

Operating Instructions

NACOS Platinum

Software Version 1.0

RADARPILOT Platinum

RADARPILOT (with transceiver NG 3050 / NG 3051)

CONNINGPILOT

The radar transceivers of this NACOS Platinum system are FCC registered as follows:

X-Band 12.5 KW:Q07NG3050X12-5KW

X-Band 25 KW:Q07NG3050X25KW

S-Band 30 KW:Q07NG3051S30KW

For these units the following notes about FCC approval apply:

NOTE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTICE:

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

NOTICE:

Changes or modifications made to this equipment not expressly approved by SAM Electronics GmbH in Hamburg may void the FCC authorization to operate this equipment.

Radiofrequency radiation exposure information:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 21 m between the radiator and your body (30 KW S-Band Radar). For more details (i.e. X-Band and various antennas and transmitting power) please refer to section A chapter 1.1.2 in this manual.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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SAM Electronics GmbH

D - 22763 Hamburg

Service

Customer Support Center

Phone: + 49 (0) 18 03 00 85 53

Fax: + 49 (0) 18 03 00 85 54

E-mail: shipservice@sam-electronics.de

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GENERAL

1 About these Operating Instructions




WARNING

Do not forget to read the chapter on general safety measures. This is obligatory to read! See [chapter I - 2 on page 13](#).

In this chapter, you will find general information about these operating instructions which have been delivered with your NACOS Platinum. It informs you about:

- I-Aim and Scope of these Operating Instructions on [page I-4](#)
- I-Validity of these Operating Instructions on [page I-5](#)
- I-How to Find Information in the Operating Instructions on [page I-7](#)
- I-Typographical Conventions on [page I-10](#)

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1.1 Aim and Scope of these Operating Instructions



WARNING

The NACOS Platinum must only be operated by persons who have passed the relevant mandatory training on the respective systems and applications. Only reading these operating instructions cannot replace such training.

These operating instructions describe how the NACOS Platinum and its software applications work, and how to operate the applications.

Since the operating instructions are generic, i.e. generally applicable to the ship control system NACOS Platinum, some information and functions or features described may not be used in your specific installation. This depends on the customisation of your system. [See chapter 3.2 on page I-23](#). For exact and specific features of your particular installation, please refer to the relevant order and delivery documents.

1.2 Validity of these Operating Instructions

These instructions are valid for the NACOS Platinum and its applications. Specific safety regulations for components used in or in combination with the system are not affected by these instructions.

1.3 Availability of these Operating Instructions

Have these operating instructions always at hand on location. If appl., ensure that copies are available at all relevant operator panels, MFDs and Outstations. You can also access an online version of the operating instructions directly in the NACOS Platinum system. See [chapter "Menu Bar" on page I-56](#).

1.4 How to Find Information in the Operating Instructions

1.4.1 Structure of the Operating Instructions

When reading through or skimming through the overall operating instructions, it is always a good idea to go from general to more specific subjects, i.e. to start with this general part of the operating instructions and then continue with the part describing the application you wish to learn about. Again, in the descriptions of the applications, read the introductory chapters before getting into detail. Otherwise you might miss information which are assumed to be understood in the chapters describing specific details.

The NACOS Platinum Operating Instructions are divided into different parts. The main parts are numbered using roman numbers. The sections of the **main applications** like RADAR and ECDIS and **optional applications** like Autopilot are labelled using capital latin letters, the sub-sections inside these sections are numbered using arabic numbers. The documentation of an application can be handled as a separate document and therefore can also be ordered separately. The structure of the NACOS Platinum Operating Instructions is as follows:

- I-GENERAL
This is the part you are currently reading. It provides general information which are important in order to be able to understand the other parts of the operating instructions.
- II-QUICK START GUIDE
Essential information on the individual applications giving a quick overview of important functions.
- Common Functions
 - Operating in the Permanent Area
 - Navigation Sensors and Instruments
- III-MAIN APPLICATIONS and IV-OPTIONAL APPLICATIONS
Descriptions of the **main applications** and **optional applications**:
 - Common functions
 - Operating in the Permanent Area
 - Navigation Sensors and
 - RADAR
 - ECDIS
 - ...
 - Autopilot (optional)
 - ...
- V-ALARMS
Information regarding NACOS Platinum system alarms.
- F-SENSORS
Descriptions on the sensing equipment installed aboard.
- H-MAINTENANCE
Instructions regarding cleaning, preventive maintenance, regular maintenance.
- VI-LISTS AND INDEXES
Standard key word index, list of figures

1.4.2 How to find Information on Specific Subjects

There will also be the case that you are basically familiar with the NACOS Platinum but only need punctual information on one specific topic or detail. In order to find information on such specific subjects, you can use the

- List of Contents
- Index of key words
Here, you can look up specific key words. You will also find, e.g. the names of functions, controls, and keys like [ESC] or [DUTY] at the beginning of the index.
- II-QUICK START GUIDE
Here you will find essential information on the individual applications which will give you a quick overview of important functions.
- List of Abbreviations
When describing a system like the NACOS Platinum, it is necessary to use terms and expressions which may be unfamiliar to you in the beginning. Most of the technical terms will be explained to you as you read your way through the more general chapters, or when reading the chapters on the specific applications. However, as a general source of information we have provided a list of abbreviations. See VI-LISTS AND INDEXES.

1.5 Typographical Conventions


The typographical conventions used in the operating instructions are kept simple, but still it is essential that you are sure to understand their meaning before reading the instructions. The following special signs are used for specific purposes:

[] (square brackets),

< > (triangular brackets),

{ } (curly brackets),

These signs are used as shown in the following examples:

Expression	Explanation
[KEY NAME]	<p>This convention is used to refer to an operator key on either a panel keypad (Machinery application), a key on a console's keyboard, on a computer keyboard, or on the onscreen keyboard.</p> <p>The text is the same text as on the respective key. The text can be letters, digits or signs. Note that the text inside the brackets is written in capital letters.</p> <p>Example: Press [ALARM LIST] to view the Alarm List. This means that you must press the key with the text "ALARM LIST" written on it, in order to view the Alarm List.</p>
[KEY] + [2nd KEY]	<p>This convention is used to refer to a key combination on the onscreen keyboard or on a computer keyboard. Example: Press [ALT]+[F4] to close the window. This means that you must press and hold the [ALT] key, and while holding the [ALT] key you have to press [F4].</p>
[▲] [▼] [◀] [▶]	<p>The symbols in the square brackets refer to the respective arrow keys on operator panels (Machinery application).</p>
[↑] [↓] [←] [→]	<p>The symbols in the square brackets refer to the respective arrow keys on a console's keyboard, on a computer keyboard, or on the onscreen keyboard.</p>
Abcd List	<p>Heading capitalisation and bold typeface are used when directly referring to names of NACOS Platinum functions and UI elements such as menus, operational modes, reports, lists, etc.</p> <p>The text can be in more than one word.</p> <p>Examples: Select Color & in the main menu. From any mode you can call up the Alarm List by pressing the [ALARM LIST] key on the panel.</p>
Main > Submenu > Sub-Submenu	<p>This is an abbreviated way for: Click on Main, then on Submenu and afterwards on Sub-Submenu</p>
	<p>This symbol indicates a hint.</p>
<variable>	<p>Describes a text string of variable length and contents. The text inside the brackets is not the actual text, but a reference to a text which is individual to your specific system. The length of the text is not specified by the text inside the brackets. The expression can refer to both text and numbers.</p> <p>Example: The display will show <duty engineer>. This means that the display will show the name of the selected duty engineer, e.g. "3RD ENGINEER".</p>

Expression	Explanation
{nnn}	<p>Describes a number with a fixed number of digits which is input or output. The number of letters inside the brackets describes the number of digits. The number must not include any decimal point.</p> <p>Example: Enter a channel number in the format {nnn}. This means that you must enter the number of a unit as a three digit number, without any decimal point.</p> <p>NOTE: You have to use zeros (0) to fill the empty spaces, if the number is less than 100 (e.g. 056)</p>
{nnn.}	<p>Like {nnn}, but there may be a decimal point at any place in the number, or none.</p> <p>Example The value is displayed in the format {nnnn.}. In the example the value may be, e.g. "12.35" or "450.6" or "0045". When entering such values, the decimal point will sometimes be preset by the system.</p>
DD-MMM-YYYY	<p>The date in international format which is used in the system. Example: <i>21 AUG 2009</i> for the 21st of August 2009.</p>
HH:MM:SS	<p>The time format used in the system. The 24 hour format is used. Examples: <i>06:30:00</i> stands for half past six and 0 seconds in the morning (6:30 am) and <i>23:58:00</i> is two minutes to midnight.</p>

Table I / 1 Typographical conventions in these operating instructions

2 Safety Precautions

This chapter describes general safety measures to be taken into account when working with or on the NACOS Platinum. In the chapters describing the applications of the NACOS Platinum you will find further important safety notes and warnings which are specific to the applications.

2.1 Warnings and Notes in these Operating Instructions

The warning levels and styles differ slightly from the suggestions of the ANSI Z.535 standard. We deliberately decided to use a three-level system of warnings in these operating instructions which is a mix of ANSI and ISO standards, and which is very explicit and comprehensible. The different warning levels have the following meaning:



DANGER

This sign is used whenever **severe injuries** or even **death** *will* occur as consequence of un-awareness or disregard of the described safety rules.




WARNING

This sign is used whenever **severe injuries** or even **death** *may* occur as consequence of un-awareness or disregard of the described safety rules.



CAUTION

This sign is used when special care must be taken to prevent unexpected consequences such as damage to equipment, incorrect or incalculable operation and behaviour of equipment.

 **Notes & Hints:** This symbol indicates useful notes and hints which will ease understanding the system or speed up operation.

2.2 Meaning of Safety Signs

The operating instructions use the following safety signs which you will also find on equipment. Their meaning is described shortly in order to give you an idea of the importance and the specific aspects to be aware of.



⚠ DANGER

HIGH VOLTAGE!

In case that the equipment is in use, dangerous voltages are present. Touching live parts of devices energised with these voltages will result **severe injuries** or even **death**. Appropriate actions must be taken. Before starting to work, observe the following safety rules:

1. Switch off the equipment, disconnect the equipment from the mains supply.
2. Take precautions against inadvertent re-connection.
3. To verify that circuits are dead and no voltage is present perform the appropriate measurements.
4. Ground and short-circuit.
5. Cover live parts in the proximity or otherwise protect them against touching.

The dangerous voltages are no longer present.

Voltage may only be applied to components being worked on when this is expressly prescribed (e.g. during troubleshooting). Mains switches are live even when the equipment is switched off. During work always observe the relevant regulations for the prevention of accidents, e.g. German VBG 4, or EN 292. Only use suitable, intact tools and measuring instruments!



⚠ DANGER

DANGER! WORK IN PROGRESS! DO NOT SWITCH!

The switch(es) marked with this sign must never be operated. **Severe injuries** or even **death** can occur as consequence of disregard. The sign will have amendments like the name of the person who has marked the switch(es) and time/date of mounting of the sign. Only the person stated on the sign may remove the sign and operate the switch(es).



⚠ DANGER

TURNING DEVICES!

Marked devices or devices in the vicinity of this sign may start turning automatically if the equipment is in use. Always switch off the respective equipment or drives of the devices. Take precautions to prevent inadvertent reactivation of the devices before you start to work on the devices.

**WARNING****WARNING! ELECTROMAGNETIC RADIATION!**

Marked devices or devices in the vicinity of this sign may emit electromagnetic radiation that can cause injury. Always switch off the respective equipment. take precautions to prevent inadvertent reactivation before you start to work on the devices. Observe the radiation danger zone of radar antennas. See [table A / 1](#).

**CAUTION****ELECTROSTATIC SENSITIVE DEVICES!**

Devices marked with this sign are extremely sensitive with regards to electrostatic discharge (ESD). They may be handled only by qualified personnel who must take the appropriate actions to avoid discharges.

NACOS Platinum components contain electrostatic sensitive devices. Observe precautions for handling. The discharge of electrostatic energy into a semiconductor can destroy the semiconductor or change its properties. Before a respective unit's housing is opened to remove or touch a board, the service equipment, Order No. 586-5011, must be used:

1. The mat must be positioned at the workplace.
2. The added potential equalization cable must be connected to the snap fastener and the clamp to a suitable protective earth contact. The cable contains a 1 MW resistor which must not be removed.
3. The wrist band must be put on. When the spiral cable is connected to the snap fastener, the discharge line is established.
4. Thoroughly grounded soldering, measurement and test tools must be used. If these tools are supplied with power from the 230 VAC mains, this supply must be protected by a fault current plug, stock No. 593-8099.

Boards and units that contain ESD-sensitive semiconductors are marked with the symbol shown above. All assisting persons who might come into contact with the endangered ESD-sensitive boards must also use the ESD equipment.

2.3 General Safety Notes – NACOS Platinum



WARNING

You are obliged to read these operating instructions prior to operation and to adhere to the operating instructions in operation in order to prevent possible danger and to ensure compliance with the designated use of the equipment. Prevention of danger includes that operator personnel are trained and authorised for safe operation of the equipment. We assume no liability for damage due to improper operation which could have been prevented.

NOTE:

Further potential danger when working with and on the NACOS Platinum is described in the respective sections on these processes.

As a very general rule, keep your workplace clean and tidy, it helps preventing accidents! Ensure unobstructed access to all workstations, operator panels, controls, and relevant switchgear cabinets in order to enable instant response to alarms!

2.4 Authorisation and Qualification of Personnel

**⚠ DANGER**

Only authorised persons may operate the NACOS Platinum.
Danger for persons, things and the environment in case of improper operation or maintenance and repair of the NACOS Platinum.
Only authorised persons are permitted to carry out cleaning and maintenance work, or troubleshooting on the NACOS Platinum!

Persons authorised to operate the system are specially instructed and trained operating personnel of the user. Persons authorised to carry out cleaning, maintenance, and troubleshooting are the specially trained and skilled personnel of the user as well as SAM Electronics personnel being qualified by training, knowledge and experience. Persons operating or servicing the NACOS Platinum must be familiar with the general safety regulations and specific safety systems and they must have passed all required training and must have read the relevant operating instructions and manuals before starting work.

2.5 Commissioning



⚠ DANGER

DANGER! WORK IN PROGRESS! DO NOT SWITCH!

It is not permissible to connect the ship's mains to the system before setting-to-work by a qualified and authorised person. The mains must be switched off (e.g. by means of a common isolating switch or a circuit breaker) in the ship's supply or the mains cable must be disconnected until commissioning is carried out.

2.6 Obligatory Safety Inspection

Inspect and survey the safety systems at intervals prescribed by the responsible classification society or other relevant authorities.

3 NACOS Platinum System Description

3.1 What is the NACOS Platinum?

The NACOS Platinum is the state-of-the-art integrated **N**avigation-**A**utomation-**C**ontrol-**S**ystem from SAM Electronics. It consists of separate applications which form the desired specific system installed on a ship. In an installation, the set of applications may range from a stand-alone RADAR installation to a full-featured comprehensive installation.

The NACOS Platinum design is the result of the efforts of a multidisciplinary usability team consisting of specialists from SAM Electronics, Chalmers University (Gothenburg, Sweden) and TNO Human Factors (Soesterberg, The Netherlands). In addition to high quality and reliability of the cost-effective solution, the main focus of the NACOS Platinum is on usability, modularity and scalability, ease of installation, commissioning and servicing, as well as integration with third-party systems.

NACOS Platinum products serve a large variety of possible installations in a professional shipborne environment ranging from stand-alone RADAR installations meeting the minimum requirements aboard up to complex installations on a large ship including RADAR, ECDIS, Route Planning, Conning, Machinery and various other applications to navigate the ship safely, and reliably to monitor and control the processes aboard.

The applications of the NACOS Platinum are operated using standardised workstations. The workstations will be called **Multi Functional Display (MFD)** further on. See [chapter I - 4 on page 27](#). MFDs are the standardised operating consoles used as MMI to the NACOS Platinum. They are based on PCs running under Windows 7. From a MFD, you will have access to the applications installed in your NACOS Platinum so that the workplaces aboard are standardised. All applications can be made available at any MFD. See [chapter I - 3.2 on page 23](#).



Fig. I / 1 MFD console design

The full suite of NACOS Platinum applications and possibly integrated third-party products provide the user with the required information and control functions and thus essentially support the user in performing the assigned tasks both in everyday routines and in difficult situations or in case of problems. The vast amount of information resulting from the ship's operation is always presented in a well-structured and concise manner so that users will have a clear overview of the ship's situation at all times.

3.2 Customisation

Your NACOS Platinum has been customised by SAM Electronics according to the ship-specific requirements which were specified when the system was ordered. In this context, customising means installing the required hardware and setting up the configuration of the hardware according to the ship-specific requirements.

Customisation covers the selection of available applications to meet your specific requirements but also involves adaptations regarding the individual applications. For example, the number of operator panels used in the Machinery application can be individually configured. This is done using special system tools which are used by SAM Electronics engineers and technicians only, and documented in the delivery documents.

Hence, in these operating instructions, the words "customisation" and "configuration" refer to the customisation provided by SAM Electronics, unless specific NACOS Platinum functions such as, e.g., the printer configuration are dealt with. For exact and specific features and functional scope of your particular installation, please refer to the relevant order and delivery documents.

NACOS Platinum products serve a large variety of possible installations in a professional shipborne environment ranging from stand-alone RADAR installations meeting the minimum requirements aboard to complex installations on a large ship including RADAR, ECDIS, Route Planning, Conning, Machinery (Automation) and various other applications to navigate the ship safely, and to monitor and control the processes aboard.

Installation, customisation, configuration, as well as initial startup are carried out by SAM Electronics according to the order specifications upon delivery of the NACOS Platinum. Thus, this is not covered by these operating instructions. The actual installation aboard a ship is always specifically customised to the individual needs. The scalability of the NACOS Platinum enables individual systems across the entire product range, e.g. a the minimum ship configuration in the figure below, the so-called IMO set:

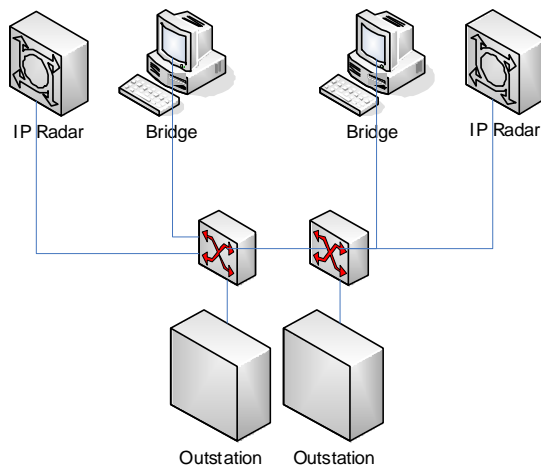


Fig. I / 2 Minimum installation – IMO set

At a higher expansion stage, a small-ship configuration could include RADAR as well as Navigation & Automation:

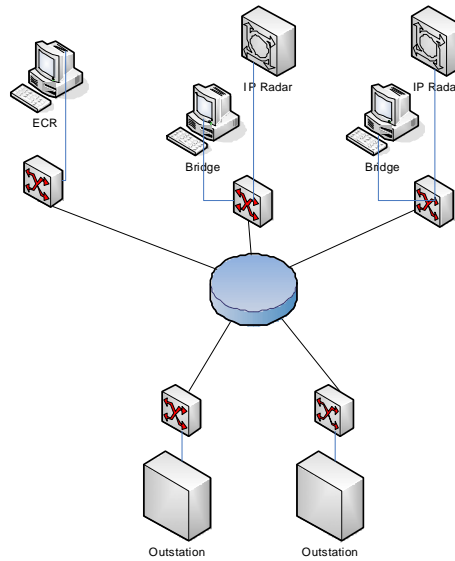


Fig. I / 3 Example of a small-ship installation

An example for a complex installation on a large ship is shown in the following figure below:

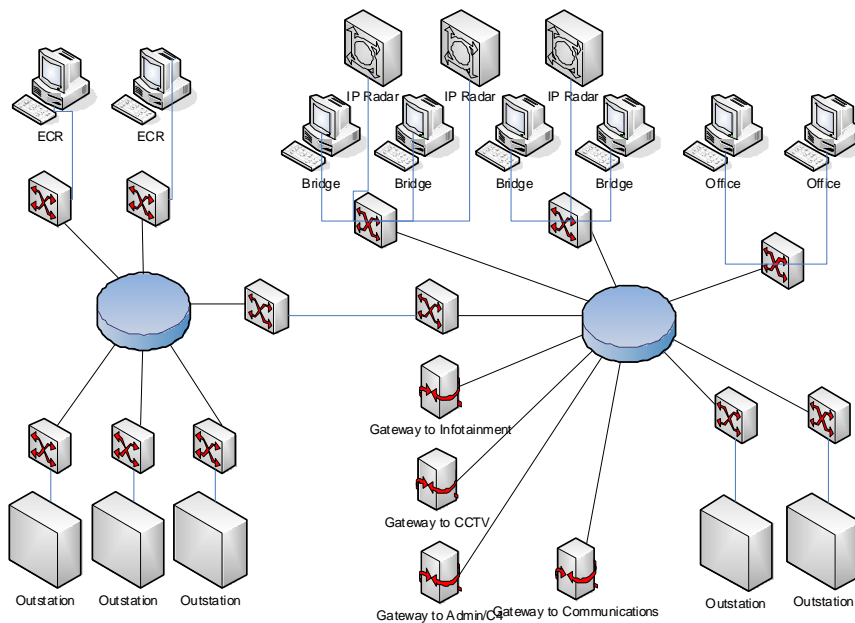


Fig. I / 4 Example of a large-ship installation

3.3 Applicable Standards

This section lists the standards and class rules the NACOS Platinum is complies with. Basically, the NACOS Platinum meets the relevant IMO INS and IMO IBS requirements. The individual standards are listed in the following.

Application	Applicable standards
RADAR	IEC 60945 / IEC 61162 / IEC 62288 / IEC 62388 / MSC.192(79)
ECDIS	IEC 60945 / IEC 61162 / IEC 62288 / IEC 61174 / MSC.232(82)
Heading Control System	IEC 60945 / IEC 61162 / IEC 62288 / ISO 11674
Track Control System	IEC 60945 / IEC 61162 / IEC 62288 / IEC 62065 / MSC.64(69) Annex 2

Table I / 2 Applicable Standards

4 Multi Function Display

This chapter describes the MFD and the relevant peripheral devices which are required or optional equipment to operate the NACOS Platinum.

4.1 General System Description MFD

The NACOS Platinum applications are operated using standardised MFDs. A MFD is based on a Personal Computer running under Windows 7 which is used for input and output of data of the NACOS Platinum using the graphical user interface (GUI) of Windows. From a MFD, you will have access to the applications installed in your NACOS Platinum. The GUI handling is the same on each MFD, i.e. the workplaces aboard are standardised. All applications can be made available at any MFD. See [chapter 3.2 on page I-23](#).


MFDs are installed in the consoles aboard, and they are equipped with a 22" or 26" TFT monitor and a trackball. Optionally, MFDs can also be equipped with mouse and keyboard. See [chapter 4.2 on page I-29](#).



Fig. I / 5 MFD

The GUI is based on Microsoft Windows 7. However, you do not have direct access to Windows so that the MFD cannot be used like a normal PC, e.g. to install software and run applications other than the applications related to the NACOS Platinum.

In these operating instructions, we assume that you are reasonably familiar with basic Windows functions such as window operations, dialogue handling, menu and button operation, selecting list items or options, and so on. Nevertheless, many of the screen elements and basic operations are explained in these operating instructions. See [chapter 5 on page I-45](#), which explains features which are specifically important for operation of the NACOS Platinum.

When the MFD is started, a basic screen is displayed, which is referred to as Super Home from where you have access to all functions and information which are available on the specific MFD. If the MFD is already running, select **Super Home** from the main menu or click  in the menu bar to switch to Super Home. See [chapter 5.1 on page I-46](#).

4.2 Operating Devices

4.2.1 Pointing Devices – Trackball and Mouse

All user interface controls are operated by the mouse or trackball which is connected to the respective MFD. Even if you are already familiar with using input devices like mouse or trackball, you will find one or the other important note in this section.

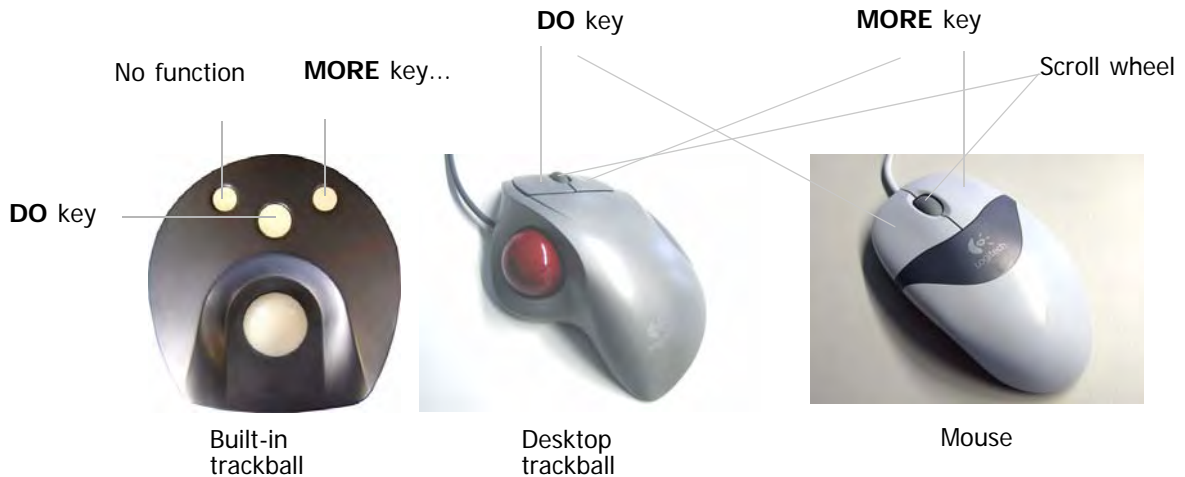



Fig. I / 6 Possible pointing devices

To start an operating step move the pointer on the screen by moving the trackball or mouse. Move the pointer to the desired position on the screen, e.g. to a text item, a numerical value, a symbol, or any desired position e.g. on the PPI. The shape of the pointer changes when you point at different elements on screen. The pointer's shape depends on the application and the element you point at. [See chapter I - 5.10 on page 82.](#)

When you point at a click-sensitive (clickable) element on screen then you can press and release (click) one of the trackball keys to display information or activate a function. The possible types of clicks are explained separately. [See chapter I - on page 31.](#) The specific effect of clicking depends on the key used, the element you clicked, and the operating situation. This is described in the specific parts of these operating instructions. Desktop trackball or mouse have two different buttons, **DO** and **MORE** key. The functions of the **DO** and **MORE** keys are described in the following.

DO Key

The most frequently used of the keys is the **DO** key, i.e. the middle key on the built-in trackball and the left button of the desktop trackball and mouse. Most elements on screen respond to this key by opening a menu from which you can select frequently used functions.

 In these operating instructions, "clicking" always means pressing the **DO** key. When you have to press the **MORE** key or the right mouse/trackball button, this will be explicitly explained in the instructions.

MORE Keys

On the built-in trackballs the two keys are situated above the **DO** key, The right one is called **MORE** key. The left key has no function. On the desktop trackball and mouse, this is the right button. The functions of the **MORE** key depend on the element you point at on screen. In some cases pressing the **MORE** key opens menus, in other cases additional information are displayed. However, not all elements which can be operated by means of the **DO** key will also respond to the **MORE** key.

Scroll Wheel

If a scroll wheel is available, it can be used to scroll down lists or to zoom into or out of charts. Only mouse and desktop trackball may be equipped with a scroll wheel.

Types of Clicks

In NACOS Platinum you point at elements on screen and click or press the **MORE** key to display information or cause action. The following types of clicks are possible:


Click	Explanation
Single click of left key or DO key	Perform action. This means pressing and immediately releasing again the DO key of the built-in trackball, or the left mouse or trackball key respectively. When you click on a button, this will start a process or open a dialogue. when you click on dropdown menus, this will open the menu. In a menu, to select an item, click on the item with a single click. A single click will also select and thus highlight an entry in a list.
Double-click of left key or DO key	In tables, a double-click will open a cell for editing. A cursor is displayed, and you can change the respective value like a text field. Editing resembles editing cells in Microsoft Excel. An example for such a table is a waypoint list that contains the waypoint number, name, position and some other properties, which you can change in that table by double-clicking on the cells. When you click on a folder icon  in folder structures, which you will find, e.g., in the Machinery application, a double-click opens that folder and lists the subordinated contents.
Press the MORE key or right-click using mouse or desktop trackball	Get information, in many cases via a context menu. This is used for providing you with object-specific menu items, such as menus for properties and maintenance. These functions also provide access to adjustments, particularly in the Machinery application. Examples are: acknowledging alarms, displaying properties, etc.

Table I / 3 Types of clicks in NACOS Platinum

4.2.2 Keyboard

To enter alphanumerical values and also to operate the user interface, the MFD may be equipped with a membrane keyboard, which is integrated in the console.



Fig. I / 7 Keyboard of a console

In some cases, an optional external keyboard is provided. For that purpose, a standard PC keyboard is used. Depending on the application you are working with, the function keys in the top row may have special functions. Please refer to the relevant descriptions of the individual applications. For example, in the RADAR applications, function keys have different functions than in the Machinery application.

If no external keyboard is available at all, values can also be entered using the so-called onscreen keyboard which is an optional feature of the NACOS Platinum user interface. However, this depends on customisation. There may be a separate icon for the onscreen keyboard.



Fig. I / 8 Onscreen keyboard

You can use this keyboard to enter text and numeric values or press function keys, just as you do when you use the physical PC keyboard. The onscreen keyboard thus emulates the PC keyboard and it can be used if, for whatever reason, the PC keyboard does not work. Simply click on the buttons to enter the respective letter or number, or activate the respective function of the key.

Note: For the RADAR application the left part and for the TRACKPILOT the right part of the MFD console can be equipped with a dedicated keyboard panel. See the respective chapters for details.

4.2.3 The ASCII Keyboard



Fig. I / 9 The Optional ASCII Keyboard

The MFD can be equipped with a ASCII keyboard in the console. It works like a common computer keyboard, except for the fact that the backlight can be dimmed and that the location of the key-groups is different and that the location of the key-groups is different.

4.2.4 The RADAR Keyboard



Fig. I / 10 The RADAR Keyboard

4.2.5 The TRACKPILOT Keyboard



Fig. I / 11 The Trackpilot Keyboard

4.3 TFT Monitor

The NACOS Platinum user interface is displayed on a 22" or 26" TFT monitor which is an integrated part of the MFD. The monitor is switched on and off automatically together with the MFD. To adjust the monitor's settings, use the software functions and controls provided. [See chapter I - 5.3.1 on page 52.](#)

4.3.1 Nominal Viewing Distance

The monitors are designed according to IEC 62388. In chapter 6.13.2 of this test standard a maximum pixel pitch of 0.29 mm per metre of nominal viewing distance (1 min of arc) is required. Both monitors have a pixel pitch of less than 0.29 mm. The requirement is fulfilled.

Further-on above standard references to IEC 60945, Clause 4, where a minimum text height is required with 3.5 mm per metre of nominal viewing distance and at least 11 pixels.

The RADARPILOT as well as CHARTPILOT application provide text heights on both monitors (independent of monitor size) as follows:

- "Large font with 5.5 mm
- "Medium size font with 4.5 mm
- "Normal size font with 3.5 mm
- "Small font with 2.5 mm

The small font is not used for navigation related tasks.

☞ The normal size font is used for navigation and determines the nominal viewing distance with 1 metre for both monitors.

This is sufficient for sitting positions in front of one of the workstations (typically 0.8 metre) as well as for a standing position in front of the centre steering console (typically 1.0 metre). In this case the console has a depth of max. 0.8 metre.

4.3.2 Colour Distortions on Monitors with Flat Screens (TFT Monitors)

If the display content on a TFT monitor has remained unchanged for a long period of time and is then replaced by a different display, an effect can occur which is known as "ion spotting" in the case of cathode ray tubes: the previous display is still faintly visible in the form of discoloration. In the case of TFT monitors, in contrast to monitors with cathode ray tubes, this effect is reversible and therefore cannot be regarded as a defect. If the monitor is operated for a long time (several hours or days) with a different display, the discoloration disappears.

4.3.3 Printers

For the different printouts of the NACOS Platinum, two different types of printers are required:

- Line printers for logs and other continually printed lists
- Page printers for complete reports which are printed in one go

Refer to the parts of the operating instructions describing the individual applications.

4.4 Startup and Shutdown of MFDs



WARNING

As long as the ship is at sea and in operation, the NACOS Platinum must be fully operational, i.e. the NACOS Platinum and its applications must not be shut down. UPS systems must not be deactivated.

- ☞ The NACOS Platinum and the related consoles and the electronics equipment are permanently up and running. They are only completely shut down by qualified authorised service personnel in case of servicing and repair. The system components are then separated from the mains using a main switch on the bridge. When switching on the mains supply again, the equipment will startup automatically without further user action.

This section describes how to use the shut-down function, if this is required, e.g. if the power supply has to be switched off during a dockyard period, or if an individual MFD shall be switched off for specific reasons. Proceed as follows to switch off a MFD:

1. Press [Alt] + [F4], or click the **Menu** button and then **Shut Down**.
2. Enter the required password.
3. In the window which is displayed, select **Shut Down** and click **OK**.
The other options **Reboot** or **Log off** can be used to re-boot the MFD immediately or to log off and on again.
4. Separate the unit from the mains using the mains switch on the bridge.

This way, the NACOS Platinum program is terminated and the PC is shut down. The display will be switched off automatically.



CAUTION

Never switch off a MFD without having completed the described shutdown procedure. The TFT display will probably function in a normal manner when just switching off the power and then switching it on again. However, and this applies to all types of PCs used: if, at the moment it is switched off, the PC accesses the hard disk, the hard disk might be permanently damaged resulting in system failure of the MFD and loss of data.

To switch on the MFD use the main power switch (if appl., refer to the drawings in the delivery documents). It will automatically start up and run in normal operating state, Super Home is displayed. If the MFD is already up and running and displaying a screensaver, just move the trackball slightly to display the graphical user interface of the MFD.

4.5 Basic Settings

4.5.1 Adjusting the Display

Use the brightness control symbols in the title bar (☀ and 🌙), in the Brilliance/Data Area menu or the keys on the console to toggle between the available color schemes. See [chapter I - 5.3.1 on page 52](#). With these keys any manual setting done with the sliders is reset to the factory-set default values.

A MORE-click on the symbols opens the **Brilliance/Data Area** menu.

With the **Brilliance** slider, the overall brilliance of the monitor can be set. In parallel, the brightness of the backlight illumination of the radar and/or TRACKPILOT keyboard is set. It is not possible to dim the ASCII-keyboard from here.

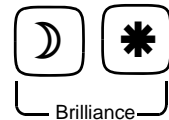


With the **Data Area** slider, the brightness of the elements of the sidebar can be set separately.

The symbols ☀ and 🌙 have the same functions as described above.

The corresponding keys on the console are:

- ☞ If the screen appears completely dark due to a brilliance setting which is unsuitable for the actual ambient light and the symbols are no longer visible, just move the mouse pointer into the top left corner and press a few times the DO button. Brilliance will light up again.



- ☞ In the PPI/or chart area the brilliance of the scales or the user symbols can be set separately. Use a MORE-click in the PPI/or chart area in order to open the context menu and set the appropriate sliders.

4.5.2 Setting Date and Time

Both date and time will be displayed permanently in the title bar: .

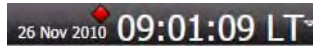



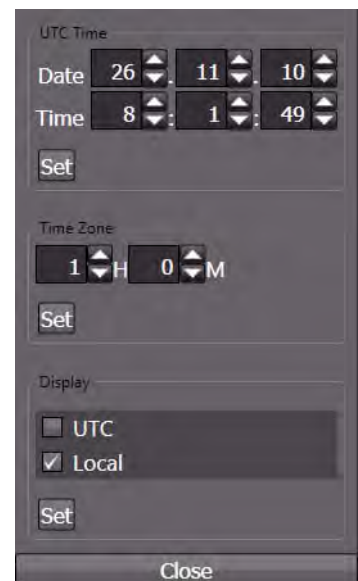
Fig. I / 12 Date and Time Display

The symbol  indicates that external synchronization of system time is not available – so that system time is running on the internal clock in the time-master DPU. Once the external time source becomes available again, the time is adjusted accordingly, and the red symbol disappears.

To set Date/Time click on the small arrow at the very right. A dialog window opens.

The operation of the controls is self-explanatory, do not forget to click on **Set** after having corrected the values in order to apply them to the system.

Click on **Close** to leave the dialog.




5 NACOS Platinum Graphical User Interface


This section describes the Graphical User Interface (GUI) of the NACOS Platinum. This includes the basic screen layout starting from the moment the system is first switched on, as well as the basic screen elements and controls, general screen navigation, and how to switch between the individual NACOS Platinum applications.

- ☞ The descriptions of the user interface in this chapter start from very general, i.e. with the big areas and elements on screen which are then broken down to detailed explanations on specific items on screen in the subsequent sections. If you are not familiar at all with the basic Windows controls and mouse/trackball pointers, it might be useful to read the respective sections before starting here. [See chapter I - 5.9 on page 69.](#)

5.1 Super Home

Super Home is the first screen that is displayed on screen after start-up of the MFD. Super Home will help you in quickly starting the main applications, and provide help in finding specific functions through the homepages of the individual applications. When you are working with the system, you can return to Super Home by using the **Super Home** shortcut in the main menu or the  button. **Super Home** provides links to:

- All main applications´ homepages: RADAR, ECDIS monitoring, ECDIS planning, Conning and Machinery / Automation home
- Secondary applications like AIS, Autopilot, Maintenance and possibly third party applications
- Documents that help you getting started.

Super Home has a title bar and menu bar. Clicking on the  button will open the Super Home page regardless of the current active application. Title bar and menu bar are described separately. See [chapter 5.3 on page I-51](#).

