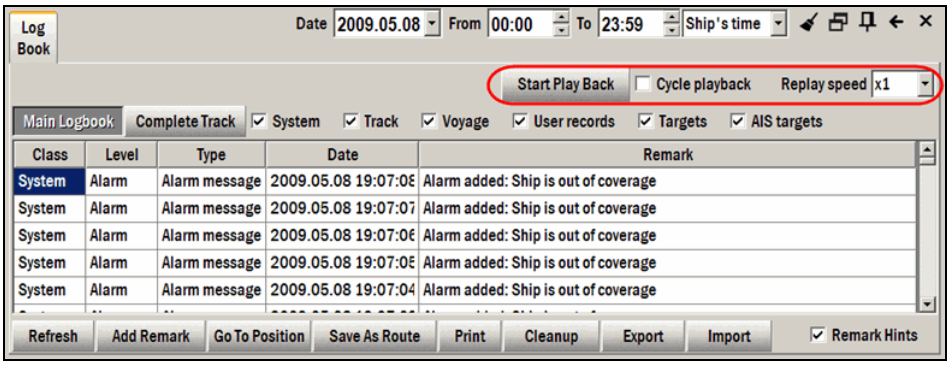

Figure 237 Log Book panel, play-back controls

2. Open the log book page you want to play back. To do so, set the date and the time period at which the data were recorded in the log book in the **Data** and the **From** and **To** fields.
3. Select the replay speed in the **Replay speed** drop-down list. The replay speed defines the time scale during playing. For example, if the replay speed is **x2**, events will be replayed two times faster than they happened in reality.
4. If you want the play-back to be cyclical, check the **Cycle playback** checkbox.
5. To start the play-back, press the **Start Play Back** button. After pressing the **Start Play Back** button and confirming that you really want to switch the Playback Mode on, in the upper left corner of the chart area a large letter 'R' (Replay) appears, informing you that you are in the Playback Mode. Also under the **Indicators** panel a special **Replay** panel appears.

Figure 238 Replay panel

The chart window will display position and scale equal to those during sailing. Date and time corresponding to the playback events are displayed in the **Replay** panel. In the right part of the panel, position, course and speed of the own ship are shown. Position of the own ship on the chart also corresponds to the replay time.

The buttons on the **Replay** panel are the following:

Play

If the **Cycle playback** checkbox is ticked, playback will be resumed from the first record otherwise replay will be stopped after reaching the last record.

Stop

Step back/forward buttons allow viewing the ship's movement step by step.

To begin/To end buttons go to the first or last logbook record.

Switch playback off button switches the Playback Mode off. Pressing the button is

equal to releasing the **Start Play Back** button (in activated condition called **Stop Play Back**) in the **Log Book** panel. The **Replay** panel will be removed from the screen and in the chart window the current ship's position will be displayed.

9.4 Navi Calculator

The navigator's calculator is an additional tool designed to help you in performing various geodetic tasks not solved automatically by the ECDIS. The Navi Calculator performs the following tasks:

- inverse geodetic problem
- direct geodetic problem
- calculating great circle points
- converting coordinates from one datum to another

To solve the inverse geodetic problem, do the following:

1. Open the **Info → Navi Calculator → Distance / Bearing** tab.

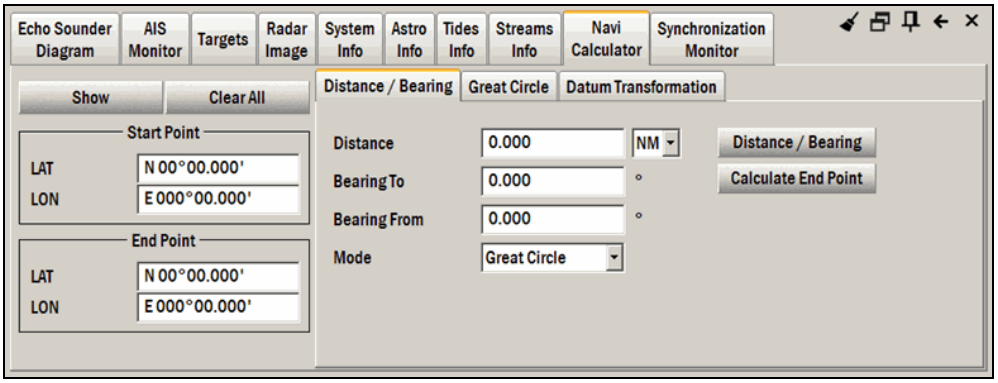

Figure 239 Info → Navi Calculator tab, Distance/Bearing tab (for direct and inverse geodetic problems)

2. Enter coordinates in the **Start Point** and **End point** sections. To show the line connecting the positions with the specified coordinates in the chart view, press the **Show** button.
3. Select a measurement unit for **Distance** (Nautical Miles, Statute Miles or kilometers) in the drop-down list near the **Distance** field.
4. Select the mode of calculation (Great Circle or Rhumb Line) in the **Mode** drop-down list.
5. Press the **Distance / Bearing** button.
6. The calculated values of distance and bearings to and from will be displayed in the **Distance**, **Bearing To** and **Bearing From** fields.
7. To clear the calculator, press the **Clear All** button.

To solve the direct geodetic problem, do the following:

1. Open the **Info → Navi Calculator → Distance / Bearing** panel.
2. Enter coordinates in the **Start Point** section.
3. Enter the distance value in the **Distance** field and select a measurement unit for distance (nautical miles, statute miles or kilometers) in the drop-down list to the right from the field.
4. Enter the **Bearing to** and **Bearing from** values.
5. Select the mode of calculation (Great Circle or Rhumb Line) in the **Mode** drop-down list.
6. Press the **Calculate End Point** button to calculate coordinates of the end point. The end point coordinates will be displayed in the **End Point** section. To show the line connecting the start point and the end point in the chart view, press the **Show** button.
7. To clear the calculator, press the **Clear All** button.

To calculate great circle points, do the following:

1. Open the **Info → Navi Calculator → Great Circle** tab.

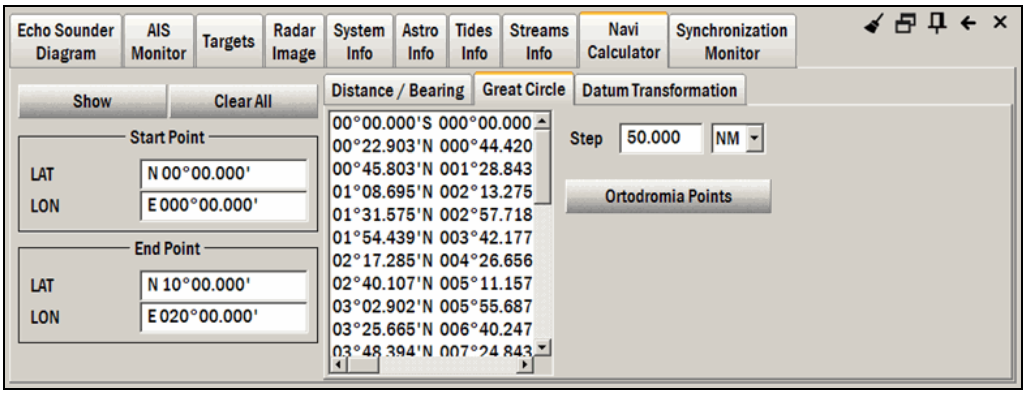

Figure 240 Info → Navi Calculator panel, Great Circle tab (for the great circle calculations)

2. Enter coordinates in the **Start Point** and **End point** sections. To show the line connecting the positions with the specified coordinates in the chart view, press the **Show** button.
3. Select a measurement unit for the step distance (nautical miles, statute miles or kilometers) in the drop-down list near the **Step** field.
4. Enter the distance value of the step in the **Step** field.
5. Press the **Ortodromia Points** button. Coordinates of the great circle points will be displayed as a list of coordinates in the special list area.
6. To clear the calculator, press the **Clear All** button.