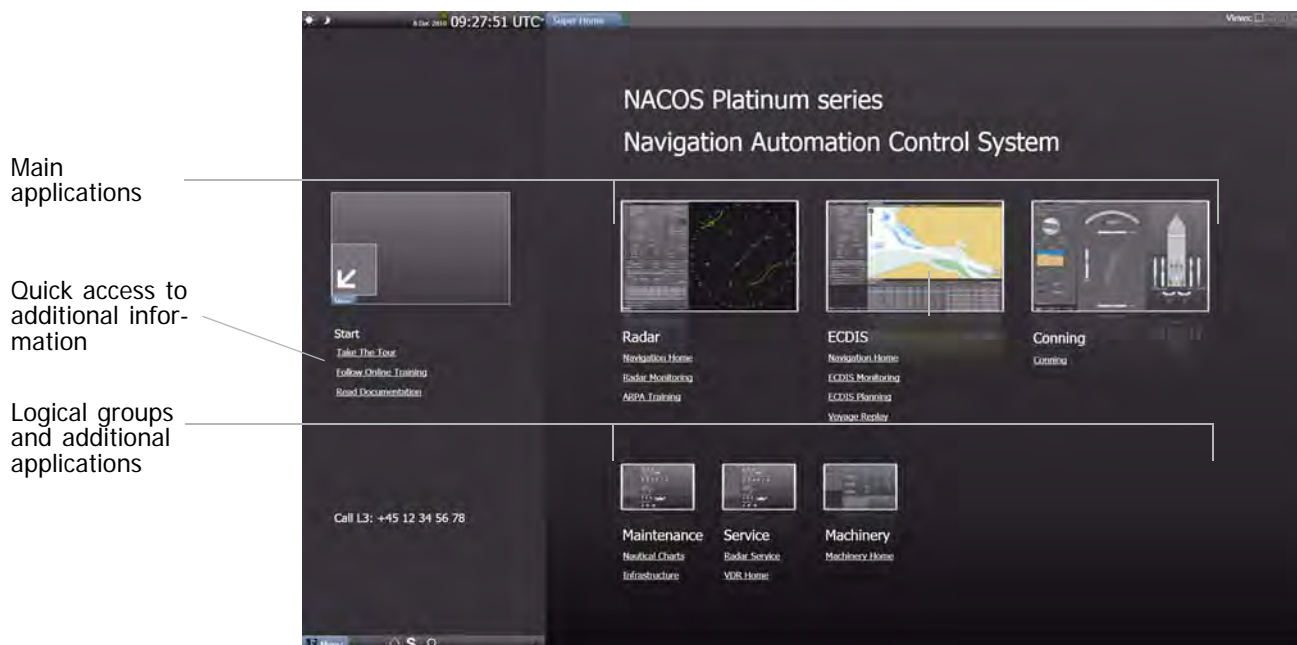


Fig. I / 13 Example of Super Home

The top row of applications of the Super Home page displays the main or primary applications that are installed in the system, in the example: RADAR, ECDIS, Machinery, and Conning. The thumbnail pictures of the applications are clickable and will link to the respective application. For example, if you click on the RADAR thumbnail, this will open the RADAR application.

The first link below the thumbnail of a main application is the link to the homepage of the application. Additional links will lead you to important functions in the applications. The second line of thumbnails contains shortcuts to groups of functionality that are considered a logical group or additional application.

For familiarization with the product, it is possible to select from the quick-links.

- **Take the Tour** opens a presentation in which the advantages and functionality of the PLATINUM are presented.

5.2 Screen Layout

The main page of an application consists of two main areas: the sidebar and the application area. The sidebar on the left provides access to details and functions of the applications. The sidebar is described separately. [See chapter 5.3 on page I-51](#). The application area located on the right shows the main window of the active application. It can show the radar PPI, the ECDIS chart or Machinery mimics etc. The general behaviour of the application area is described separately. [See chapter 5.4 on page I-59](#).

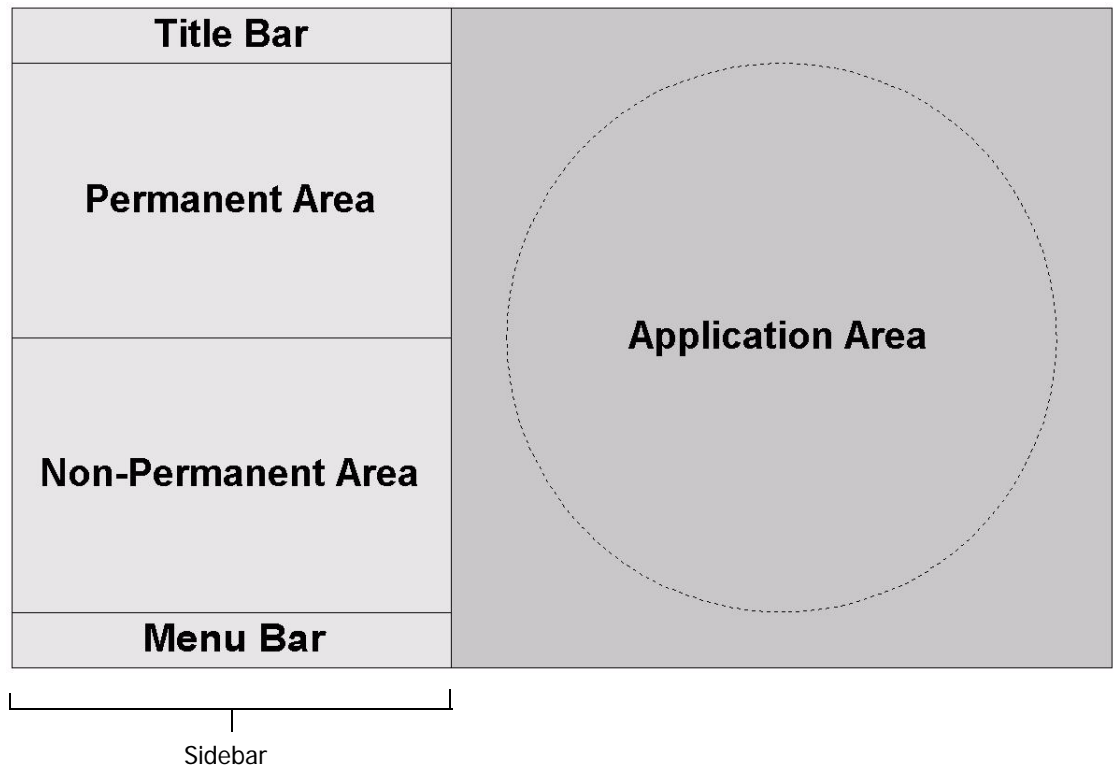


Fig. I / 14 General screen layout of the NACOS Platinum (RADAR Mode)

The general screen layout, especially the size of the different areas, may vary between the different available applications.

5.2.1 Title Bar

The title bar provides information and functions which are permanently available in the system.



Fig. I / 15 NACOS Platinum title bar of RADAR application

The figure above shows an example of the title bar with the RADAR application being the active application. The information and functions provided are explained in the following.

5.2.1.1 Brilliance

You can use the ☀ / 🌙 buttons in the top left corner to toggle between the available color schemes for different ambient light conditions. Alternatively you can use the keys on the console or the appropriate entry in the menu.



Five different color schemes are available for different ambient light conditions. The brilliance is toggled between 5%, 20%, 60%, 80% and 100%.

The Data Area brilliance setting is not affected by these controls. But it changes accordingly, because the brilliance setting is relevant for the whole screen.

☞ The brilliance of the monitor does not change stepwise, in fact it changes smoothly from the previous setting to the actual desired value.

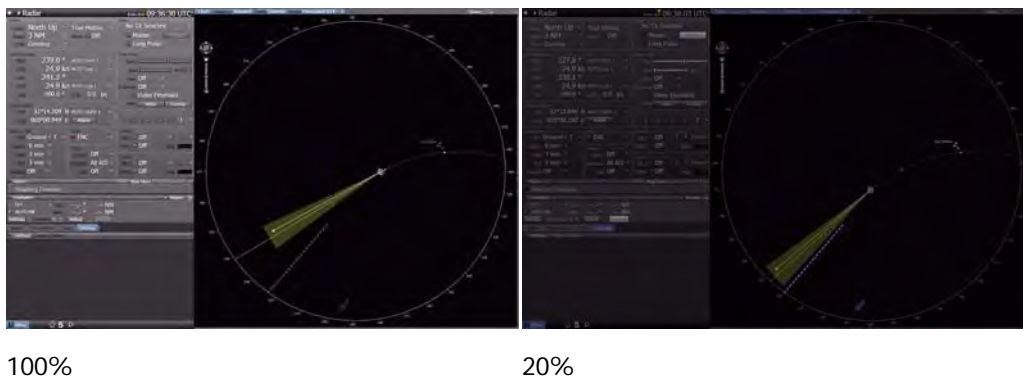





Fig. I / 16 Color schemes of the Color & settings

The buttons are located in the top left corner which is easy to remember. This way, when the screen is hardly readable due to changing light conditions, you will be easily able to find the ☀ / 🌙 buttons at the fixed and easy to find location.

However, you can also individually adjust the brilliance of the screen. If you press the **MORE** key (right-click) on the  /  button to open the **Brilliance** menu. To adjust the settings, click on the right or left of the slider or drag the slider. The new value is shown on the right and the screen's settings are adjusted accordingly.



 There are no knobs or other controls on the monitor(s) to adjust the brightness.



 **CAUTION**

The use of the brightness controls may inhibit visibility of information, particularly when using the night color tables!

5.2.1.2 Active Application Title

The title bar displays the name of the application which is currently active in the application area, e.g.

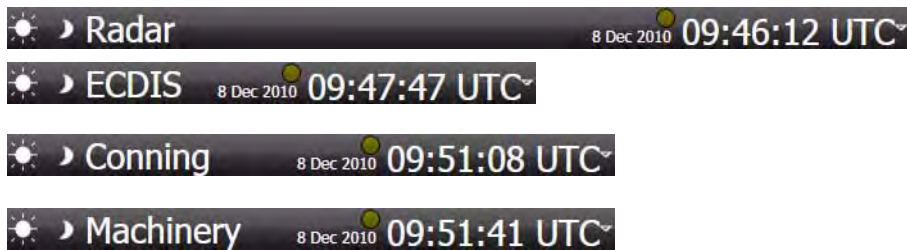


Fig. I / 17 Active Application Title

5.2.1.3 Date and Time

Both date and time will be displayed permanently in the title bar:



5.2.1.4 Alive Indication

There are different possibilities available to verify the alive status of the MFD which are listed and explained below.

The Time Display

The system provides feedback that it is still active and operating, i.e. alive. This is specifically indicated on each MFD in the title bar of the HMI by the seconds changing in the time display.

If picture freeze occurs, all data on the screen as well as the display of the seconds will be frozen, so that the operator is able to notice this fault.

The Cursor and HMI

Picture freeze caused by the computer or the graphics adapter of the MFD can also be recognized by the fact that moving the trackball or the mouse does no longer change the cursor position on the screen.

If the computer or its application software has a severe fault it can also happen that the cursor is still moving but a click on any HMI element (for instance an operable button on the screen) is no longer working correctly.

The RADAR Video

The transmission of the radar video from a connected transceiver to the MFD is monitored continuously. If the connection to the transceiver is disturbed or completely lost, the respective alarm messages describing the reason for the fault are given (See chapter 7.15 on page A-81 for details).

If the refresh of the radar video is not possible, the alarm **No RADAR Video** is issued; the video in the PPI is cleared and will no longer be updated.

If no such alarm is indicated and you want to check the alive status of the radar transmission and the PPI update you should switch off all signal processing of the radar video, increase the video gain to maximum in order to visualize all targets and eventually clutter in the vicinity, or - as a minimum - make the video noise visible on the PPI. If the video noise is visible and is changing at each antenna rotation, this part of the system is alive and operable.

In order to make the rotating antenna sweep visible, you can

- "Step up and down with the radar range, or
- "Change the video gain between minimum and maximum.

In both cases the update of the video sectors on the PPI should be observable.

The Monitor

A green LED at the lower right corner of the MFD monitor indicates the running connection to the MFD computer. If the connection is lost or disturbed, the LED will stay green but start flashing once per second and the screen will normally become dark. If the LED changes to orange the monitor is in stand-by mode waiting for sync signal, red indicates the switched off status. The LED will flash red in case of excessive temperatures.

5.3 Sidebar

The width of the sidebar in each application is fixed, but it varies from application to application. The sidebar consists of a permanent area, a non-permanent area, title bar and a menu bar, which are explained in the following sub-sections.

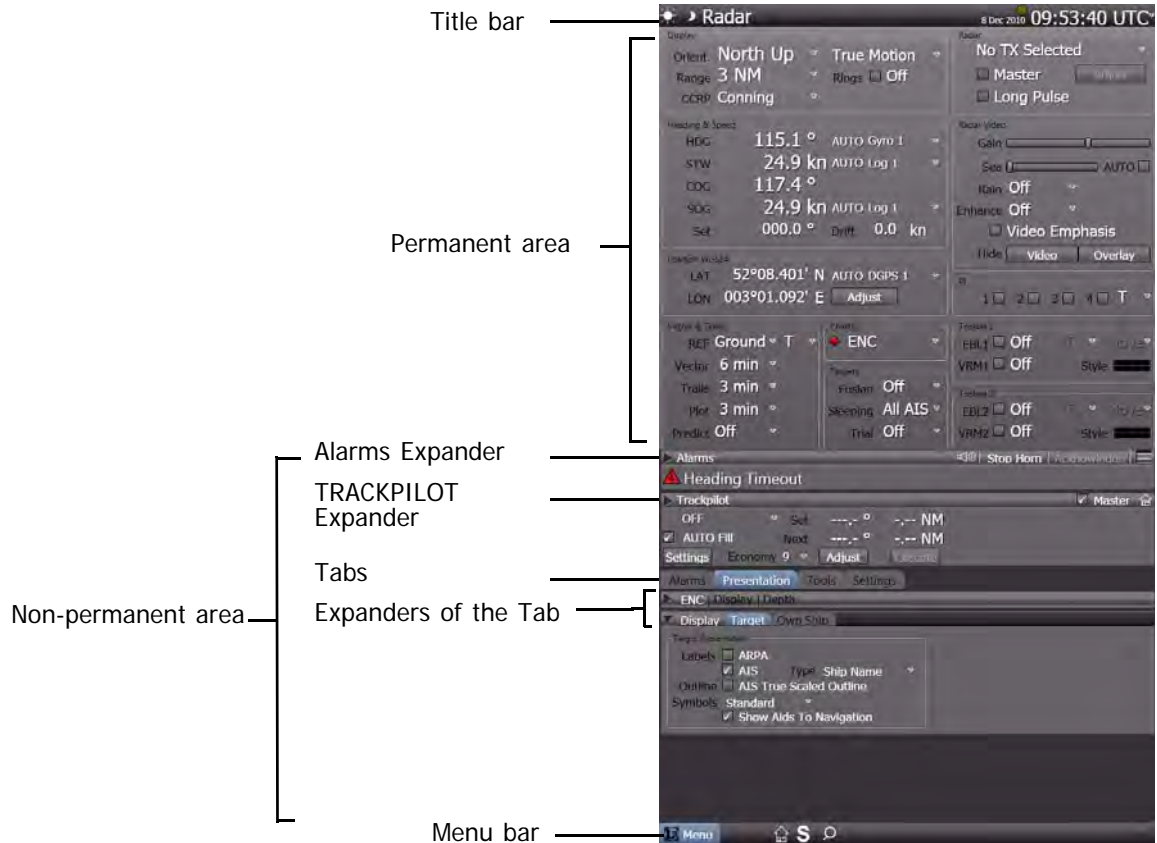


Fig. I / 18 RADAR sidebar

5.3.1 Permanent Area

The upper half of the sidebar is the permanent area. It shows status information and controls that are mandatory according to regulations and thus must be permanently visible. In addition, the permanent area can show information that is not mandatory but which you would expect to be permanently visible or that are de facto standards. This area can never be overlapped or hidden by permanent pop-ups or dialogue windows.

The height of the permanent area varies between the applications since some NACOS Platinum applications require more permanently visible information than others. For instance, RADAR requires more permanent controls than the Machinery application. The figure below shows the permanent area of the RADAR application:

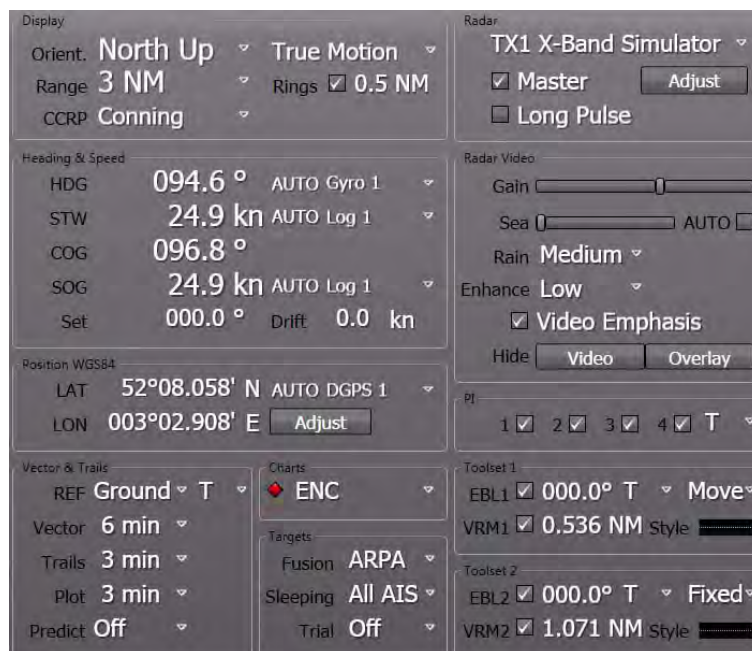



Fig. I / 19 Sidebar – permanent area of the RADAR application

The RADAR application has the largest permanent area in the system since it requires the most mandatory controls. The RADAR permanent area is divided into two columns containing various groups. The following information are provided in the groups:

- Display
containing orientation, motion, range and reference controls.
- Heading and Speed (of own ship).
Drift is not mandatory but it is included based on an early investigation into S-mode requirements.
- Position
- Vector and Trails
- Chart
- Targets
- RADAR
containing the radar transceiver controls

- RADAR Video
containing the video display controls
- Electronic Bearing Lines (EBL), Variable Range Markers (VRM) and Parallel Index Lines (PI).

Alarm icons in front of a value indicate that the respective value is in alarm or warning status. [See chapter I - 5.9.12 on page 81.](#)

The  buttons are push buttons used to toggle between hiding and displaying the radar video and overlay.

5.3.2 Non-Permanent Area

The lower half of the sidebar is the non-permanent area. It shows status information, parameters, tools and controls. Some expanders are constantly visible, some can be hidden. See table below for details.

The expanders are grouped and stacked by means of so-called tabs. Click on a tab to view the subordinated expanders. Using expanders you can expand and collapse, i.e. display and hide a variety of views, controls or setting screens. The height of the non-permanent area is flexible and depends on the size of the permanent area. If an opened expander exceeds the available space, a scrollbar is provided to scroll up and down the contents of parts of the non-permanent area or to scroll left/right within parts of expanders.


The controls displayed in the non-permanent area depend on the active application. For instance, the RADAR application will display various settings screens. Machinery includes a navigation tool to browse through large sets of mimic screens. The figure below shows an example of the non-permanent area of the RADAR and ECDIS application:



Fig. I / 20 Sidebar – example of the non-permanent area of the RADAR application

The **Alarm** line expander and the optional TRACKPILOT expander have a permanent bar below the title bar. This additional permanent bar will display information such as the latest alarm message, ioperating mode, settings, etc. The general handling and type of expanders are described separately. The detailed content and functionality of exoanders is part of the different application related chapters.

☞ If you open multiple expanders they often donot fit into the sidebar. In such cases, other expanders will be closed or cut off at the lower end.

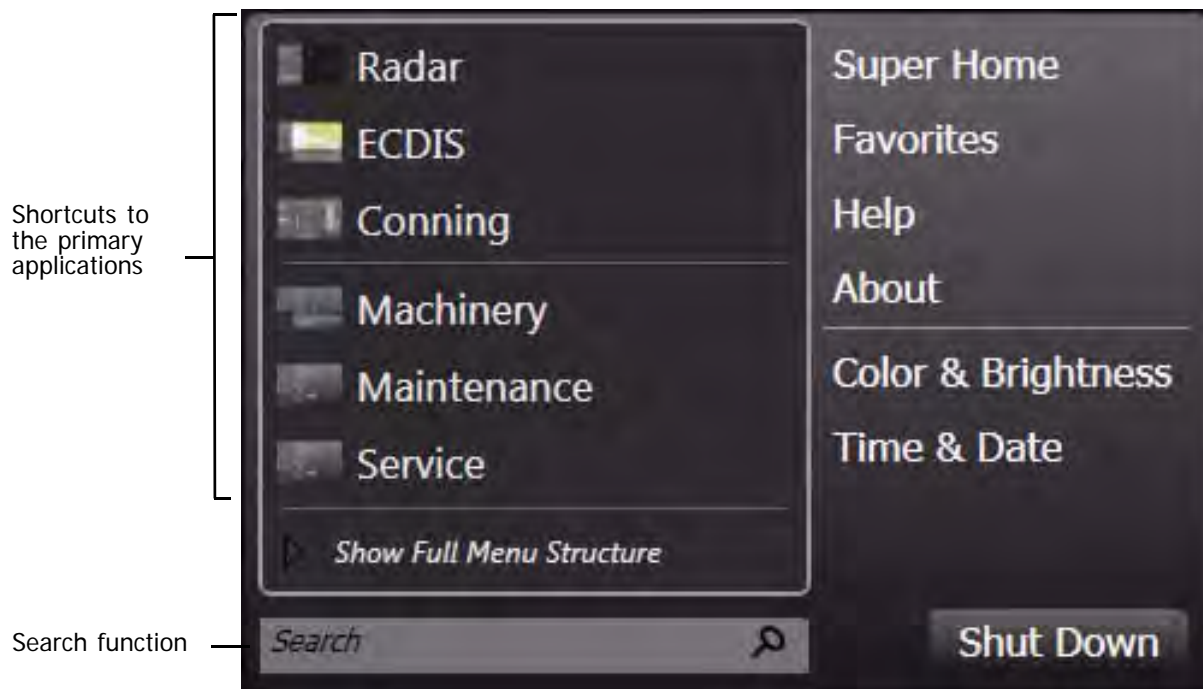
 The expanders shown and described in this handbook may vary from the ones visible on your system. The presence and display of the expanders depends on the system's configuration. Nevertheless, all possible expanders will be described in this handbook.

Expander Name	is always visible / is only visible if the system contains ...
ENC	always visible
Target	always visible
Route	?
Display	always visible
Trackpilot	Only visible if an Autopilot is present in the system
Alarms	always visible
Measurements	?
Mimics	?

Table I / 4 Visibility of Expanders

5.3.3 Menu Bar

The menu bar provides functions for navigation between applications and screens in the NACOS Platinum. To open the menu, click on the **Menu** button in the bottom left corner of the display. The menu resembles the Start menu of MS Windows 7. The figure below shows an example of a NACOS Platinum menu which is displayed when clicking on the **Menu** button:



The individual buttons and elements are described below. See [table I / 5](#).

Fig. I / 21 Opened NACOS Platinum main menu

- ☞ When you move the mouse or trackball pointer over the buttons of the menu bar, you will experience a rollover effect indicating the button you are currently pointing at. This will help you to pinpoint the right button for the current operating situation even in case of emergency.

The items and functions of the menu bar depend on the configuration. They are described in the following table:










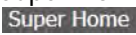
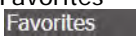

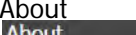


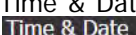


Menu Item / Button	Explanation
 Menu	When you click on the Menu button, the menu is opened like the Start menu of MS Windows 7.
 Show Full Menu Structure	When the Show Full Menu Structure option is activated, the list will change to a tree view showing a complete menu structure in form of a folder structure. The Option then becomes the Back option, and if you click on the Back option, the menu returns to the standard variant.
 Home	The Home button takes you to the Super Home page.
 S-mode	The S-mode button takes you to a standard settings mode of the current active application. S-mode for RADAR consists of a specific configuration of settings according to the relevant standards for RADAR. S-mode is like a clean-up function that brings the application to a default configuration closing all manually opened expanders. See chapter II - 1 on page II-3 for details.
 Search	The Search button opens a text field and places the cursor in that search field to do a system-wide search. When you start to type in the text or numbers to be looked up, the menu switches into search result display mode. The search results are instantly displayed and continuously updated as you type in the character string. 
 Full Screen	The Full Screen button hides the sidebar. See chapter I - 5.3.3.1 on page 58.
 Unhide Sidebar	The Unhide Sidebar button restores the sidebar. Only displayed when the current application is running in Full Screen mode. See chapter I - 5.3.3.1 on page 58.
Shortcuts, e.g.  ECDIS	Shortcuts access the configured main applications, e.g.: RADAR, ECDIS Monitoring, ECDIS Planning, and Machinery. There are also shortcuts provided that access Super Home and the homepages of the main applications.
Super Home  Super Home	Returns to the Super Home window. See chapter 5.1 on page I-46 for details.
Favorites  Favorites	Using the Favorites you can quickly select specific (favorite or often visited) screens or application pages.
Help  Help	Nothing happens.
About  About	Displays a window with information about the software version etc: 
Color & Brightness  Color & Brightness	Nothing happens.
Time & Date  Time & Date	The menu window is closed.
Shut Down  Shut Down	Use this button to shut down the MFD. Observe the relevant safety notes! See chapter I - 4.4 on page 40

Table I / 5 Items on the NACOS Platinum main menu

5.3.3.1 Full Screen Mode

The Full Screen (or hide sidebar) function is a mechanism that switches the display to a full screen view that shows only the application area, and the sidebar is hidden. However, full screen mode is only available depending on the application:

- RADAR does not allow the full screen mode.
- ECDIS in monitoring mode does not allow the full screen mode.
- Operating the **TRACKPILOT** as the **TRACKPILOT**-Master does not allow the full screen mode.
- Machinery containing alarm displays does not allow the full screen mode.
- Conning allows the full screen mode.

To switch to full screen mode, click on the  button (Full Screen) in the menu bar. The sidebar is then hidden:

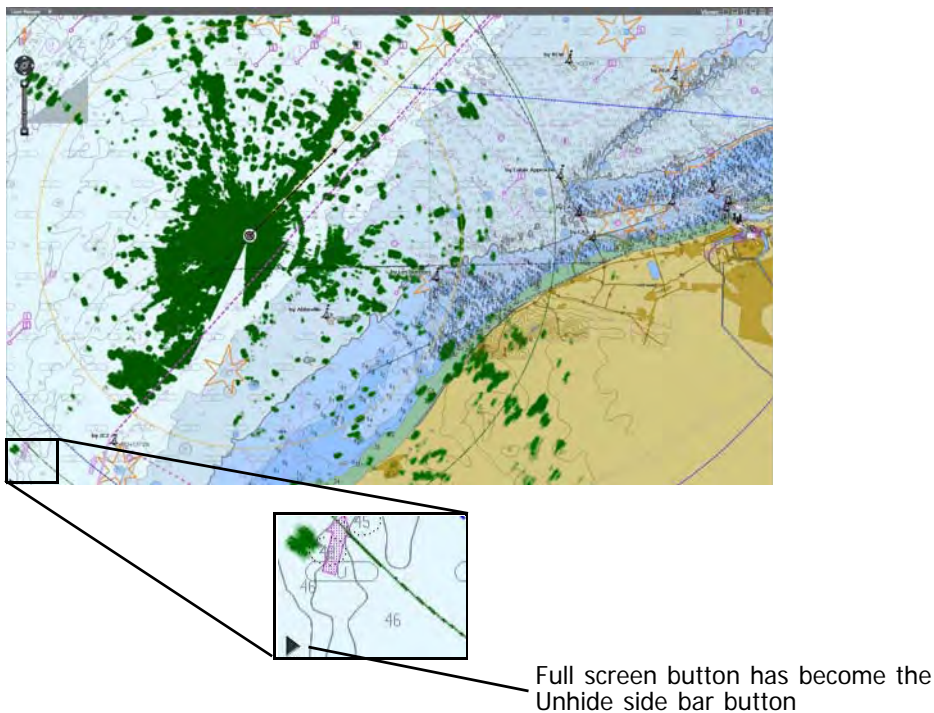





Fig. 1 / 22 ECDIS in full screen mode

In Full Screen mode, only the  button becomes the  button (Unhide sidebar). No other controls will be visible. To unhide the sidebar again, simply click on the  button in the bottom left corner. The sidebar will then be restored.

5.4 Application Area

5.4.1 Application Area Frames

The application area on the right of the sidebar shows the main window of the active application. It can show the RADAR PPI, the ECDIS chart, or Machinery mimics etc. The application area can have six different layout types. The grouped contents are arranged in separate frames.

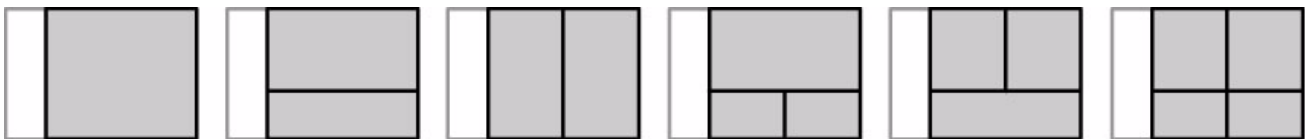
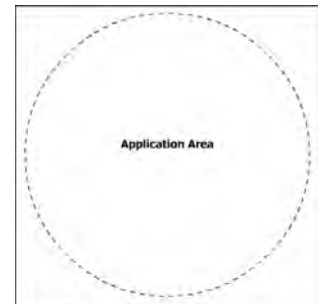


Fig. I / 23 Application area frames

The sizes of the frames are flexible in some of the operation modes of the MFD. In some applications the dividers between the frames can be moved to resize the frames, in others not. For that purpose, click on the divider, hold the button and drag the divider into the desired direction. The picture below shows an example of a screen with three frames:

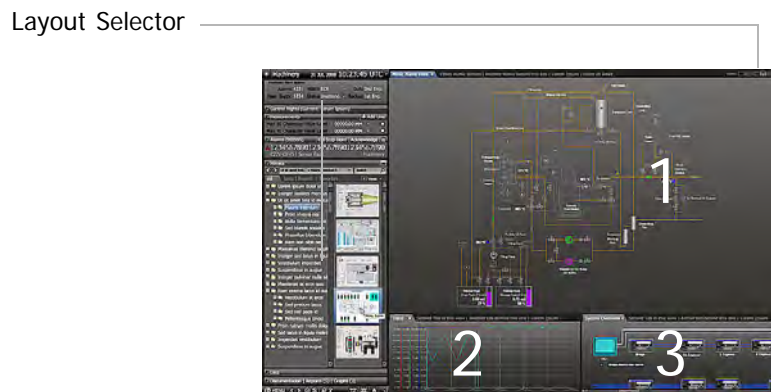



Fig. I / 24 Example: Machinery screen with three frames

Each frame in a layout can contain multiple tabbed panels that group similar information. [See chapter I - 5.5 on page 62.](#)

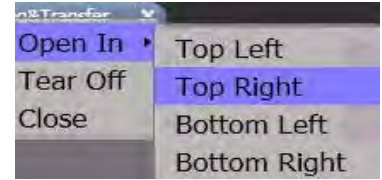
Switching Between Layouts

Layouts can be switched by selecting a new layout type using the **Views:** buttons in the top right corner of the screen. The currently selected layout is indicated by the white icon. The other layout types are greyed out.

Switching to More Frames

When you switch to a layout type with more frames than the current layout, e.g. from 1 frame to 2 frames, the existing frames are kept and one or more new frames are added. The new tabs are loaded with a default content. For that purpose, use the  buttons in the title bar of the main application window.

If the application area has multiple frames, then you can select a specific frame, in which the tabbed panel will be opened, by pressing the **MORE** key (right-clicking) on the tab and selecting the desired option from the context menu. This behaviour is similar to the Open In New Tab function in web browsers.



Switching to Different Arrangement of Frames

When you switch to an equal number of frames, e.g. from 2 horizontal to 2 vertical frames, some content moves. No content is hidden if it is not necessary. Between the two-frames layouts the bottom content moves to the right frame and vice versa. Between the three-frames layouts the top right content moves to the bottom right frame and vice versa.

Switching to Less Frames

When you switch to a layout type with less frames than the current layout, e.g. from 3 frames to 2 frames, some frames will be hidden. In addition to choosing a new layout type using the buttons in the top right corner of the screen, you can also switch to a lower layout type by closing the last tab in a frame. When the last tab is closed the frame is closed too.

5.5 Tabbed Panels

In the NACOS Platinum applications, information are in many cases grouped on so-called tabbed panels. Tabbed panels are screen pages which are arranged on top of each other like a pile of paper sheets. The tabs identify the panels, and they are used to navigate through the panels. The picture below shows an example:

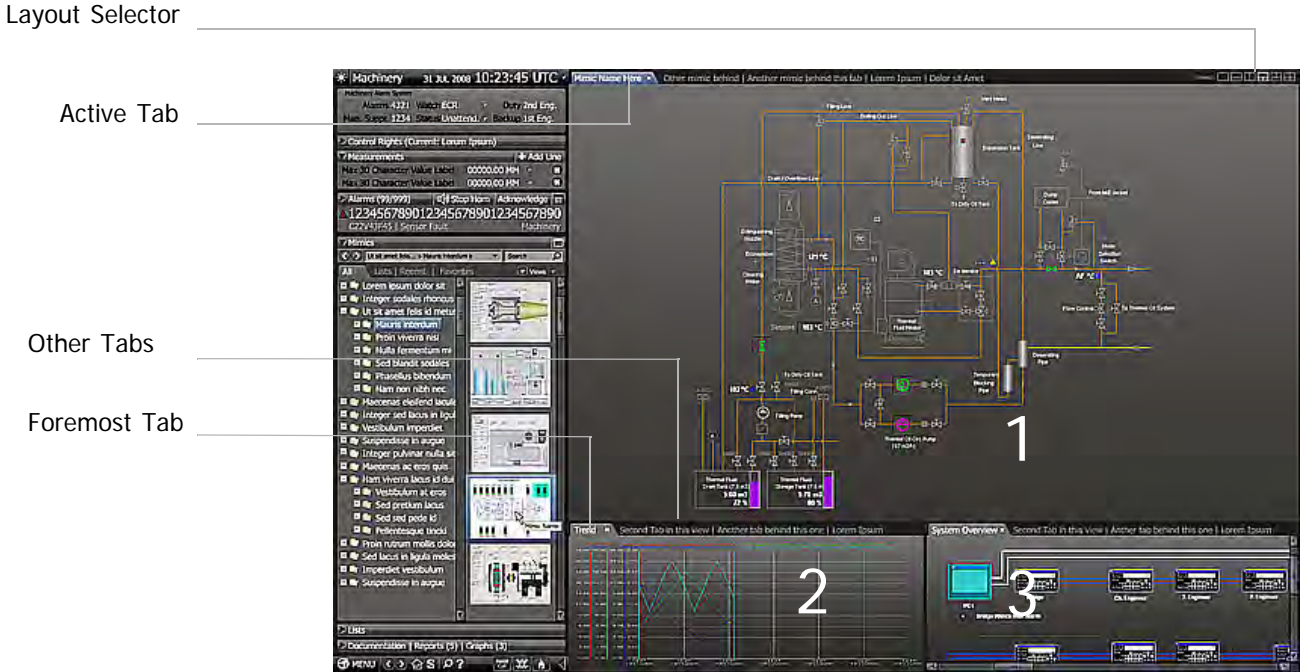


Fig. I / 25 Example: Machinery screen with tabbed panels in three frames

The active tab is displayed in the foreground, and it is highlighted, which is e.g. indicated by a blue tab. The active tabbed panel has the so-called focus. That means that editing, e.g. entering values or adjusting the display, is only possible on that active tab. The other tabs are displayed as grey text separated with a vertical line. When you click on a hidden tab in the background, it is brought to the foreground and becomes the active tab. See table I / 25 above. You can also press [CTRL]+[TAB] on the keyboard repeatedly to switch from tab to tab. In a multiple-frame-view, the other frames, which do not have the focus, the front tabs are still highlighted by a grey tab but you will see that only one tab will be active and have the focus.

Active Tab Behaviour when Switching to Different Layouts

When you switch to a new layout type using the **Views:** [Icons] buttons (Layout Selector) the active tab has the following behaviour. If you switch to a layout type that has...

- One more frame: the new frame becomes the active frame.
- Two or three additional frames: the current active frame stays the active frame.
- The same number of frames: the current active frame moves along with the switching behaviour.
- Less frames: the current active frame remains the active frame unless it is the one which is closed. In that case the horizontally adjacent frame becomes active.

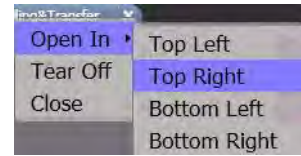
In all cases the active tabbed panel will be highlighted, indicated by the blue tab.

Note:

In some applications or display modes (e.g. radar) not all views may be available to the operator

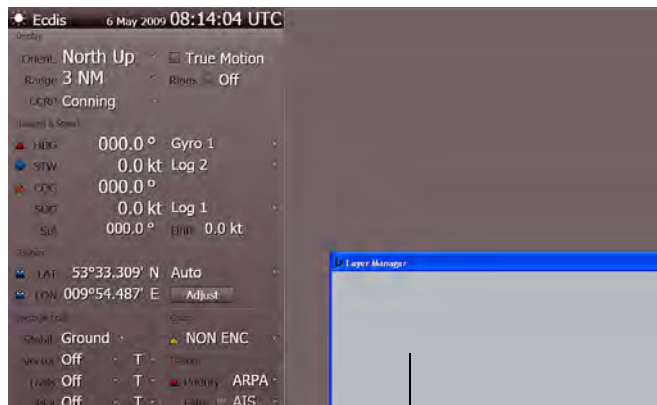
Tab Context Menu

When you press the **MORE** key (right-click) on a tab, this will open the context menu. Using a tab's context menu you can specifically adjust the tabbed panel's appearance on screen and move it to a different location on screen.



The following options are available:

- **Open in**
Displays the contents of the tab in a different frame, which you select in a sub-menu.
- **Tear Off**
Display the contents of the tab in a new, independent window that can be moved all over the screen. To make the window a tab again, drag and drop the window by pointing at its upper left corner and move it back to the tab's position in the upper left corner of the respective frame.



Torn-off tab
...now displayed as a window

Fig. I / 26 Tab after using tear-off function

- **Close**
Closes the current tabbed panel.

5.6 Lists & Tables

Wherever useful in NACOS Platinum, system data which have a record structure are displayed in lists, e.g. alarms, track details, etc. In the following you will find examples of two lists.



Fig. I / 27 Example 1: Target List in RADAR sidebar

The target list shows the the currently tracked radar targets. Using the scrollbar on the right you can scroll and page up and down the list. The next figure shows an example of the Machinery Alarm List:

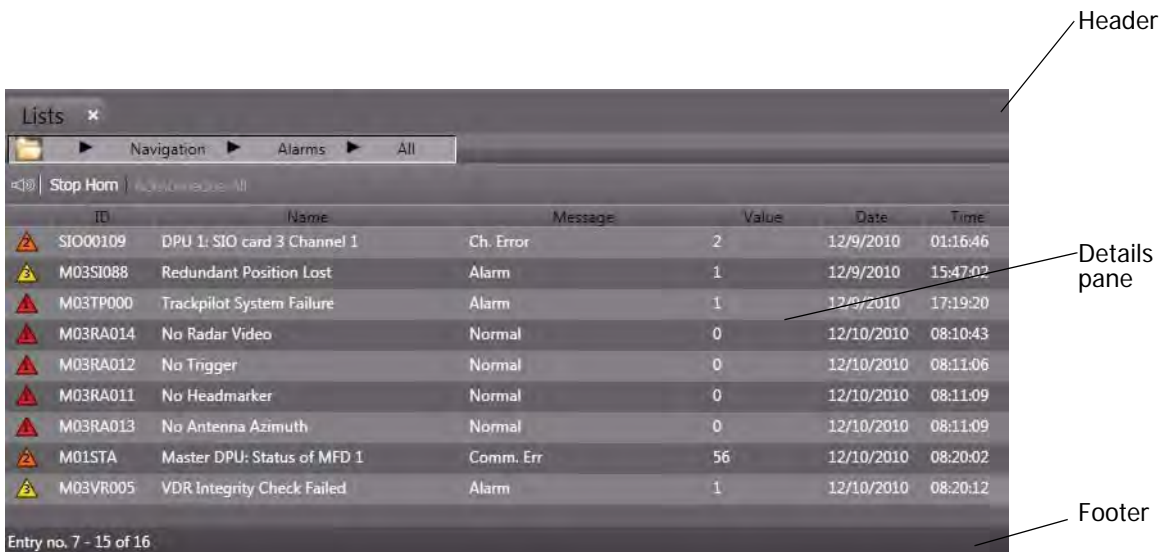
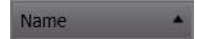


Fig. I / 28 Example 2: Alarm List

Lists have a header, a details pane, and a footer.

List Details Pane

In the top row of the details pane you will find the column headings. You can change the sorting order by clicking on a column heading. The sorting order is indicated by a small arrow. For example, the arrow up in the Name column indicates that the list is sorted by the Name column in alphanumerically ascending order. When you click on the Name column again, this will revert the sorting order to descending.



In some lists the sorting order is predefined. For example, the Alarm list must be sorted chronologically. Hence it is predefined that the Alarm list is sorted by the time column in descending order starting with the oldest alarm. The width of a column can be adjusted by dragging the separator line between two column headings. In some cases adjusting of width may be disabled. Also showing, hiding and reordering of columns can be enabled or restricted in the individual case.

List Footer

The footer of a list in some cases contains the number of list entries.

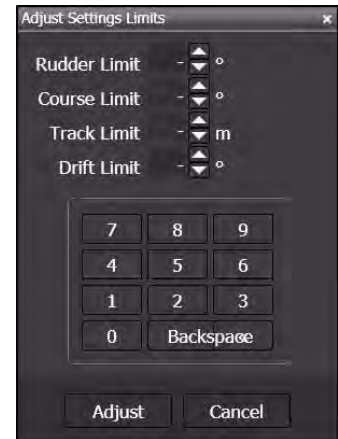
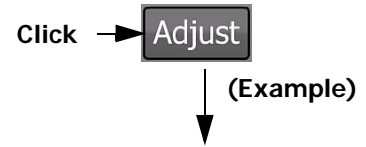
5.7 Dialogues

Dialogues are opened when you click on buttons or they are opened by the system as a response to actions or events, e.g. in case of error. Message dialogues and popup edit windows need to be differentiated, and they are explained in the following.

5.7.1 Popup Edit Windows

When you wish to adjust a value in the NACOS Platinum, you will in many cases click on an **Adjust** button to open a separate popup edit window. Such a window contains:

- Edit fields with a label in front. The edit field will allow input of text. Also, the small up-down arrows are provided that increments/decrements the value. See [chapter I - 5.9.8 on page 77](#). In rare cases a slider might also be available.
- An indication of the range the value can have (for example 0 - 360°).
- OK button and a Cancel button. The OK preferably uses a more specific verb that is applicable to the specific action, like 'Adjust' or 'Send'.



5.8 Tooltips

Tooltips are an interface element that is used to provide you with instant information on elements you see on screen. Tooltips are small text pop-ups which are displayed when you simply point at elements on screen. After a short delay, a small popup is displayed with a short description informing you about the function or meaning of the element you pointed at. After a short while, the tooltip is faded out so that you can see all screen information again.

When you open the menu and move the trackball pointer down the list of menu items, tooltips are displayed for the individual menu items:



Fig. I / 29 Tooltip of a menu item

- ☞ Please note that you will not find tooltips on all elements on screen but on important display elements and controls such as buttons and dropdown menus. Also, many screen objects like the tools, chart symbols and targets in the PPI of the radar can have tooltips to supply relevant information such as distance, bearing and ETA, or the own ship's position.

5.9 Controls – Adjusting Values

Most of the controls used in the NACOS Platinum applications are very similar to the known controls used by Microsoft Windows. The picture below shows some examples of the controls:

The figure shows a screenshot of the NACOS Platinum graphical user interface with several control panels. Callouts point to various UI elements:

- Field group name:** Points to the 'Display' header of the top-left panel.
- Field group, controls for the same topic:** Points to the 'Orient.' and 'True Motion' dropdowns.
- Fields:** Points to the 'Range' and 'Rings' text fields.
- Slider:** Points to the 'Gain' slider in the 'Radar Video' panel.
- Fields with dropdown menus:** Points to the 'Rain' and 'Enhance' dropdowns.
- Push button:** Points to the 'Adjust' button in the 'Position WGS84' panel.
- Check boxes:** Points to the '1', '2', '3', and '4' checkboxes in the 'Radar' panel.
- Dropdown menu:** Points to the 'T' dropdown in the 'Radar' panel.
- Alarm/Warning icon related to the indication:** Points to a red diamond icon in the 'Charts' panel.
- Scrollbar:** Points to a horizontal scrollbar at the bottom of the main interface.
- Expander:** Points to a 'Target' expander button.
- Spin boxes:** Points to the 'Rudder Limit' and 'Course Limit' spin boxes in the 'Adjust Settings Limits' dialog.
- Keys for numeric values:** Points to a numeric keypad in the 'Adjust Settings Limits' dialog.
- Zoom and pan control:** Points to a zoom and pan control in the bottom right corner.

Fig. I / 30 Examples of NACOS Platinum controls

The individual controls shown in the figure are described in the following sub-sections.

5.9.1 Fields

In NACOS Platinum, values in form of text, numbers, slider settings, check boxes, etc. are generally referred to as fields. A field consists of the value and a label, the field name. Some of the fields are read-only, they only serve for information purposes. In other fields, the values can be adjusted. [See chapter I - 5.9 on page 69.](#)

5.9.2 Field Groups

Field groups are represented on the NACOS Platinum user interface by a thin frame around a number of fields. The frame indicates that the fields inside it belong together, i.e. that they belong to the same subject or to a group of related items. Field groups have a name which is a kind of heading for the fields inside the group.

5.9.3 Sliders

Using sliders you can set a value within a range of possible values. The current value is indicated as you drag the slider to either side. The minimum value is 0%, the maximum value is 100%. Simply clicking on the slider's handle displays the current value of the slider.

When you click on the slider next to the current value, this will increase or decrease the value by 10 or another predefined value.



Show current value



Decrease value by 10


5.9.4 Push Buttons

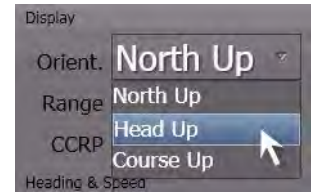
Push buttons resemble buttons in the real world. When you press them, something will happen. When you click on a push button on screen an action will be carried out or details will be displayed. The purpose of a button is indicated by its label, in some cases tooltips are provided. See [chapter I - 5.8 on page 68](#).

- ☞ The **Hide Video / Overlay** buttons are spring-loaded. They are only active as long as the appropriate button of the pointing device is pressed.



5.9.5 Dropdown Menus

Dropdown menus are indicated by a small downward arrow  next to a field. To open the menu, click on the arrow. To select different value for the field, click the desired item on the dropdown menu. The field is then updated accordingly. To close the menu without making any changes, just click on any free area on screen or press the [ESC] button on the keyboard.



5.9.6 Check Boxes

Check boxes indicate that there is an option that can be set or not. In the example in the figure on the right, the parallel index lines (PI) 1 to 4 are ticked off, i.e. selected and thus activated. This is indicated by the small check mark . To select a check box, just click on it so that it is ticked off. To clear the check box again, click on it so that the check mark disappears (.



5.9.7 Scroll Bars

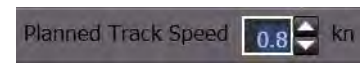
Scroll bars are displayed when contents do not fit on the screen or sidebar etc. You can then use scroll bars to move the display up and down or sideways to view hidden parts.



To scroll the display in small steps you can click on the scroll arrows at the end of the scrollbar. To page through the display in larger steps click on the scrollbar or drag the scroll box. Alternatively you can use the navigation keys of the computer keyboard, e.g. arrow keys or [PAGE UP] and [Page DOWN] for vertical scroll bars.

5.9.8 Spin boxes

Spin boxes are used in the NACOS Platinum to display and adjust numeric values. To adjust the value you can enter the new value directly in the text box. Alternatively, you can use the small arrow buttons. When you click on the small arrows and hold the trackball button, then the velocity value in the example will increase or decrease continuously until you release the button again. A single click on one of the buttons will increase or decrease the value by one increment step.



5.9.9 Keys for Numeric Values

Whenever it is possible or needed to enter a numeric value, the appropriate keys will be displayed in the control window. Select the value to be changed and enter the desired value by clicking the appropriate keys.



5.9.10 Zoom and Pan Control

The zoom and pan control in NACOS Platinum consists of a slider to adjust the zoom factor for, e.g., the ECDIS chart, and the compass control with pan buttons, which you can use to move the image section currently displayed.

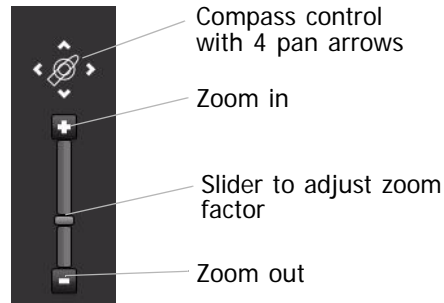






Fig. I / 31 Zoom and pan control

To zoom in in increments, click on , you will then see more details on the respective display. However, the overall area displayed is smaller. To zoom out again, click on the . You will then see less details but you will have a better general overview of, e.g. an electronic chart displayed.


To pan the display, use the panning arrows of the compass control. For example, if you click on  then the display moves to the right in increments to view a different image section of a chart or whatever is displayed. The effect is like travelling with the eye over a large map.

To center the display, e.g. after panning, just click on the  icon once.

-

5.9.11 Alphanumeric and Graphical Indications

To make things stand out on mimics and on graphics presentations special kinds of indications are provided. See figure I / 32. You will find the following four types of indicators:

- Static graphics and symbols
These are not operational. Neither manual nor automatic. They are visualized to help you getting an idea of the real infrastructure aboard, e.g. of piping systems. The status is not shown because the device is not connected to any sensing or to the interface.
- Live updated graphics and values
These graphics are not operated through the NACOS Platinum user interface, but the state and value is automatically (live) updated by the system. These graphics are indicated with a drop shadow and colored graphics or a value / text indicating their state (usually "running" or "stopped"). The drop shadow indicates live updating by the system. The color of the graphics is used to indicate the state of the related machinery component. Even if it is blocked for some reason the color shall be maintained as long as the state is known. For Machinery components the block state is indicated by a "B" shown next to the graphics.
- Changeable (clickable) graphics and values
These graphics can be operated using the NACOS Platinum user interface. They are clickable and can be set or changed, and the value is automatically (live) updated via the system. These values are indicated with a drop shadow below the colored graphic or value. The color of the graphic is used to indicate the state of the related machinery component. For Machinery components the block state is indicated by a "B" shown next to the graphics. When the mouse pointer is over the object the pointer also changes to a pointing hand .
- Manually changeable graphics and values
This is an infrequent indicator. The state of a device can be set in the interface but the device is not operated from the interface. Also the value is not live updated via the system. You have to go to the physical device and change the state. The indication on the screen is an aid to the human memory. However it also has the danger of indicating a different state than the device is actually in. These indicators will be visualized with a "manual" icon. The colored graphic will display the state.






	Static	Live Updated	Changeable (Automated)	Changeable with Alarm	Manual Changeable (Manual Device)
Mimics	 Label	 78.6 °C	 78.6 °C	 78.6 °C ▲	 M
Property Sheets		Label 78.6 °	Label 78.6 ° ▾	Label 78.6 ° ▾ ▲	

Fig. I / 32 Visualisation types of indication

5.9.12 Alarm Icons

In NACOS Platinum all alarms will be indicated in the same way in all cases. The different states of an alarm are indicated by different symbols in dedicated colors. The symbols will be used in the following manner:




- Placed in front of the alarm line in Alarm Lists
- Placed in front of the label in the permanent area of RADAR and ECDIS
- As a separate symbol in mimic diagrams for binary alarms. (e.g. used for a level switch in a tank)
- As a symbol placed behind the Unit of an analogue value displayed on a mimic diagram. (e.g. used for display of a temperature with a limit)
- As a symbol placed beside a function block symbol (indicating the state of machinery components, e.g. pumps, valves, generators etc.

	Binary Alarm	Alarm List	Analog value with alarm Property Sheet	Analog value in Mimics	Function Block with alarm
Normal	(n.a.)	(n.a.)	Label 78.6 °C	78.6 °C	(Running Stopped)
Device Fail / Sensor Fail	◆	◆ Alarmline	Label --. °C ◆	--. °C ◆	◆
Manual Cutout / Auto Cutout	✕	✕ Alarmline	Label 78.6 °C ✕	78.6 °C ✕	✕
Event	■	■ Alarmline	Label 78.6 °C ■	78.6 °C ■	■
Alarm Prio 3	▲	▲ Alarmline	Label 78.6 °C ▲	78.6 °C ▲	▲
Alarm Prio 2	▲	▲ Alarmline	Label 78.6 °C ▲	78.6 °C ▲	▲
Alarm Prio 1	▲	▲ Alarmline	Label 78.6 °C ▲	78.6 °C ▲	▲

Fig. I / 33 Example of alarm types

For detailed information about alarms, please refer to the V-ALARMS part of these operating instructions.

5.10 Mouse Pointers and Clicks

In NACOS Platinum you will experience that the shape of the mouse or trackball pointer will change in different situations as you move it over the screen. The basic shape is always the arrow  used to open menus and options on screen. In text fields, the pointer becomes a text edit caret ; on dividers, the pointer turns into a double arrow  indicating that you can resize something, and so on.









 Precision select	 Text edit caret (cursor)
 Cross hair	 Move
 Arrow	 Resize, double arrow
 Pointing hand	 Waiting

Table I / 6 Mouse pointers

The different shapes are explained in the following for the RADAR and ECDIS applications as well as for the Machinery application. The possible types of clicks are explained separately. [See chapter I - on page 31.](#)

5.10.1 Pointers in RADAR and ECDIS

You will find the following specific types of pointers in the RADAR and ECDIS applications:







Pointer	Explanation
 Arrow	Standard pointer when you are not pointing at an any specific object on screen in the application area but when you point at menus, fields and other controls in the sidebar, in dialogues, or in frames showing lists etc.
 Precision select	Standard pointer when you are not pointing at an any specific object on screen in the application area.
 Cross hair	<p>Cross hair– one target: When the mouse pointer is over one target, the cross hair pointer indicates that the target can be acquired. A single left click acquires the target.</p> <p>cross hair – multiple targets: When the mouse pointer is over multiple targets, the cross hair pointer indicates that the targets can be acquired. A single left click opens a menu that displays the relevant acquisition options (for instance Acquire RADAR, Acquire AIS, Acquire Both, Escape)</p> <p>When the mouse pointer is over an acquired target a box around the target indicates that it is already acquired and properties / data of the target can be accessed. A single right click displays the properties in a tooltip or popup. This popup should automatically hide after a few seconds.</p>
Position indication	<p>When you move the pointer over the RADAR PPI or the ECDIS display, then the respective position is indicated in a text box together with range and bearing.</p> 
 Pointing hand	When the mouse pointer is over a clickable object, the pointing hand indicates that the object is clickable. Both left and right clicks can have an effect.
	When the mouse pointer is over a moveable object, for example a "handle" of a variable range marker, the arrows indicate the direction in which the handle of the object can be moved.

Table I / 7 RADAR and ECDIS pointers

5.10.2 Mouse Pointers for Machinery

You will find the following specific types of pointers in the Machinery application:



Pointer	Explanation
 Arrow	Standard pointer when you are not pointing at an any specific object on screen in the application area but when you point at menus, fields and other controls in the sidebar, in dialogues, or in frames showing lists etc.
 Pointing hand	When the mouse pointer is over a clickable object, the pointing hand indicates that the object is clickable. Both left and right clicks can have an effect.

Table I / 8 Machinery pointers

QUICK START GUIDE

1 How to start quickly

After power-on, the system starts automatically and displays the **Super Home** page. [See 5 on page I-45](#). From this page, the appropriate functions of the system can be chosen.

Since the electronic units are always in standby, even if the screens are dark, it is necessary to be able to return to a specified state, the power - on state.

For this, the S-Mode is relevant.

Once the appropriate button is clicked on the screen, the RADAR/ECDIS returns to the settings that have been present on power-on.

1.1 The S-Mode for RADAR

Pressing the S-Mode button for RADAR leads the following settings:

- Range: 6 nm
- Orientation: North up
- VRM1 on
- EBL1 on
- Vectors & plots: on, 6 minutes
- Transceiver settings remain unchanged
- Target acquisition status remains unchanged
- Route remains visible (if activated)
- ENC: if available and active, the display will be reduced to "Base Display"
- Color-scheme / brightness control remains unchanged.
- expanders are closed apart from the target list

1.2 The S-Mode for ECDIS

Pressing the S-Mode button for ECDIS leads the following settings:

MAIN APPLICATIONS

1 Overview of Products and Applications

1.1 NACOS Platinum Products

The NACOS Platinum Series is offering four advanced products for various vessel and user requirements as follows:

Product	Applications			
	RADAR	CONNING	ECDIS	MACHINERY
RADARPILOT	<input checked="" type="checkbox"/>	Option: Advanced	Option: Chartradar	
ECDISPILOT		Option: Advanced	<input checked="" type="checkbox"/>	Option: Automation
MULTIPILOT	<input checked="" type="checkbox"/>	Option: Advanced	<input checked="" type="checkbox"/>	Option: Automation
MCS				<input checked="" type="checkbox"/>

Table III / 1 NACOS Platinum and its Applications

Each product provides one or more applications and possible options as indicated above. Each product comprises also the necessary hardware to run these applications. The hardware consists of the Multi-Functional-Display (workstation), navigation and engine interface, and in case of MACHINERY also automation I/O and controllers, and in case of RADAR also an X- or S-band antenna unit. The applications come along with supporting packages for service, training, configuration, and others. The product name as above is written at the top left frame corner of the monitor of the corresponding workstation (not the screen!).

Each navigation product can be combined with the optional TRACKPILOT application. In that case the keyboard of the corresponding workstation is fitted with the joystick and labelled with TRACKPILOT. On the Platinum home page the additional TRACKPILOT application will be shown.

Further on the hardware is extended by an extra electronic unit as well as a special TRACKPILOT interface. The TRACKPILOT application does not have its own user interface but is integrated in the non-permanent area of RADAR or ECDIS.

ECDISPILOT and MULTIPILOT can be combined with the optional MACHINERY application. In that case the Platinum home page shows the MACHINERY application in addition and the workstation is connected via network to the automation subsystems.

1.2 RADAR Application

The RADAR application shows the raw video as well as the radar targets processed by the antenna unit which has been selected by the operator. The new IP RADAR technology allows the operator to switch via network to any assigned antenna unit on-board (one or more X-band as well as one or more S-band units). Advanced filter techniques are used for clutter suppression and enhanced small target detection. Various navigation tools are available for collision detection and calculation based on the pre-processed targets. AIS targets from a separate AIS transponder unit are processed exactly in the same way as radar targets. RADAR and AIS targets can be merged together. The user may edit his own user symbols and route data on a separate layer under the radar presentation.

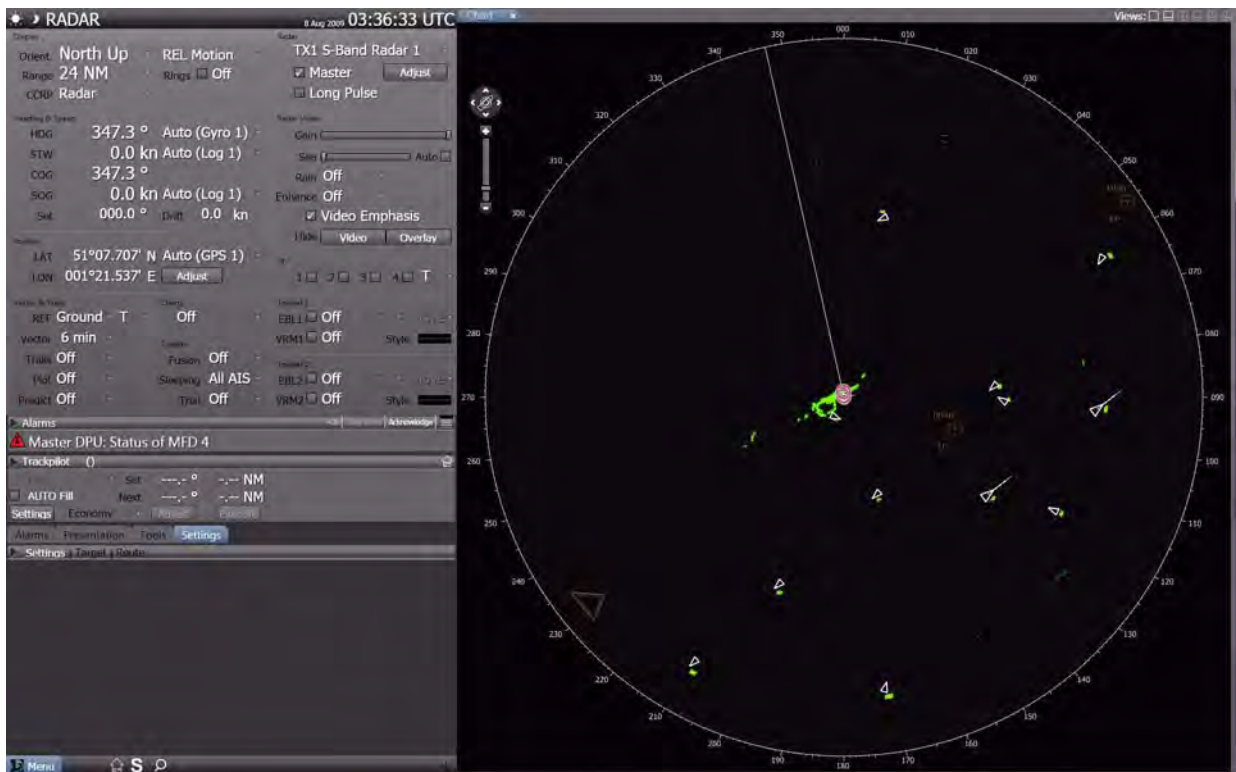


Fig. III / 1 Overview of the RADAR Screen

The "Advanced RADAR" option provides next to other features a CONNING application. The user may switch over to this application at any time or have a separate display for permanent use.

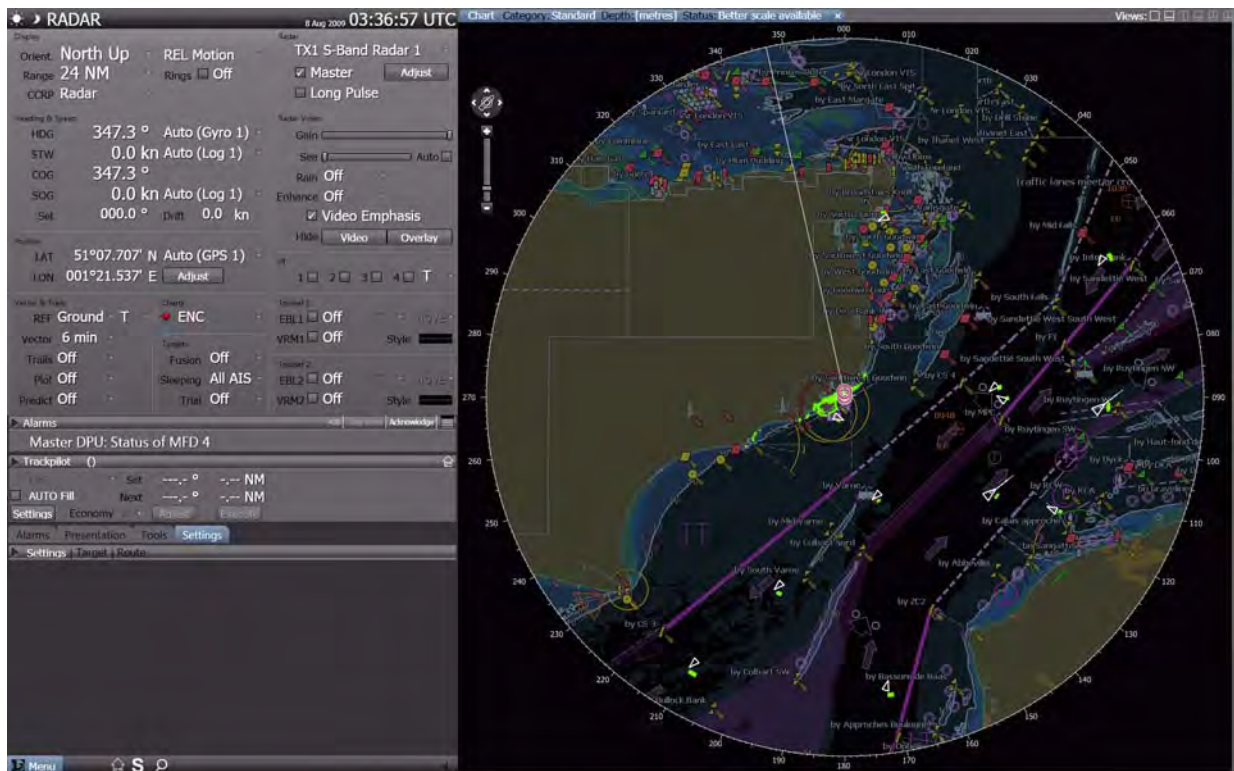


Fig. III / 2 Overview of the Chartradar Screen

The "Chartradar" option provides an ECDIS background within the bearing scale on the PPI. Chart data bases for ENC are used. The Chartradar is approved as ECDIS back-up and designed to meet the IEC 62288 and IEC 62388, a standard for radar with chart.

1.3 ECDIS Application

The ECDIS application for the ECDISPILOT as well as CHARTRADAR and MULTIPLOT presents the own ship embedded in an ENC chart. Various tools are available for route planning and voyage execution, for navigation, for route checking, for shallow water warning and for collision avoidance. AIS targets from a separate AIS transponder unit and radar targets are processed together and merged in the same way as for the RADAR application. ¹⁾

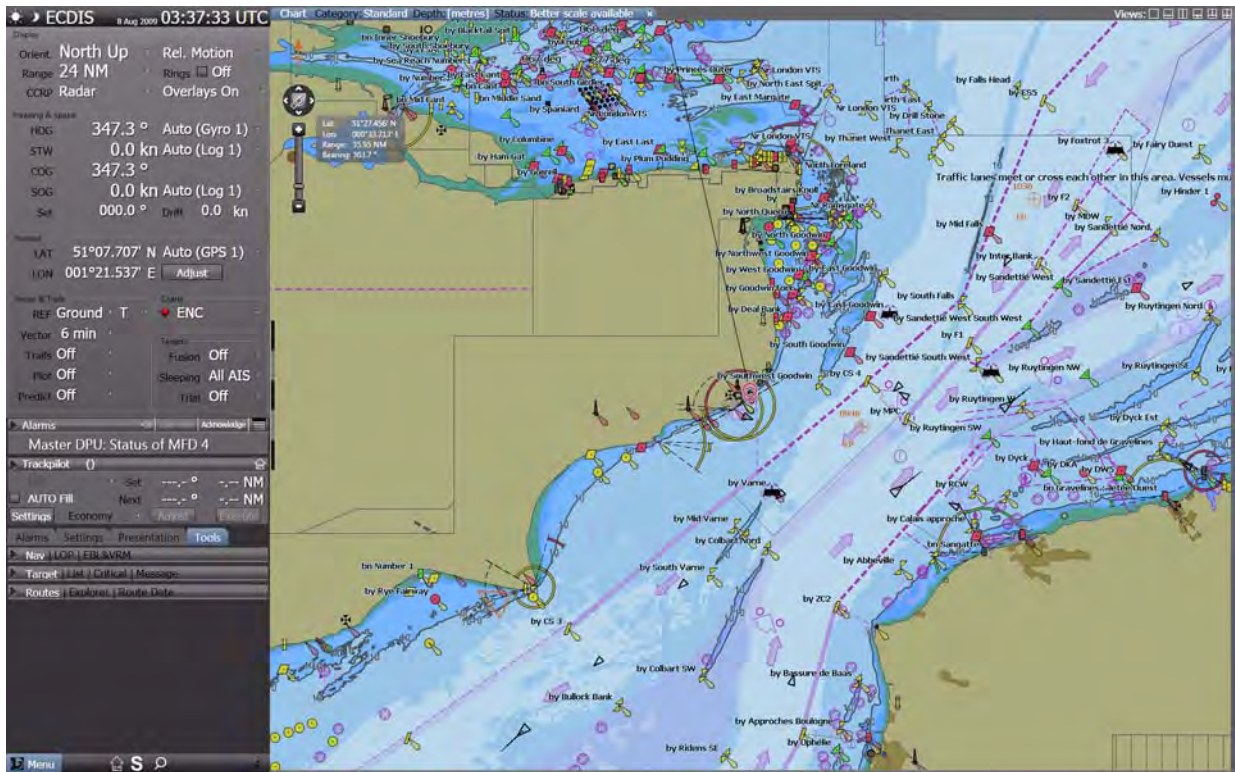


Fig. III / 3 Overview of the ECDIS Screen

¹⁾ A Standalone-ECDISPILOT does not process RADAR targets.

1.4 CONNING Application

The CONNING application provides an overview of the navigational situation of the vessel. It displays all navigation data and if fitted with the optional engine interface also rudder and propulsion related data.

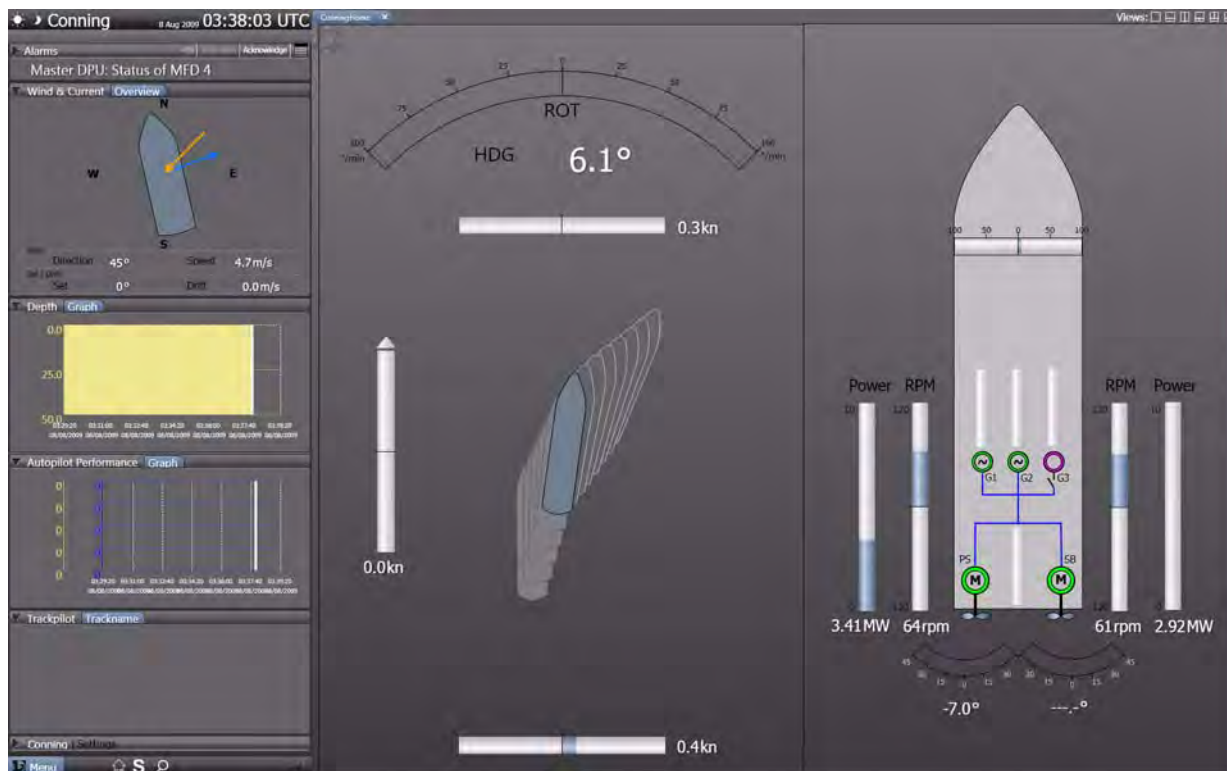


Fig. III / 4 Overview of the Conning Screen

1.5 TRACKPILOT Application

The TRACKPILOT application controls the vessel for constant heading, course or along a pre-planned track as prepared with the ECDIS planning function. With the option SPEEDPILOT the speed of the vessel along a leg can be controlled to reach the final destination at a pre-planned time.

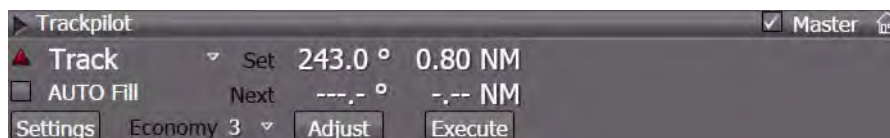


Fig. III / 5 Overview of the Trackpilot Expander

1.6 MACHINERY Application

The MACHINERY application provides remote indicators and controls for the complete automation system on-board. Subsystems may include main engine control, fuel supply, cooling, generators, fire detection, electric power distribution, ballast, etc.

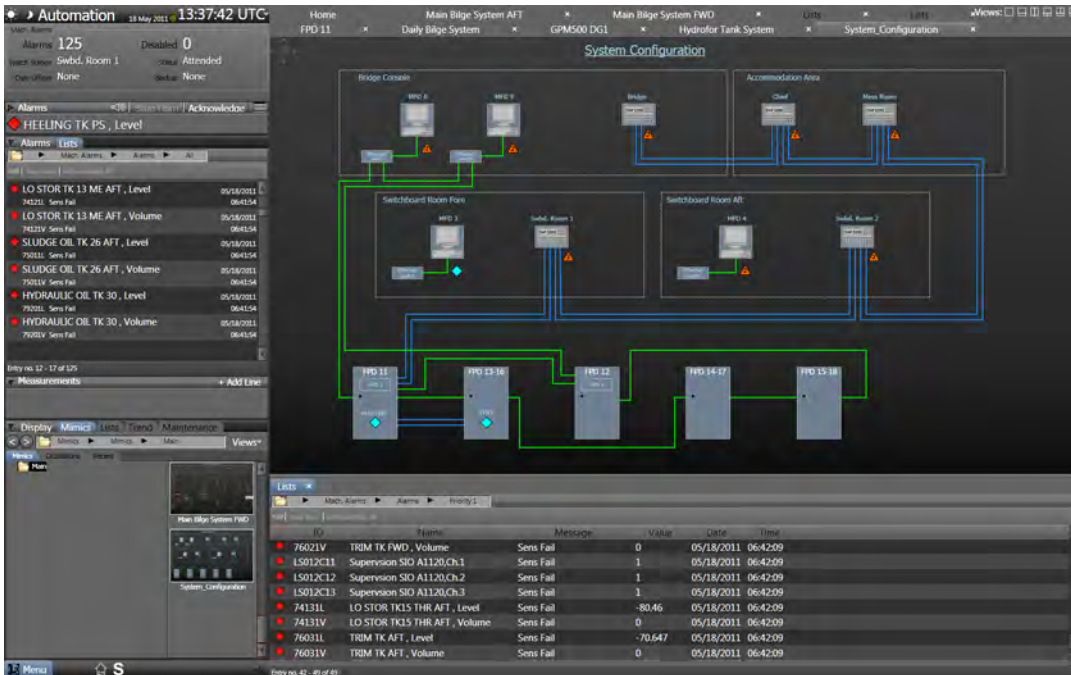


Fig. III / 6 Overview of the Machinery Screen

1.7 Common Functions for Products and Applications

The table below gives an overview about the common NACOS Platinum functions which are used in the RADAR and ECDIS applications and which can form a RADARPILOT, a CHARTRADAR, an ECDISPILOT, or a MULTIPILLOT. The main differences between these products are as follows:

- RADARPILOT: Basic radar functions incl. ARPA and AIS targets, no chart functions
- CHARTRADAR: As above, plus chart functions with black background colour table*
- ECDISPILOT: Chart functions in full colour, AIS targets on top
- MULTIPILLOT: CHARTRADAR plus ECDIS with ARPA and AIS targets ¹⁾


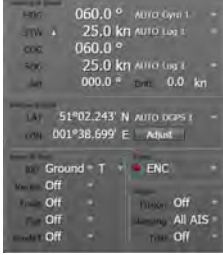
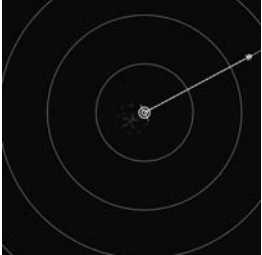
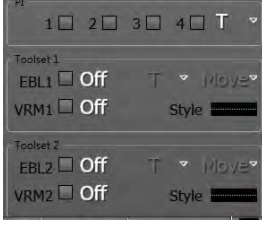



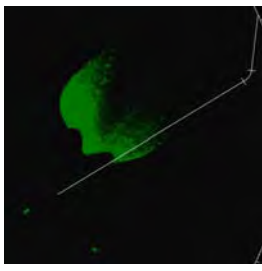

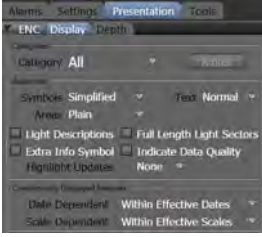
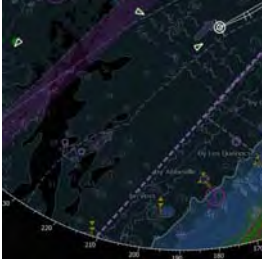


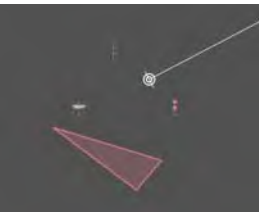


Function	tested against	Task	RADAR PILOT	CHART RADAR	ECDIS	MULTI PILOT
Navigation sensor management	IEC 61162 IEC 62388/ Ch13	plot own ship with vectors/ trails	✓	✓	✓	✓
Stabilize display	IEC 62388/ Ch9	display traffic scenario, HU, north	✓	✓	✓	✓
Navigation tools	IEC 62388/ Ch8	provide EBL, VRM, (and LOPs)*	✓	✓	✓	✓
Process radar video	IEC 62388 / Ch 5,6	display raw radar video	✓	✓	✓	✓
Target handling	IEC 62388/ Ch10	display ARPA and AIS targets	✓	✓	✓	✓
Display chart objects	IEC 62388/ Ch11	display buoys, beacons, etc.		✓	✓	✓
Display basic chart areas	IEC 61174	display land and water areas		✓	✓	✓
Display user symbols (maps)	IEC 62388/ Ch 8	display user setbeacons, lines, etc.	✓	✓	✓	✓
CCRS	IEC 62388/ Ch7	relate all nav. data to single ref. point	✓	✓	✓	✓
Alarm management	IEC 62388/ Ch15	process alarms on 3 levels	✓	✓	✓	✓
Route planning	IEC 61174	provide waypoint editor with control	✓	✓	✓	✓
Chart monitoring	IEC 61174	check passage against chart depth		✓	✓	✓
Chart maintenance	IEC 61174	update chart information		✓	✓	✓
Conning	IEC 62288	show navigation instruments	✓	✓	✓	✓
Track control	IEC 62065	controls ship on pre-planned route	✓	✓	✓	✓
Workstation hardware	IEC 60945	monitor; operating device; processor	✓	✓	✓	✓

Fig. III / 7 Common Functions for Products and Applications

¹⁾ The detailed arrangement of foreground and background layers is shown on the following page

The table on the next page presents the most important layers and their priority shown for the CHARTRADAR.