To convert coordinates from one datum to another, do the following:

1. Open the **Info → Navi Calculator → Datum Transformation** tab.

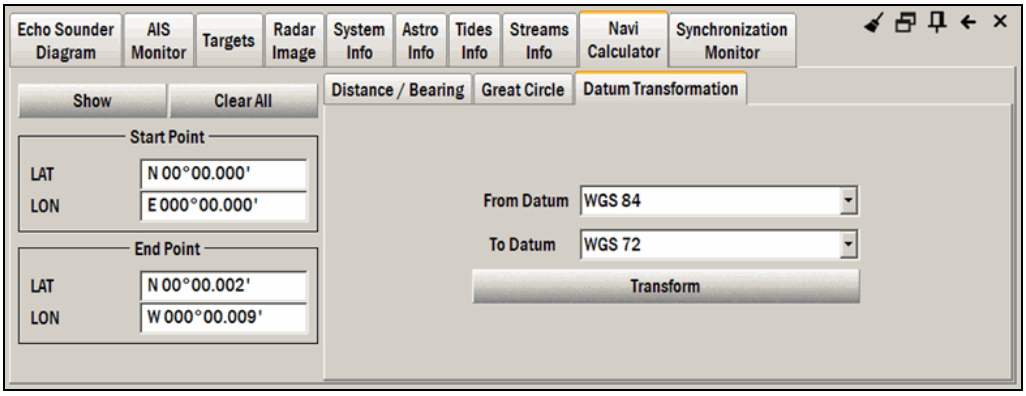

Figure 241 Info → Navi Calculator tab, Datum Transformation tab

2. Enter coordinates in the **Start Point** section.
3. Select the original datum in the **From Datum** drop-down list.
4. Select the target datum in the **To Datum** drop-down list.
5. Press the **Transform** button and read converted coordinates in the **End Point** section. To view the line connecting the start point and the end point, press the **Show** button.
6. To clear the calculator, press the **Clear All** button.

APPENDIX A List of Input Sentences

The table below lists sentences which can be received and processed by the ECDIS and devices producing the sentences.

Device Type	Sentences	Recommended sentences
Position device	GLL; VTG; RMC; GGA, ZDA, DTM, SGD, GNS	GLL; VTG; ZDA, DTM
Gyro	VHW, THS, HDT, HDM, HDG, ROT, VDR	THS, ROT
Speed Log	VHW, VBW	VBW
ARPA	TTM, TLL	TTM
AIS	VDM, VDO, ABK	VDM, VDO
Echo Sounder	DBT, DPT	DPT
Wind Sensor	MWV	MWV
Route Planner	RTE, WPL	RTE, WPL

- **ABK – UAIS Addressed and binary broadcast acknowledgement**

Standard: NMEA 0183 v.3, 2000 (not recommended for new designs)

The ABK-sentence is generated when a transaction, initiated by reception of an ABM, ACA, AIR, or BBM sentence, is terminated. This sentence provides information about the success or failure of a requested ABM broadcast of either ITU-R M.I 371 messages 6 or 12.

`$--ABK, xxxxxxxxx1, x2, x.x3, x4, x5*hh<CR><LF>`

No.	Field	Description	Comments
1	xxxxxxxxx	MMSI of the addressed AIS unit	
2	x	AIS channel of reception	
3	x.x	Message type	
4	x	Message sequence number	
5	x	Type of acknowledgement	

- **DBT – Depth Below Transducer**

Standard: IEC 61162-1 Ed.3, 2007

Water depth referenced to the transducer.

`$--DBT, x.x1, f2, x.x3, M4, x.x5, F6*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Depth value in feet	
2	f	Measurement unit: ‘f’ for feet	
3	x.x	Depth value in meters	

No.	Field	Description	Comments
4	M	Measurement unit: 'M' for meters	
5	x.x	Depth value in fathoms	not processed
6	F	Measurement unit: F for fathoms	not processed

➢ **DPT – Depth**

Standard: IEC 61162-1 Ed.3, 2007

Water depth relative to the transducer and offset of the measuring transducer. Positive offset numbers provide the distance from the transducer to the waterline. Negative offset numbers provide the distance from the transducer to the part of the keel of interest. For the ECDIS the offset is always negative so as to provide depth relative to the keel.

`$--DPT, x.x1, x.x2, x.x3*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Water depth relative to the transducer, in meters	
2	x.x	Offset from transducer, in meters (distance from transducer to keel)	
3	x.x	Maximum range scale in use	not processed

➢ **DTM – Datum Reference**

Standard: IEC 61162-1 Ed.3, 2007

Local geodetic datum and datum offsets from a reference datum. This sentence is used to define the datum to which a position location and geographic locations in subsequent sentences are referenced. Latitude, longitude and altitude offsets from the reference datum, and the selection of the reference datum, are also provided.

`$--DTM,ccc1,a2,x.x3,a4,x.x5,a6, x.x7,ccc8*hh<CR><LF>`

No.	Field	Description	Comments
1	ccc	Local datum	
2	a	Local datum subdivision code	not processed
3	x.x	Lat offset, min	not processed
4	a	N/S	not processed
5	x.x	Lon offset, min,	not processed
6	a	E/W	not processed
7	x.x	Altitude offset, m	not processed
8	ccc	Reference datum	

➢ **GGA – Global positioning system (GPS) fix data**

Standard: IEC 61162-1 Ed.3, 2007

Time, position and fix-related data for a GPS receiver.

`$--GGA, hhmmss.ss[1], llll.ll[2], a[3], yyyyy.yy[4], a[5], x[6], xx[7], x.x[8], x.x[9], M[10], x.x[11], M[12], x.x[13], xxxx[14]*hh<CR><LF>`

No.	Field	Description	Comments
1	hhmmss.ss	UTC of position	
2	llll.ll	Latitude: degrees and minutes	
3	a	N/S	
4	yyyyy.yy	Longitude	
5	a	E/W	
6	x	GPS quality indicator	
7	xx	Number of satellites in use, 00-12, may be different from the number in view	not processed
8	x.x	Horizontal dilution of precision	not processed
9	x.x	Antenna altitude above/below mean sea level (geoid)	not processed
10	M	Units of antenna altitude, meters	not processed
11	x.x	Geoidal separation: the difference between the WGS-84 earth ellipsoid surface and mean sea level (geoid) surface, " – " = mean sea level surface below the WGS-84 ellipsoid surface.	not processed
12	M	Units of geoidal separation, meters	not processed
13	x.x	Age of differential GPS data: time in seconds since last SC104 type 1 or 9 update, null field when DGPS is not used.	not processed
14	xxxx	Differential reference station ID, 0000-1023	not processed

➢ **GLL – Geographic Position – Latitude/Longitude**

Standard: IEC 61162-1 Ed.3, 2007

Latitude and longitude of vessel position, time of position fix and status.

`$--GLL, llll.ll1, a2, yyyyy.yy3, a4, hhmmss.ss5, A6, a7 *hh<CR><LF>`

No.	Field	Description	Comments
1	llll.ll	Latitude	
2	a	N/S	
3	yyyyy.yy	Longitude	
4	a	E/W	

No.	Field	Description	Comments
5	hhmmss.ss	UTC of position	
6	A	Status: A=data valid; V=data invalid	
7	a	Mode indicator	

- **GNS – GNSS Fix Data**

Standard: IEC 61162-1 Ed.3, 2007

Fix data for single or combined satellite navigation systems (GNSS). This sentence provides fix data for GPS, GLONASS, possible future satellite systems and systems combining these. This sentence could be used with the talker identification of GP for GPS, GL for GLONASS, GN for GNSS combined systems, as well as future identifiers. Some fields may be null fields for certain applications, as described below.

`$-- GNS, hhmmss.ss[1], llll.ll[2], a[3], yyyyy.yy[4], a[5], c–c[6], xx[7], x.x[8], x.x[9], x.x[10], x.x[11], x.x[12] *hh<CR><LF>`

No.	Field	Description	Comments
1	hhmmss.ss	UTC of position	
2	llll.ll	Latitude: degrees and minutes	
3	a	N/S	
4	yyyyy.yy	Longitude	
5	a	E/W	
6	c—c	Mode indicator	
7	xx	Total number of satellites in use, 00-99	not processed
8	x.x	Horizontal dilution of precision	not processed
9	x.x	Antenna altitude above/below mean sea level (geoid), meters	not processed
10	x.x	Geoidal separation, meters	not processed
11	x.x	Age of differential data	not processed
12	x.x	Differential reference station ID	not processed

- **HDG – Heading, deviation and variation**

Standard: IEC 61162-1 Ed.3, 2007

IMO Resolution A.382 (X). Heading (magnetic sensor reading), which if corrected for deviation will produce magnetic heading, which if offset by variation will provide true heading.

`$--HDG, x.x1, x.x2, a3, x.x4, a5*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Magnetic sensor heading, degrees	
2	x.x	Magnetic deviation, degrees	

No.	Field	Description	Comments
3	a	E/W	
4	x.x	Magnetic variation, degrees	
5	a	E/W	

- **HDM – Heading magnetic**

Standard: NMEA 0183 v.3, 2000 (not recommended for new designs)

Actual vessel heading in degrees magnetic.