The arrangement for the MULTIPILLOT is only slightly different. The priority of the radar video is changed in favour of the chart objects. The radar video layer is shifted down and placed in between basic chart areas and chart objects acc. to IEC 61174 (see arrow 1). The dusk and night colour sets used for the chart areas are extended to the full daylight colour set. All other functions are the same.

Data Source	Function Controls	Presentation Layer	Objects and Priority (for CHARTRADAR)
 From navigation sensors			Own Ship (on top), with headmarker, vector and trails, AIS and ARPA targets
none			Navigation Tools, comprising EBL, VRM and LOP
			RADAR Video, raw video as received from antenna unit, sea and rain filtered as selected by the user
ENC Chart Chart Objects  internal data format, converted from S-57			Chart Objects buoys, beacons, traffic separation, text labels, dangerous zones, coastlines, planned route
 internal data format			User symbols, user defined buoys, beacons, lines and areas
ENC Chart Basic Areas  internal data format, converted from S-57			Basic Chart Area, land, water, depth lines

The arrangement of layers is shown for the CHARTRADAR from top to bottom. For the MULTIPILLOT the raw video is shifted down as indicated by the arrow 1).

All the common functions as listed earlier and the layers as listed in the previous table are integrated to a complete application for RADAR or for ECDIS.

If the two applications RADAR or ECDIS are combined on a single workstation to build-up a CHARTRADAR or MULTIPILLOT only those functions are added, which are not already available with the first application. Each of the functions as listed above is only started once on a workstation. But depending on the actual configuration it may have a slightly different appearance. Differences are listed i.e. at the end of the Chartradar chapter.

Some common functions have been extracted from the description of the individual applications and set in front of the RADAR and ECDIS description.

Examples are the Consistent Common Reference System (CCRS) (See chapter III - 2.1 on page III- 14), the navigation sensor management, and the common user interface (HMI) (See chapter I - 5 on page I-45).

More complex and more seldom used common functions have been extracted as well and set behind the RADAR and ECDIS description.

Examples are the alarm management (See chapter V - 2 on page V-9), the route and chart monitoring (See chapter C - 2 on page C-37), and the optional conning and track control function.

Please refer to the corresponding subsequent chapters for more detailed information.

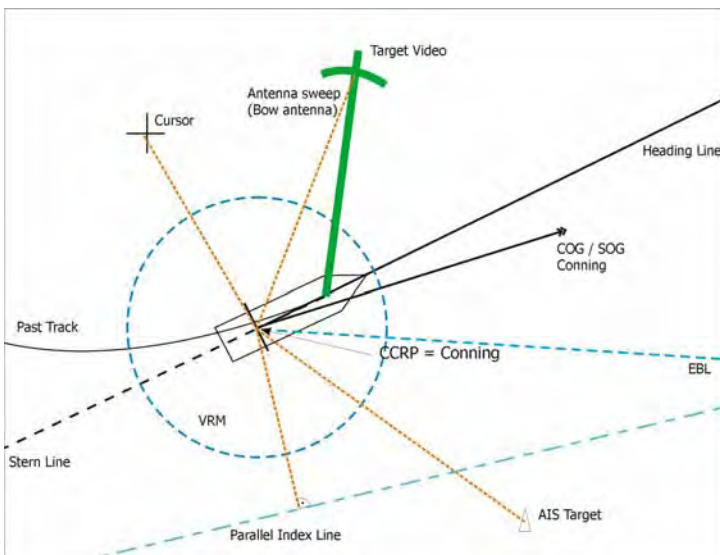
2 Common Functions for Navigation

2.1 The Consistent Common Reference System (CCRS)

The NACOS Platinum navigation system is designed as a Consistent Common Reference System (CCRS). It references all horizontal measurements such as target range, bearing, relative course, relative speed, closest point of approach (CPA) or time to closest point of approach (TCPA) to one single point on-board, the Consistent Common Reference Point (CCRP), typically the conning position of the bridge.

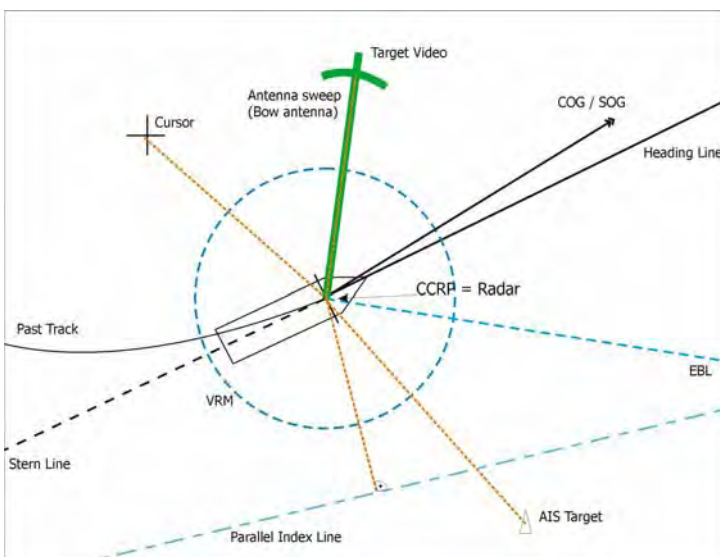
The offset between the installation location of a navigation sensor i.e. for position, speed, or heading and the CCRP is compensated by the Platinum system. The offset between a radar antenna position and the CCRP is compensated as well. If multiple antennas are installed, there is a provision for applying different position offsets for each antenna in the radar system. The offsets are applied automatically when any radar sensor is selected.

The CCRP can be selected by the user, the default setting is the conning position. For precise radar measurements it can be set to the just selected radar antenna. The relations are shown in the following two diagrams.



Measurement relative to the **Conning Position. (CCRP = Conning)**

All bearings, distances, positions are indicated relative to the conning position on the ship's bridge



Measurement relative to the **RADAR antenna (Bow RADAR as an example) (CCRP = RADAR)**

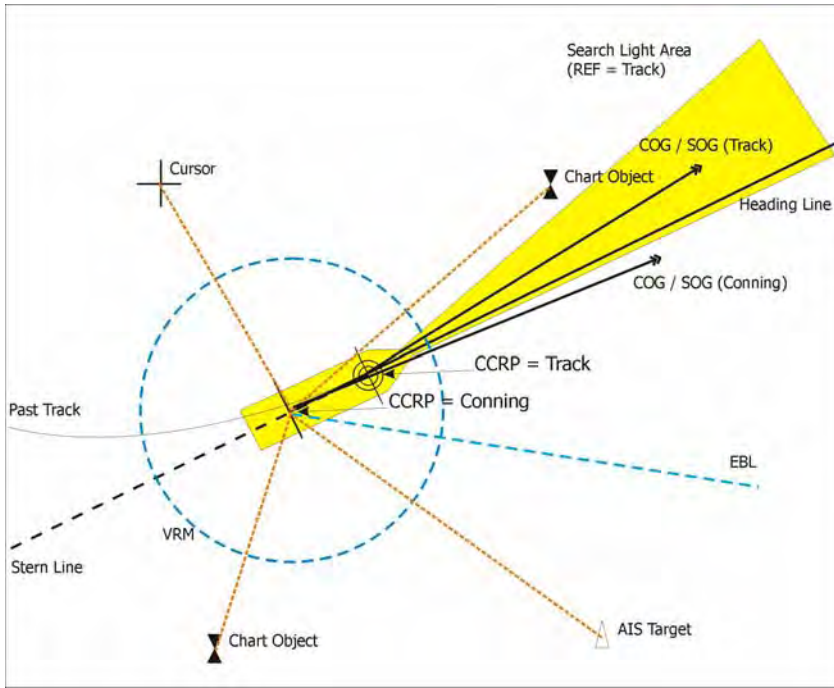
All bearings, distances, position etc are indicated as seen from the radar antenna location.

All different radar antennas on the ship can be selected as the reference for the radar CCRP.

Fig. III / 8 CCRP on RADAR

For systems with integrated Track Control System (Autopilot) it is important to use the same reference position for the track control and for the monitoring process of the ECDIS. For both purposes the so-called System Position, located in the bow of the ship, is used system-wide.

In NACOS Platinum the System Position is called Track Control position, which can be selected with **CCRP = Track** in the GUI as an optional reference point.



Measurements relative to the **Conning Position (CCRP = Conning)**

The chart monitoring function of the ECDIS sub-system is done for the CCRP=Track Control Position, i.e. the guard sector (also called look-ahead sector) starts at the bow of the ship. Length and width of the sector can be adjusted in the ECDIS-HMI.

Fig. III / 9 CCRP on ECDIS

For measurements relative to the own ship (EBL, VRM, Cursor, target data) on the NACOS Platinum the Conning Position is used normally. In contrast to a RADAR system, where the reference may also be the position of the radar antenna, in a stand-alone ECDIS no alternative reference position than the Track Control position can be selected by the operator.

2.2 Context Menus

Context Menus in the Application Area

Context menus are available in the application area, i.e. the PPI in RADAR mode and the Chart Area in ECDIS mode. Most of the menus are described in the different functional chapters of the applications running on the MFD. This chapter shall give an overview about the entire context related functionality available today in the main navigational applications.

By a DO or a MORE click into the application area a context menu is opened which contains all possible user actions at the current click position. For this purpose the area near the click position is analysed by the system which is then presenting a choice of several options.

Context Menus with DO

For the case that the DO click is unambiguous (only one object is found below the cursor) the action or selection is done without context menu.

If more than one object is found, the context menu opens and the operator must select the operation which he wants to access.

Examples:

- AIS class A / RADAR Video:
A radar target and an AIS target is available.
- RADAR Video / VRM1:
A radar target and the VRM1 can be selected.
- Waypoint 9 / Leg 009-010 / PI3:
The waypoint symbol, the leg behind waypoint 9 or the Parallel Index Line 3 can be selected.

Context Menus with MORE

The MORE click into the application area presents a more or less predefined selection of functions which is depending on the active running application or the operating mode of the application area or even the fact that one or the other function is in On or Off state.

For RADAR and ECDIS mode the same set of functions is used where some of them are only possible in ECDIS mode; i.e. the RADAR mode has a reduced sub-set of these functions, they are marked with (R) in the following list ¹⁾

¹⁾ The number and functionality of context menus may be increased in future.

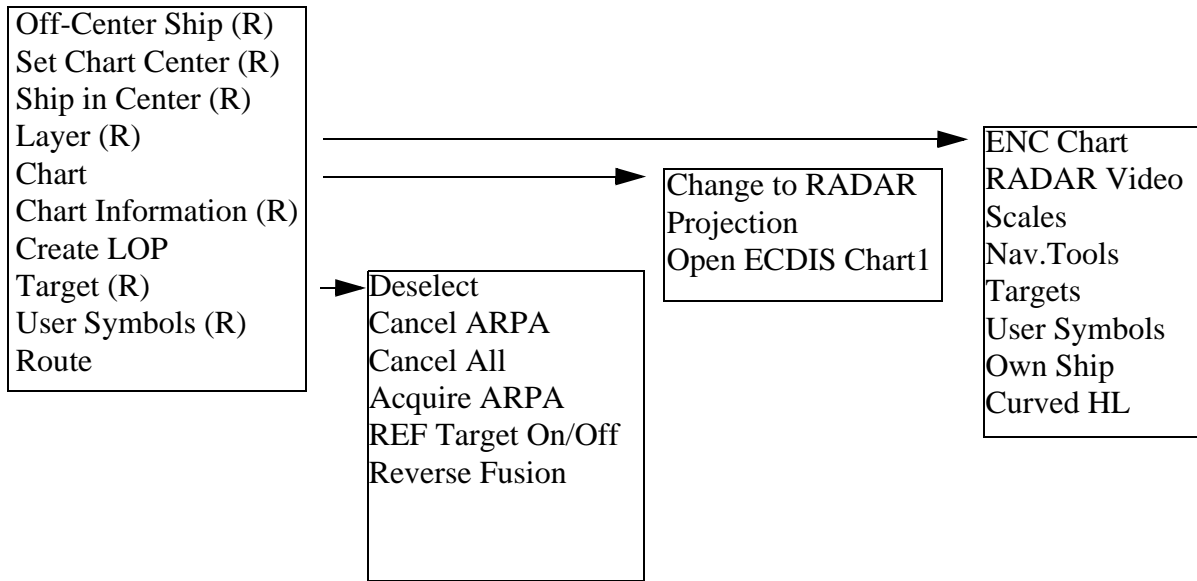


Fig. III / 10 Structure of Context Menus

Depending on the system status and the object found under the cursor other or more entries may be available, for example Clear Trails, Reset PI Lines, Center EBL; the additional entries may also have own secondary sub-menus.

In some cases it is necessary first to select an item on the screen with the DO key in order to have access to the relevant context menu.

Examples:

- Select a user made chart object (a symbol, a line or area, an event or a text note) in order to have access to it via the User Symbols menu.
- Select a waypoint or a leg of the route to get the Route menu with its sub-menus.

Layers

The different graphic overlays in the application area are organized in so called layers. Via a MORE click into the PPI / chart area you can access the different layers.

The Layer context menu has two main functions

- Selection of visibility of the available layers
- Brightness control of the visible layers.

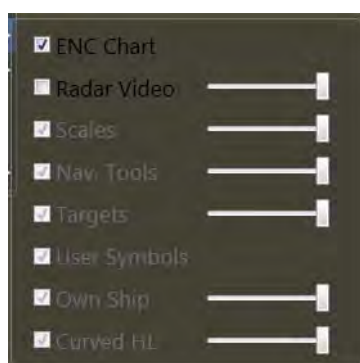


Fig. III / 11 Layer Context Menu

The availability and the controllability of the different layers are dependent on the active main application (RADAR or ECDIS mode, etc.). For example in ECDIS you may switch off the radar video and the chart, but you cannot dim the chart, and in RADAR mode you may switch off the chart, but not the radar video. Caused by the rules and standards some of the layers are not allowed to be dimmed to complete darkness.

2.3 The Chart Information Window

With a **MORE** click within the PPI/Chart area and then on **Chart Information** in the context menu, the Chart Information window is opened.

In this window, information about different criteria of the chart database and the chart cells can be displayed.

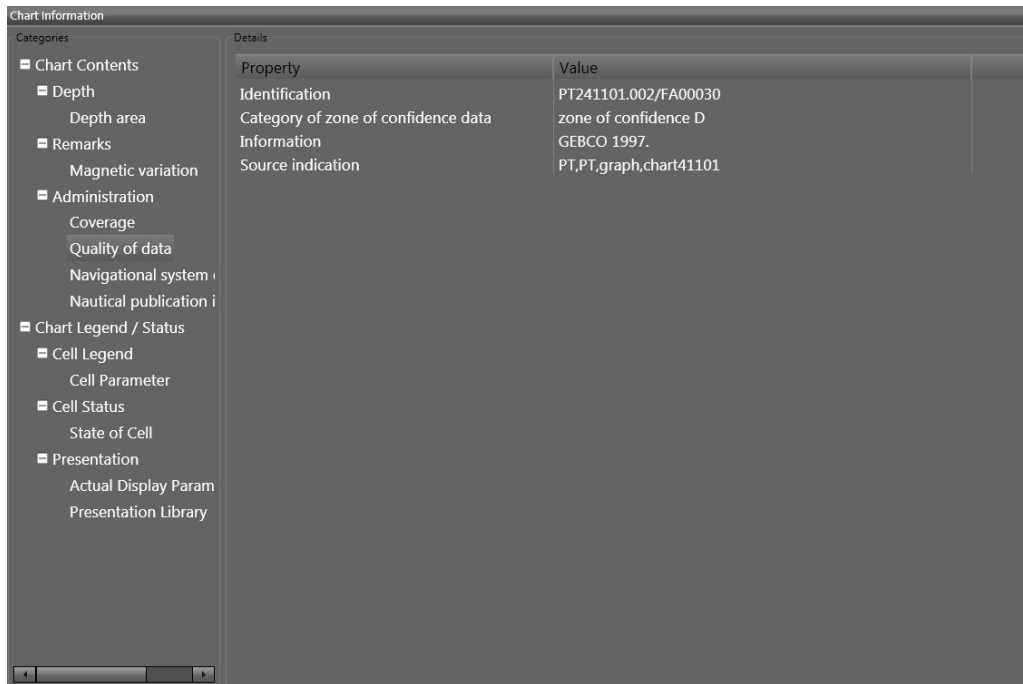


Fig. III / 12 The Chart Information window

3 Permanent Area for Navigation

The common part for the applications.

As mentioned in the general chapters, the screen is divided into the application area and the sidebar.

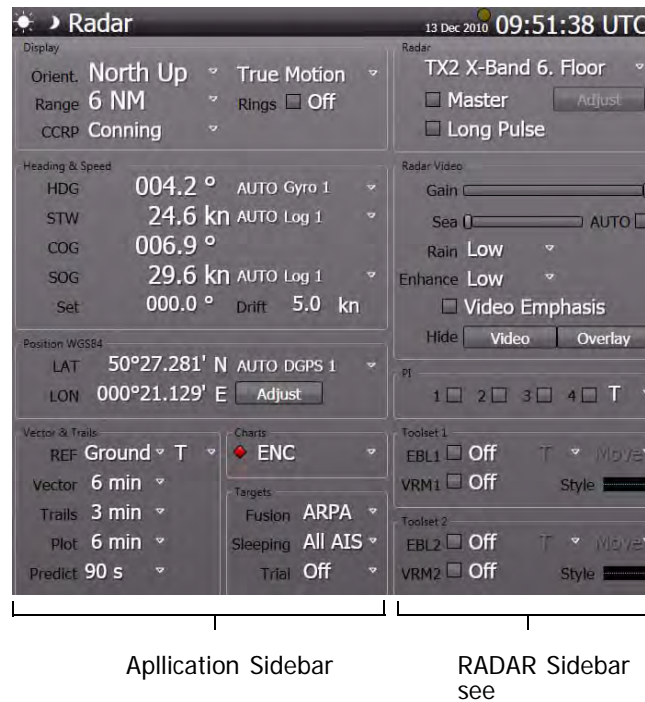


Fig. III / 13 Permanent Area for Navigation

The sidebar itself is divided into the permanent area and the nonpermanent area. The permanent area contains elements and displays that refer to the settings of the radar, the ECDIS and the entire system. The elements are grouped. In the following chapters, each group of the application sidebar will be described separately.

The right part of the permanent area in the sidebar is related to the radar system. It is described in the chapter RADARPILOT. The left part of the sidebar is fully valid for the RADARPILOT, ECDISPILOT and the MULTIPLOT. Any dependencies of the controls on the selected main operation mode (RADAR or ECDIS) are described in the following chapters.

- ☞ All settings in the permanent area made in RADAR mode or ECDIS mode are synchronized between the modes, with other words, switching between the modes does not change the common settings and adjustments.

3.1 Display

This group affects the general settings of the radar display and the chart area of the ECDIS:

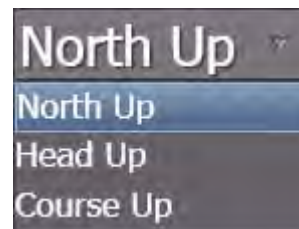
- the angular screen orientation
- the movement of the own ship on the screen
- the display range and the range rings
- the CCRP, i.e. the reference point on your ship used for calculation of the system data like COG, SOG, CTW/STW and position and for calculation of the ship-relative data like bearing and distance of EBL and VRM and the cursor in the application area.



3.1.1 Orientation

Displays the radar picture and the superimposed chart in three different ways.

- **Head-Up:**
The heading of own ship points upwards, the radar video is moving with the yawing of the ship
- **North-Up:**
Geographic north points upwards, the radar video is stabilized with the gyro heading
- **Course-Up:**
The course which exists at the instant of switch-on or re-orientation of this mode points upwards, the radar video is thereafter stabilized with the gyro heading.



In Course-Up Mode a click with **MORE** on the Course-Up indicator takes over the current heading as the new reference heading.

- ☞ After switch-over and re-orientation, the target trails are not influenced; they remain visible in the new mode.

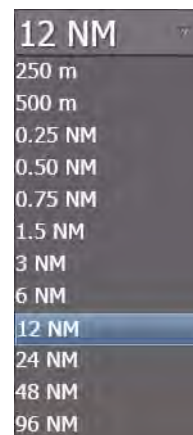
When the ECDIS display mode is selected, the system can additionally be switched into the planning mode. This mode is called Browse mode. See [chapter B - 1.3.2 on page B-8](#) and [section 3.1.5](#).

Browse mode is only supported in North-Up and Course-Up orientation. Selection of Head-Up automatically switches back to the Monitoring mode.

3.1.2 Range

The display range can be chosen from a selection of ten **nautical ranges** (PPI radius between 0.25 NM and 96 NM) and two **docking ranges** (PPI radius 250 m and 500 m).

- ☞ In the nautical range and also in the docking ranges, all distances are stated in NM and all speeds in kn.
- ☞ If the range selection is done by means of the radar keyboard, the ranges are selected stepwise (up or down).



The Range can also be set by means of the radar keyboard or by the zoom control.
See [chapter 4.1 on page A-34](#).



3.1.3 Rings

Fixed range rings can be displayed. Range rings are concentric circles with the reference position of the selected CCRP as their centre ¹⁾, and are situated at equal distances from one another.

Depending on the selected range, the radii of the rings and the distances between them are different:

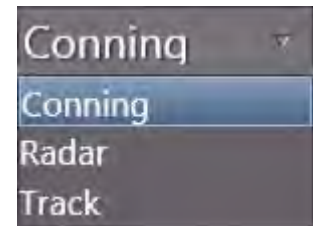
Range	250m	500m	0,25NM	0,5NM	0,75NM	1,5NM	3NM	6NM	12NM	24NM	48NM	96NM
Distance Ring	50m	100m	0,05NM	0,1NM	0,25NM	0,25NM	0,5NM	1,0NM	2NM	4NM	8NM	16NM

Table III / 2 Range Rings

¹⁾ For reference position see [See chapter 2.1 on page III-16](#)

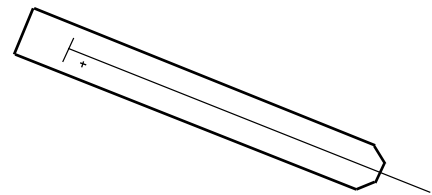
3.1.4 CCRP

The Consistent Common Reference Position can be chosen from three different possibilities:



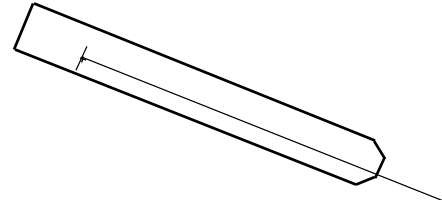
- **Conning:**

The measurements are stated relative to the conning position, which is a defined position on the bridge.



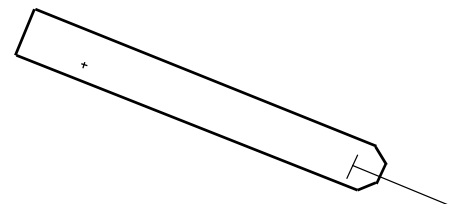
- **RADAR:**

The measurements are stated relative to the position of the selected radar antenna. If another transceiver is selected, the reference position is changed automatically. If RADAR is not selected as CCRP, its location on the ship symbol is marked by a small cross: +




- **Track:**

Referring to [section 2.1](#) it must be noted here that the Trackpilot is utilising the data of the so called System Position in the bow of the ship for its control purpose and also for calculation of all ship relative data (course and track deviation, drift angle, bearing, distance and time to go to waypoint and wheel over point, etc.). When in the Trackpilot Section of this manual the term **own ship** or **own ship's position** is used, the own ship's System Position (at the bow of the ship) is referenced.



See [chapter 2.1](#) on page III-16 for details on reference systems.

In each case the minimized ship symbol , the speed vector, EBL, VRM, range rings and stern line are starting from the selected CCRP and all measurement tools and the graphic cursor are working and indicating relative to this reference point.

Note: The display of the own ship symbol outline in true scale is depending on user selection and the selected display range, if **True Scaled** is switched on.

3.1.5 Screen Stabilisation

As far as the screen stabilisation is concerned, there is a choice between the following:

- **True Motion (TM):**

The radar video of not moving targets (buoys, beacons, land or lighthouses) is fixed; the own ship symbol moves across the screen. The PPI/chart area orientation is North-Up or Course-Up. Either manually, or automatically by means of a **TM reset**, the own ship symbol on the PPI/chart area is reset in good time before the PPI/chart area boundary is reached; this resetting is done in such a way that the larger part of the PPI/chart area lies ahead of own ship.

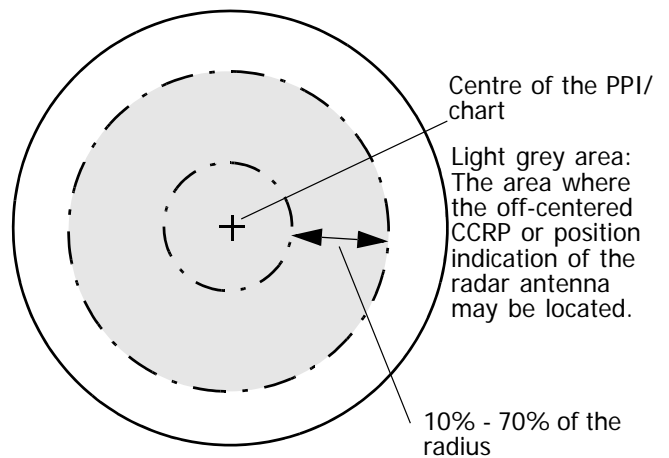
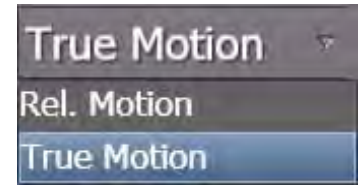
For the ECDIS application, the **TM reset** takes place in the instant that the indication of the CCRP has reached a distance of 10% up to 70% of the chart diameter from the centre of the PPI.

For RADAR, the value is not adjustable. See chapter A - 4.1 on page A-34 for details.

The appropriate value for ECDIS **True Motion Reset** value can be set by means of the slider in the **ECDIS > Settings > True Motion** dialog:

- **Relative Motion (RM):**

Own ship's position is fixed; the radar video moves relative to own ship in accordance with the movement of own ship. As far as the PPI/chart area orientation is concerned, it is possible to choose between Head-Up, North-Up and Course-Up.



Examples for True/Relative Motion and Head-/North-/Course-Up

In figures III / 14 and III / 15, screen excerpts from two instants of the same scenario are shown schematically for the five Monitoring display modes:

Instant 1

- Own ship's course 60°, speed 20 kn
- Two moving targets, courses 60° and 150°, speed 10 kn for both
- Two fixed targets
- Two grid lines showing the alignment of the electronic chart

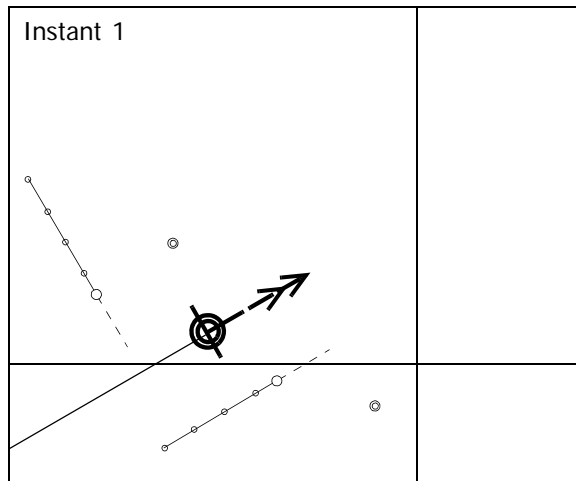
Instant 2

The same scenario, but after an own ship's course change to 10° (all other data unchanged).

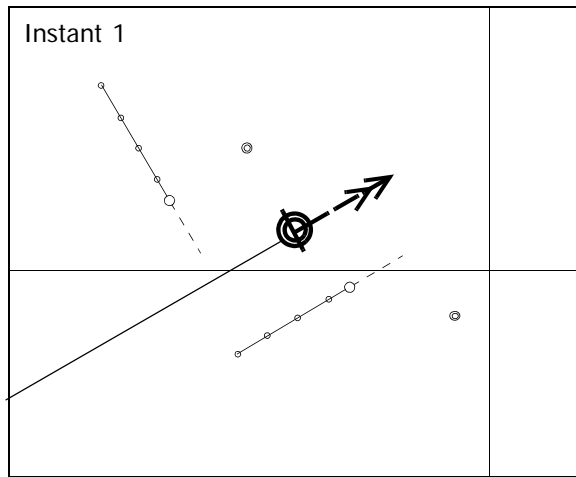
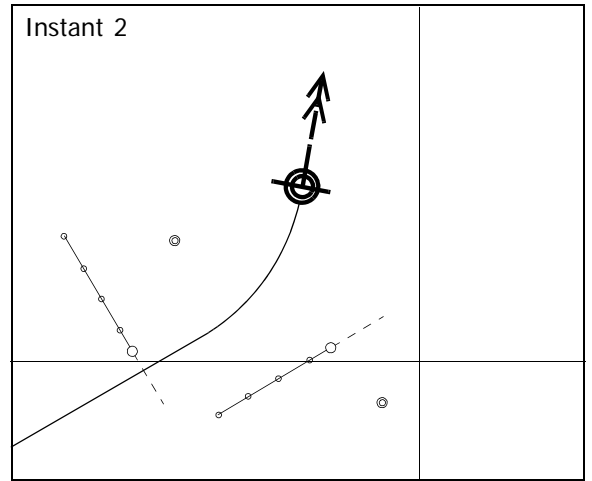
Displays of the following are set: Own ship symbol, course and speed vectors, past plots of the targets.

Except in the case of **True Motion**, the centre of the screen excerpt shown is the own ship's position that was set with **Set Center** function of the context menu in the PPI/Chart Area.

- ☞ The display of the own ship symbol is depending on user selection and on the selected display range if "true scaled" is switched on in the Presentation tab.



True Motion (with true vectors and past plots)



Centered Display (with true vectors and past plots)

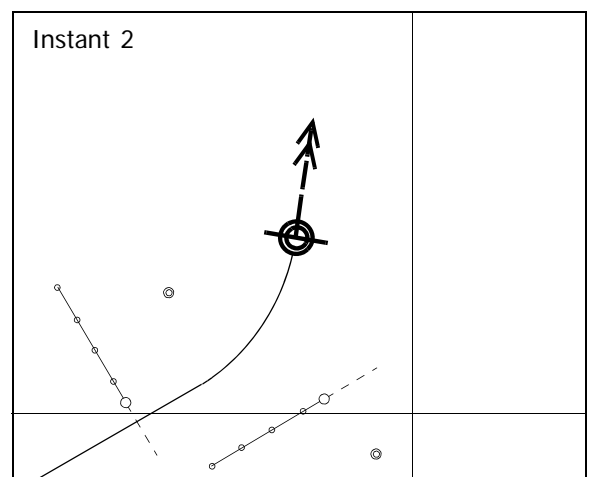
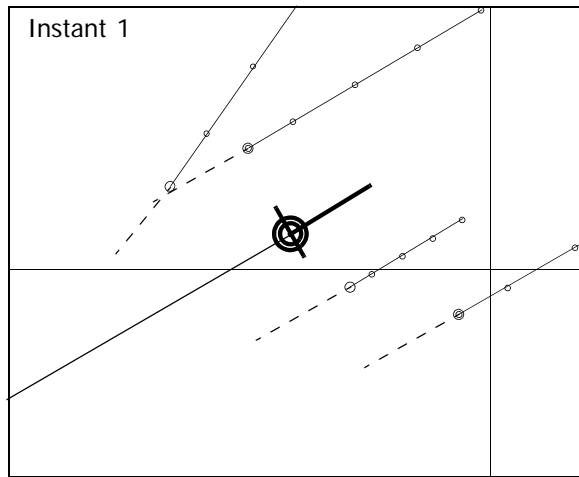
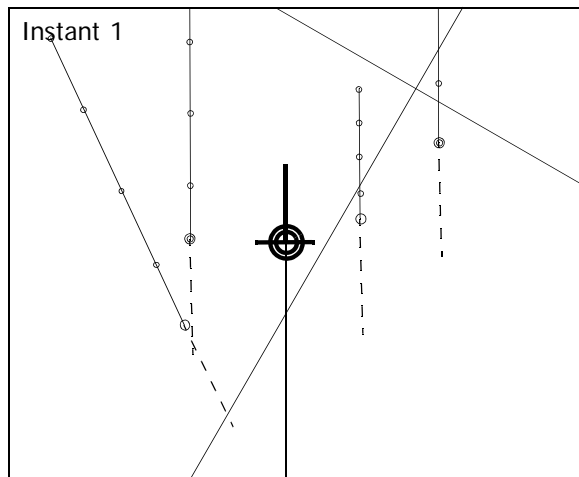
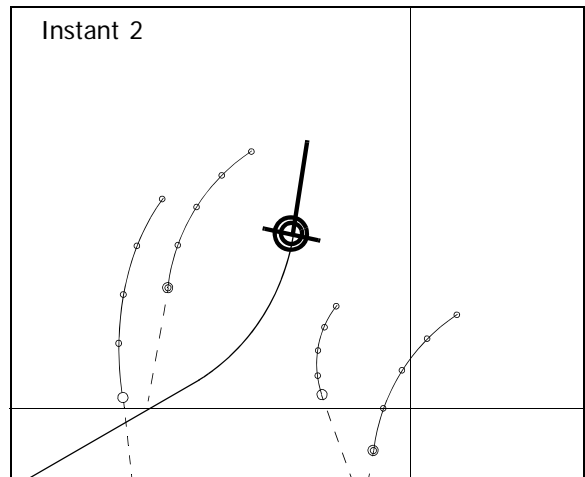


Fig. III / 14 Display in the modes True Motion and Centered Display

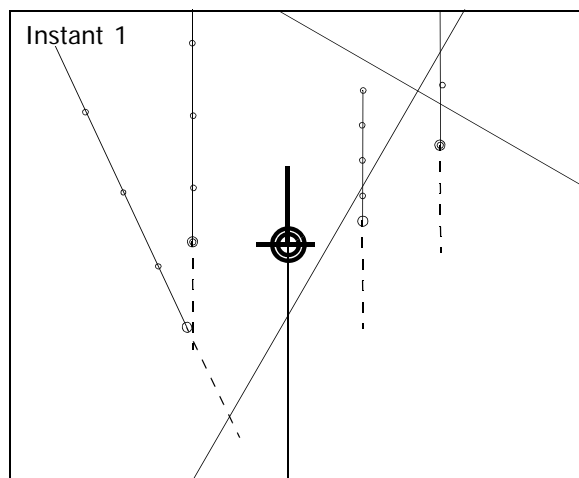
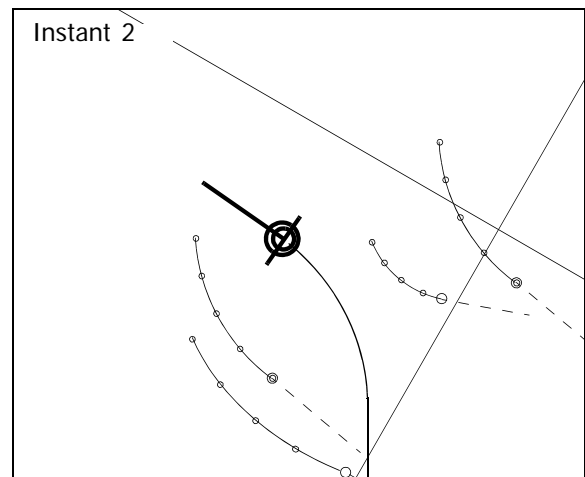
In this mode, the headline is shown as a short, thick line.



North-Up RM (with relative vectors and past plots)



Course-Up RM (with relative vectors and past plots)



Head-Up RM (with relative vectors and past plots)

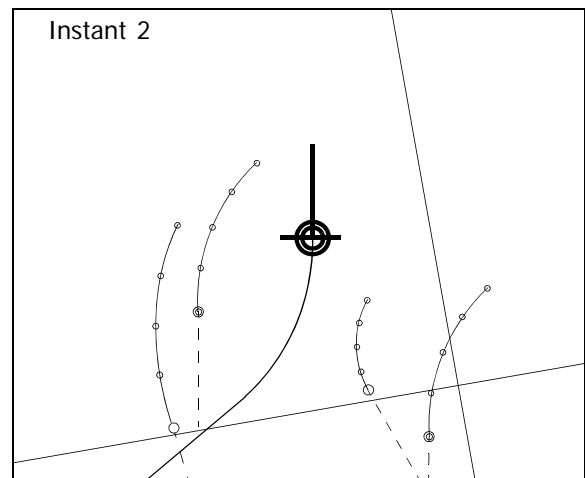


Fig. III / 15 Display in the modes North-Up RM, Course-Up RM and Head-Up RM

3.2 Navigation Sensors

This chapter describes the navigation sensors available in the system. The main navigation sensors used for the heading, speed and position instruments are monitored depending on the "sensor selection mode". Those sensors which are available twice or more in the installation can be supported by an automatic selection mode indicated by **AUTO** in the different displays.



CAUTION

The automatic selection mode is the default setting after start or restart of the system.

- If the selection mode is **AUTO** the switching over to another sensor of the same type is done with a warning indicating the new sensor selection.
In **AUTO** mode the switch over to a manual sensor (Manual Speed or Manual Position) is accompanied by an alarm if the manual data have not been set before.
- If the manual sensor selection is chosen the switching over to the backup sensor must be done manually after the respective alarm or warning has been given.
In the meantime (until a new sensor has been selected) the system is using the last valid values of the disturbed or faulty sensor which produced the alarm.
It is required to perform the switch over to the new sensor as soon as possible, but not before its data have been checked for plausibility and correctness.



CAUTION

In any case (in manual or automatic sensor selection mode) the set data for the sensors running in manual mode must be checked regularly and a real sensor must be selected as soon as possible.


Details are given in chapter V-ALARMS as required in the explanations to the different sensor alarms.

3.2.1 Integrity Marking of Sensors


According to the currently valid performance standards, invalid information or information with low integrity shall be clearly marked qualitatively and/or quantitatively. In NACOS Platinum a qualitative marking of sensors by alarm icons is used ¹⁾.

For this purpose the main navigation sensors used for the instruments in the permanent area are continuously monitored by the system. If the signal of a sensor is no longer received or is corrupted, or if it is marked invalid by the sensor itself or by the NACOS internal sensor monitoring, a respective "sensor timeout" or a "sensor invalid" alarm message is given for the faulty sensor ²⁾.

In case of activated AUTO selection mode another connected sensor (if available) can automatically be connected to the respective instrument and the instrument data remain available and valid.

If this is not possible, or if the manual selection mode is used, the sensor will be marked invalid by an alarm icon  shown before the sensor label in the instruments displayed on the permanent area.

This can happen for the HDG, STW SOG and COG labels in the Heading & Speed group and for the position data in front of the LAT and LON labels.

If the manual input mode is selected (caused by sensor failure or decision of the operator) and the manually set data are used for any navigation sensor, this will be shown by the  icon, which is indicating manual input mode and additionally the warning level 3.

On a vessel at sea manually set sensor data are generally to be treated as doubtful and with low integrity as they must permanently be monitored and adapted to the real situation by the operator.

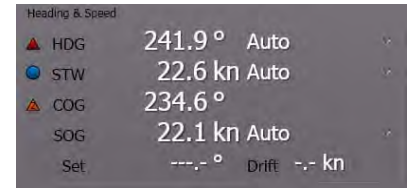
¹⁾ For a complete list of available alarm icons refer to chapter [see chapter V - 1.1 on page V-4](#).

²⁾ If you need more detailed information about the sensor modes, valid/invalid marking or other details of the different sensor interface protocols, refer to the Technical Manual delivered with the system.

3.2.2 Heading and Speed

This group displays information about the actual values for heading and speed and offers the possibilities to choose different heading and speed sensors ¹⁾.

In front of each depiction of one of the sensors, there may be a symbol indicating a warning or an alarm.







<p>Yellow</p> 	<p>Input from the process is disconnected in the software, and the value is entered manually by the operator</p>
<p>Red</p> 	<p>Error in the Control and Supervision system, the indication is invalid or the value received from the sensor is outside the legal limits</p>

Table III / 3 Integrity Marks for Heading/Speed Sensor Data

The meaning of the indicators is explained in detail in chapter V-ALARMS.

 The values for STW, COG and SOG will go into alarm status  if RADAR is selected as the CCRP, but no radar transceiver is selected.

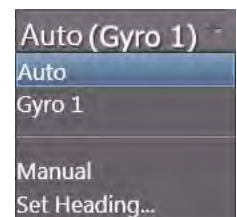
Heading - HDG



⚠ CAUTION

Be aware that a missing or wrong speed input to the compass system can also produce remarkable course errors.

The value for heading is the direction the bow of the own ship is pointing at. It is derived from the compass system of the ship. Behind the heading value, the actual choice and the selection mode of the heading sensor is displayed.



AUTO


Means that the heading sensor is chosen by the system automatically. The best available sensor will be used. If a failure occurs on the actual sensor, the backup sensor is chosen, if available, and a warning is given.

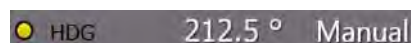
Gyro x

From the number of gyro compasses that are connected to the system, one can be chosen to be used as heading sensor. Sensor selection mode is manual.


¹⁾ The sensor selection list is depending on the navigation sensors connected to the system.

Manual (Option)

The actual course of the own ship can be entered manually. In case a manual value is present, the indication of the value is preceded by a  in the same line.



After having changed the heading sensor to manual mode, use the **Set Gyro...** function in order to enter the desired value.

 This choice is normally not visible. It can only be used for special purposes such as demo systems etc.

About Speed Sensors

Speed sensors are treated as part of the CCRS. (See chapter III - 2.1 on page III-16 for details). This means that the indicated speed data and the speed vector displayed in the PPI/chart area are valid for the CCRP sected under "CCRP" on page III-28



CAUTION

It must be ensured that an approved SDME (Speed and Distance Measuring Equipment) is connected, that means that all speed sensors must accord to IEC 62388 (2007) and to IMO resolution MSC.96(72).

There may be several speed sensors connected to the system. One of them is chosen by the system on startup. In the case of speed sensors which transfer the longitudinal speed only, the drift and set can be entered manually, because those devices cannot detect the effect of leeway and current. As an alternative to selection of a speed sensor, it is also possible to input the speed manually, if necessary. If fixed ARPA targets are available, the speed can also be determined by **Reference Target Tracking**. See chapter 7.13 on page A-78 for details.

- ☞ The speed sensors also include position sensors which transfer not only the position but also the speed and course made good. Compared to the present-day state of the art, they generally do not meet the IMO Performance Standards for SDME (Speed and Distance Measuring Equipment, IMO resolution MSC.96(72)). Therefore, they might not be configured in the system, and so it might not be possible to select them for speed input.

Two different values for the speed of the ship are displayed:

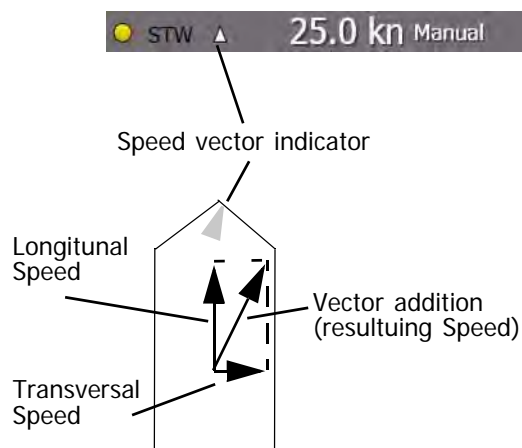
- **STW: Speed through Water**
Only the longitudinal speed (i.e. the speed in ship's direction) is indicated behind STW. An arrowhead describes the ahead or astern velocity. The speed through water results in a speed vector described by CTW, STW. The speed through water often is not equal to the speed over ground, set and drift may influence the measurement. Speed logs for waterspeed (single axis log) often do only measure the longitudinal speed, i.e. the speed mainly produced by the propulsion of the ship. In this case the CTW is equivalent to the actual heading.
The resulting velocity is also indicated as a CTW/STW vector on the HMI and graphically in the PPI/chart area.
- **SOG: Speed over Ground**
The speed over ground is the most accurate and best way to determine the ship's speed. It is often measured by two-axis logs, doppler-logs or alternatively by position sensors which calculate the ship's speed from the difference of positions and the time elapsed while sailing.
The resulting velocity is indicated as a COG/SOG vector on the HMI and graphically in the PPI/chart area.

Speed through Water - STW ¹⁾

Next to the depiction STW there is a small indication like an arrow-head. This is the speed vector indicator. It shows the direction of the vector addition of the longitudinal and the transversal own ship's speed through water.

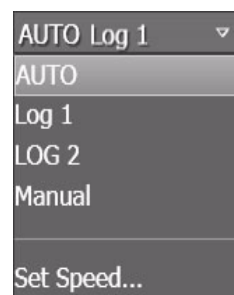
If the ship is moving straight forward through the water, the arrow head points upward, if it is moving straight backward, the arrow head will point downward.

The arrow head may also point into any other direction, then the transversal speed component makes the ship move sideways through the water ²⁾.



AUTO

Means that the STW or waterspeed sensor is chosen by the system automatically. The best available sensor will be used. If a failure occurs on the actual sensor, the backup sensor is chosen if available, and a warning is given..



Log x

The selected speed log is used as system sensor for water speed. The sensor selection mode is manual.

Manual

The actual STW of the own ship can be entered manually. In case a manual value is presently used, the indication of the value is preceded by a yellow circle in the same line.



Before having changed the speed sensor to manual mode, use the **Set Speed...** function in order to enter the desired value, which should match as good as possible to the real speed through water of your ship.

1) The selected CTW/STW vector for speed through water is used as the data source for **Water Stabilisation** of the targets in the radar PPI/chart area.
2) Transversal speed information is only available if a 2-axis speed log is connected.

Own ship symbol with vector.

Ground
COG/SOG

Water
CTW/STW




Course over Ground - COG ¹⁾

The value for course over ground is calculated

- by use of the heading and the log sensors (a bottom-track-log for example) or
- computed from the measured values of a sensor and additional information (a water-track-log and the values for drift and set for example).
- It can also be computed from the difference of own-ship positions within a specified time (normally delivered by a position sensor in a specific telegram).

The method the COG is computed depends on the sensors selected. For example, in case of the speed log its longitudinal and transversal speed values together with the heading value are used to calculate the true course vector over ground. The system decides itself and chooses the best and most accurate way to compute the COG. In any case the indicated COG is based on the data received from the speed sensor shown behind the SOG value.

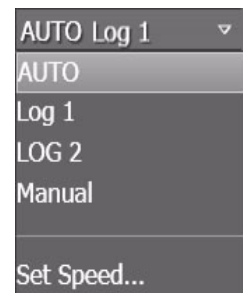
 The COG/SOG instrument in the Permanent Area displays course and speed over ground as a data pair describing the direction and the length of the speed vector over ground.

Speed over Ground - SOG ¹⁾**AUTO**

Means that the speed over ground sensor is chosen by the system automatically. The best available sensor will be used. If a failure occurs on the actual sensor, the backup sensor is chosen and a warning is given.


Manual Sensor Selection**Log x**

The selected speed log is used as system sensor for ground speed. If the selected log is a single axis log, it is advisable to enter set and drift to correct for tidal currents.

**GPS x**


Position sensors may be selected as input for SOG values. See also hint on [page III-37](#) for details.

REF TGT**REF TGT**

speed input can only be selected on radar systems and if, as a minimum, one tracked target is selected as a reference target (shown as  on the PPI, [see chapter A - 7 on page A-55](#) for details.)

STW

Sets the SOG to the same value as STW. In this case it is advisable to enter set and drift to correct for tidal currents.

 If set and drift are not set or initialized, it may happen that the COG/SOG data will be made invalid.

¹⁾ The selected COG/SOG vector for speed over ground is used as the data source for **Ground Stabilisation** of the targets in the radar PPI/chart area.


Set Drift

Depending on the choice of sensors, the values for direction and strength (speed) of the drift are computed by the system or they have to be entered by the user, in order to get an accurate measurement for COG and SOG. In order to enter the set and drift manually, open the dropdown lists for SOG, click on **Set Drift...** and enter the values in the appropriate fields.

Afterwards, click on **Set** to accept the values entered.



Manual

The actual STW of the own ship can also be entered manually. In case a manual value is presently used, the indication of the value is preceded by a  in the same line.



Before having changed the speed to manual mode, use the **Set Speed...** function in order to enter the desired value.

- ☞ Setting a manual speed value for the SOG instrument often also requires the manual **Set and Drift** input, in order to correct for the set and drift created by wind and waves and the current



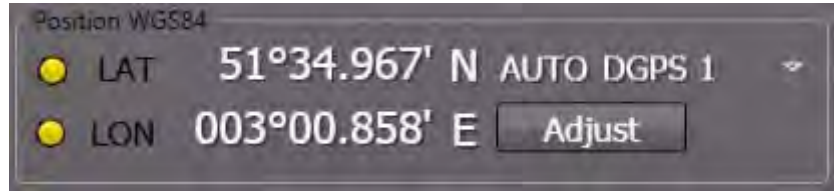
CAUTION

Manual speed and REF TGT speed input are only to be used as **temporary** solution. In both cases it **must** be observed repeatedly if the values used are still valid and stable.

3.2.3 Position

The position display indicates the Lat/Lon values, the position status and its selection mode. With **Adjust**, the position data can optionally be corrected for position errors.

In front of each depiction of the values LAT/LON, there may be a symbol indicating a warning or an alarm.





<p>Yellow</p> 	<p>Input from the process is disconnected in the software, and the value is entered manually by the operator</p>
<p>Red</p> 	<p>Error in the Control and Supervision system, the indication is invalid or the value received from the sensor is outside the legal limits</p>

Table III / 4 Integrity Marks for Position Sensor Data

The meaning of the signs is explained in detail in chapter V-ALARMS.

About Position Sensors

Position sensors are treated as a part of the CCRS. See chapter III - 2.1 on page III-16 for details. This means that the LAT/LON values indicate the position of the selected CCRP (Conning/RADAR/Track). For this function the sensor locations defined on service level are utilized.



CAUTION

It must be noted that the necessary accuracy is achieved only if all positions used relate to the same chart datum, preferably WGS 84.

- When using the system as a planning system, position coordinates obtained from a chart with a datum deviating from WGS 84 must be converted to WGS 84 User Symbols and route data.
- The only position receivers that may be connected to the NACOS Platinum system are those that output the position values in the geographical reference system WGS84 via an interface as per IEC 61162-1.
- It must be ensured that an approved EPFS (Electronic Position Fixing System) is connected, that means that all position sensors must accord to IEC 62388 (2007) and to IMO resolution MSC. 112(73).

If more than one position sensor is connected to the system, a position monitoring function will automatically be activated and will be running on the MFD ¹⁾.

The data transmitted from a position sensor to the system may contain additional information about validity , sensor type, sensor mode etc. These data are combined in the sensor label shown in the position display.

¹⁾ This function is a mandatory requirement for ECDIS.

Examples:

Types of sensors: GP (for GPS), GL (for GLONASS), GA (for Galileo), LC (for LORAN C), IN (for INS)...

Modes of sensors: A (for autonomous), D (for differential), P (for Precision), R (for RTK), F (for float RTK)...

Modes E (for Estimated), M (for Manual), S (for Simulation) are not accepted as valid input data.

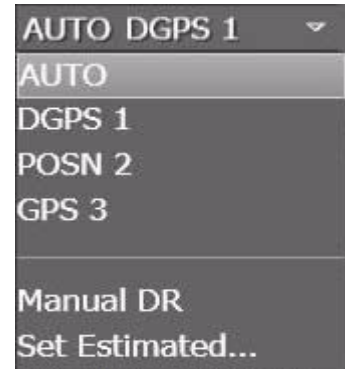
Position Sensor Selection

Changing the position sensor will also have an effect on the position monitoring function.

The sensor selection list is dependent on number, type and mode of the position sensors connected to the system.

AUTO

Means that the position sensor is chosen by the system automatically. The best available sensor will be used. If a failure occurs on the actual sensor, the backup sensor is chosen and a warning is given.



mGPS n


Selects the desired position sensor from the list of available sensors in the system.

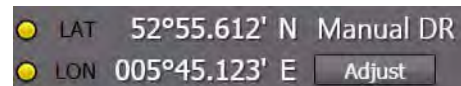
As long as the mouse pointer is positioned above the depiction of a sensor, the position data delivered by this sensor and also the offset position of the sensor from the actual CCRP position are displayed in a tool tip window.



m indicates the sensor mode,
GPS may be replaced by another sensor type,
n indicates the sensor number.

Manual DR

As long as **Manual DR** is selected, the manually entered position will be used as the basis for all further position calculations by dead-reckoning. This method uses the gyro heading and the speed of the selected COG/SOG speed sensor to estimate the own-ships position. In case a manual value is present, the indication of the value is preceded by a  in the same line.



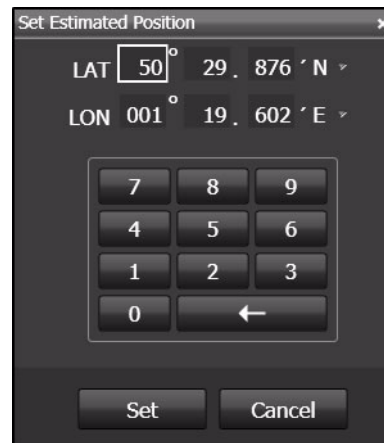
CAUTION

The accuracy of the dead-reckoned position (shown in the position display as: **Manual DR**) must be checked continually, because its accuracy is very poor and its position error is increasing over time. For safety reasons, an available position-sensor must be selected as soon as possible.

Set Estimated...

The actual position can be entered manually by means of the on-screen keyboard.

After a position sensor failure the last valid data received from the sensor are automatically present in the input fields. Be sure to correct the data input if the last valid data taken over from the sensor are no longer valid.



Position Monitoring

In addition to the selectable position plot of the 2nd position sensor (see 2nd Past Track) for display in ECDIS mode, the system provides an automatic position monitoring between the selected sensor and any other connected position sensor.

In the position instrument you select the main position sensor to be used in the entire system for display and control purposes. These sensor data are compared to the data received from the secondary available position sensor. For this purpose the best available secondary sensor will automatically be selected by the system.

Assumed you have two sensors GPS1 and DGPS2 connected to the system, there are several different states of the position monitoring process:

1. GPS1 is selected: DGPS2 is used for comparing its position data to the selected position.
2. DGPS2 is selected: GPS1 is used for comparing its position data to the selected position.
3. DR Mode is selected: DGPS2 is used for comparing its position data to the estimated position of the dead reckoning calculation.
4. Any position (GPS1, -2 or DR Mode) is selected, but none of the secondary sensors is available (switched off, defective or producing invalid data):

The alarm **Redundant Position Lost** will be given.

Monitoring Limits

The limits used for the position monitoring process are generated by the system automatically (i.e. there is no possibility for the operator to have an influence on it). The following table gives an overview about the dependencies based on the theoretical sensor accuracy.

Position accuracy	Example	Limit ¹⁾
very good	DGPS	very small
good	GPS	small
low	Loran	high

¹⁾ To avoid unnecessary alarms, an additional speed dependent lowest limit is used to filter out the natural position noise.

Table III / 5 Monitoring Limits

Position Monitoring Alarm

If the defined limit between the two compared positions is exceeded, the alarm **Redundant Position Differs** is given. For this purpose the distance in meters between the selected and the secondary position is calculated.

Position Adjust

For various reasons, it can happen that the position of the electronic chart on the screen is not in agreement with reality (i.e. with the ship's own position and with the radar or ARPA targets). In such cases, the **Position Adjust** function offers the possibility of adding the necessary correction value to the system position used in the NACOS.

Position Adjust is used to correct a constant position-error (position offset) of the selected position sensor or of a manually set position in Manual DR mode.



CAUTION

The Position Adjust function must be used extremely carefully! An offset is added to the received position data, which will have an impact on all NACOS applications based on or using position data!

The position offset has an effect throughout the whole system, i.e. also on the automatic track keeping. For this reason, it can happen that, as a result of the position adjust, an alarm message (e.g. the TP Track Limit alarm of the TRACK-PILOT) is triggered on connected units and that the Trackpilot takes corrective actions to steer back to the pre-planned track line ¹⁾.

- ¹⁾ If this shall be avoided, switch the TRACKPILOT into **Heading** or **Course** mode before you apply a position offset to the system position.

Position Offset

If the displayed LAT/LON position is incorrect, the videos and the target symbols of fixed point-targets (e.g. buoys or landmarks) do not coincide with the chart symbols of these targets or with the user made symbols that are entered at the correct positions in the chart.

A position offset of the position sensor can also be made visible without displaying the chart background on a radar, if you observe the coincidence of AIS target symbols with their target videos:

- If all targets have an offset in the same N/E direction, a position error is very probable.
- If all targets have the same bearing offset, it is more probable that either the radar itself or the compass system needs to be adjusted.

Correction by Position Adjust


The position error can be corrected manually by making the video or symbol of a fixed target coincide with its chart symbol:

1. Switch on a sufficiently small display range to be able to observe and measure the position offset. If no radar targets are available as a reference use other means to determine the position error.
2. Click on the Adjust button in the Position display. In the input dialog which then opens, key in the North and East values of the offset you want to eliminate. South and West values must be set as negative values.

Note: If the chart object is located north / east of the relevant radar target you must key in a North / East value and vice versa. With other words: you must shift the chart object to the radar or ARPA target.

3. Clicking on Set in the input dialog takes over the offset value ¹⁾.
4. As a result, the correction values displayed in the Adjust dialog take effect as a position offset and this offset is added to the position data of the sensor.

¹⁾ 1) Click on Cancel if you want to discard all inputs

- The entire track and chart synthetics move by an amount equal to the position offset. With other words the own ship's position jumps on the screen (the PPI / chart area) exactly by that offset.
 - The position offset that is entered continues to be displayed in the Adjust dialog.
 - In this way, each direction (N/S and E/W) can be corrected by up to 999 m.
 - The LAT / LON data are marked with the manual input symbol  as long as a position offset is applied.
5. Check that the other symbols of the chart and the AIS target symbols too now coincide as well as possible with their radar echoes. If necessary, the steps 2 to 3 can be repeated to correct the position offset.

**CAUTION**

If the entire video has a rotational displacement relative to the chart, this indicates that there is probably a compass error which cannot be deleted by a position offset. Either the synchronisation within the compass system is inadequate (this must then be corrected) or the compass system itself has a static or dynamic course error. This should, if possible, be corrected in the compass system.

Deleting the Position Offset

The position offset can only be deleted manually by clicking on the Adjust button and entering 0 m for each direction.

The position offset is **not** deleted automatically when a different position sensor is selected.

**WARNING**

Check regularly whether the position offset is still valid, especially after a change of positional accuracy from DGPS to GPS and vice versa or after selection of another position sensor.

When the watch is changing over, the selected offset must definitely be pointed out to the new officer of the watch.

3.3 Vector and Trails


Basically, the display of vectors and trails depends on the way of speed determination within the system.

Speed Over Ground (SOG), the so-called Bottom-Track, or Speed Through Water (STW), the so-called Water-Track can be used in order to compute the vectors for the own ship and the targets.

The speed vectors of the own ship and of targets, the trails of targets, the past-position plot and the path prediction for the own-ship can be configured here.

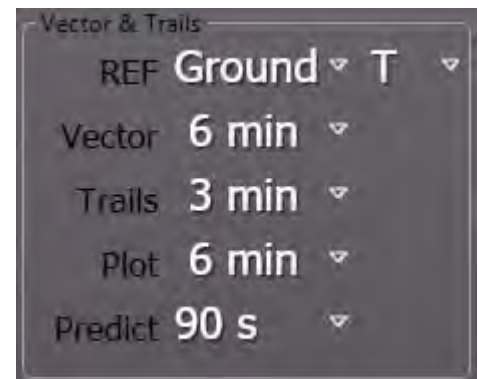
The speed vector, the target trails and the target's past position plot can be displayed as true or relative.

The own ship's position plot is only displayed as true plot, i.e. it is independent of the **T/REL** setting.

 The setting **T** for true or **REL** for relative measurements is valid for all vectors and trails within all navigational applications of an MFD.

As mentioned before, the calculation principles for relative or true data have some important differences: The relative data are calculated directly by the ARPA. The ARPA uses the plots of consecutive antenna scans in order to calculate relative course and speed of the target. Out of this, CPA and TCPA can be calculated.

In order to calculate true data of a target, the own ship's course and speed must be known. The accuracy of the true data calculation depends on the accuracy of the sensors from which the own ship's course and speed are provided.



CAUTION

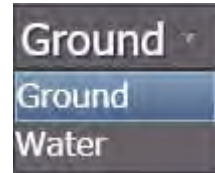
If there is any doubt that the own ship's speed data are not correct, use the REL target data and PPI presentation for collision avoidance purposes!

3.3.1 Ground / Water Stabilisation

For true vectors and trails it can be selected if the ground speed or water speed based stabilisation shall take place. Ground stabilisation is normally used for all kind of navigational functions. Water stabilisation is often used for anti-collision functions. In case of relative display mode, the stabilisation is not relevant.

Select

- Ground
for Bottom Track computation. The speed over ground (see COG/SOG) will be used to determine the true vectors and trails.
- Water
for Water Track computation. The speed through water (see CTW/STW) will be used to determine the true vectors and trails.



The position plot of the own ship and the path prediction are always ground stabilised (i.e. use the COG/SOG vector).

3.3.2 Vector

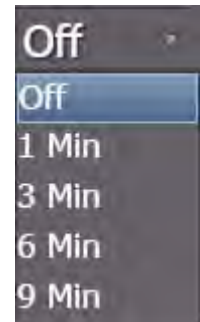
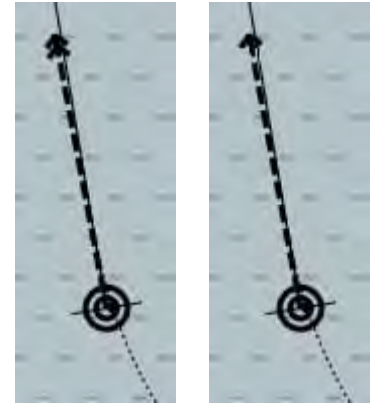
The direction of the own ship speed vector corresponds to the existing course of the own ship. The length corresponds to the existing speed of own ship.

Together with the calculated speed vectors of the tracked targets, the display of the speed vector can be switched on and off, and the time represented by the displayed vectors can be specified. Furthermore, it can be seen from the vector symbol of own ship whether the vector is relative to the sea (**Water** selected in **Stabilisation** = one arrow-head) or relative to the bottom (**Ground** selected in **Stabilisation** = two arrow-heads).

Vectors of targets can be displayed as true or relative. In relative vector mode the own ship's vector is not shown. See chapter 3.1.5 on page III-29 for graphic examples.

The length of the vectors depends on the time that is selected in the dropdown-list.

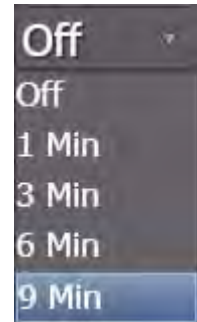
Own ship symbol with vector.
Ground Water



3.3.3 Trails

For radar echoes moving on the PPI, video trails can be displayed. These trails can be used as synthetic afterglow of the target video. Trails are generated from previous antenna scans and can be varied as follows:

- The display of trails can be switched on and off.
- Their length can be specified.
- If the screen stabilisation is set to **Rel. Motion**, the trails can be displayed with the PPI/chart area orientation North-Up and Course-Up relative to own ship or with true (absolute) orientation, i.e. in relation to the sea bottom or water stabilized.
- The trail history can be deleted so that they have to build up again
 - by the setting **Off** in the menu and selecting the time again
 - by a **MORE** click into the PPI and selecting **Clear Trails**



In the true display mode, trails make it possible to reach a conclusion quickly about the manoeuvre performed by radar targets. In the relative display, the trails provide a quick overview of the danger situation (a constant bearing can quickly be recognized). However, only qualitative information can be obtained from them.



CAUTION

If the trails are lengthened, they reach the new specified length only after the time difference (i.e. in the case of switching over from 4 to 12 minutes, 8 minutes will pass before the trails correspond to a length of 12 minutes).
The reduction of the trail length too takes some time.

Switching the Display of the Trails On and Off

The display of the trails is switched on and off by clicking on the **Trails** field.

Specifying the Length of the Trails

Click on the **Trails** field with the **MORE** key; then, in the dialog that is opened as a result, click on the desired time

In the **Trails** field, the length currently being selected is indicated, i.e. the **max.** length of the trails on the PPI.

Switching the Trails to Relative or True Display

The switch-over is performed by clicking into the **Relative/True** field in the **Vectors & Trails** group. This selection is then also valid for target vectors and their past plots.

Deletion of Trails

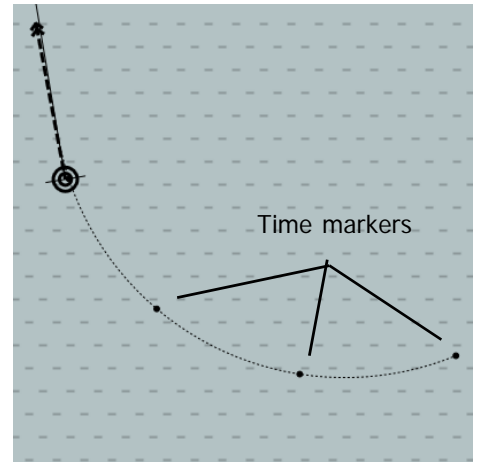
Click on the PPI area with the **MORE** key. In the dialog that is opened as a result, click **Clear Trails** with the **DO** key.

- ☞ The trails are also deleted whenever a switch-over occurs which changes the entire radar video transceiver selection or range, but they then appear again and build up over time.

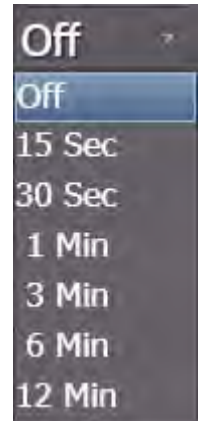
3.3.4 Plot

The past position plot corresponds to the past movement of the own ship. On it, there are four time markers, whose distance apart in time can be set. The setting of the time marker spacing also defines the entire length of the plot that is displayed. This setting and the on/off switching of the past plot display take place in common with the past plots and time markers of the targets.

Plots can not be deleted, so that they do not have to build up again after switching them off.



The length of the past plot depends on the time that is selected in the dropdown-list. The plots can be displayed as relative or true. In **REL** mode the own ship's plot is not shown. The way of displaying plots is switched together with the vectors and trails of targets in combination (**T/REL** selection).



CAUTION

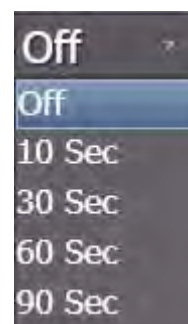
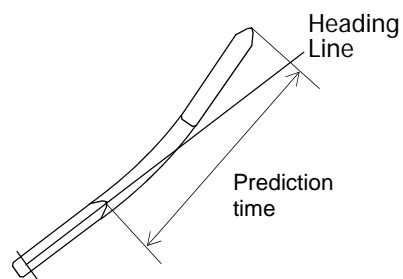
If the time interval for past position plots is lengthened, it reaches the new specified length only after the time difference has passed (i.e. in the case of switching over from 6 to 12 minutes, 6 minutes will pass before the past position plots correspond to a length of 12 minutes).
The reduction of the interval too takes some time.

3.3.5 Predict

In the small display ranges up to 1.5 NM, depending on the size of the symbol, it is possible to display the probable track (the predicted path) along which the own ship will travel if it maintains its existing rate of turn and its existing speed. The prediction time can be set here.

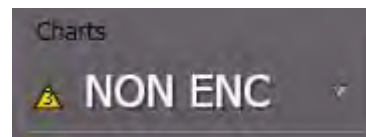
In comparison to the own ship symbol in true scale, the prediction graphics is drawn with thinner lines.

The prediction length can be set by the time value in the drop down list belonging to the **Predict** setting.




3.4 Charts

On the RADARPILOT there is the option to overlay the radar video and vector charts ¹⁾. Chart overlay can be switched on and off by the **ENC** drop down menu.



The chart content itself can be adjusted to an operator selectable level in the same way as in ECDIS mode or on the ECDISPILOT. Select **Presentation, ENC** and **Display** in the non-permanent expander to access the details of possible settings. On the same expander the displayed depth contours and depth shades can be influenced.

 It is recommended to reduce the number of chart elements displayed on the radar PPI as far as possible when radar monitoring has priority.

Determining the edition number

In order to determine the edition number of the presentation library, right-click in the application area and choose **Object info**.



In the lower part of the application area, a new window opens. Click on **Chart Legend, Presentation, Presentation Library**. In the **Details** group the edition number is displayed.



¹⁾ Other selectable chart types will be made available in future. If installed on your system, raster charts cannot be selected for overlay on the radar PPI.

3.4.1 The Chart Status Line

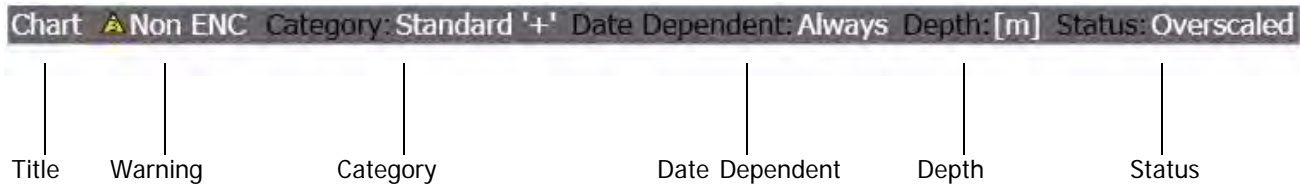


Fig. III / 16 The Chart Status Line

Title

Chart: The Chart Status Line is always visible if a Vector Chart Application is active, e.g. in ECDIS as well as in Chartradar mode

Warning

Non ENC (incl. yellow warning symbol), this is only visible if the ENC vector charts on screen and at least one part of the screen is filled with data from a "Non Official Vector Chart".

In the Cursor-Tool-Tip of this part of the screen the text: "**Non-HO data may not be used for navigation. Please refer to paper chart.**" will be visible in that part of the screen.

Category

- **Standard** is the IHO Standard selection for visible chart objects
- **Base** is the IHO Definition for the minimum required selection of visible chart objects
- **All** means that all chart objects are visible, except objects for data quality indication (data quality objects mostly overwrite the whole screen, therefore a special button exists in the presentation menu)
- **Customized** means that the user's selection of visible chart objects is displayed

If in the **Customized** mode at least one visibility group is switched off, then the appropriate mode and an additional '-' character will be displayed.

If in the **Customized** mode at least one visibility group is added, then the appropriate mode and an additional '+' character will be displayed.

In the Cursor-Tool-Tip of this part of the screen the details of the actual selections are displayed.

Date Dependent

Always: Is only visible if in the presentation menu the selection button "Date Dependent" is set to "Always".

In the Cursor-Tool-Tip of this part of the screen the text: "**Date dependent objects are always visible. Information displayed may be incorrect for the present date and time.**" will be visible.

Depth

[m]: The actual units for chart depth values belonging to the chart cell at the own ships position in True or Relative Motion mode or at the center position of the chart area in **Browse** mode.

Status

Overscaled Xn.n: The chart cell at the own ships position in **True** or **Relative Motion Mode** or at the chart centre position in Browse Mode is displayed with a larger scale than defined for this cell. The actual overscale factor is displayed as Xn.n. (e.g. X2.5 means that the chart is displayed with Range 2.5 times smaller than normally defined).

The text **Better scale available** will be displayed here (additionally) if a chart is available at the same position with a better 'Navigation purpose' (larger scale). More chart details will be made visible if you change to a smaller display range scale. The text **No ENC available** will be displayed here if no chart with an appropriate scale exists at the own ship's or center position. In the Cursor-Tool-Tip of this part of the screen a detailed text will be displayed additionally.

3.5 Targets

ARPA and AIS targets can be displayed simultaneously on the PPI. In some cases it is possible that one and the same object is tracked as an ARPA target and also activated as an AIS target. If the ARPA and AIS target have similar data for distance, course and speed, they can be fused. This means that they are treated as one target as long as the similarity is existant. The limits for the similarity of the data can be defined by the operator. [See chapter 3.5.1 on page III-59](#)

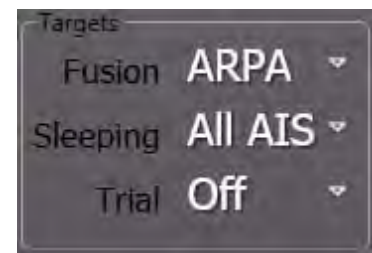
In other cases it is possible that the two targets are treated as two different objects.

Anyway under **Fusion**, the system can be set in a way that one type of targets has priority being displayed. Nevertheless, both types of targets are still tracked or remain activated in the background.

Independent of the selected priority in the PPI it can be selected for an individual target which data and graphics shall be shown. [See chapter 7.2 on page A-59](#), "Reverse Fusion" for details.

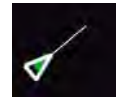
Additionally it can be selected under **Sleeping** which type of sleeping AIS targets are to be displayed continuously.

With the selection Trial the trial manoeuvre function can be activated or switched off. [See chapter 7.12 on page A-72](#) for details.



3.5.1 Fusion

Defines temporarily the priority for showing the ARPA or AIS target symbol and target data in case that the defined target association limits are fulfilled. See [chapter 3.5.1 on page III-59](#) for details about target fusion function and settings.



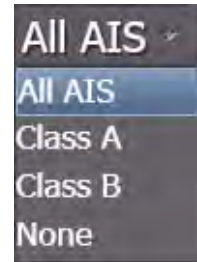
Fused radar echo and AIS activated target, AIS symbol is displayed.

3.5.2 Sleeping Targets

AIS targets are divided in Class A or Class B targets.

- Class A are commercial vessels,
- Class B are leisure crafts

With this selection list it can be chosen which types of sleeping AIS targets are displayed in the PPI continuously and are available in the target list.



- ☞ Even if the AIS target display is switched off for above mentioned vessels (i.e. even if **None** is selected), all received AIS target information is continuously processed in the background. In any case those AIS targets being classified as Dangerous can be activated automatically if this function is not switched off. (See [chapter 7.5 on page A-62](#)). If AIS targets are already tracked and their display is switched off in the above menu, already activated targets remain in the PPI and in the target list.

RADARPILOT platinum

1 General Information

1.1 RADAR Safety



CAUTION

Pay particular attention to the notes and warnings referring to possible faults in the radar display, since such faults can impair the detection of targets.

The radar can perform its safety function only if it is in proper state. Observe the following rules to ensure correct functioning of the radar.

- Check the radar's transmission power and the receiver sensitivity regularly by means of the performance monitor – see RADAR part of the operating instructions.
- Position receivers connected to the NACOS Platinum system must comply with the standard IEC 61162-1, which largely corresponds to NMEA 0183.
- ARPA target data directly depend on the accuracy and proper functioning of the selected speed sensor and the gyro compass.
- Correct interpretation of indicated data requires knowledge about the implemented Consistent Common Reference System (**CCRS**). See chapter III - 2.1 on page 16.

1.1.1 RADAR Safety – Electrical Systems



DANGER

HIGH VOLTAGE!

Even when the equipment is switched off, there can be dangerous voltage present at exposed contacts in the units. Therefore, before a unit is opened, it must be ensured that the voltage supply to the unit is disconnected from the ship's mains, and that it remains disconnected.

Because of the capacitors contained in the units, there can be a dangerous voltage present in any unit several minutes or even for hours after switching off and disconnection from the mains supply. The different electronic units of the RADAR system may be opened by qualified, trained persons only.

If it should be necessary to work on gearboxes while they are opened, pay special attention to the setting of the high-voltage supply switch (interlock). It is situated inside the gearbox and switches off the high voltage of the transceiver as soon as the cover of the gearbox is opened. **BUT:** For service purposes the interlock can be set into a position that high voltage is present inside the gearbox. Refer to the technical manual for details.