`$--HDM, x.x[1], M[2]*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Magnetic heading, degrees	
2	M	Heading type: M for magnetic	

- **HDT – Heading true**

Standard: IEC 61162-1 Ed.3, 2007

Actual vessel heading in degrees true produced by any device or system producing true heading.

`$--HDT, x.x1, T2*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	True heading, degrees	
2	M	Heading type: T for true	

- **MWV – Wind speed and angle**

Standard: IEC 61162-1 Ed.3, 2007

When the reference field is set to R (Relative), data is provided giving the wind angle in relation to the vessel's bow/centerline and the wind speed, both relative to the (moving) vessel. Also called apparent wind, this is the wind speed as felt when standing on the (moving) ship.

When the reference field is set to T (Theoretical, calculated actual wind), data is provided giving the wind angle in relation to the vessel's bow/centerline and the wind speed as if the vessel was stationary. On a moving ship these data can be calculated by combining the measured relative wind with the vessel's own speed.

`$--MWV, x.x1, a2, x.x3, a4, A5 *hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Wind angle, 0° to 359°	
2	a	Reference, R = relative, T = true	
3	x.x	Wind speed	
4	a	Wind speed units: K = km/h; M = m/s; N = knots	
5	A	Status: A = data valid; V= data invalid	

- **RMC – Recommended minimum specific GNSS data**

Standard: IEC 61162-1 Ed.3, 2007

Time, date, position, course and speed data provided by a GNSS navigation receiver.

`$--RMC, hhmmss.ss[1], A[2], llll.ll[3], a[4], yyyyy.yy[5], a[6], x.x[7], x.x[8], xxxxxx[9], x.x[10], a[11], a[12]*hh<CR><LF>`

No.	Field	Description	Comments
1	hhmmss.ss	UTC of position fix	
2	A	Status: A = data valid; V = navigation receiver warning	
3	llll.ll	Latitude	
4	a	N/S	
5	yyyyy.yy	Longitude	
6	a	E/W	
7	x.x	Speed over ground, knots	
8	x.x	Course over ground, degrees true	
9	xxxxxx	Date: dd/mm/yy	
10	x.x	Magnetic variation, degrees	not processed
11	a	E/W	not processed
12	a	Mode indicator	

- **ROT – Rate of turn**

Standard: IEC 61162-1 Ed.3, 2007

IMO Resolution A.526. Rate of turn and direction of turn.

`$--ROT, x.x[1], A[2]*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Rate of turn, °/min, "-" = bow turns to port	
2	A	Status: A = data valid; V = data invalid	

- **RTE – Routes**

Standard: IEC 61162-1 Ed.3, 2007

Waypoint identifiers, listed in order with starting waypoint first, for the identified route. Two modes of transmission are provided: "c" indicates that the complete list of waypoints in the route is being transmitted; "w" indicates a working route where the first listed waypoint is always the last waypoint that had been reached (FROM), while the second listed waypoint is always the waypoint that the vessel is currently heading for (TO) and the remaining list of waypoints represents the remainder of the route.

`$--RTE, x.x1, x.x2, a3, c--c4, c--c5, ......6 c--c7*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Total number of messages being transmitted	
2	x.x	Message number	
3	a	Message mode	
4	c--c	Route identifier	
5	c--c	Waypoint identifier	
6	……	Additional waypoint identifiers	
7	c--c	Waypoint "n" identifier	

- **SGD – Position accuracy estimate**

Standard: NMEA 0183 v.3, 2000 (not recommended for new designs)

Estimate of position accuracy based on geometric dilution of precision (GDOP) and system noise, in feet and nautical miles.

Limited utility, no recommended replacement.

`$--SGD, x.x1, N2, x.x3, f4*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Accuracy in nautical miles	
2	N	'N' for nautical miles	
3	x.x	Accuracy in feet	not processed
4	f	'f' for feet	not processed

- **THS – True heading and status**

Standard: NMEA 0183 v.3, 2000 (not recommended for new designs)

Actual vessel heading in degrees true produced by any device or system producing true heading. This sentence includes a "mode indicator" field providing critical safety related information about the heading data, and replaces the deprecated HDT sentence.

`$--THS, x.x1, a2*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Heading, degrees true	
2	a	Mode indicator	

- **TLL – Target latitude and longitude**

Standard: IEC 61162-1 Ed.3, 2007

Target number, name, position and time tag for use in systems tracking targets.

`$--TLL, xx[1], llll.ll[2], a[3], yyyyy.yy[4], a[5], c--c[6], hhmmss.ss[7], a[8], a[9]*hh<CR><LF>`

No.	Field	Description	Comments
1	xx	Target number 00 – 99	
2	llll.ll	Target latitude	
3	a	N/S	
4	yyyyy.yy	Target longitude	
5	a	E/W	
6	c--c	Target name	
7	hhmmss.ss	UTC of data	
8	a	Target status: L = Lost, tracked target has been lost; Q = Query, target in the process of acquisition; T = tracking	
9	a	Reference target = R, null otherwise	

- **TTM – Tracked target message**

Standard: IEC 61162-1 Ed.3, 2007

IMO Resolution A.820:1995 and MSC 64(67) Annex 4: Data associated with a tracked target relative to own ship's position.

`$--TTM, xx[1], x.x[2], x.x[3], a[4], x.x[5], x.x[6], a[7], x.x[8], x.x[9], a[10], c--c[11], a[12], a[13], hhmmss.ss[14], a[15] *hh<CR><LF>`

No.	Field	Description	Comments
1	xx	Target number, 00 to 99	
2	x.x	Target distance from own ship	
3	x.x	Bearing from own ship, degrees	
4	a	true/relative (T/R)	
5	x.x	Target speed	
6	x.x	Target course, degrees	
7	a	true/relative (T/R)	
8	x.x	Distance of closest-point-of-approach	
9	x.x	Time to CPA, min., "-" increasing	
10	a	Speed/distance units, K/N/S	
11	c--c	Target name	

No.	Field	Description	Comments
12	a	Target status: L = Lost, tracked target has been lost; Q = Query, target in the process of acquisition; T = Tracking	
13	a	Reference target = R, null otherwise	
14	hhmmss.ss	Time of data (UTC)	
15	a	Type of acquisition	

- **VBW – Dual ground/water speed**

Standard: IEC 61162-1 Ed.3, 2007

Water-referenced and ground-referenced speed data.

$--VBW, x.x[1], x.x[2], A[3], x.x[4], x.x[5], A[6], x.x[7], A[8], x.x[9], A[10]*hh<CR><LF>

No.	Field	Description	Comments
1	x.x	Longitudinal water speed ("-" = astern), knots	
2	x.x	Transverse water speed ("-" = port), knots	not processed
3	A	Status, water speed: A = data valid, V = data invalid	
4	x.x	Longitudinal ground speed ("-" = astern), knots	
5	x.x	Transverse ground speed ("-" = port), knots	not processed
6	A	Status, ground speed: A = data valid, V = data invalid	not processed
7	x.x	Stern transverse water speed ("-" = port), knots	not processed
8	A	Status, stern water speed: A = data valid, V = data invalid	not processed
9	x.x	Stern transverse ground speed ("-" = port), knots	not processed
10	A	Status, transverse ground speed: A = data valid, V = data invalid	not processed

- **VDM – AIS VHF data-link message**

Standard: IEC 61162-1 Ed.3, 2007

This sentence is used to transfer the entire contents of a received AIS message packet, as defined in ITU-R M.1371 and as received on the VHF Data Link (VDL), using the “six-bit” field type. The structure provides for the transfer of long binary messages by using multiple sentences.

Data messages should be transmitted in as few sentences as possible. When a data message can be accommodated in a single sentence, then it shall not be split.

!--VDM, x1, x2, x3, a4, s–s5, x6*hh<CR><LF>

No.	Field	Description	Comments
1	x	Total number of sentences needed to transfer the message, 1 to 9	
2	x	Sentence number, 1 to 9	
3	x	Sequential message identifier, 0 to 9	

No.	Field	Description	Comments
4	a	AIS channel	
5	s—s	Encapsulated ITU-R M.1371 radio message	
6	x	Number of fill-bits, 0 to 5	

- **VDO – AIS VHF data-link own-vessel report**

Standard: IEC 61162-1 Ed.3, 2007

This sentence is used to transfer the entire contents of an AIS unit's broadcast message packet, as defined in ITU-R M.1371 and as sent out by the AIS unit over the VHF data link (VDL) using the "six-bit" field type. The sentence uses the same structure as the VDM sentence formatter.