- ☞ If the units are to be disconnected from the ship's mains, keep in mind that each antenna unit, each transceiver electronics unit and each indicator has its own supply of power from the ship's mains. If synchro transmitters are used for the transfer of signals, e.g. transfer of the heading signal from the compass system, a dangerous voltage is present in the units until the reference voltage is switched off.

1.1.2 RADAR Safety – Radiation



WARNING

WARNING! ELECTROMAGNETIC RADIATION!

Do not enter the radiation danger zone of the rotating antenna, and make sure that no other person enters the danger zone. See table A / 1. Before working on the antenna unit, the antenna switch on the unit must be set to 0 and the transceiver must be disconnected from the ship's mains.

☞ There is no international agreement about the danger posed by high frequency radiation of the kind produced by the radar systems. In most countries, a radiation density exceeding 100 W/m² is considered dangerous; in some countries, values over 10 W/m² are regarded as not being completely safe. If in doubt, observe the applicable local regulations, and always ensure minimum possible exposure.

Antenna Type	Transceiver A=Up B=Down	Radius of the Radiation Danger Zone		
		Radiation Density 100 W/m ²	Radiation Density 50 W/m ²	Radiation Density 10 W/m ²
5 ft X-Band	12.5 kW, Version A	1.4 m	2.8 m	14 m
	25 kW, Version A	2.1 m	4.2 m	21 m
8 ft X-Band	25 kW, Version B	1.65 m	3.3 m	16 m
	12.5 kW, Version A	0.65 m	1.4 m	7 m
14 ft S-Band	25 kW, Version A	1.3 m	2.6 m	13 m
	25 kW, Version B	0.9 m	1.8 m	9 m
14 ft S-Band	30 kW, Version A	1.3 m	2.6 m	13 m
	30 kW, Version B	0.7 m	1.6 m	7.8 m

Table A / 1 Radiation danger zone of radar antennas

1.1.3 RADAR Safety – Mechanical Systems

**⚠ DANGER****TURNING DEVICES!**

When the radar system is switched to ON, it is possible that, instead of the expected antenna, a different one will begin to rotate depending on the settings and configuration adjusted before shutdown of the radar system. Therefore, it must be ensured beforehand that all antennas can rotate freely and that there are no persons in the danger zones of all antennas.

Before starting work in the vicinity of a radar antenna, make sure to switch off the man-aloft switch which is situated on the bottom side of the gearbox. Refer to the technical manual for details.

**⚠ CAUTION****CRUSHING HAZARD!**

Gearboxes and other mechanical units of the RADAR system may be opened by qualified, trained persons only.

**⚠ WARNING****DANGER OF VIOLENT PRESSURE TO HANDS AND FINGERS!**

Uncovered toothed belts and wheels inside the housing.

Make sure the MAN ALOFT SWITCH is set to "0" when working at the opened gear box!

1.2 Current IHO Standards / Regulatory Approvals

According to the international convention for the Safety of Life at Sea (SOLAS) chapter V radar equipment is classified into three categories depending of the size of the ship. The RADAR Platinum series is approved for the highest two categories CAT 1 and CAT 2. The table below provides a summary of capabilities and differences for both categories as implemented in this radar series.

Category of ship/craft		
	CAT 2 ¹⁾	CAT 1 ²⁾
Size of ship/craft	500 gt to <10000gt	All ships/craft ≥10000 gt
Minimum operational display area diameter	250 mm	320 mm
Minimum display area	270 mm x 270 mm	340 mm x 340 mm
Usually used monitor for Platinum	22" TFT	26" TFT
Auto acquisition of targets	Yes	Yes
ARPA target capacity	40	40
Activated AIS target capacity	40	40
Sleeping AIS target capacity	200	200
Trial manoeuvre	Yes	Yes

1) Earlier classified as 12" radar

2) Earlier classified as 16" radar

Table A / 2 Categories of RADAR

If the CHARTRADAR option is installed, above categories are extended with the suffix C as follows:

With 22" TFT monitor: CAT 2 C

With 26" TFT monitor: CAT 1 C



CAUTION

The NACOS Platinum and especially the RADARPILOT Platinum is not yet approved for High Speed Crafts (HSC)

1.3 System Structure and Installation

On the following pages drawings of two typical radar system installations are shown. The system internal wiring (interconnection) of the Ethernet LAN and other signals is shown on a basic level. For details on a more technical level, refer to the Technical Manuals.

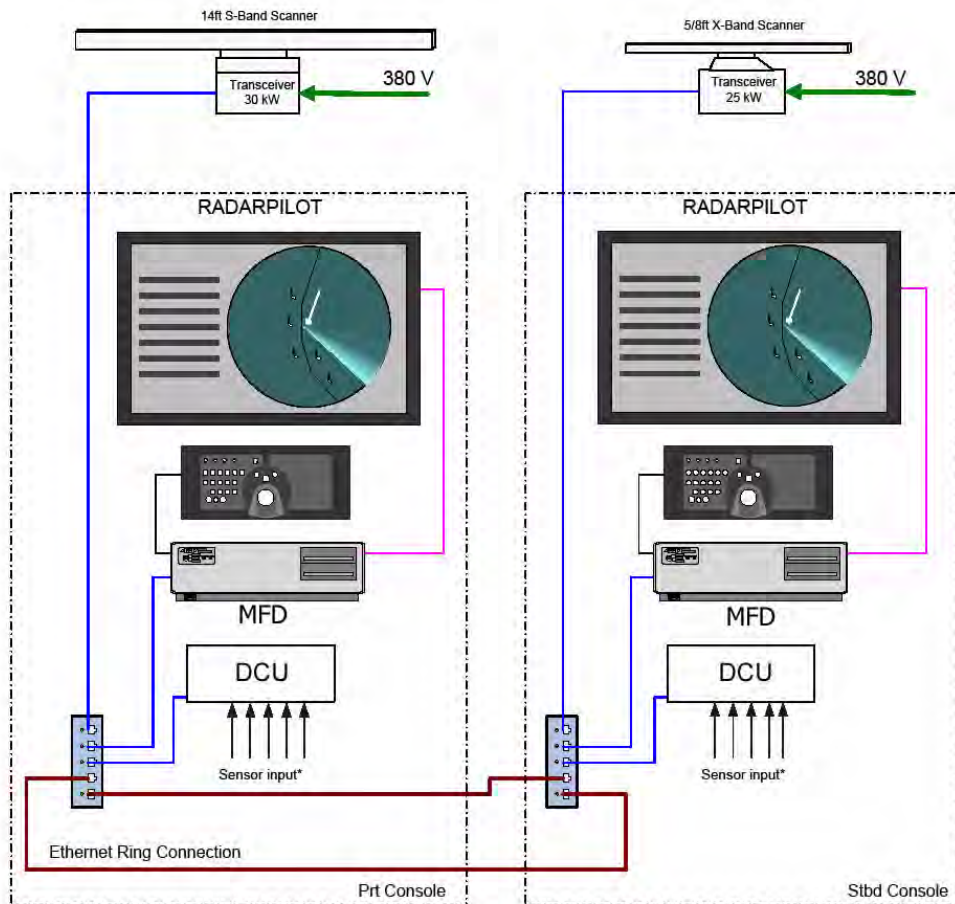


Fig. A / 1 IMO-Set installation

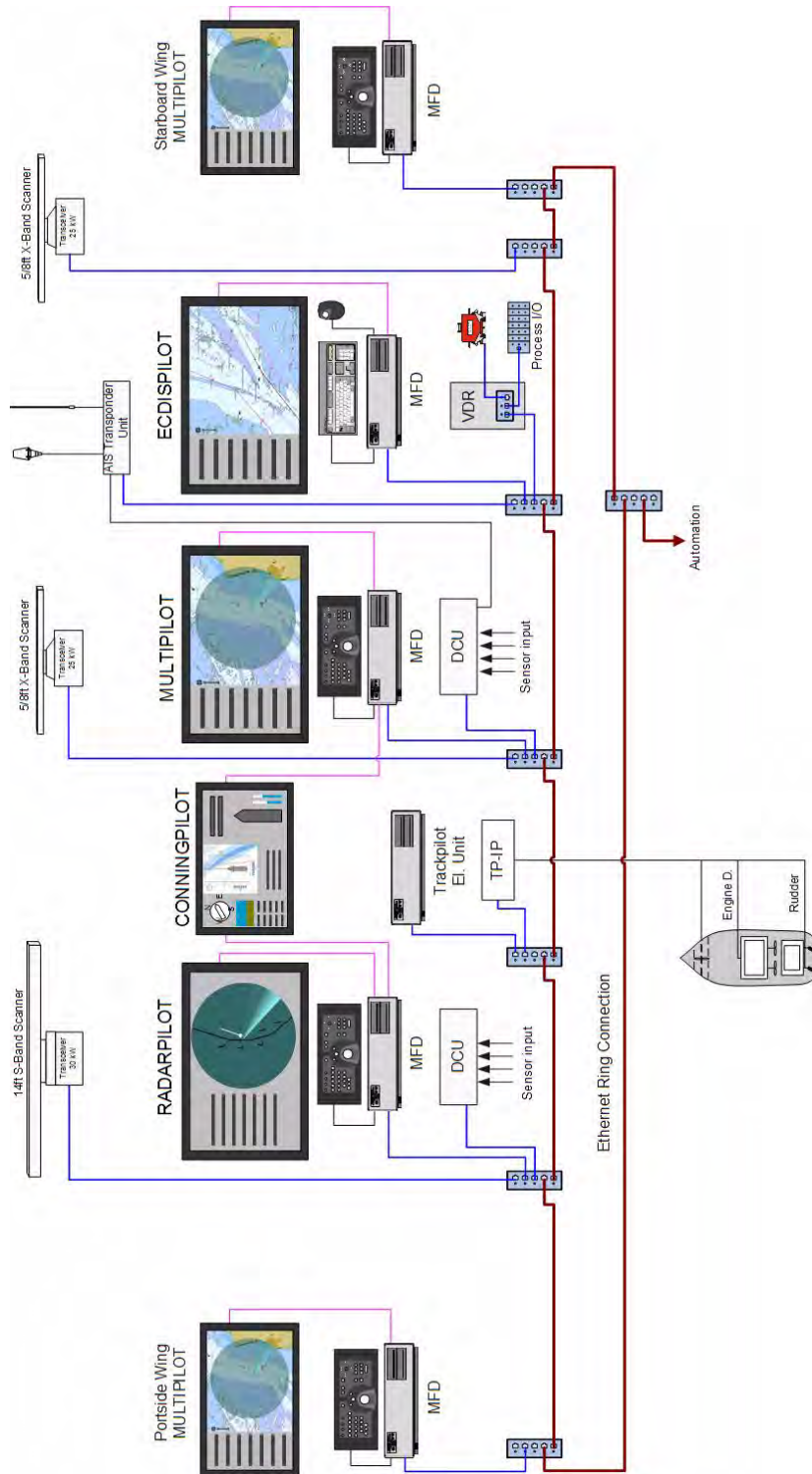


Fig. A / 2 INS-5 Installation

For the INS-5 installation as shown above, consisting of 5 MFD plus Conning Display, additional components of NACOS Platinum are necessary in order to form a redundant, approved ship control system. See the appropriate chapters of the mentioned components for further information.

Safeguards

The following table gives an overview about the failure modes and the respective system status as well as possible measures supporting maximum system availability.

Failure description	Status	Measure and Result
Antenna Unit (antenna, gearbox or transceiver) inoperable or defective	This antenna / transceiver cannot be selected by any MFD any more	RADAR operation with all other installed Antenna Units is still available
Display Electronics (MFD-PC) inoperable or defective	One of two (or more) radar indicators is not available	Operate X- or S- Band radar via the secondary or any other still available MFD
Display Monitor inoperable or defective		
RADAR Keyboard inoperable or defective	RADAR indicator remains available	Operate the MFD with on screen commands and Track ball only; full operating level is available
Trackball inoperable or defective		Limited basic radar operation via the keyboard remains available
Network Switch or its power supply defective	RADAR indicator and connected transceiver are not available	Operate another X- or S- Band radar via the secondary or any other still available MFD
Sensor Interface, i.e. Data Processing Unit (DPU), Data Communication Unit (DCU) or its power supply defective	All radar indicators and transceivers remain available	System automatically activates the secondary DPU or DCU, the main navigation sensors (for HDG, SOG, POSN) remain available.
In a double installation, one of the transceivers is inoperable or defective	The transceiver is not available	The remaining transceiver ¹⁾ can be set as slave on the second indicator; picture is visible at both indicators.
In a double installation, one of the MFDs is inoperable or defective	The system cannot be controlled by this MFD any longer	Both transceivers can be controlled with the remaining MFD unit; both radar pictures can be observed separately
In a double installation, "No RADAR Video" alarm is shown	The actual transceiver is not available ²⁾	Switch to the remaining transceiver
In a multiple transceiver installation, one of the transceivers is inoperable or defective	The transceiver is not available	Remaining transceivers can be set as slave on one of the other indicators, picture is visible on all indicators.
In a multiple transceiver installation, one of the MFDs is inoperable or defective	The system cannot be controlled by this MFD any longer	All remaining transceivers can be controlled with the remaining indicator electronics units, all radar pictures can be observed separately.

¹⁾ If one of the sensor signals is missing, that navigation data are derived from one of the other sensors as far as possible, either automatically or manually. For details please refer to chapter [See chapter III - 3.2 on page 33](#)

²⁾ Transmission of the radar video from a connected transceiver to the MFD is monitored continuously. If the connection to the transceiver is disturbed or completely lost, the respective alarm messages describing the reason for the fault are given ([See chapter A - 7.15 on page A-81](#) for details). If the refresh of the radar video is not possible, the alarm No RADAR Video is issued; the video in the PPI is cleared and will no longer be updated.

Table A / 3 RADAR Failure Modes

As shown in the above table in case of an installation with two or more radar systems each system is working independently from the other one, a failure in one system does not affect the operation of the other systems. Each system can work as stand-alone radar without changing any configuration settings.

1.4 Basics / Evaluation of the RADAR Video

1.4.1 Basics of the Evaluation of RADAR Video in Platinum Series

Generally, the echo data received by the transceiver can be amplified, attenuated or filtered in order to enhance the display of desired data like targets. The main intention of the signal processing is the clear and unmistakable display of radar targets and the suppression of unwanted echoes like sea clutter, rain clutter or interferences.

Amplification, attenuation or filtering is done in several ways, with continuously or digitally working filters. (Some can be set from 0% to 100%, others can only be switched on or off).

Further on, echo data with the same azimuth delivered from one or more radar pulses („sweep-to-sweep-data“) can be processed or data from one or more antenna turnarounds („scan-to-scan-data“) can be evaluated.

The amplitudes of echoes can be evaluated in order to determine whether the echoes are targets or noise, or the correlation of sweep-to-sweep or scan-to-scan data can be used to enhance the radar picture:

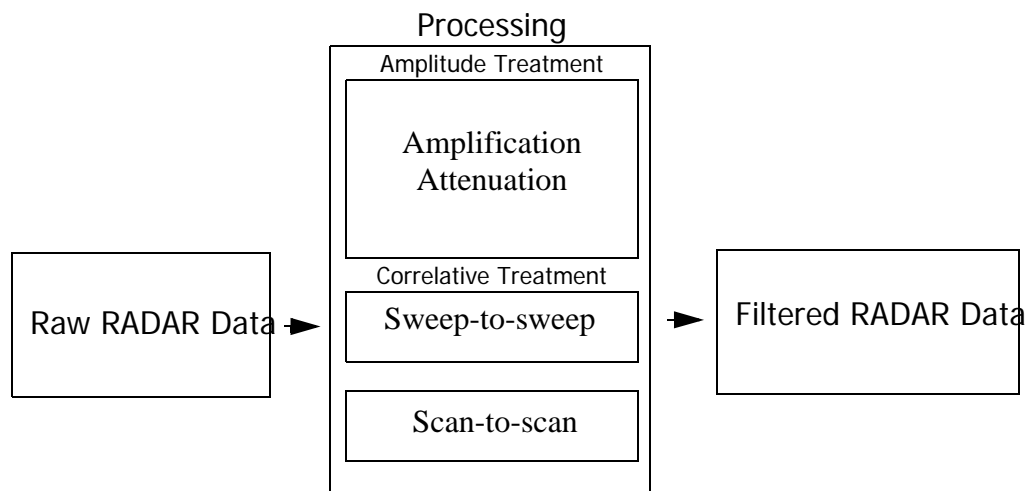


Table A / 4 Scheme of RADAR Video Evaluation

Amplitudes are influenced for example by the **Gain** and **Sea** settings, correlation is done amongst others by the **Enhance** functions.

In the following, the different filters, their basic techniques and advantages or limitations are described in the sequence they appear on the screen.

Short Pulse/Long Pulse is available for any range of the radar. The internal pulse length changes with respect to the selected range automatically. For detailed information on the pulse lengths for any range, please refer to the table in [section 1.4.2](#) of the Operating Instructions.

The default setting for the pulse length should be **Short Pulse**. A longer pulse has a higher energy, but not a higher amplitude. Thus, it delivers stronger echoes. It is allowed to switch between the two pulse lengths at any time.

If target enhancement or any other filtering methods are active, the stronger echoes are processed by the filters and are able to improve a weak radar picture.

The **Tune** function can be set manually or automatically. **Tune** influences the center frequency of the entire radar echo evaluation process. For the adaption of **Tune**, no radar echoes are needed and interference from other radar devices is suppressed so that automatic tuning (AFC) has the best results and should be used as default. An optimum tuning is not only important for a clear visual display of the targets on the video but is also a necessary prerequisite for the ARPA functions.

Gain setting influences the amplitudes of all echoes and works like an amplifier that makes it possible to enhance all echoes and noise in the same way in order to get a better picture. But, as said before, also the noise will be amplified and can disturb the clear display of targets. **Gain** should in any case be set in such a way that slight noise is always visible.

Rain can be set to **Off** or **Low, Medium** and **High**. With an optimal setting of **Rain** only the boundary of the rainy area facing towards the transceiver is displayed and echoes within or behind the rainy area will be displayed if their echo is still strong enough after having been filtered. Weak echoes will not be displayed if their echo is too small after the signal has been processed by the filter.

For each setting, a correlative signal processing takes place and filters out the noise of the rainfall. Echoes which are strong enough will be displayed, others may disappear.

**CAUTION**

In the case of heavy rain, snow and hail, it can be expected that, even if the setting is correct, radar targets which only produce weak reflections - especially targets situated behind a strong rain front - will remain undetected. Such targets can appear suddenly when leaving the rainy area.

Sea can be set to manual or automatic mode. In manual mode, its setting influences the amplitudes of the radar echoes in such a way that it attenuates echoes close to the antenna very much and that it attenuates echoes which are more distant to it only very little. Due to the fact that the distance of a target is represented by the time its echo needs to return to the antenna, this is called „sensitivity-time-control“ (STC). Nevertheless, echoes which are as strong as the unwanted reflections of the sea may be suppressed and not visible, or they may appear and disappear, depending on how strong the surrounding unwanted reflections are.

In automatic mode, a fixed, approved value for the **Sea** filter is set. Advantages or limitations to the effect are the same as in manual mode.



CAUTION

In the case that anti-clutter sea value is set too large, weak targets can be lost, especially at close range. If the sea is very rough, it can be expected that radar targets which only produce weak reflections will remain undetected, even if the setting is correct.

Simultaneous operation of Rain and Sea



CAUTION

In case that Rain and Sea are operated simultaneously, especially in very rough weather conditions, the detection of radar targets may fail even if all settings are correct, because the sum of clutter (reflections of sea and rain) is as high as or even higher than the reflection of targets.

Enhance combines an adaptive STC, an additional correlative filter and a so-called „target enhancement“ in four selectable steps. See also the table on [page A-14](#).

Definitions:

Adaptive STC is a second STC that is derived from the medium value of the echoes of the last sweeps. It is added to the manual STC and is able to suppress clutter.

The correlative filter works in scan to scan mode or over several scans respectively with its parameters relative to the selected range. In large ranges, the correlation filter will need several scans until an effect to the picture is visible, in smaller ranges the effect of the filter is faster. It is also able to suppress noise.

Target enhancement is used to display even very small or weak targets. For example, if an echo is this small that it only lights up one pixel of the screen, it could be overseen or regarded as noise or clutter. Target enhancement makes it a little bigger, so that it is better to discover among the more dynamic clutter or noise. With this enhanced target, the correlation filter can work much more precisely.



CAUTION

When the **Enhance** function is running, the scan-to-scan correlation might have the result that small, fast-moving targets or Racon codes are displayed with reduced intensity or might be suppressed.

In order to get information of when to use which of the four levels of the **Enhance** function, please refer to the user manual. See [chapter 5.2.4 on page A-43](#).

In the table below the settings of the respective filters are described:

Enhance	Off	Low	Medium	High
Adaptive STC	no	no	yes, but small	yes, medium value
Correlation	no	yes, with short time-constant	yes, longer time-constant than „LOW“	yes, longer time-constant than „MEDIUM“
Target enhancement	very little, small targets just visible	little	medium	high

Table A / 5 Qualitative description of **Enhance** levels

Interference Rejection is a means to suppress interferences caused by other radars working on the same frequency. For example, if two radars of the same kind operate very close to each other and the PRF and signal frequency are similar or equal, the radars will influence each other with their pulses or echoes. Circles or coils will appear on the PPI. With **Interference Rejection** on, most of those effects will be eliminated by a filter that is able to detect those special signals. Targets will not be suppressed. See also A-Distortions of the RADAR Video in [section 1.4.3](#).

Video Emphasis can be used to increase the detection of targets of the radar. Very strong echoes will be shown in orange colour. It can help to decide whether an echo is one or two combined objects. For example, without VE the echo is only a large yellow spot, with VE switched on it is visible that the yellow spot contains 2 smaller orange dots, it can be decided that there is a structure in the yellow spot or that there are two echoes very close to each other. The display of targets on the PPI will be improved, targets will not get lost if VE is switched off. Also structures in land areas or in rainclouds or seaclutter can be made more visible by the VE function, for instance a light house on a land area or buoys with only a short distance to the land, whose echoes would normally melt into the ones of the land.

1.4.2 Achievable RADAR Range

The **theoretically achievable radar range** limited by the curvature of the earth depends on the height of the antenna above the water surface and the height of the target, and is applicable under normal atmospheric conditions - see the following table.

Antenna Height Above Water Surface	Theoretically Achievable RADAR Range at a Target Height of						
	1 m	3 m	10 m	30 m	100 m	300 m	1000 m
8 m	9 NM	12 NM	13 NM	18 NM	28 NM	44 NM	76 NM
15 m	11 NM	13 NM	16 NM	21 NM	31 NM	47 NM	79 NM
30 m	12 NM	16 NM	19 NM	23 NM	34 NM	50 NM	82 NM

Table A / 6 Achievable RADAR Range

Whether radar targets can be detected up to this theoretical range, even with optimum video setting, depends not only on the atmospheric conditions but also on the characteristics of the target:

- Large targets with good reflection characteristics produce strong echo signals and are displayed with corresponding clarity on the screen.
- Smaller targets situated in the shadow of large objects are not illuminated by the radar pulses and are therefore not displayed.
- Flat coasts have an unfavourable reflection cross-section and cannot be recognized until they have been approached more closely. On the other e , high coastlines and mountainous regions further inland are recognised at a very early stage.
- In the coastal approaches, the tide rip lines and surf areas are displayed similarly to coastlines. However, this rather irritating display can be a valuable orientation aid for the coastal navigator.
- The reflections of radar waves from ice depend largely on the surface structure of the areas illuminated by the radar. Rough and jagged surfaces produce good echo displays, whereas smoothly frozen-over surfaces, rounded surfaces and surfaces at an oblique angle generally reflect the transmitted pulses away from the ship. Thus, for example, the echo display of large icebergs can fluctuate extremely severely, depending on the existing aspect.
- The detection of low-lying blocks of ice (growlers) probably presents the greatest uncertainty:



CAUTION

Even if the anticlutter facilities are operated carefully, the echoes from growlers can no longer be definitely identified if moderate disturbances from the sea surface are present.

1.4.3 Distortions of the RADAR Video

Because of the physical characteristics of the radar principle used, the video displayed does not correspond exactly to the position and form of the reflecting target. A distinction must be drawn between radial distortions (in the direction of the target) and azimuthal distortions (perpendicular to the target direction) - see figure on next page.

Radial Distortions

Radial distortions in the direction of transmission are caused by the fact that a target reflects the transmitted pulse for as long as the pulse is moving past the target¹⁾. Thus, radial lengthening depending on the pulse duration occurs on the screen. In the case of range measurements, it must be noted that the echo edge facing own ship corresponds to the true front edge of the target.

If there are several targets behind one another with small (radial) distances between them, they are shown separately on the screen if, and only if, their distance apart is so large that the radial lengthened echoes do not overlap.

Azimuthal Distortions

Azimuthal distortions are caused by the width of the beam radiated by the antenna. A point target appears wider the further away it is. At a distance of 10 NM with a horizontal antenna-beamwidth of 1.5°, an individual target is displayed as an arc with a length of 480 m. Because of this effect, individual targets situated beside one another can merge to form a single target.

¹⁾ The pulse length setting Long Pulse thus generates larger radial distortions than Short Pulse.

☞ Not only individual targets but also small spits of land aligned in the radial direction appear wider than they really are, and radially oriented entrances appear narrower than in reality. As a result of azimuthal distortions and/or changes in the target position, the radar centroid of a target can change, especially at short range. In the case of a target being tracked, this can lead to a sudden change in the displayed vector.

In addition to these undesirable azimuthal distortions, targets can also be deliberately widened with increasing distance, so that narrow, close-range targets too can be seen clearly. This function is used in the **Enhance** modes **Medium** and **High**. It ensures that the azimuthal distortion corresponds to the radial distortion over a wide range of distances. Because the radial distortion depends on the pulse length, the targets are displayed particularly large by the selection of **Long Pulse**.

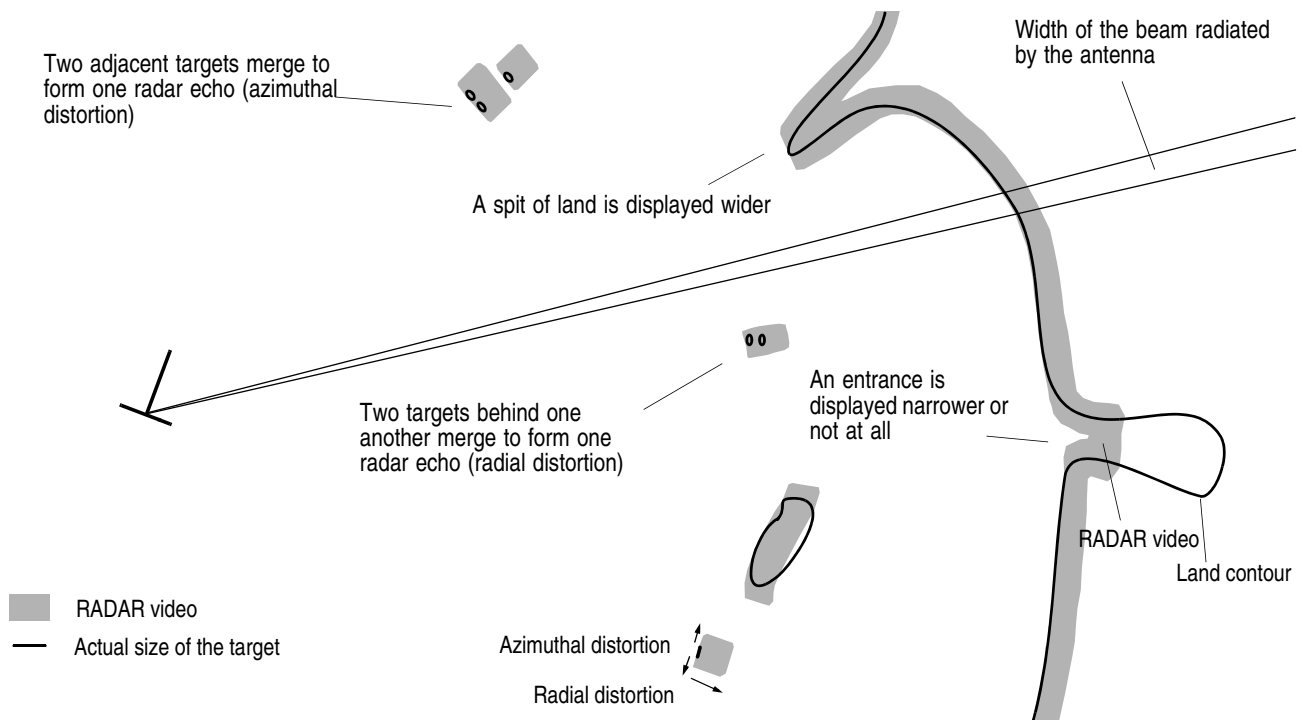


Fig. A / 3 Radial and azimuthal distortions of the radar video

1.4.4 Undesirable Echo Displays and Effects

Disturbances of the radar video are caused by

- meteorological processes,
- reflections from the sea surface,
- radar signals from other transmitters,
- false echo displays,
- sectors of reduced radar visibility,
- superrefraction and subrefraction.

Influences of Meteorological Processes

The influence of meteorological phenomena such as fog, rain, snow or hail on the radar video increases with the size of the droplets in relation to the radar wavelength, and with the density of the droplets. The shorter-wave X-Band radar (with a wavelength of 3 cm) is therefore generally impaired more severely by meteorological influences than is the longer-wave S-Band radar (10 cm wavelength).

The following table describes the influences of rain and the influences on the radar:

Reduction of target detection	S-Band, short pulse	S-Band; long pulse	X-Band, short pulse	X-Band, long pulse
Rain, 4mm/h, close range < 5nm	Slightly	Severely	Slightly	Severely
Rain, 4mm/h, medium range	Nearly none	Up to half	Slightly	Severely
Rain, 4mm/h, long range > 10nm	Nearly none	Slightly	Slightly	Severely
Rain, 16mm/h, close range < 5nm	Slightly	Severely	Up to half	Severely
Rain, 16mm/h, medium range	Nearly none	Severely	Up to half	Severely
Rain, 16mm/h, long range > 10nm	Nearly none	Severely	Up to half	Up to half

Table A / 7 Influences of Meteorological Processes

In general, it is advisable not to use long pulse in rainy conditions and it is better to use the S-band radar rather than the X-band. If no S-band radar is available, it must be considered that X-band radars lose 50% of their coverage in heavy rains.

X-Band RADAR

Even in the X-Band radar, fog causes practically no disturbances, whereas precipitations with larger droplets attenuate the transmitted radar pulses and thus weaken to a greater or lesser extent the display of targets situated behind extensive areas of precipitation. Furthermore, throughout their entire extent, rain, snow and hail reflect part of the transmitted energy and produce echoes in the form of milky areas in the radar video (backscatter).

Because of the very different signal structures of useful targets and rain areas, rain clutter can be noticeably reduced by the rain clutter suppression function.

In the case of strong, extended areas of rain, the losses become so great that the achievable range is reduced very severely. Useful targets might be completely concealed.

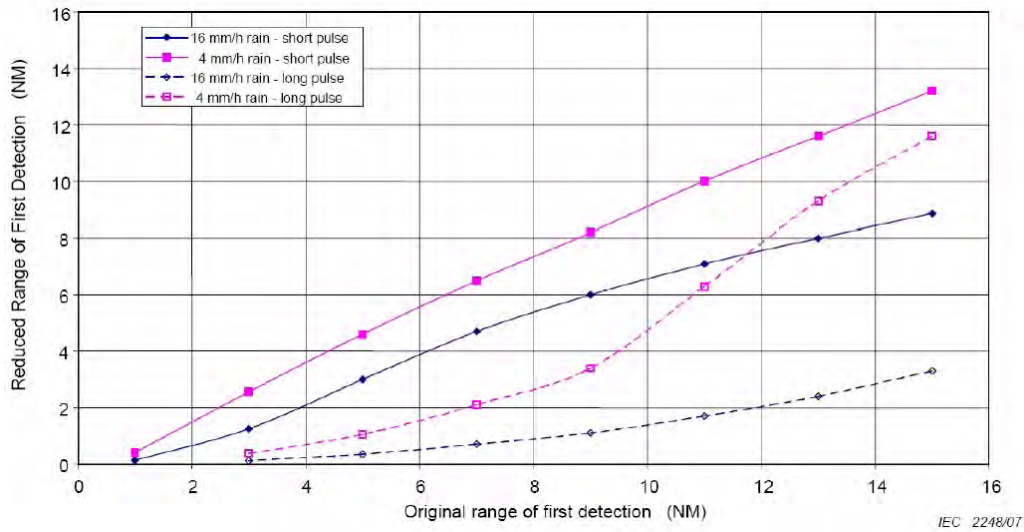


Fig. A / 4 Reduced Range of First Detection in Dependence on Precipitation in X-Band

S-Band RADAR

The S-Band radar „sees“ through the rain with practically no attenuation losses, and even detects targets in and behind a rain area. The echo signals caused by the rain are only displayed weakly. Similar behaviour is exhibited in the case of hail and snow.

In this case too, unusually heavy rain can reduce the achievable ranges and thus cause sudden loss of targets.

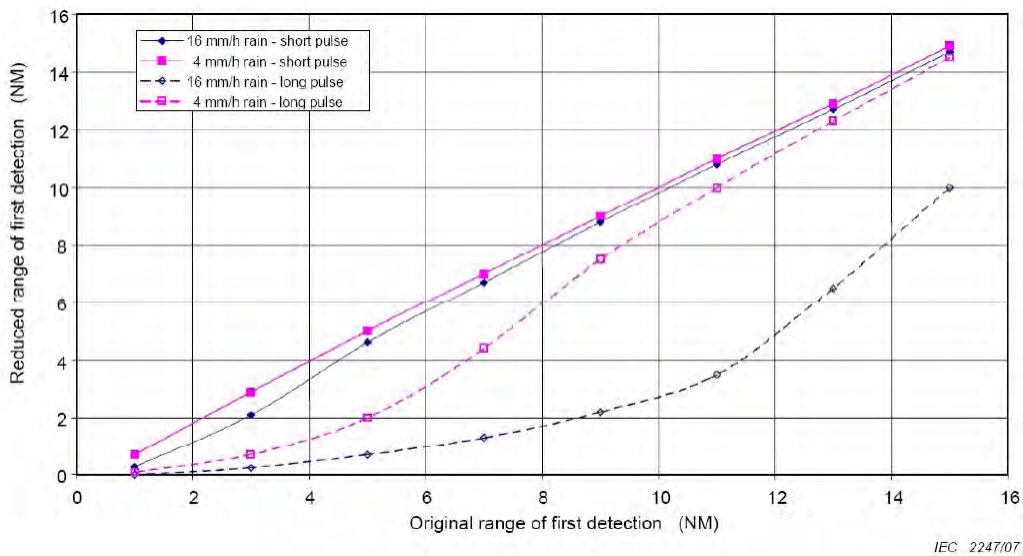


Fig. A / 5 Reduced Range of First Detection in Dependence on Precipitation in S-Band

Reflections from the Sea Surface

Clutter echoes from the surface of the sea can be recognised from the fact that a mostly circular but eccentric area displaced in the wind direction and having non-uniform brightness is formed around the own ship symbol (sea clutter). These echoes make targets in this region more difficult to detect and track, but they have no effect on the display of targets situated behind the reflection zone.

These disturbances are more severe in the case of a radar antenna mounted high up than for one mounted lower down. The area covered by these disturbances increases with increasing sea state, and is increased particularly by steeper waves.

With the aid of the sea clutter suppression function, the disturbance echoes described above can be reduced. However, since this also weakens the display of targets and because the target might not be displayed with every revolution of the antenna, maximum concentration by the observer is necessary. In the case of automatic target tracking, the sea clutter suppression function can lead to the loss of targets due to the attenuation of the signals.

Disturbances Caused by Other RADARs

Transmissions from other radars working in the same electrical frequency band occur as disturbances in the form of small points or dashes. These move in rapid succession along straight or curved tracks to the centre of the screen or in the opposite direction.

These disturbances appear particularly clearly at the larger range settings, but they impede radar observation to an insignificant extent only. They can be almost completely eliminated by means of the **Interference Rejection** function which is activated automatically on the Platinum RADAR but which can be switched off if required.

False or Indirect Echo Displays

False or indirect echo displays ("ghost echoes") occur as a result of reflection of the radar pulses by the ship's own superstructures of all kinds and by nearby objects that reflect very well. Therefore, a typical feature of these echoes is that they appear at the bearing of the reflecting surface, regardless of the real position of the targets.

When two ships pass one another on parallel courses, multiple echoes can often be observed as a result of pulses reflected to and from several times between the ships' sides. On the screen, a series of equispaced echo displays of decreasing intensity appears at the bearing of the object.

Sectors of Reduced RADAR Visibility

Sectors of reduced radar visibility occur as a result of own ship's superstructures which impair and prevent rectilinear propagation of the radar pulses. Theoretical determination of the geometry of these sectors and of their influence on the display of targets is possible to an inadequate extent only. An effective practical method consists of determining the shadow sectors against the background of disturbance signals from the sea surface (sea clutter).

Superrefraction - Subrefraction

If the normal refraction gradient for the radar wave in the maritime boundary layer of the atmosphere is changed by external influences, subrefraction occurs when the transmitted beam is bent upwards away from the earth's surface, and superrefraction occurs when the transmitted beam is bent down towards the earth's surface.

In the case of superrefraction, false echoes of targets outside the set range of measurement can occur: the echo of a transmitted pulse is not received within the set range but during the next transmit cycle or by the one after that. The resulting ghost echoes can occur at any position. Since the position of ghost echoes depends on the pulse repetition frequency, ghost echoes can be recognised as such by switching over the pulse length or the range on the master radar.

-
- ☞ Every pulse length has a particular pulse repetition frequency assigned to it; therefore, when the pulse length or range is changed, the repetition frequency changes too (See chapter 1.4.8 on page A-23).

1.4.5 RADAR Setting for the Display of Racon Codes

The code of Racons consists of a radially arranged dash-dot code which begins in the radar video a short distance behind the beacon position. By means of different codes described in the Lists of Lights, the approach points equipped with Racons can be clearly identified.

Most Racons transmit in the X-Band, but there are some Racons installed which transmit in the S-Band. The majority of Racons change their transmission frequency slowly throughout the entire frequency band, and so they are not received in every revolution of the antenna.

For the setting of the radar, the same basic principles are applicable as for SART detection (See chapter 1.4.7 on page A-21)

1.4.6 RADAR Settings for Target Enhancer Detection

The target enhancer is an active device on a target vessel which transmits an X-band pulse upon reception of any X-band radar signal. The pulse length of this secondary radar pulse does not typically reflect the size of the actual target vessel but is fixed. In general this kind of equipment is used on small boats which have not a significant radar profile like pleasure boats or wooden boats or lifeboats. There are no special settings required for detection of target enhancers. They are just visualized like a very well reflecting target.

1.4.7 RADAR Setting for SART Detection (X-Band only)

The information needed for reliable detection of SART's is described in IMO Circular 161. The content of that paper is reproduced on the following pages.

ANNEX

OPERATION OF MARINE RADAR FOR SART DETECTION

WARNING: A SART will only respond to an X-Band (3 cm) radar. It will not be seen on an S-Band (10 cm) radar.

Introduction

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

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

RADAR Range Scale

3. When looking for a SART it is preferable to use either the 6 or 12 n.mile range scale. This is because the total displayed length of the SART response of 12 (or 24) dots may extend approximately 9.5 n.miles beyond the position of the SART and it is necessary to see a number of response dots to distinguish the SART from other responses.

SART Range Errors

4. When responses from only the 12 low frequency sweeps are visible (when the SART is at a range greater than about 1 n.mile), the position at which the first dot is displayed may be as much as 0.64 n.mile beyond the true position of the SART. When the range closes so that the fast sweep responses are seen also, the first of these will be no more than 150 metres beyond the true position.

RADAR Bandwidth

5. This is normally matched to the radar pulse length and is usually switched with the range scale and the associated pulse length. Narrow bandwidths of 3-5 MHz are used with long pulses on long range scales and wide bandwidths of 10-25 MHz with short pulses on short ranges.

6. A radar bandwidth of less than 5 MHz will attenuate the SART signal slightly, so it is preferable to use a medium bandwidth to ensure optimum detection of the SART. The RADAR Operating Manual should be consulted about the particular radar parameters and bandwidth selection.

Note about item 6: The bandwidth of the radar is not less than 5 MHz. Therefore, the setting described here is not necessary

RADAR Side Lobes

7. As the SART is approached, side lobes from the radar antenna may show the SART responses as a series of arcs or concentric rings. These can be removed by the use of the anti-clutter sea control although it may be operationally useful to observe the side lobes as they may be easier to detect in clutter conditions and also they will confirm that the SART is near to own ship.

Detuning the RADAR

8. To increase the visibility of the SART in clutter conditions, the radar may be detuned to reduce the clutter without reducing the SART response. RADARs with automatic frequency control may not permit manual detune of the equipment. Care should be taken in operating the radar in the detuned condition as other wanted navigational and anti-collision information may be removed. The tuning should be returned to normal operation as soon as possible.

Gain

9. For maximum range SART detection the normal gain setting for long range detection should be used i.e., with a light background noise speckle visible.

Anti-Clutter Sea Control

10. For optimum range SART detection this control should be set to the minimum. Care should be exercised as wanted targets in sea clutter may be obscured. Note also that in clutter conditions the first few dots of the SART response may not be detectable, irrespective of the setting of the anti-clutter sea control. In this case, the position of the SART may be estimated by measuring 9.5 n.miles from the furthest dot back towards own ship.

11. Some sets have automatic/manual anti-clutter sea control facilities. Because the way in which the automatic sea control functions may vary from one radar manufacturer to another, the operator is advised to use manual control initially until the SART has been detected. The effect of the auto sea control on the SART response can then be compared with manual control.

Anti-Clutter Rain Control

12. This should be used normally (i.e. to break up areas of rain) when trying to detect a SART response which, being a series of dots, is not affected by the action of the anti-clutter rain circuitry. Note that Racon responses, which are often in the form of a long flash, will be affected by the use of this control.

13. Some sets have automatic/manual anti-clutter rain control facilities. Because the way in which the automatic rain control functions may vary from one radar manufacturer to another, the operator is advised to use manual control initially until the SART has been detected. The effect of the auto rain control on the SART response can then be compared with manual control.

Note:

The automatic rain and sea clutter controls may be combined in a single 'auto-clutter' control, in which case the operator is advised to use the manual controls initially until the SART has been detected, before assessing the effect of auto.

1.4.8 Transmission formats

To optimise detection performance for the different weather conditions, the radar provides different pulse lengths and repetition rates.

The pulse repetition rates in relation to the range and the pulse length are shown in the following table:

Scanner rotation frequency	23/28 rpm									
Range (NM) ¹⁾	0.25	0.50	0.75	1.5	3	6	12	24	48	96
Short pulse Pulse length (µs)	0.08		0.15	0.30	0.50	1.00 ²⁾ (0.90 ³⁾				
PRF (Hz)	2000			1000			500			
Long pulse Pulse length (µs)	0.15		0.30	0.50	1.00 ²⁾ 0.90 ³⁾					
PRF (Hz)	1000					500				

- 1) All values of the 0.25 NM range are also valid for the 250 m/500 m ranges
- 2) 12.5 kW X-Band Transceiver
- 3) 25 kW X-Band and 30 kW S-Band Transceiver

Table A / 8 Transmission formats

1.5 Basic setting of the RADAR Video

So that radar targets can be detected with certainty, an optimum setting of the radar video is of fundamental importance.

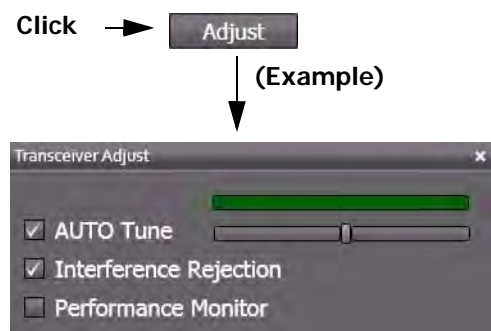


CAUTION

Especially in the case of heavy rain and/or a rough sea, it is essential that the setting be adapted by trained personnel so that it is suitable for the situation.

In the following, there is a description of how to set the video of a radar correctly on the master indicator. Only after these settings have been made on the master indicator can activated slave indicators too be set in the same way (parameters that cannot be set on slave indicators are pointed out).¹⁾

1. Select the 12 NM display range. Click on the **Adjust** control. The **Transceiver Adjust** window is opened, settings can be made.



2. **Tuning (adjustment of the frequency)** (can be set on the master indicator only)



CAUTION

An optimum tuning is not only important for a clear visual display of the targets on the video but is also a necessary prerequisite for the ARPA functions.

Automatic tuning: Select the Auto checkbox. This is the default setting.

The slider is moved automatically by the system into the position of the optimal value.

- ☞ If two X-Band or two S-Band systems are being operated simultaneously, disturbance of automatic tuning might occur (if it is being used). In such cases, manual tuning is appropriate.

Manual tuning: Clear the **Auto** checkbox and use the slider to perform manual tuning. The green indicator bar above the slider corresponds to the amplitude with which the input signal is available for signal processing. Observe more than one antenna rotation to find the maximum.

¹⁾ In ECDIS mode, only those settings are possible that can be performed with the radar keyboard (if a radar keyboard is installed).

3. Gain (input amplification)

Switch off the **Enhance** function. Use the **Gain** slider, and increase the value with the trackball until slight noise is visible on the PPI. Then reduce the value a little until the noise has just disappeared, but not more. Switch on the **Enhance** function again and, if necessary, increase the gain a little (up to 100% for a favourable sea state).

☞ With the **Enhance** function activated, the change in gain only has an effect after several revolutions of the antenna.

☞ On the keyboard, manual tuning is performed by turning the **Gain** knob.

4. Select the desired **display range**.

5. Anticlutter Sea (sea clutter suppression)

With anticlutter sea, the input amplification at close range is reduced depending on the distance.



CAUTION

In the case of anticlutter sea values that are too large, weak targets can be lost, especially at close range. If the sea is very rough, it can be expected that radar targets which only produce weak reflections will remain undetected, even if the setting is correct.

Manual suppression of sea clutter: Use the **Sea** slider to set the value so that the clutter caused by a rough sea is as weak as possible but radar targets are still clearly visible.

☞ If the **Enhance** function is switched on, the radar requires several revolutions of the antenna in order to adjust itself to changed anticlutter sea values. Therefore, any large changes should only be made slowly (step by step).

☞ On the keyboard, manual tuning is performed by turning the **Sea** knob.

Automatic suppression of sea clutter: Select the **Auto** checkbox behind **Sea**.

☞ The automatic anticlutter sea function has the advantage that the clutter values taken into account in the upwind direction are different from those taken into account in the downwind direction. To check the display of very small target-echoes, it is necessary to switch over to manual operation.

See chapter 1.4.1 on page A-11 for further description of this mode and its specifics.

6. Anticlutter Rain (suppression of rain clutter)



CAUTION

In the case of heavy rain, snow and hail, it can be expected that, even if the setting is correct, radar targets which only produce weak reflections - especially targets situated behind a strong rain front - will remain undetected. Such targets can appear suddenly when leaving the rainy area.

The suppression of rain clutter can be set to **Off** or three values: **Low**, **Medium** or **High**.

If the value is set to **Low** or **Medium**, the filter works with pre-set coefficients just like in manual mode, if the value is set to **High**, the suppression is operated with correlative coefficients like in automatic mode.



The anticlutter rain function has the advantage that it takes place individually for regions with widely differing precipitation. A manual rain clutter control is not available.

Choose one of the the values so that the boundary of the rainy area is clearly visible and the clutter in the region behind it is as weak as possible. However, radar targets should still be clearly visible.

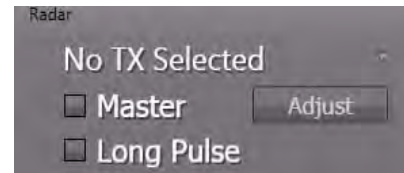
See chapter 1.4.1 on page A-11 for further description of this mode and its specifics.

7. Video Emphasis

Strong video signals can be accentuated optically by switching on the Video Emphasis function. This function is switched on and off by selecting or clearing the **Video Emphasis** checkbox.

8. Pulse length

After switch-over to a smaller display range, check whether a better display is obtained by switching to a different pulse length. Switching is done by selecting or clearing the **Long Pulse** control.



Orientation values for settings on the open sea

Up to sea state 3 - 4, no rain

Gain	90% - 100%
Anticlutter sea	20%
Anticlutter rain	Off
Enhance	Medium or High
Interference rejection	On
Pulse length	SP

Up to sea state 3 - 4, rain medium to heavy

Gain	85% - 95%
Anticlutter sea	20%
Anticlutter rain	Medium or High
Enhance	Medium or High
Interference rejection	On
Pulse length	SP or LP

Sea state 6 - 9, with rain

Gain	80% - 90%
Anticlutter sea	30% - 50%
Anticlutter rain	Low
Enhance	Medium or High
Interference rejection	On
Pulse length	LP

1.6 RADAR Accuracy

Background

The correct measurement of a target position by radar is determined by the bearing and range accuracy of the radar system. Both parameters are depending on physics, on installation, and on the ability of the user to read accurate values from the screen.

As far as the physics is concerned, the accuracy of bearing measurement basically depends on the narrowness of the radar beam. The radar beam for X-band has a horizontal beam width of 1.5° with the 5 foot antenna and 0.95° with 8 foot antenna. For S-band the corresponding value is 1.8° with 14 foot antenna. These values describe the 3 dB corners on each side of the beam, where the transmitted power is half of the centre value. Experience shows, that typically at sea these values are doubled. So the practical beam width of an 8 foot X-band antenna is about 2°. It provides an echo with a size of:

$$\rightarrow 6 \text{ nm} \times \sin 2^\circ = 387 \text{ m}$$

Further on physics is involved with range measurement. It depends on the pulse rate and length which are determined by the user selected range. To minimize error when measuring the range of a target, put the target echo at an outer position on the screen by selecting a suitable range.

In terms of installation the bearing is usually taken relative to the ship's heading, and thus, proper adjustment of the heading line at installation is an important factor in ensuring bearing accuracy.

Finally the user aspect has to be considered. To minimize error when taking the bearing of a target from screen, put the target echo at an outer position on the screen by selecting again a suitable range.

Results

According to IMO (MSC.192/5.2) the radar system range and bearing accuracy shall be as follows:

- "Range: within 30 m or 1 % of the range scale in use, whichever is greater;
- "Bearing: within 1°

in typical operational and environmental conditions.

A well adjusted ¹⁾ Platinum RADARpilot is exceeding these requirements as follows:

- "Range: within 15 m or 0.3 % of the range scale in use, whichever is greater;
- "Bearing: within 0.5°

in typical operational and environmental conditions.

¹⁾ in terms of trigger delay and heading line adjustment

2 The RADAR Keyboard

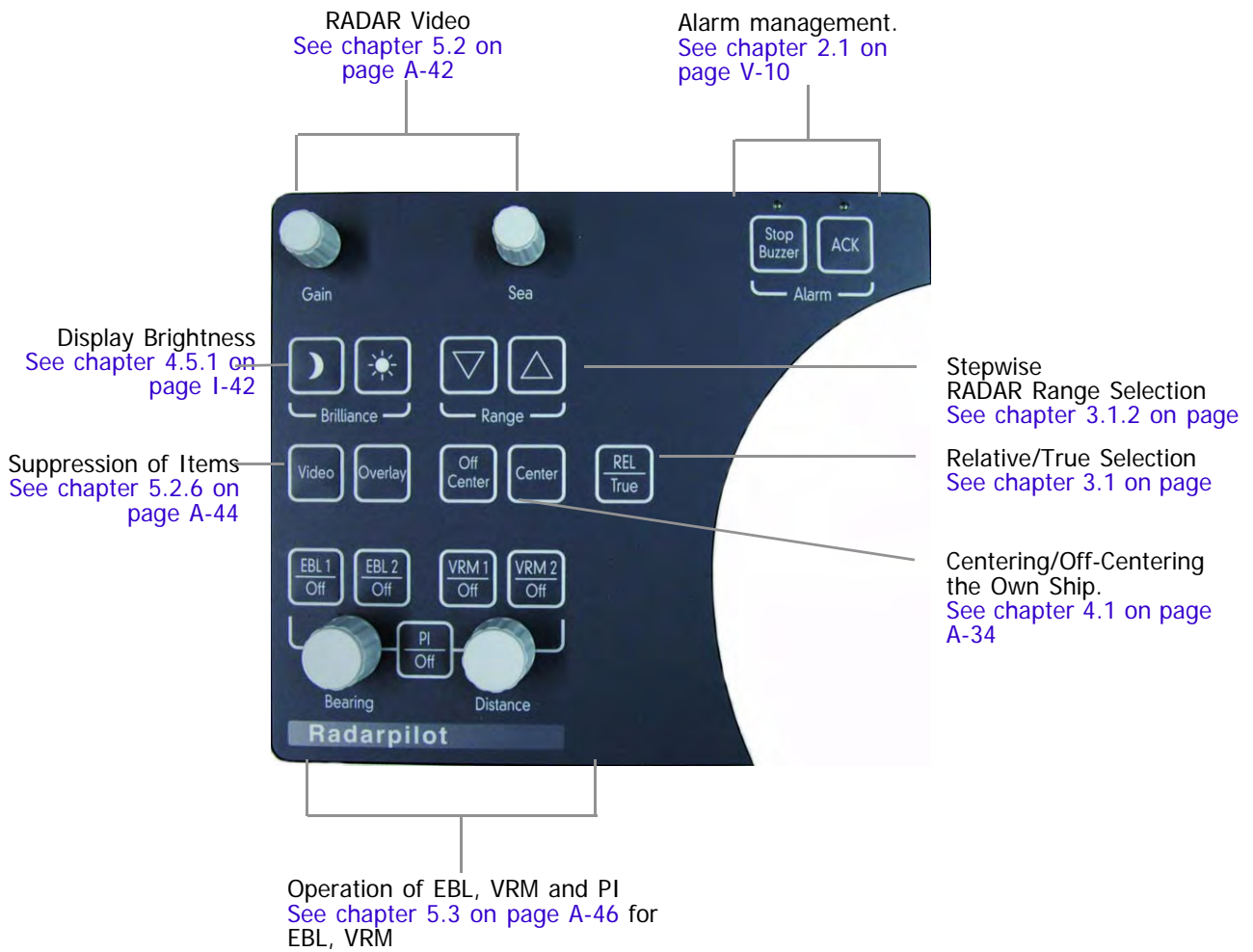


Fig. A / 6 The RADAR Keyboard

Several RADAR functions can not only be operated via the GUI but also via the radar keyboard installed optionally in the left part of the operating console. Follow the links to their description in this operating instructions as shown in the above figure.

The radar keyboard consists of the main operating items for the radar electronics. The radar video itself and also the artificial elements like VRM or EBL can be set, use the above picture to find quick access to the relevant chapters.

3 An Overview of the Screen

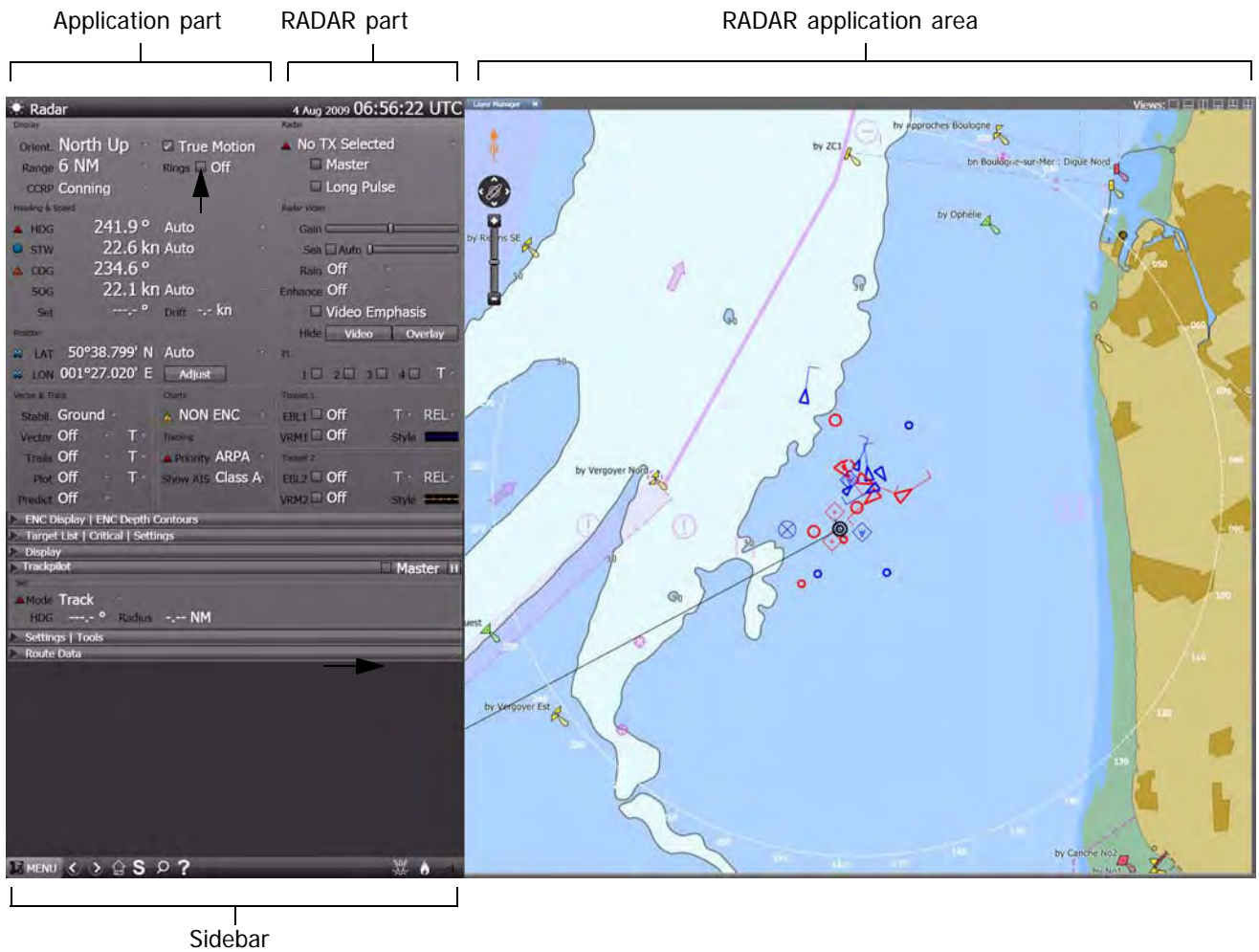


Fig. A / 7 Overview of the RADAR screen

4 RADAR Application Area

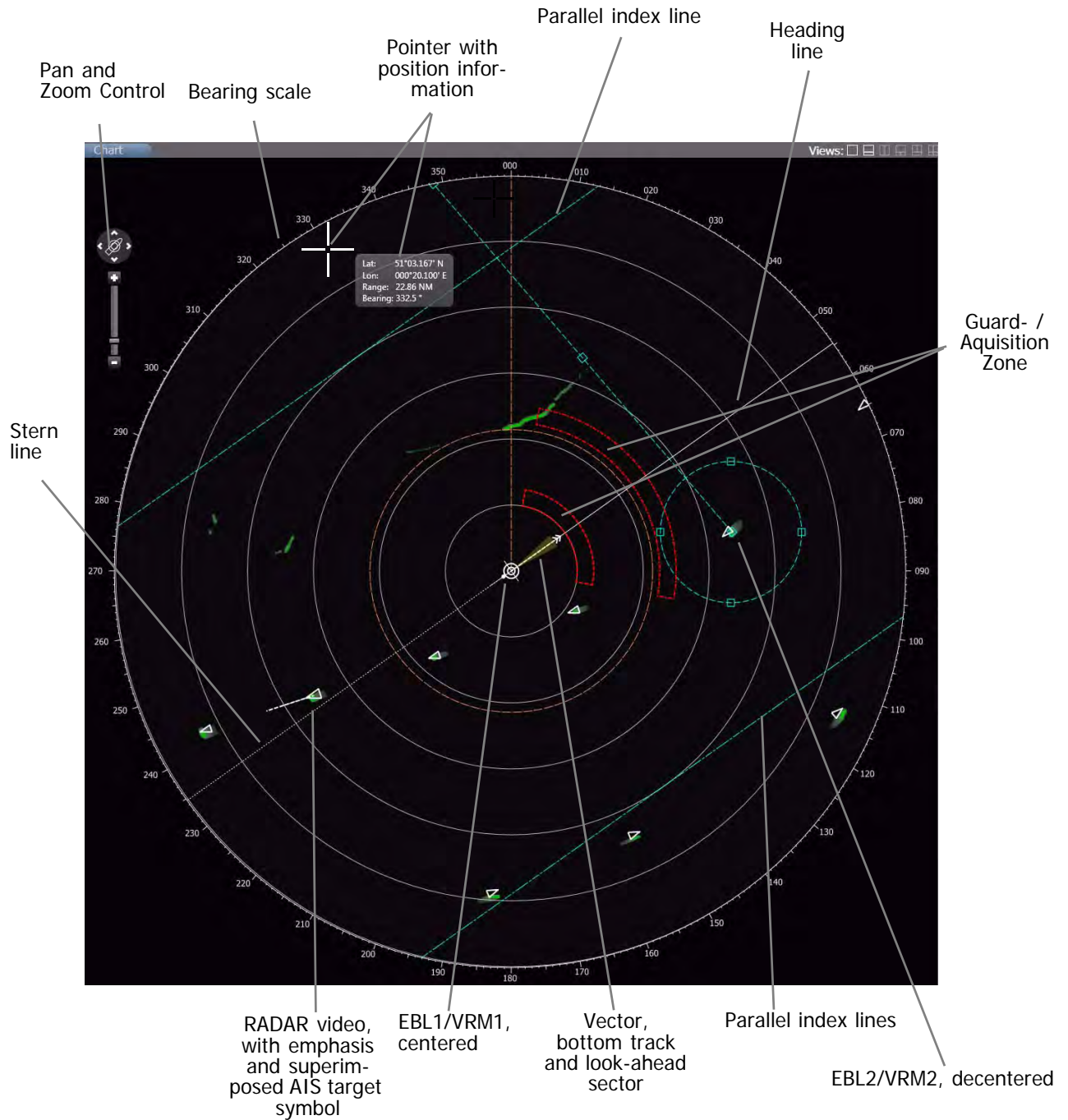


Fig. A / 8 PPI with superimposed elements

For detailed information about the handling of the displayed elements see the following chapters.

4.1 The Zoom and Pan Control

The zoom control in NACOS Platinum consists of a slider to adjust the range setting for the radar or the zoom factor for the ECDIS chart display. The compass control consists of pan buttons, which you can use to move the image section currently displayed.

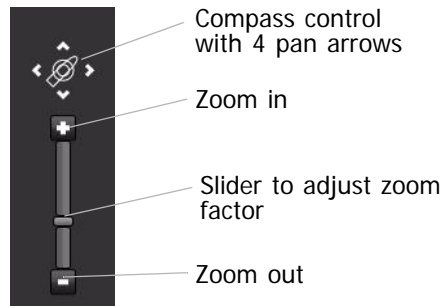









Fig. A / 9 Zoom and Pan Control

To zoom in incrementally, click on , you will then see more details on the respective display. However, the overall area displayed is smaller. To zoom out again, click on the . You will then see less details but you will have a better general overview of, e.g. an electronic chart displayed.

Using the slider or the  /  controls switches the range for radar or the zoom factor for ECDIS in the steps described later on.

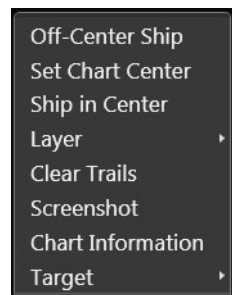
To pan the display, use the panning arrows of the compass control. For example, if you click on  then the display moves to the right in increments to view a different image section of a chart or whatever is displayed. The effect is like travelling with the eye over a large map.

To center the display, e.g. after panning, just click on the  icon once.

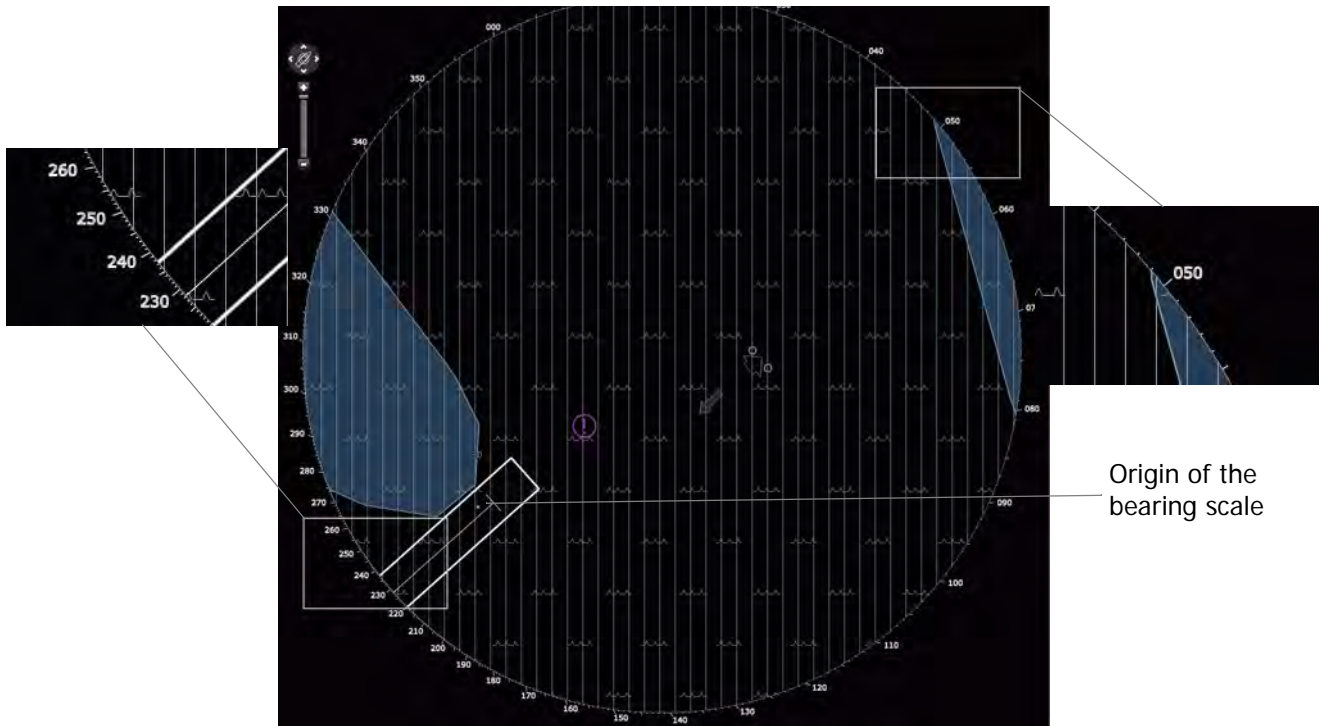
 It is also possible to off-center and re-center the ship by means of the context menu or by means of the button on the radar keyboard.

CENT

or

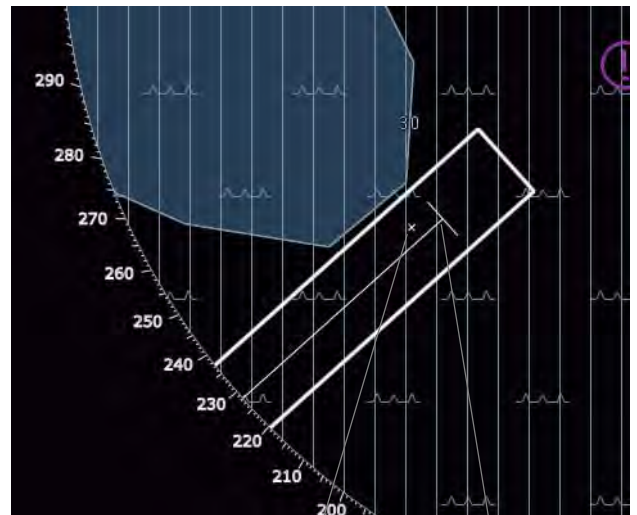


Due to the fact that the bearing scale relates to the position of the CCRP in the PPI, the division of the bearing scale is altered in a way that the scale still fits to the de-centered position of the CCRP.

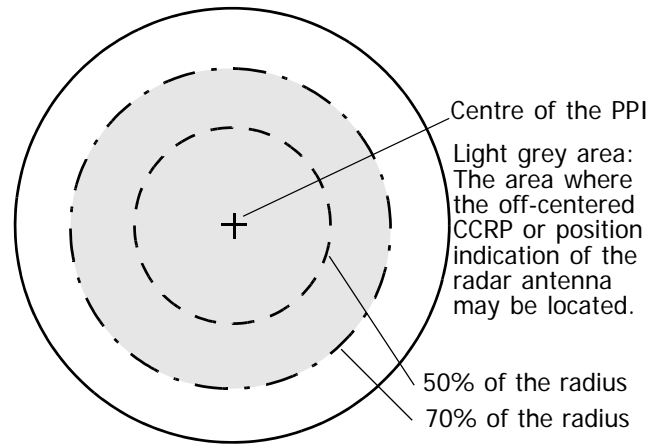


In the case that a very large ship uses a very small scale for the display (e.g. 250m) it might happen that parts of the ship's outline are situated outside of the PPI. But neither the CCRP nor the indication of the position of the selected radar antenna itself can ever leave the PPI, regardless of the settings for CCRP.

Before either the CCRP or the indication of the position of the selected radar antenna will leave the PPI, they will be shifted back to the opposite point where they are supposed to leave according to the ship's movement at the time when the CCRP/the antenna indication have reached 70% of the radius of the PPI, measured from the centre.



Indication of the position of the selected radar antenna CCRP



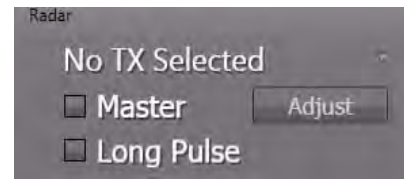
5 RADAR Sidebar - Permanent Area



Fig. A / 10 An Overview of the Permanent Area of the RADAR

5.1 RADAR Transceiver Settings

This group offers the selection of the desired radar transceiver and basic settings for the radar. The transceiver can be adjusted by means of clicking on the **Adjust** button.

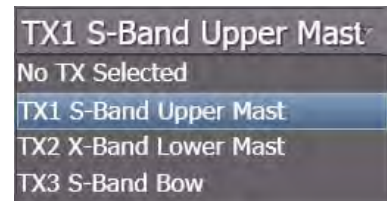


The **Adjust** button is only sensitive and operable when one of the available transceivers is selected and connected to the MFD and the MFD is selected as master.

5.1.1 Transceiver Selection

From the dropdown-list select the transceiver whose radar video is to be displayed at the MFD. The chosen transceiver and antenna motor are activated, if not yet done by another MFD.

If **No TX Selected** is chosen, the appropriate transceiver is turned off and the respective antenna stops rotation, if it is not selected by another MFD.



In order to have the current status of one of the transceivers in the list displayed, move the pointer to the depiction of the transceiver and let it stay for about one second, a small window pops open and shows the information.



A transceiver with the status **Not Connected** cannot be activated or controlled in any way.



CAUTION

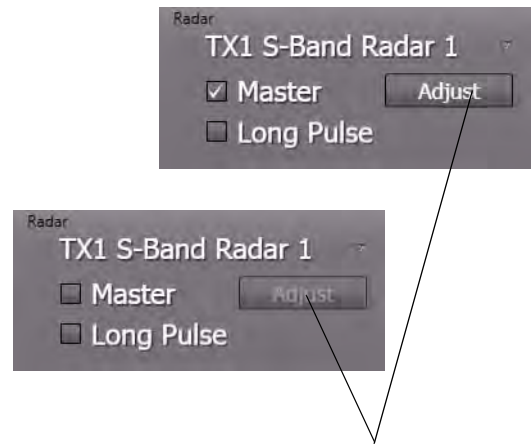
At the instant of switch-on of the radar function, the antenna begins to rotate and the emission of high frequency radiation is started. In the case of multiple installations, it can also happen that, instead of the expected antenna, a different one begins to rotate. Therefore, it must be ensured beforehand that the antennas can rotate freely and that there is nobody present close to the antenna turning circles.

- It is not advisable to select **RADAR** as the **CCRP** in the **Display** group of the Permanent Area, if **No TX Selected** has been chosen. In this case, all instruments would become invalid as the RADAR CCRP is not defined.

5.1.2 Master / Slave Selection

If **Master** is selected, the appropriate MFD becomes the master operating unit for the transceiver. The former master MFD for the selected transceiver is no longer master and on its screen the checkmark will disappear. Any MFD of the system configured as a radar indicator on service level can be switched to act as the master. On the master indicator, the radar transmitter and the receiver are operated. A slave-indicator cannot operate the transmitter, but it can control the video adjustments on the MFD.

If you try to become the master of a transceiver with the status **Not Connected**, the checkmark of the **Master** selector will disappear and the **Adjust** button will become insensitive again within 1-2 seconds.



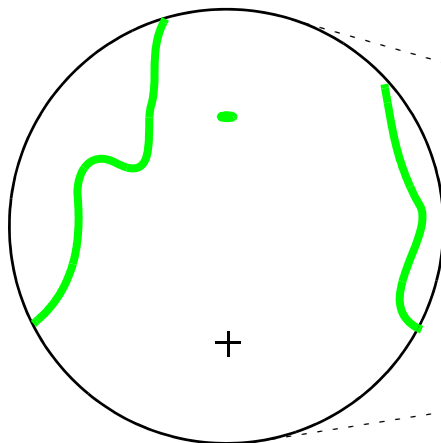
Adjust control changes state when master changes.



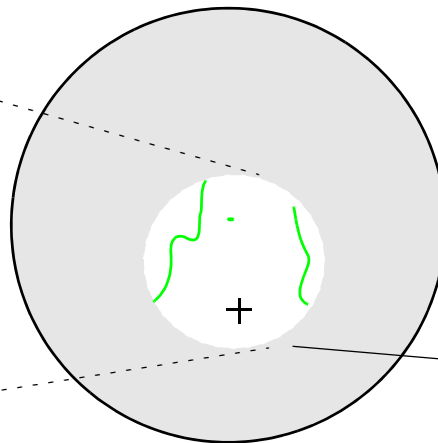
CAUTION

Picture distortions may occur on the slave MFD if the radar range selected by the master MFD is more than one step smaller than the radar range of the slave and the slave indicator is de-centered.

Technical background: The radar picture generated by the transceiver always has twice the diameter of the selected range of the master transceiver, in order to ensure a proper function of the off-center mode.



Master, 3 NM



Slave, 12 NM

Due to the fact that the range of the master is more than one step smaller than the range of the slave, details outside the 6 NM (=2 x 3 NM) range are not visible!

Scetch is not to scale!

5.1.3 Pulse Length

Long Pulse is available for any range of the radar. The internal pulse length changes with respect to the selected range automatically. For detailed information on the pulse lengths for any range, please refer to [page A-23](#).

The default setting for the pulse length should be short pulse, which means no checkmark on **Long Pulse**.

The short pulse delivers a better resolution, targets which are very close together will be displayed as separated echoes.

A longer pulse has a higher energy, but not a higher amplitude. Thus, it delivers stronger echoes and possibly a better target visibility at longer ranges. But it may be possible that two targets which are very close together would be displayed as one echo.

In general, it is advisable not to use the long pulse in rainy conditions.

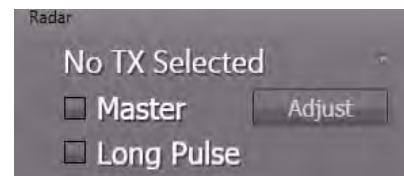
It is allowed to switch between the two pulse lengths at any time.

If target enhancement or any other filtering methods are active, the stronger echoes are processed by the filters and are able to improve a weak radar picture.

5.1.4 Adjusting the Transceiver


The selected transceiver's tuning and Interference Rejection can only be adjusted by the MFD which is selected as Master for it.

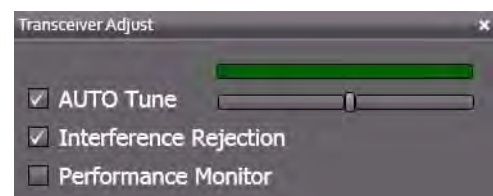
If **Master** is not selected, the **Adjust** control will be insensitive.



Tuning

The tuning (adjustment of the transceiver frequency) can be influenced manually or by means of the automatic control.

 An optimum tuning is not only important for a clear visual display of the targets on the video but is also a necessary prerequisite for the ARPA functions.



Automatic tuning

The default setting is **Auto Tune**, the transceiver frequency is controlled automatically.

The slider is moved automatically by the system into the position of the optimal value.

If two X-Band or two S-Band systems are being operated simultaneously, disturbance of automatic tuning might occur (if it is being used). In such cases, manual tuning is appropriate.

Manual tuning

Clear the **Auto Tune** checkbox and use the slider to perform manual tuning. The green indicator bar above the slider corresponds to the amplitude with which the input signal is available for signal processing. Observe more than one antenna rotation to find the maximum.

Interference Rejection

Interference caused by other radars (see [page A-19](#)) can usually be eliminated by switch-on of the interference rejection function. The default setting for Interference Rejection is **On**, but it can temporarily be switched off by the operator.

Performance Monitor

See [chapter H - 1 on page H-3](#) for details about the operation of the Performance Monitor.