`!--VDO, x1, x2, x3, a4, s–s5, x6*hh<CR><LF>`

No.	Field	Description	Comments
1	x	Total number of sentences needed to transfer the message, 1 to 9	
2	x	Sentence number, 1 to 9	
3	x	Sequential message identifier, 0 to 9	
4	a	AIS channel	
5	s—s	Encapsulated ITU-R M.1371 radio message	
6	x	Number of fill-bits, 0 to 5	

- **VDR – Set and drift**

Standard: IEC 61162-1 Ed.3, 2007

The direction towards which a current flows (set) and speed (drift) of a current.

`$--VDR, x.x1, T2, x.x3, M4, x.x5, N6*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Direction, degrees true	
2	T	'T' for true	
3	x.x	Direction, degrees magnetic	not processed
4	M	'M' for magnetic	not processed
5	x.x	Current speed in knots	
6	N	'N' for knots	

- **VHW – Water speed and heading**

Standard: IEC 61162-1 Ed.3, 2007

The compass heading to which the vessel points and the speed of the vessel relative to the water.

`$--VHW, x.x1, T2, x.x3, M4, x.x5, N6, x.x7, K8*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Heading, degrees true	not processed for speed log
2	T	'T' for true	not processed for speed log
3	x.x	Heading, degrees magnetic	not processed for speed log
4	M	'M' for magnetic	not processed for speed log
5	x.x	Current speed in knots	not processed for gyroscope
6	N	'N' for knots	not processed for gyroscope
7	x.x	Current speed in km/h	not processed
8	K	'K' for km/h	not processed

- **VTG – Course over ground and ground speed**

Standard: IEC 61162-1 Ed.3, 2007

The actual course and speed relative to the ground.

`$--VTG, x.x[1], T[2], x.x[3], M[4], x.x[5], N[6], x.x[7], K[8], a[9]*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Course over ground, degrees true	
2	T	'T' for true	
3	x.x	Course over ground, degrees magnetic	
4	M	'M' for magnetic	
5	x.x	Speed over ground, knots	
6	N	'N' for knots	
7	x.x	Speed over ground, km/h	
8	K	'K' for km/h	
9	a	Mode indicator	

- **WPL – Waypoint location**

Standard: IEC 61162-1 Ed.3, 2007

Latitude and longitude of specified waypoint.

`$--WPL, llll.ll[1], a[2], yyyyy.yy[3], a[4], c--c[5]*hh<CR><LF>`

No.	Field	Description	Comments
1	llll.ll	Waypoint latitude, N/S	
2	a	N/S	
3	yyyyy.yy	Waypoint longitude, E/W	
4	a	E/W	
5	c--c	Waypoint identifier	

- **ZDA – Time and date**

Standard: IEC 61162-1 Ed.3, 2007

UTC, day, month, year and local time zone.

`$--ZDA, hhmmss.ss[1], xx[2], xx[3], xxxx[4], xx[5], xx[6]*hh<CR><LF>`

No.	Field	Description	Comments
1	hhmmss.ss	UTC time	
2	xx	Day, 01 to 31 (UTC)	
3	xx	Month, 01 to 12 (UTC)	
4	xxxx	Year (UTC)	
5	xx	Local zone hours, 00 h to ±13 h	not processed
6	xx	Local zone minutes, 00 to +59	not processed

APPENDIX B List of Output Sentences

The table below lists sentences which can be transmitted by the ECDIS and devices for which the sentences are intended.

Device Type	Sentences
Route Planner	RTE, WPL

➢ **RTE – Routes**

Standard: IEC 61162-1 Ed.3, 2007

Waypoint identifiers, listed in order with starting waypoint first, for the identified route. Two modes of transmission are provided: "c" indicates that the complete list of waypoints in the route is being transmitted; "w" indicates a working route where the first listed waypoint is always the last waypoint that had been reached (FROM), while the second listed waypoint is always the waypoint that the vessel is currently heading for (TO) and the remaining list of waypoints represents the remainder of the route.

`$--RTE, x.x[1], x.x[2], a[3], c--c[4], c--c[5], .....[6] c--c[7]*hh<CR><LF>`

No.	Field	Description	Comments
1	x.x	Total number of messages being transmitted	
2	x.x	Message number	
3	a	Message mode	
4	c--c	Route identifier	
5	c--c	Waypoint identifier	
6	……	Additional waypoint identifiers	
7	c--c	Waypoint "n" identifier	

➢ **WPL – Waypoint location**

Standard: IEC 61162-1 Ed.3, 2007

Latitude and longitude of specified waypoint.

`$--WPL, llll.ll[1], a[2], yyyyy.yy[3], a[4], c--c[5]*hh<CR><LF>`

No.	Field	Description	Comments
1	llll.ll	Waypoint latitude, N/S	
2	a	N/S	
3	yyyyy.yy	Waypoint longitude, E/W	
4	a	E/W	
5	c--c	Waypoint identifier	

APPENDIX C Algorithm and Examples of Manual Position Fix by Range and Bearing LOPs

➢ Algorithm

All measurements are assumed as corrected by systematic device errors (device description table allow modification of this corrections).

All measurements are assumed as containing not correlated random errors (Gaussian distribution with 0 mean value and RMS retrieved from device description table).

All Lines of Position are assumed as Geodetic lines on the reference-ellipsoid (now fixed to WGS 84). Calculations on the ellipsoid use internal algorithm from dKart library.

A position FLa = (λ, φ) is needed for the algorithm. Initial position is usually received from dead reckoning.

Start position covariance matrix Ba is 2x2 diagonal with values for latitude and longitude covariance equal to 10000 m RMS value. This makes no affect of a priory given position to the resulting estimated position.

The iteration calculates as well known minimum RMS

`dFL=1/(1/Ba + H'(1/B)H) H'(1/B) dZ (1)`

`FL=FLa+Cp dFL (2)`

where

`dFL = [dLat dLon]` position tranfser vector;

`B` is NxN (N - number of LOPs) diagonal matrix with diagonal element `Bii = RMSd * RMSd` for distance measurements and `Bjj = RMSbrg * RMSbrg * Drp *Drp`; `RMSd` is a RMS of distance measurements assumed as increasing on more distances in not a linear function; `RMSbrg` is a bearing measurement error (radians) `Drp` - calculated from given position distance to reference point;

`H` is a gradient matrix 2xN dimension with elements calculated as differentials of the LOP parameter by corresponded coordinate Lat or Lon;

`dZ` is a difference vector N - size with element (LOP calculated - LOP measured)

`Cp` is a 2x2 matrix of the Latitude and Longitude effective radius calculated in the FL position.

➢ Measurements aging

When the positioning system (for example Navstar GPS) is used continuously and manual observation is for check the position by another than GPS data the aging is not applied to LOP measurements taken in different time. In the Dead Reckoning mode we assume that Speed Over Ground error SOGerr affects to the aged measurements in SOGerr * DeltaT / D * sin (BRG - COG) for bearing measurements covariance and SOGerr * DeltaT * cos (BRG - COG) for distance measurements.

➢ **Common examples of manual LOP fixes based on 3 bearing lines**

1. Three reference points with bearing differences of 120° equally distant from the dead reckoning position of the own ship

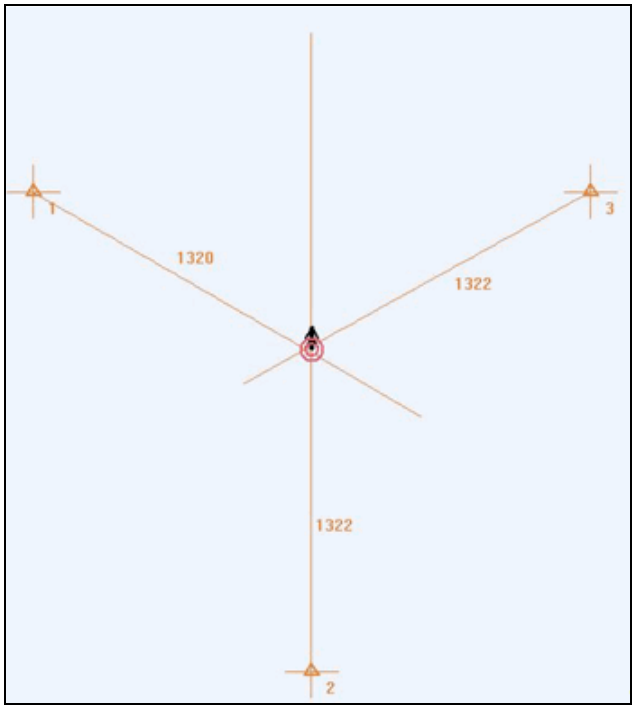

Figure 242 Three reference points, bearing difference is 120°, equally distant from DR position

a. If the time of measurements is the same, lines of position are equally accurate; the observed position is in the center of the error figure, and the figure is a circle

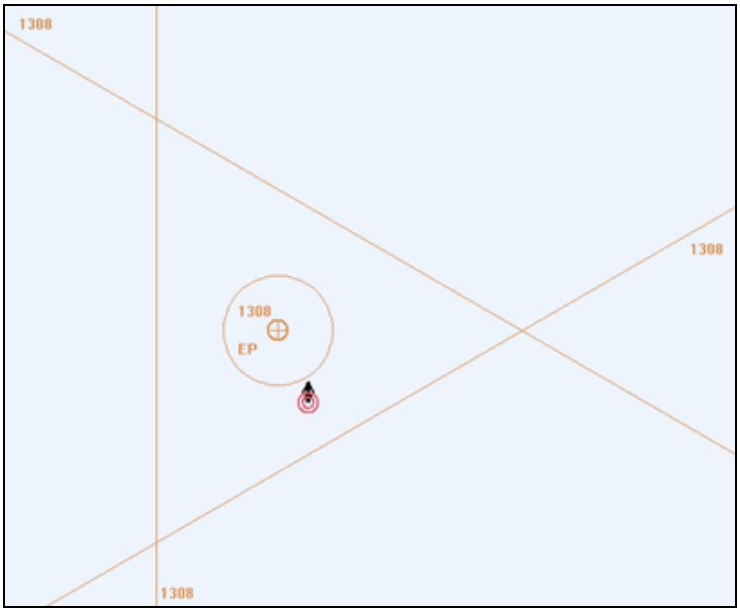

Figure 243 Observed position in the center of the error figure

b. If the time of measurement is different, lines of position are not equally accurate anymore due to measurement aging. For example, if one LOP was measured earlier than the other two, the observed position moves to the intersection of the later measured LOPs.

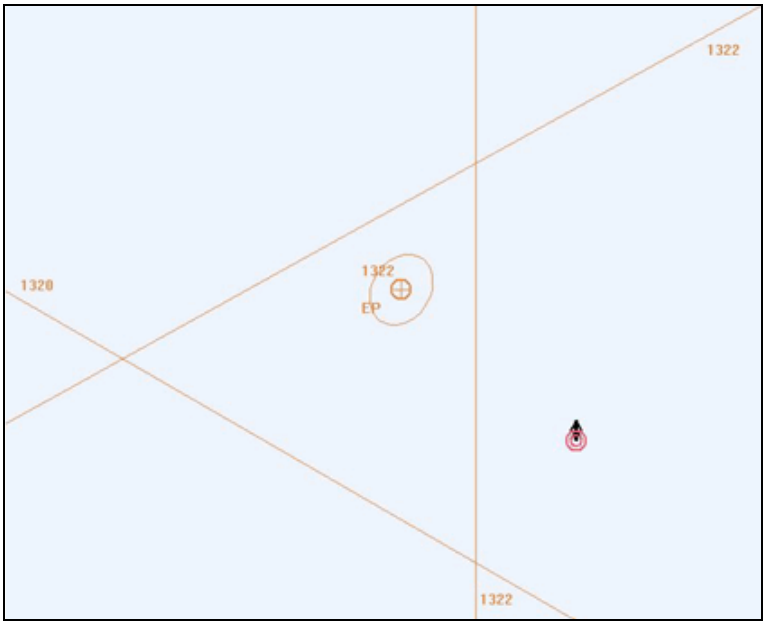

Figure 244 Observed position near the intersection of LOPs measured later

2. Three reference points with bearing difference of 120°, two reference points are equally distant from the dead reckoning position of the own ship, distance to the 3rd reference point is twice as long as to the first two, time of measurement is the same

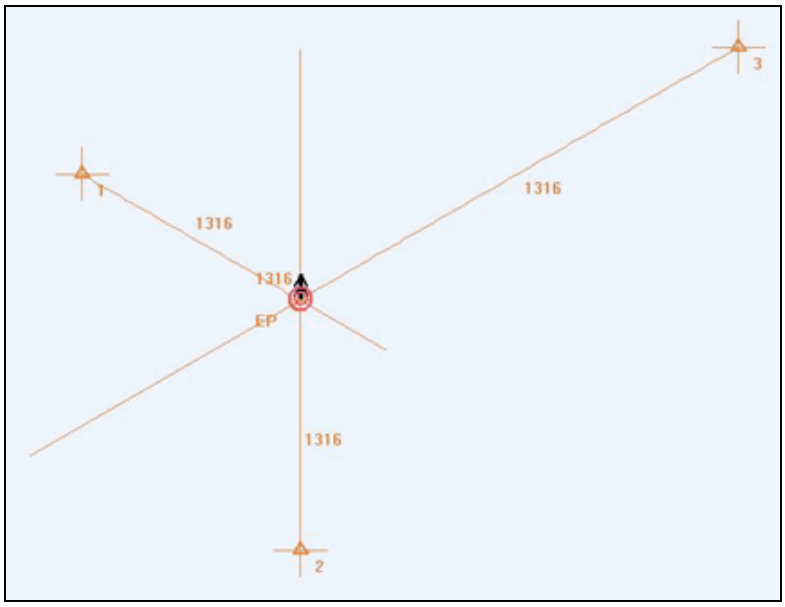

Figure 245 Three reference points, bearing difference is 120°, one reference point is at a double distance from DR position than the other two

The observed position moves to the intersection of the more accurate LOPs; the accuracy ellipse major axis is perpendicular to the less accurate LOP.

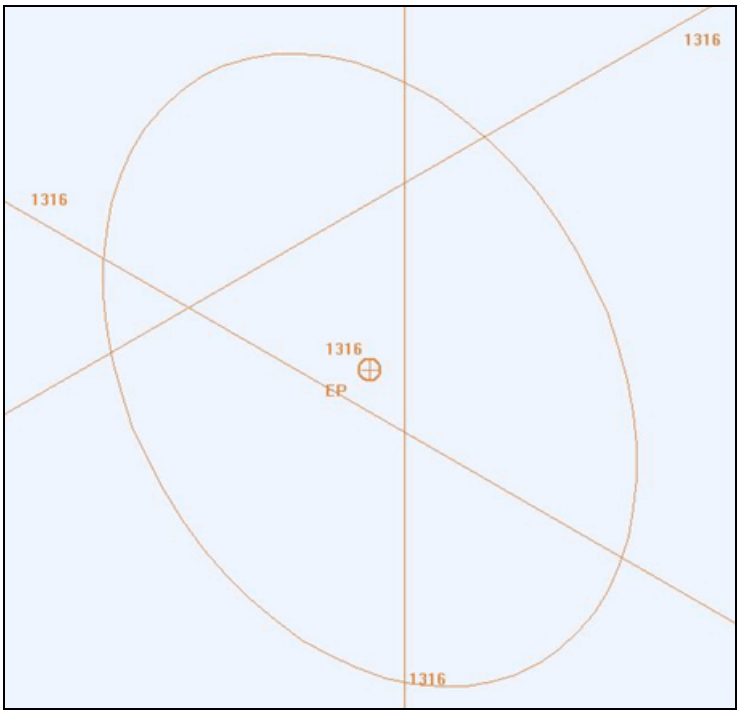

Figure 246 Observed position near the intersection of the more accurate LOPs

3. Two of the three reference points equally distant from the dead reckoning position of the own ship have a small difference between bearings

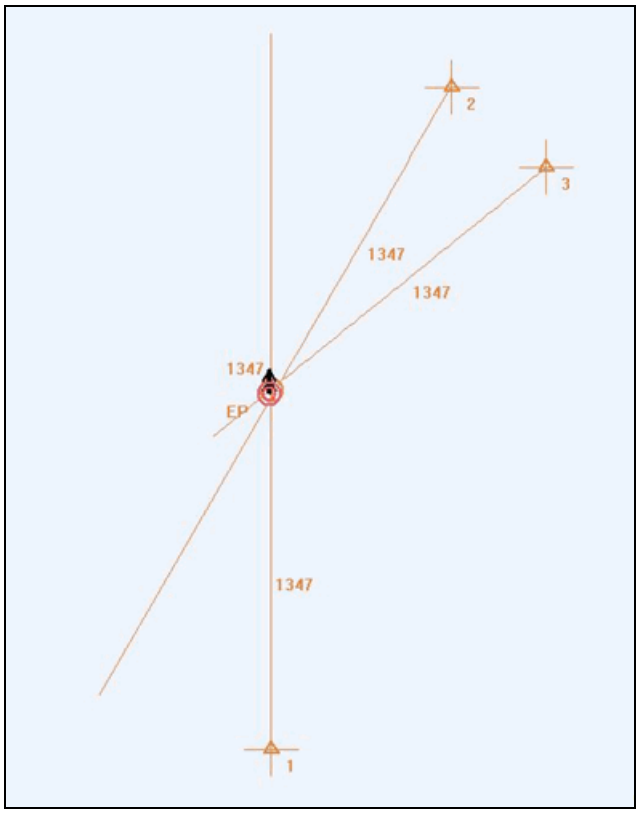

Figure 247 Three reference points, equally distant from DR position, small angle between bearing lines of two points

The observed position is situated near the intersection of LOPs with the angle between them closer to 90°; the accuracy ellipse major axis is aligned with LOPs intersecting at a smaller angle.

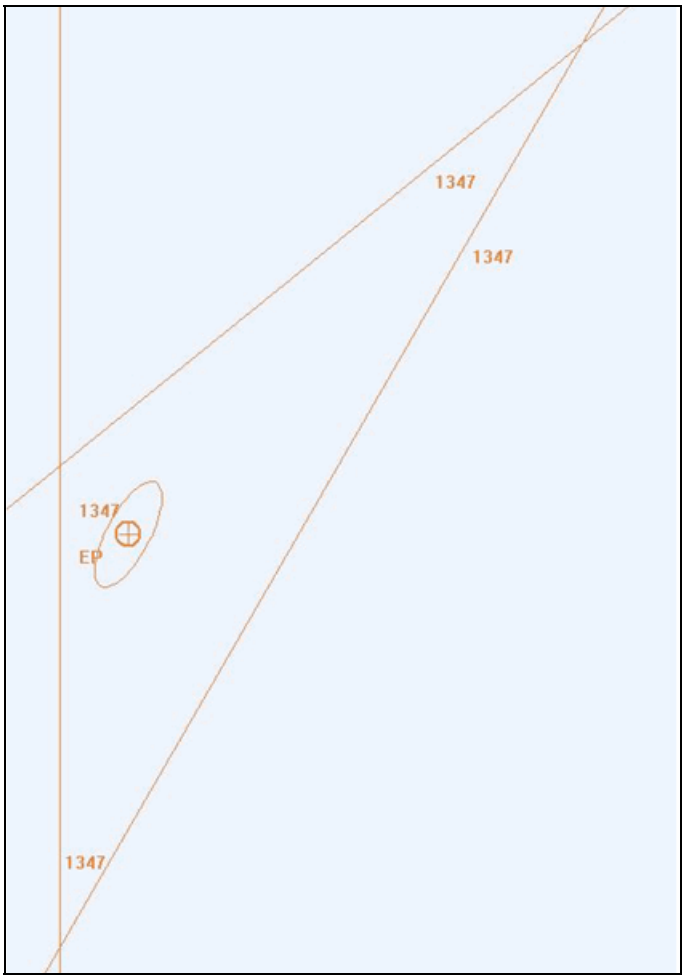

Figure 248 Observed position near the intersection of LOPs with the angle closer to 90°

Glossary

Activated AIS target

A target activated for the display of additional graphically presented information (for example, heading line, velocity vector, etc.)

Aids to Navigation

Usually pertains to buoys, ranges and the like.

AIS

See Automatic Identification System.

ARPA

See Automatic Radar Plotting Aid.

Automatic Identification System (AIS)

AIS provides a means of broadcasting digitally navigation information including ship position/speed/heading/dimension/name/destination/ROT, aids to navigation, base station reports and more. Created by the IMO and sanctioned by the U.S. Coast Guard for ship monitoring and collision avoidance. It is used by ship traffic monitoring and control locations throughout the world to improve situational awareness and help prevent collisions at sea.

Automatic Radar Plotting Aid (ARPA)

The functionality entailing the detection of moving targets and calculating their speed and course. Used to automatically detect radar targets and output to other devices, ARPA is a collision avoidance system.

Autopilot

A self-steering device which attaches to a ship's steering mechanism to control the ship's bearing.

Azimuth

Azimuth of a body is the arc of the horizon intercepted between the North or South point and the foot of the vertical circle passing through the body. It is reckoned in degrees from either the North or South point clockwise entirely around the Horizon. (source: Our Restless Tides).

Bathymetric

Measurement of the depth, contours and slopes of the floor of a body of water (sea, lake, ocean or river), obtained through topographic charting.

Beam

Ship width.

Bearing (BRG)

The angle between the direction of the boat and the reference direction expressed in degrees, with a notation of True or Magnetic Variation (T or M). Due north corresponds to 0 degrees, east to 90, south to 180 and west to 270. For compass bearings, the reference direction is magnetic North. For true bearings the reference direction is true North.

Bearing from Ship to Cursor

This data is an aid in route making and planning. Bering from ship to cursor is expressed in degrees, with a notation of True or Magnetic Variation.

Bookmark

A saved combination of chart selection, zoom level and position on the chart. Created with the **Set Bookmark** command, it may be returned to at any time with the **Go to Bookmark** command.

Bow

The front of a ship

Broadcast Notice to Mariner (BNM)

See Local Notice to Mariners (LNM).

Cartesian Coordinates

Also known as "Rectangular Coordinates". A two-dimensional plane contains an x-axis and a y-axis. Negative x coordinates lay to the left of the y-axis and positive x-coordinates to the right. Negative y coordinates lay below the x-axis and positive above the x-axis.

Chart

Nautical term for maps used in nautical navigation that show the depth of waters as well as land boundaries and other obstructions. Charts may be paper or electronic and electronic charts may be of raster or vector type.

Chart License

Chart Licenses unlock a Chart region. Each license is made up of 16 digits laid out in the following convention: 1234-1234-1234-1234

Closest Point of Approach (CPA)

Predicted closest point a maneuvering boat will get relative to any target, moving or otherwise, located at a point on the relative movement line perpendicular to the reference ship. The minimum horizontal distance between two crafts during a close proximity encounter.

COG

See Course Over Ground.

COM Port

The interface through which the ECDIS can communicate with peripherals. Visual series support 32 COM Ports.

Course

The direction a boat is being steered.

Course Over Ground (COG)

Is the track of the ship over the ground and is based on position changes.

CPA

See Closest Point of Approach

Cross Track Error (XTE)

The distance of a perpendicular line drawn from the ship to an active route leg. Determines how much the ship is straying from the course of a *Route*.

Current

The flow of water characterized by direction and speed. Current speed and direction may change with the tide.

See also Ebb Current and Flood Current.

Dangerous Target

Tracked radar or reported AIS target with a predicted CPA and TCPA that violates values preset by the user. The respective target is marked by a “dangerous target” symbol

Data Sentence

The unit of information sent between peripherals and the ECDIS, conforming to the NMEA 0183 specification.

Dead-reckoned Position

DR position extrapolated from the last accepted position update, based on present course and speed.

Dead Reckoning

A method of navigation where known values (position, course, speed, time and distance to travel) are used to calculate unknown values. Values such as set and drift can also be incorporated.

Deviation

Changes in the magnetic field due to the ferrous composition of surrounding objects affecting the measured direction of magnetic North. Deviation is measured as the angular difference in direction between the actual magnetic heading and the compass heading.

DGPS (Differential GPS)

A network of 60 radio beacons in conjunction with a GPS that sends correction information used to reduce positional error to the 1-3 meter range.

Digital Selective Calling (DSC)

A type of VHF radio that allows boats to contact other, similarly equipped boats using that boat’s *MMSI Number*. DSC allows two radios to communicate selectively with each other while excluding other receivers from using the signal. DSC can report position information.

Display Base

Level of information which cannot be removed from the ECDIS display, consisting of information which is required at all times in all geographic areas and all circumstances. It is not intended to be sufficient for safe navigation.

Display Scale

Ratio between a distance on the display and a distance on the ground, normalized and expressed as, for example 1:10 000.

Dongle

Small hardware device that unlocks the ECDIS.

Dongle Number

Similar to the *Serial Number*, a Dongle Number is attached to the *Dongle*, made up of 20 digits in the following convention: 1234-123456-1234-123456

DR

See Dead Reckoning.

Draft

The extent to which a boat protrudes into water. The draft of a boat may vary due to changes in weight and changes in water salinity.

Drift

The cumulative effect of wind and current on the ship.

DSC

See Digital Selective Calling.

Ebb Current (Ebb)

Movement of tidal current away from shore or down a tidal river or estuary.

Echo Sounder

See Sounder.

Electronic Chart Display and Information System (ECDIS)

A hardware/software/data marine navigation system that meets the specifications of the International Hydrographic Organization (IHO). An ECDIS is the only electronic system allowed to replace paper charts under the International Convention for the Safety of Life at Sea (SOLAS).

Electronic Chart System (ECS)

A system comprised of:

navigation software

navigation data

system hardware

An ECS is any combination of hardware and software that displays marine charts electronically. The term ECS is used specifically when ECDIS specifications are not met by the software/hardware system.

Electronic Navigation Chart (ENC)

An electronic data file containing information that could be used to display a chart. 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 (for example sailing directions) which may be considered necessary for safe navigation.

EP

See Estimated Position.

Estimated Position

Position of own ship determined by the common intersection of two LOPs.

Estimated Time of Arrival (ETA)

The calculated arrival time to an active waypoint, assuming no change in present course and speed or weather conditions. This time is based on computer clock time. For greatest accuracy, make sure computer clock is synchronized with real time.

Fish Finder

See Sounder.

Fix

Position of own ship determined, without reference to any former position, by the common intersection of three or more LOPs.

Flood Current (Flood)

The movement of tidal current up the shore or up a tidal river or estuary.

Geo-reference

To establish the relationship between page coordinates on a planar map and real-world coordinates.

Global Positioning System (GPS)

A worldwide radio-navigation system developed by the US Department of Defense. In addition to military purposes it is widely used in marine, terrestrial navigation and location based services. Uses stationary satellites or a surface signal to locate the ship with a very high degree of accuracy. The term GPS is frequently used to refer to GPS receivers.

GPS

See Global Positioning System.

Great Circle

A Great Circle is the shortest distance between two points on a spheroid. A great circle is formed at the edge of a plane crossing through the center of a sphere. Unlike Rhumb Lines, great circles generally do not have constant bearing (the equator and the meridians are prominent exceptions).

Greenwich Meridian

See Prime Meridian.

GRIB (Gridded Binary)

A general purpose, bit-oriented data exchange format, GRIB is an efficient vehicle for transmitting large volumes of gridded data over high-speed telecommunication lines using modern protocols. GRIB weather communicates large weather data files efficiently.

Heading

The direction the ship is oriented.

High Water (HW)

The maximum height reached by a rising tide.

Higher High Water (HHW)

The highest of the high water (or single high water) of any specified tidal day due to the declinational effects of the Mood and the Sun.

Higher Low Water (HLW)

The highest of the low water of any specified tidal day do to the declinational effects of the Moon and the Sun.

International Hydrographic Organization (IHO)

An organization that provides the specifications for what qualifies as an ECDIS.

Knot (Kt)

A speed unit of one international nautical mile (18520.0 meters or 6,076.11549 international feet) per hour.

Latitude

The designation for angles measuring how far North or how far South a position is. Value range is from 90ºS to 0º at the equator to 90ºN. Latitude values are represented by the Greek letter lambda (λ).

Lat/Lon

Any object's position, expressed in Latitude and Longitude.

Leg

The segment of a route between two waypoints.

Line of Position

Plotted line on which own ship is located determined by observation or measurement of the range or bearing to an aid to navigation or other charted element.

Log

A record of the ship's movements and a place for manual text entries.

Longitude

The designation for angles measuring how far West or how far East a position is. Value range is from 180ºE to 180ºW. Values of longitude are represented with the Greek letter phi (φ).

LOP

See Line of Position.

LORAN (LOng Range Aid to Navigation)

LORAN is a terrestrial-based navigation system using the time interval between radio signals to determine the position of the receiver. LORAN was popular with marine navigation prior to the existence of GPS. The current version of LORAN in use is LORAN-C. LORAN fails under different conditions than GPS, arguably making it a complementary radio-navigation system.

Lost Target

Tracked radar or reported *AIS target* for which the system is no longer receiving valid position data. The target is represented by a "lost target" symbol.

Low Water

The minimum height reached by a falling tide.

Lower High Water (LHW)

The lowest of the high waters of any specified tidal day due to the declinational effects of the Moon and the Sun.

Lower Low Water (LLW)

The lowest of the low waters (or single low water) of any specified tidal day due to the declinational effects of the Moon and Sun.

Magnetic Variation

The degree to which the magnetic north differs from the true north. This data is available from the Current Chart indicator.

Man Overboard (MOB)

Mark that can be placed on a digital chart to indicate emergency location. The ECDIS will track that location to aid in returning the boat to MOB coordinates.

Maritime Mobile Service Identity (MMSI)

MMSI Numbers are a series of nine digits transmitted over a DSC radio path in order to uniquely identify ship stations, ship earth stations, coast stations, coast earth stations and group calls. These identities can be used by telephone and telex subscribers connected to the general telecommunications network principally to call ships automatically.

Mean High Water (MHW)

A tidal datum. The average of the higher high water heights observed over the National Tidal Datum Epoch.

Mean Higher High Water (MHHW)

A tidal datum. The average of all the high water heights of each tidal day observed over the National Tidal Datum Epoch.

Mean Low Water (MLW)

A tidal datum. The average of all the low water heights observed over the National Tidal Datum Epoch.

Mean Lower Low Water (MLLW)

A tidal datum. The average of the lower low water height of each tidal day observed over the National Tidal Datum Epoch.

Mercator Projection

The Mercator projection is a conformal projection devised by Gerhardus Mercator in 1569. Similar to a cylindrical projection in that the horizontal and vertical distances are stretched towards the poles. Unlike the cylindrical projection the vertical and horizontal stretching of the chart preserves shape and direction. Due to increasing distortion towards the poles Mercator charts are not very useful for representing cartographic information towards the poles.

Lines of latitude and longitude are straight lines on the Mercator projection.

On Mercator charts, rhumb lines can be drawn as straight lines because the Mercator projection preserves bearing.

MMSI

See Maritime Mobile Service Identity.

MOB

See Man Overboard.

National Marine Electronics Association (NMEA)

This organization has determined a standard, 0183, to which all data transmission to and from marine peripherals must conform. The NMEA issues standards for interfacing marine electronics devices. Pronounced "nee-ma". Not to be confused with NEMA (National Electrical Manufacturers Association).

Computers directly connected to NMEA producing devices (GPS, heading sensor, etc). receive raw NMEA data. This data conforms to the NMEA 0183 (3.01) specification.

See also NMEA 0183 and NMEA 2000.

NMEA

See National Marine Electronics Association.

NMEA 0183

NMEA 0183 defines the electrical interface and data protocol for communications between marine instrumentation. Many times referred to as "NMEA" in the context of marine instrumentation communications.

NMEA 2000

This standard contains the requirements for a serial data communications network to inter-connect marine electronic equipment on ships. It is multi-master and self configuring and there is no central network controller. Equipment designed to this standard will have the ability to share data, including commands and status with other compatible equipment over a single channel. (source: http://www.nmea.org/pub/2000/)

NOAA (National Oceanic and Atmospheric Administration)

NOAA is a federal agency focused on the conditions of the oceans and the atmosphere. NOAA supplies navigation chart information for the coastal U.S. and the Great Lakes region.

Overscale

Display of the chart information at a display scale larger than the compilation scale. Overscaling may arise from deliberate overscaling by the mariner, or from automatic overscaling by ECDIS in compiling a display when the data included is at various scales.

Pan

To move the view window over the chart. (Also called Scrolling).

Past Track

An onscreen and/or logged record of a ship's previous movements.

Polyconic Projection

The polyconic projection involves projecting the surface of the Earth onto a series of cones situated with their apexes over the poles.

Port

Port designates the left side of a boat as seen standing on the deck facing toward the bow. Port side is indicated with a red light.

Prediction Vector

A vector displayed in front of the vessel showing where the boat will be after a specified period of time, assuming no intervening heading or speed changes.

Prime Meridian

The meridian of longitude which passes through the original site of the Royal Observatory in Greenwich and used as the origin of Longitude. Also known as the Greenwich Meridian.

RADAR (RAdio Distancing And Ranging)

Microwave pulses used to detect objects (usually metallic) based on wave reflection.

Radio Technical Commission for Maritime Services (RTCM)

In the United States, the Federal Communications Commission (FCC) and U.S. Coast Guard use RTCM standards to specify radar systems, Emergency Position Indicating Radio Beacons and the basic version of Digital Selective Calling (DSC) radios.

Range

The distance between two specified points, usually the ship and a mark.

Range from Ship to Cursor

The distance between the ship icon and the cursor.

Raster Chart

Charts where the chart information is stored as a rasterized image. Examples are raster charts are Raster Plus (RPL), BSB and GeoTIFF. Rasters are the scanned images of the original paper chart.

Rate Of Turn (ROT)

The speed at which heading is changing.

Rhumb Line

A Rhumb Line is a line of constant bearing. Unlike great circles, rhumb lines are usually not the shortest path between two points on a sphere. Part of the utility of rhumb lines is that they can be drawn as straight lines on Mercator projections. Rhumb lines have the advantage of being easy to navigate because they follow a constant bearing. The parallels of the earth are examples of rhumb lines. Rhumb lines are undefined values at the poles.

A rhumb line of sufficient length will usually tend to spiral around the earth towards a pole forming a loxodrome. Such spiraling rhumb lines will form a logarithmic spiral on a polar stereographic projection.

ROT

See Rate Of Turn.

Route

Desired path of travel, created on a chart or grid and consisting of starting, ending and any number of interim waypoints. The ECDIS can instruct a properly connected autopilot to steer along the path of a *Route*.

Scale

See Zoom.

Scroll

To move different parts of a long list into view, using the arrow buttons or scroll bar. Also, scroll is often used as a synonym for pan.

Selected Target

Target selected manually or automatically for the display of detailed alphanumeric data, information and text in a separate user dialogue area. The target is represented by a “selected target” symbol.

SENC

See System Electronic Navigational Chart.

Set

The cumulative effect of wind and current on the direction of a ship.

Slack Water (Slack)

The state of a tidal current when its speed is hear zero, especially the moment when a current changes direction and its speed is zero.

Sleeping AIS Target

AIS target indicating the presence of a vessel equipped with AIS in a certain location. The target is represented by a “sleeping target” symbol indicating the vessel’s orientation. No additional information is presented until the AIS target is activated.

SOG

See Speed Over Ground.

Sounder (also known as Fish Finder or Echo Sounder)

A Sounder uses ultrasonic pulses to detect the distance to the sea floor, calculating the time interval between signal transmission and the detected reflected signal.

Source Scale

The original scale of a paper chart from which an electronic chart is derived.

Standard Display

Level of information that should be shown when a chart is first displayed on ECDIS. The level of the information it provides for route planning or route monitoring may be modified by the user according to the user's needs.

STW

See Speed Through Water.

Speed Over Ground (SOG)

SOG is the actual, fixed, geographic speed of a ship over the earth’s surface. It is essentially the *Speed Through Water (STW)*, plus the cumulative effect of wind and current.

Speed Through Water (STW)

STW is the relative speed of the vessel over water surface. *See also Speed Over Ground (SOG).*

Starboard

Starboard designates the right side of the boat as seen standing on the deck facing toward the bow. Starboard side is indicated with a green light.

Stern

The rear of a ship.

System Electronic Navigational Chart (SENC)

A database in the manufacturer’s internal ECDIS format, resulting from the lossless transformation of the entire ENC contents and updates. It is this database that is actually accessed by ECDIS for the display generation and other navigational functions, and is the equivalent of an up-to-date paper chart. The SENC may also contain information added by the mariner and information from other sources.

Target

In nautical terminology, a target is generally an obstacle or object in or near the water to avoid for the purpose of safe navigation.

TCPA

See Time to Closest Point of Approach.

Tidal Currents

Tidal currents (a horizontal motion) are a result of the rise and fall of the water level due to tides (a vertical motion). The effects of tidal currents on the movement of water in and out of bays and harbors can be substantial.

See Neap Tides.

Tide

The change in ocean levels due to gravitational influences external to the Earth. Formulas for calculating tides can be found in tide and current tables provided by NOAA and the British Admiralty.

Time to Closest Point of Approach (TCPA)

This is the time remaining until the closest point of approach of a target.

Time To Go (TTG)

The amount of time estimated until the ship reaches an active waypoint, assuming no intervening change in course or speed. Displayed in hours and minutes.

TTG

See Time To Go.

Universal Transverse Mercator Projection (UTM)

UTM is similar to the Mercator projection except the projecting cylinder is mapped transverse to the meridians and the Mercator projection used is a secant variation where the map scale to nominal scale is 0.9996.

The UTM segments the earth into 60 six degrees of longitude wide zones where the cylinder is oriented along the central meridian of a zone. The zones extend from 84ºN to 80ºS. The sixty zones start 180 degrees east and proceed eastward. The usage of zones allows the UTM projection to be used over the entirety of the Earth while minimizing distortion towards the poles.

User-added Electronic Chart Information

Electronic chart information manually entered by the user for presentation (for example, navigational notes, safety zones of interest, local notices to mariners, etc.)

Variable Range Marker (VRM)

Term describing a circle around the boat. When enabled, the VRM can be manually manipulated to change the radius.

Variation

Also known as Magnetic Variation and Declination. The angular difference in direction between true North and magnetic North.

Vector Chart

A chart where chart information is stored in terms of points, lines and polygons. NCX and TX-97 charts are vector chart formats.

Velocity Made Good (VMG)

The speed at which the boat is moving towards its intended destination, regardless of the ship's direction.

Vertical Datum

For marine applications, a base elevation used as a reference from which to reckon heights or depths. It is called a tidal datum when defined in terms of a certain phase of the tide. Tidal datums are local datums and should not be extended into areas which have differing hydrographic characteristics without substantiating measurements. In order that they may be recovered when needed, such datums are referenced to fixed points known as bench marks. (source: Our Restless Tides).

VMG

See Velocity Made Good.

VRM

See Variable Range Marker.

Waypoint

A mark of which routes are made. The ship, when following a route, steers by successive waypoints.

XTE

See Cross Track Error.

Zoom

To change the apparent scale of a chart in the chart view.

Abbreviations

ACK

Acknowledgement

AIS

Automatic identification system

ARPA

Automatic radar plotting aid

BRG

Bearing

BTW

Bearing to Waypoint

BWW

Bearing Waypoint to Waypoint

COG

Course Over the Ground

CP

Control Point

CPA

Closest point of approach

CS

Conning Station

DGPS

Differential Global Positioning System

D, DIST

Distance

DPT

Depth

DR

Dead reckoning

DTG

Distance to Go

DWP

Distance to Next Waypoint

E

East

ECDIS

Electronic Chart Display and Information System

ECMWF

European Centre for Medium-Range Weather Forecasts

ENC

Electronic Navigation Chart

EP

Estimated position

ERBL

Electronic range and bearing line

ETA

Estimated Time of Arrival

ETD

Estimated Time of Departure

GC

Great Circle

GMDSS

Global maritime distress and safety system

GLONASS

Global Navigation Satellite System

GPS

Global Positioning System

GRIB

GRIdded Binary

HDG

Heading

HO

Hydrographic office

IHO

International Hydrographic Organization

IMO

International Maritime Organization

LAT

Latitude

LOC

Local Mean Time

LON

Longitude

LOP

Line of Position

MMSI

Maritime Mobile Service Identities

MOB

Man Overboard

N

North

N/A

Not Available

NAVTEX

Navigational Telex

NMEA

National Marine Electronics Association

NOAA

National Oceanic and Atmospheric Administration

RAD

Radius

RL

Rhumb Line

RM

Relative motion

RMS

Root Mean Square

ROT

Rate of turn

S

South

SAR

Search and Rescue

SENC

System Electronic Navigational Chart

SOG

Speed Over the Ground

SOLAS

Safety of life at sea

SPD

Speed

STW

Speed through Water

TCPA

Time to Closest Point of Approach

TM

True motion

TTA

Time to Arrival

TTG

Time to Go

UTC

Universal Time, Coordinated.

VRM

Variable range marker

W

West

WOL

Wheel Over Line.

WOP

Wheel Over Point

WP, WPT

Waypoint

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