Magnetron Hours

The transmitting valve or magnetron is the only device which has in comparison to other electronic devices in the radar system a limited lifetime. Typical running time hours are given in the Maintenance section chapter 3.2.

In order to check the actual operational hours of a specific magnetron just place the cursor on the transceiver in question in the selection list and a small status window is opened with the magnetron hours.



5.2 RADAR Video Settings

This group shows options which influence the display of the radar video on the MFD. These settings are influencing only the radar video on the operated MFD, but not on other MFDs which are connected to the same transceiver as slave or master.

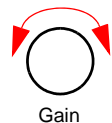


5.2.1 Gain

Gain setting influences the amplitudes of all echoes and works like an amplifier that makes it possible to enhance all echoes and noise in the same way in order to get a better picture. But, also the noise will be amplified and can disturb the clear display of targets.

- ☞ For optimum setting, adjust the **Gain** slider in a way that slight noise is visible on the PPI. Then reduce the value a little until the noise has just disappeared, but not more.

The gain can also be set by means of the Gain turning knob on the radar keyboard.



5.2.2 Sea

Sea can be set to manual or automatic mode. In manual mode, its setting influences the amplitudes of the radar echoes in such a way that it attenuates echoes close to the antenna very much and that it attenuates echoes which are more distant to it only very little. Due to the fact that the distance of a target is represented by the time its echo needs to return to the antenna, this is called „sensitivity-time-control“ (STC). Nevertheless, echoes which are as strong as the unwanted reflections of the sea surface may be fully suppressed and not visible, or they may appear and disappear, depending on how strong the surrounding unwanted reflections are.



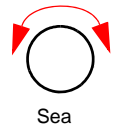
CAUTION

In the case of anticlutter sea values that are too large, weak targets can be lost, especially at close range. If the sea is very rough, it can be expected that radar targets which only produce weak reflections will remain undetected, even if the setting is correct.

In automatic mode, a fixed, approved value for the **Sea** filter is set. Advantages or limitations to the effect are the same as in manual mode.

- ☞ The automatic anticlutter sea function has the advantage that the clutter values taken into account in the upwind direction are different from those taken into account in the downwind direction. To check the display of very small target-echoes, it is necessary to switch over to manual operation.

The sea clutter suppression can also be set by means of the turning knob on the radar keyboard.



5.2.3 Rain

The suppression of rain clutter can be set to **Off** or to three values: **Low, Medium or High**.

If the value is set to **Low** or **Medium**, the filter works with pre-set coefficients just like in manual mode, if the value is set to **High**, the suppression is operated with correlative coefficients like in automatic mode.

The anticlutter rain function has the advantage that it takes place individually for regions with widely differing precipitation.

To check the display of very small target-echoes in a rain area, it is necessary to switch over to manual operation.



CAUTION

In the case of heavy rain, snow and hail, it can be expected that, even if the setting is correct, radar targets which only produce weak reflections - especially targets situated behind a strong rain front - will remain undetected. Such targets can appear suddenly when leaving the rainy area.

5.2.4 Enhance

The target enhancement function is a scan-to-scan technology that helps differentiate between radar targets and noise. It can be set to **Off** or to three automatic values: **Low, Medium or High**.

Refer to chapter 1.5 for the correct gain setting in combination with the activation of the **Enhance** function.

Target enhancement is used to display even very small or weak targets. For example, if a target echo is this small that it only lights up one pixel of the screen, it could be overseen or regarded as noise or clutter. Target enhancement makes it a little bigger, so that it is better to discover among the more dynamic clutter or noise. With this enhanced target, the correlation filter can work much more precisely.



CAUTION

When the **Enhance** function is running, the scan-to-scan correlation might have the result that small, fast-moving targets like high speed crafts or Racon codes are displayed with reduced intensity or might be fully suppressed.

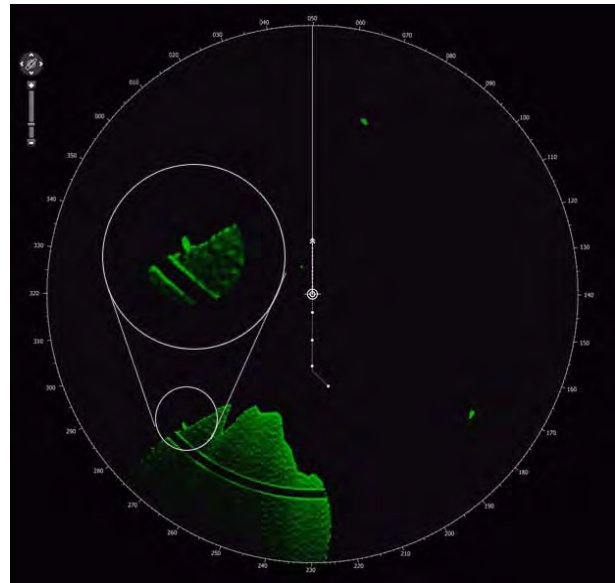
5.2.5 Video Emphasis

Strong video signals can be accentuated optically by switching on the **Video Emphasis** function.

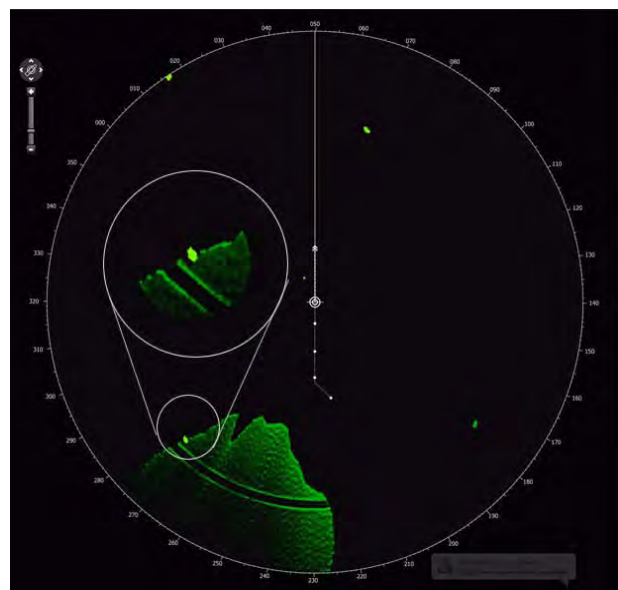
Video Emphasis can be used to increase the detection of targets of the radar. Very strong echoes will be shown in light green colour. It can help to decide whether an echo is one or two combined objects or whether a strong object is covered by noise, for example the echo of a cloud.

The display of targets on the PPI will be improved, targets will not get lost if VE is switched off. Also structures in land areas or in rainclouds or seaclutter can be made more visible by the VE function, for instance a light house on a land area or buoys with only a short distance to the land, whose echoes would normally melt into the ones of the land.

The examples show a radar echo that is covered by the noise of a raincloud.



RADAR picture without video emphasis



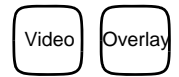
RADAR picture with video emphasis

5.2.6 Hide Video / Overlay

The radar video itself or the superimposed synthetics overlay can be suppressed temporarily by holding down the appropriate push-buttons. As soon as the pushbuttons are released, the video or the synthetic overlay are displayed again.



Suppression of the radar video or the synthetic overlay is also possible by means of the radar keyboard. As long as the buttons are pressed down, the appropriate objects on the PPI are suppressed.



5.3 Toolset1 and 2

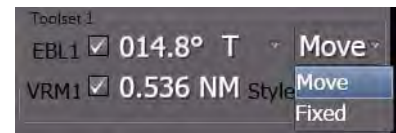
Each toolset offers the use of one variable range marker (VRM) and one electronic bearing line (EBL).

With the aid of the EBL and VRM bearings and distances between an object and the own ship or bearings and distances between two objects can be determined.

When measuring bearing and distance between the own ship and an object, the current setting of the CCRP must be considered: The CCRP set to RADAR gives measurements relative to the selected radar antenna, and CCRP set to Conning gives values relative to the conning position on the bridge, as long as EBL and VRM are operated in centered mode. See chapter 2.1 on page III-16.

Using the dropdown-list beneath T, it can be chosen whether the bearing is to be displayed as true bearing (T) or relative bearing (REL). When the pointer is moved upon the dropdown list, a window appears showing the true and relative bearing of the recent VRM.

Additionally, Move can be chosen if the origin of the bearing line is to move together with the own ship, Fixed can be selected if the origin is to remain at an absolute position on the screen.



5.3.1 EBL

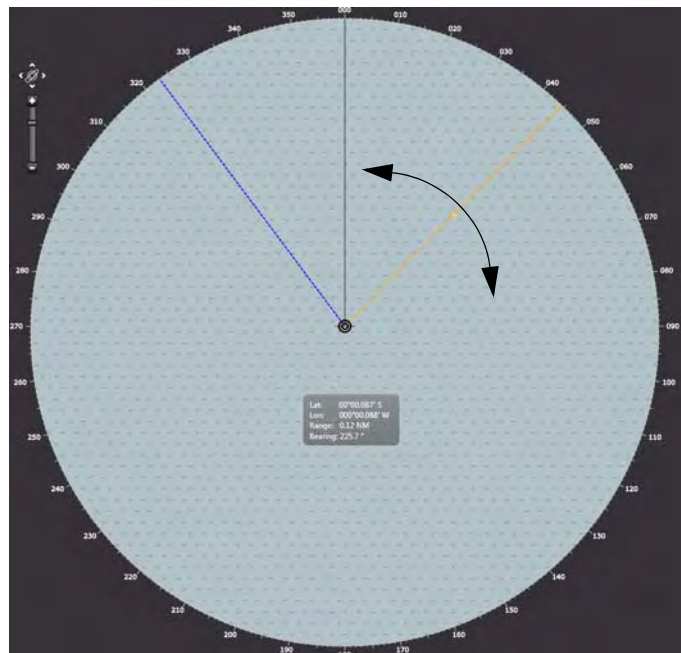
With the EBL, the bearing of an object with respect to own ship or the bearing between two objects can be determined.

After switch-on by means of a click in the Toolset group, the EBL are superimposed in the PPI. EBL appear with the same data as they have been displayed last time.

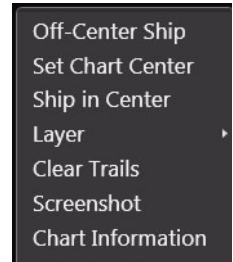
In order to alter the bearing of the EBL, click on it in the PPI. The EBL is now displayed with a small "handle" in its middle. Click and hold the handle and pull the line to the desired bearing.

In order to change the origin of the bearing line, click and pull its origin to the desired position.

Switch the EBL off and on again in order to re-center it on the own ship.



Re-centering of the EBL (and VRM if joined) can also be done by the context menu in the application area. Right-click in the PPI and choose **Center EBLx**.



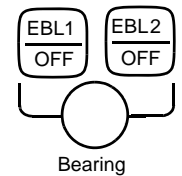
The current bearing is displayed in the Toolset group.

To switch off display of the EBL, clear the checkbox in the Toolset group.



The EBL can also be set by means of the radar keyboard.

To switch on the EBL, press the button for a short time. Adjust the bearing by means of the rotary knob. To switch off the EBL, press the button for about 2 seconds.



Latitude-Dependent Errors in the Display of the EBL

With the type of projection used for the longitude/latitude grid in the radar, the parallels of latitude become more strongly curved with increasing latitude, while the meridians converge increasingly with increasing distance from the equator (i.e. the direction of a meridian at the edge of the PPI is not 0° - 180° but might be 358° - 182°); in other words, their directions no longer correspond to the degree scale at the edge of the PPI.

In contrast to this, the EBL is always displayed as a straight line; its bearing displayed as an EBL value has a deviation with its maximum at the most distant point from own ship.

The following table shows the maximum bearing deviation for various latitudes and range settings.

Distance of EBL from Own Ship	Geographical Latitude			
	20 °	40 °	60 °	80 °
10 NM	< 0.1 °	0.1 °	0.3 °	0.9 °
20 NM	0.1 °	0.3 °	0.6 °	1.9 °
40 NM	0.2 °	0.5 °	1.2 °	3.8 °
60 NM	0.4 °	0.8 °	1.7 °	5.7 °
80 NM	0.5 °	1.1 °	2.3 °	7.5 °

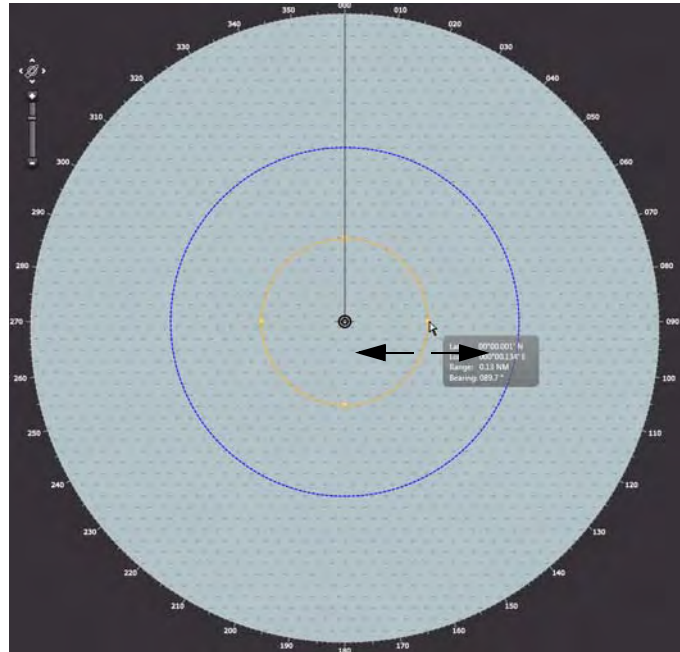
Table A / 9 Latitude-Dependent Errors of the EBL

5.3.2 VRM

With the variable range markers, the distance of an object from own ship or (in conjunction with the EBL) the distance between two objects can be measured.

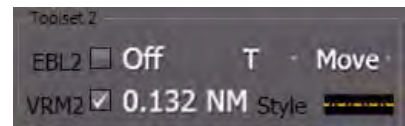
After switch-on by means of a click in the **Toolset** group, the VRM are superimposed in the PPI. VRM appear with the same data as they have been displayed last time, if the VRM range is below the display range. Otherwise it is switched on at 50% of the displayed range.

In order to alter the range of the VRM, click on it in the PPI. The VRM is now displayed with four small "handles". Click and hold one of the handles and pull the ring to the desired radius.



The current VRM radius is displayed in the Toolset group.

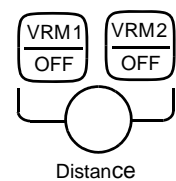
To switch off display of the VRM, clear the checkbox in the Toolset group.



☞ If the display range is reduced when the VRM is in the switched-on state, the VRM might be situated outside the visible range. Switch the VRM off and then on again, to return it to the visible range.

The VRM can also be set by means of the radar keyboard.

To switch on the VRM, press the button for a short time. Adjust the range by means of the rotary knob. To switch off the VRM, press the button for about 2 seconds.



5.3.3 Operating VRM and EBL jointly

Two sets of EBL and VRM can be operated jointly without influencing each other. They are displayed with differing colours.

EBL1 and VRM1 are combined in one toolset, as well as EBL2 and VRM2.

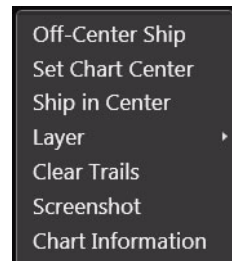
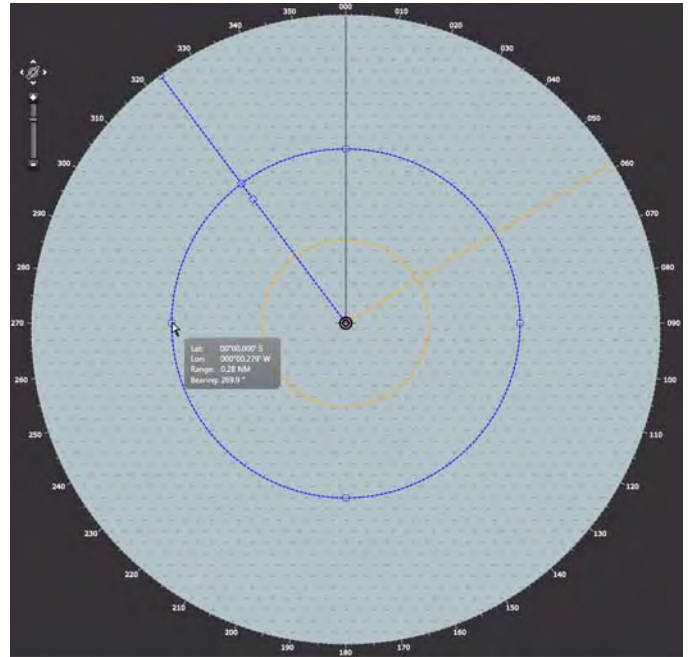
The activation of EBL1 also activates VRM1 if both are in the switched on state. To activate the joined setting click on the intersection of EBL and VRM. Both objects get the small "handles" and can be operated.

Additionally, the intersection point between VRM and EBL is marked and can be used to alter bearing and range simultaneously.

The origin of the EBL and the VRM can be changed simultaneously by clicking and pulling their origin.

To re-center the combined EBL and VRM, switch the EBL off and on again. Switching off the EBL only recenters the VRM.

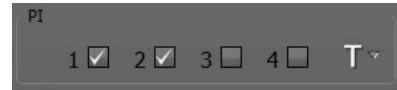
Re-centering of the EBL (and VRM if joined) can also be done by the context menu in the application area. Right-click in the PPI and choose **Center EBLx**.



5.4 Parallel Index Lines (PI)

There are 4 independent Parallel Index Lines available.

Depending on the setting in the **PI** group, the bearing is displayed as true (**T**) or relative (**REL**) bearing

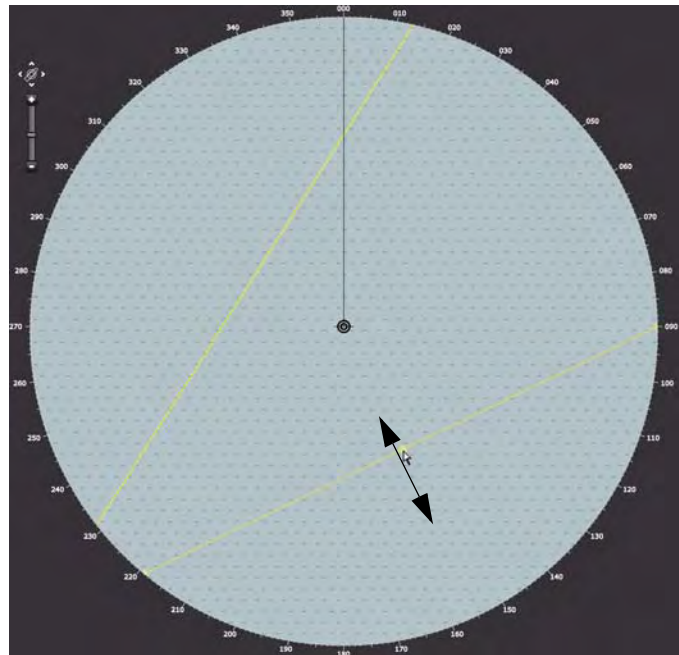


☞ When parallel index lines are switched on, they appear in the form in which they were set last. If the display range has been reduced in the meantime, they might be situated outside the visible range. In order to make the lines visible again without changing the range, the context menu can be used. See description on next page for details.

The four parallel index lines can be adjusted individually. The picture shows two of them.

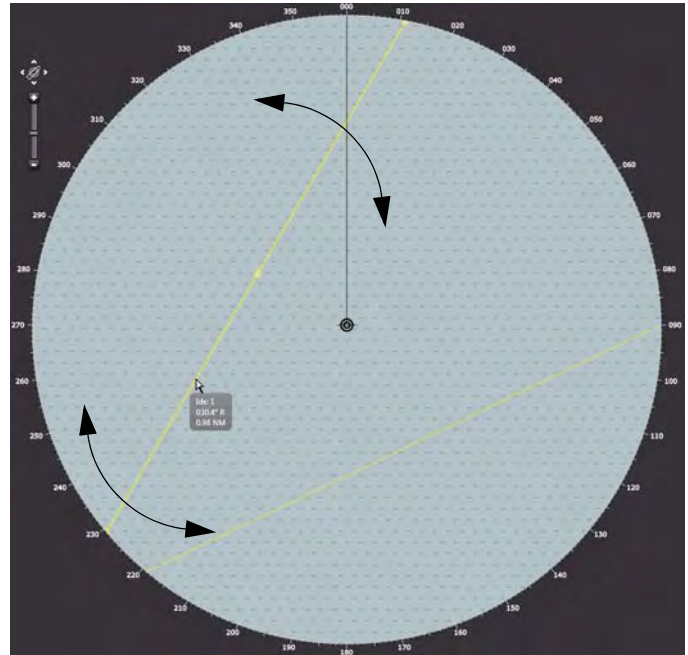
After switch-on by means of a click in the **PI** group, the lines are superimposed in the PPI. They appear with the same data as they have been displayed last time.

In order to alter the distance of a line, click on it. The line is now displayed with a small "handle". Click and hold the handle and drag the line to the desired distance.

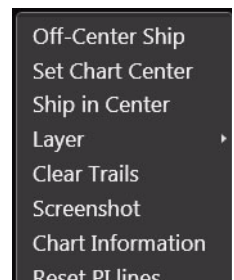


In order to change the bearing of the line, click on it. Then click and hold the line anywhere but not on the small handle and rotate it to the desired bearing.

The balloon-text shows the actual bearing and distance data of the line.



To reset the PI lines to the default state, right-click in the PPI and choose **Reset PI lines** in the context menu. The lines are set to 45° and 25% or 50% of the display range to both sides of the PPI-center.



The PI can also be switched on or selected by means of the radar keyboard. Press the key for a short time. The PI are switched on in numerical order, starting with the one that had been used last. To switch off a specific PI, use the checkboxes 1...4 in the PI group or select the specific PI with a short keypress on the PI-button and then switch off by pressing it for about 2 seconds.



Depending on the system configuration, the Non-permanent Area of the radar may not show every object described in this part. For example, if there is no Trackpilot in the system, the appropriate expander is not shown. Anyway, every possible expander will be described here.

In order to save space, a number of expanders have been combined into groups contained in three index cards: **Alarms, Presentation, Tools** and **Settings**:

6 RADAR Sidebar - Non-Permanent Area




Fig. A / 11 RADAR Sidebar of the Non-Permanent Area


- The **Alarm line** shows the oldest not acknowledged alarm of highest priority and provides alarm management
- The **Alarm expander** includes the alarm list and alarm settings for the ECDIS sub-system.
- The **Trackpilot** expander provides indications and control elements for the heading control and automatic track keeping system
- The **ENC** expander provides settings for the visualisation of the electronic chart (ENC)
- The **Display** expander provides target, route and own ship settings and allows setting of user symbols into electronic chart
- The **Target** expander provides the target list, the data of the most critical target and the AIS message handling
- The **Routes** expander provides utilities for route planning, route management and route/display.
- The **Settings** expander contains different parameters for the setting of AIS and ARPA targets, the automatic target acquisition and route display settings.

7 Target Handling

7.1 Overview

Two types of targets can be handled on the radar, ARPA targets and AIS targets. For the targets, the AIS electronics unit and the ARPA electronics of the radar are two independent sensors whose displays and operating procedures take place on one and the same MFD. The two sensors deliver data independently, the data of both sensors are used for the collision avoidance computation, which takes place in the background of all actions. It can raise alarms, for instance if objects are on collision course.








 A radar echo that is supposed to be taken in account is called an acquired target.

 An AIS target that is supposed to be taken in account is called an activated target.

Targets can be acquired/activated manually using the GUI or automatically by the system. This chapter first gives an overview of types of targets and their treatment in the system. If necessary, cross references to manual/automatic target acquisition are noted.

ARPA Targets

ARPA targets are acquired or tracked radar echoes received from the selected transceiver. They can be tracked from a distance near 0 NM depending on antenna height and the target's ship structure up to 24 NM irrespective of the range scale in use. Before a radar echo can be used as ARPA target, its echo is evaluated by the ARPA electronics during a number of antenna revolutions. ARPA targets can be of the following kind:

ARPA targets	
A radar echo on the PPI. It is displayed as a green bunch of pixels	
A radar echo that has been acquired manually and that is under evaluation now	
A radar echo that has been acquired automatically by the examination of the radar video in an acquisition/guard zone.	 flashing, red
An acquired target that is tracked by the ARPA electronics. Its past positions and speed/direction vector can be shown	
A tracked target, which is selected and whose data are marked in the target list	
ARPA targets may have an ID ¹⁾ displayed on the bottom right of the symbol. The ID consist of a consecutive number generated by the system preceded by the selected transceiver number.	 1 04
Lost Target. If any of the abovementioned targets gets lost, a flashing cross is superimposed above the target symbol.	flashing, red  1 04

¹⁾ ID is used as a shortcut for (target) identifier in these operating instructions.

Table A / 10 Symbols of ARPA Targets in RADAR

See the chapters below for further information.

AIS Targets

AIS targets are all targets whose data are received by the AIS electronics unit connected to the system. All AIS targets are visible per default after switch-on of the MFD.

 The display of groups of AIS targets (Class A, Class B , All) may be switched on and off by the operator. Select All if you want to see all targets received from the AIS electronics unit.

AIS targets can be of the following kind:








AIS targets	
A sleeping AIS target is a target that is displayed in the PPI. Its data are evaluated and can be shown on demand.	
A manually activated AIS target is displayed with detailed data such as HDG, true scaled outline (if available in the received data set and the PPI scale is large enough), ROT indicator, past positions and speed/ direction vector can be shown	
An automatically activated target by the collision avoidance computation or by a acquisition/guard zone	flashing, red 
An activated AIS target, which is selected and whose data are marked in the target list	
AIS targets may have an ID displayed on the bottom right of the symbol. The ID consists of the callsign or the ships name or the MMSI depending on the settings in the target presentation menu.	 BXGHE  MS Hamburg
Lost Target. If any of the above mentioned targets gets lost, a flashing cross is superimposed above the target symbol. For AIS targets the lost target alarm can be switched off in the Target settings.	flashing, red 


Table A / 11 Symbols of AIS Targets

Target Fusion

Due to the fact that an AIS target within the radar range normally also produces a radar echo, the symbols of tracked and activated targets are displayed close to each other:

In this case, it is possible to decide whether the object is to be treated as an AIS target or as an ARPA target. [See chapter 3.5.1 on page III-59](#) for details. In terms of an improved display readability and avoidance of cluttering the screen, the objects can be fusioned if they meet some boundary conditions. That means, that they can be displayed only as either AIS or as ARPA target depending on user selection. [See chapter 7.7 on page A-65](#) for details on **Target Fusion**.





 The number of ARPA and AIS targets being tracked should be kept as small as possible; the presence of too many targets causes confusion on the screen and distracts the operator's attention from what is really important. Targets that are no longer relevant should be deleted (RADAR) or deactivated (AIS).

-
- ☞ In the case of tracked targets entering a clutter area (rain or sea clutter), a "target swap" might occur; parts of the rain front can suddenly be "tracked". A target swap can also occur if there are targets situated close to each other or close to land. In the case of target swaps, no warning is given.

7.2 Manual Target Acquisition

Acquiring a target with DO

Move the pointer on top of the desired object. The pointer then becomes a hand  or a gun sight . This depends on the object underneath the pointer:



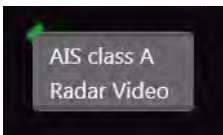





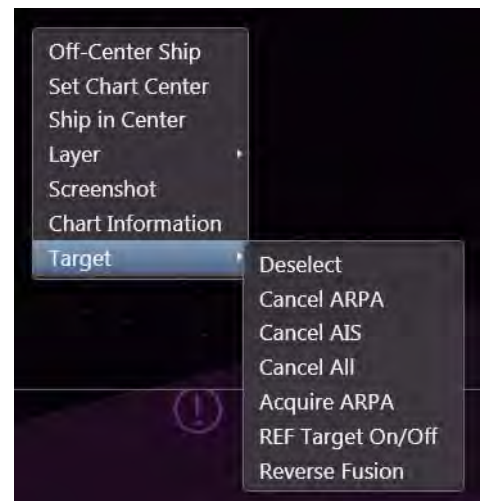
Pointer becomes	 a hand	 a gun sight
Object is	not clearly identifiable, it could be an AIS target or a radar echo	clearly identifiable, it is a single AIS target or a single radar echo
reason	AIS target and radar echo appear on the same position or are fusioned	the object is an AIS target with no radar echo (transceiver off or bad radar conditions) or the object is a radar echo that carries no AIS
indication after click with DO	 make the choice...	AIS target activated  radar echo with activated ARPA function 
	AIS target activated  radar echo with activated ARPA function 	

Table A / 12 Manual Target Acquisition

Acquiring/Deleting a target with MORE

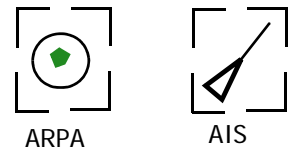
Clicking on the target symbol with MORE opens the context menu. Choose **Target** and select

- **Deselect** in order to stop the accentuation of this target in the target list.
-  It is not necessary to **Deselect** a target before another target can be selected, in fact it is possible to change the selection of targets by just clicking them with **DO**.
- **Cancel ARPA** to stop tracking the object as ARPA target
- **Cancel AIS** to stop tracking the object as AIS target, making it a sleeping target
- **Cancel All** to stop tracking for all targets, all activated AIS targets become sleeping targets
- **Acquire ARPA** to force a radar echo to be tracked as ARPA target
- **Reverse Fusion** to make a fusioned target that is handled as AIS target become an ARPA target and vice-versa



7.3 Manual Target Selection

An activated AIS target as well as an acquired or tracked ARPA target can be selected. Then, its data are marked in the target list. To do so, click on the activated AIS target or the acquired ARPA target with **DO**. The target will be marked with a broken frame and its data are marked in the target list with blue color. Only one target can be selected at a time on the PPI or in the list.



Selected targets

CPA	TCPA	Name	Range	Bearing	Speed	Course	Source
00.07 NM	-00:25 M		00.08 NM	359.5 °	15.0 kn	346.3 °	AIS A
06.01 NM	-10:49 M		07.14 NM	246.5 °	15.0 kn	227.4 °	AIS A
03.80 NM	-04:29 M	MS HA	04.08 NM	170.5 °	15.0 kn	052.3 °	AIS A
03.21 NM	-23:59 M		08.16 NM	078.4 °	15.0 kn	052.3 °	AIS A

Data of a selected target accentuated in the list

Fig. A / 12 Data of the Selected Target

See chapter 7.10 on page A-68 for details about the target list.

7.4 Automatic Target Acquisition

ARPA targets can be acquired automatically, sleeping AIS targets can be activated automatically as well.

There are two possibilities to acquire/activate targets automatically:

By means of the collision avoidance computation for dangerous AIS targets

- The collision avoidance computation observes every AIS target whose data are received continuously. For any of those targets, the closest point of approach (CPA) and the time until the CPA is reached (TCPA) are computed and compared with operator-defined limits. If the CPA and TCPA values of a target fall short of the limits, the target is activated (AIS) and the **Dangerous Target** alarm is raised. See also next chapter for details.

By means of the acquisition/guard zones for radar and AIS targets

- Two of those zones can be switched on in order to perform automatic target acquisition/activation of ARPA and AIS targets. Any radar echo and AIS target that enters one of the zones will be acquired/activated and an alarm is raised.



Settings for collision avoidance computation, i.e. Dangerous Targets

Settings for Acquisition/Guard Zones



CAUTION



Automatic target acquisition and tracking are ensured only if the radar video is OK, i.e. if it is adjusted in the same way as would also be necessary for visual evaluation.

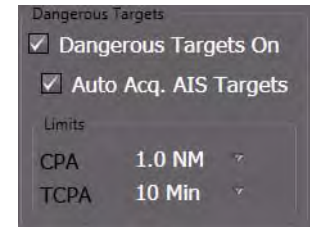
Under particularly unfavourable meteorological conditions, it can happen even with an optimum setting of the radar that targets in the radar video cannot be detected automatically.

7.5 Settings for Dangerous Targets

Dangerous Targets On


With this function activated, targets tracked by the ARPA and also AIS targets can automatically be marked as dangerous targets by the automatic collision avoidance computation if their CPA/TCPA data fall short of the limits set in the **Limits** group. As a result,

- the **Dangerous Target** alarm appears,
- the target which has caused the alarm is indicated on the PPI by means of the flashing symbol  or ; if a sleeping AIS target has caused the alarm, that target is automatically activated beforehand. The flashing of the symbol stops after the alarm **Dangerous Target** for the appropriate target has been acknowledged. The alarm is kept in the alarm list as long as one dangerous target is present.



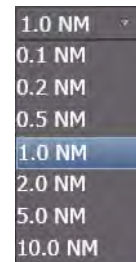
Auto Acquire AIS Targets

In particular cases, it might be required to prevent AIS targets from being acquired by the collision avoidance computation, for example to avoid unnecessary alarms in port or at other berths caused by too many AIS targets. In this case the checkbox **AUTO ACQ AIS Targets** must be cleared.

-  As long as AUTO ACQ AIS Targets is activated, even sleeping targets not being selected for display are recognized as Dangerous targets automatically. See [chapter 3.5.2 on page III-60](#) for details.

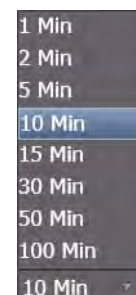
Limits-CPA

The limit for the distance to the closest point of approach of a target can be set here. If a target gets closer than the set limit, it is automatically marked as dangerous target and the alarm **Dangerous Target** is raised.



Limits T CPA

The limit for the time to closest point of approach of a target can be set here. If the T CPA of a target gets shorter than the set limit, it is automatically marked as dangerous target and the alarm **Dangerous Target** is raised.



Prerequisites for the Collision Avoidance Computation in case of AIS Targets


The collision avoidance computation can be performed only if the relative speed between own ship and the target is known. This must be determined from the speed vector over ground (COG, SOG) received from the AIS target and from the own speed vector over ground. The own speed vector over ground is mainly determined from the **Bottom Track** data of the selected speed sensor; otherwise, it is determined with the aid of the COG/SOG of the selected position sensor.

If an AIS target is not transmitting COG and SOG, no collision avoidance computation takes place for this target. Therefore, the target cannot be acquired automatically. If it is already being tracked, no **Dangerous Target** alarm occurs in the case of a dangerous approach. The symbol of this AIS target is displayed dashed.


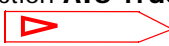
If, because of missing data or caused by sensor selection, the own speed vector over ground cannot be determined, then for all AIS targets the collision avoidance computation and the **Dangerous Target** alarm does not take place. The symbols of all AIS targets are then displayed dashed. Three minutes after the occurrence of this situation, the **AIS No CPA Alarm, SOG Lost** alarm appears

7.6 Settings for Acquisition/Guard Zones

In the case of automatic target acquisition by means of acquisition/guard zones, the radar evaluates all radar echoes and sleeping AIS targets appearing in the acquisition/guard zones.

If the **radar echo** appears at a certain position at least six times during ten revolutions of the antenna, it is evaluated as an ARPA target. If the echoes do not belong to a target already being tracked, the position is treated as an acquired target and is marked with the flashing symbol . The **Target Auto-Acquired** alarm appears, or - if the target has already been tracked when it entered the acquisition/guard zone - the **Target Entered Guardzone** alarm appears. After acknowledgement of the alarm, the automatic target tracking begins.

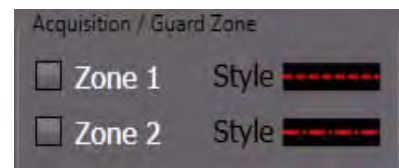
If a **sleeping AIS target** enters the region of a switched-on acquisition/guard zone, it is activated automatically, afterwards


- it is marked with the flashing symbol  or if the function **AIS True Scaled Outline** is activated the AIS target can be shown with the true scaled outlines 
- the **Target Auto Acquired** alarm appears, or - if the target has already been active when it entered the acquisition/guard zone - the **Target Entered Guardzone** alarm appears.

If there are already 95% of the maximum number of ARPA targets or 95% of the maximum number of AIS targets being tracked or acquired, the **Check ARPA/AIS Target Capacity** warning appears. In this case, at least one unimportant target must first be deleted before another target can be acquired.

If there are already 100% of the maximum number of ARPA targets or 100% of the maximum number of AIS targets being tracked or acquired, the **ARPA/AIS Target Capacity Exceeded** alarm appears. In this case, at least one unimportant target must first be deleted before another target can be acquired.


Two independent acquisition/guard zones can be switched on in order to acquire targets automatically. The acquisition/guard zone is switched on and off by checking the controls **Zone 1** or **Zone 2**.



-  If the acquisition/guard zone is switched off, automatic target acquisition does not take place any longer. Targets already being acquired or activated will be tracked further on.


Setting the Range of the Acquisition/Guard Zone

Example shown for Guard Zone 1: Click on the arc that defines the acquisition/guard zone and use the small handle to drag the zone to the desired size.

-  The outer limit can be set to a range value between 1.5 NM and 20 NM.

Setting the Angle of the Acquisition/Guard Zone

Click on the angle line that defines the acquisition/guard zone and use the small handle to drag the zone to the desired angle.

-  The angle can be set to a value between 5° and 360°. The setting takes place relative to the heading direction, i.e. the acquisition/guard zone turns with the ship's heading.



Handles

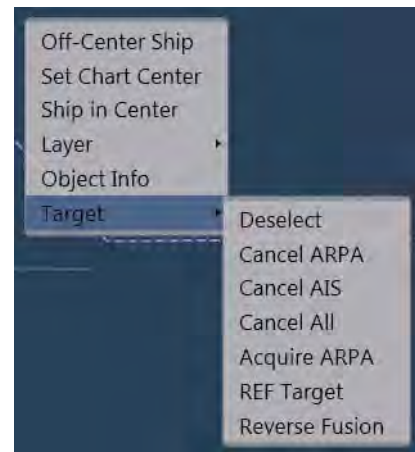
7.7 Target Fusion

An ARPA target and an AIS symbol may represent the same object. In order to determine if this is the fact, ARPA and AIS data for distance, speed and course are compared. If the difference in data are within pre-set limits, the targets will be associated if this function is activated. In this case, only one of the symbols is shown. Anyway, both targets will be continuously tracked. The blanked-out symbol will appear again automatically if the differences in data exceed the pre-set limits.



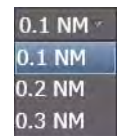
The limits required for this function are set here.

It is possible to define the priority for showing an object as ARPA or AIS targets for the case that target fusion is active for a tracked target. This means that one of the symbols can be suppressed on the PPI. See chapter 3.5.1 on page III-59 for details. Additionally, it can be defined for a single selected target on the PPI to show the suppressed symbol for a limited period of time. For this purpose click on Reverse Fusion in the Target context menu in the PPI.



Fusion Distance

If the distance is less than the set limit, the ARPA and AIS target are displayed as one target.



Fusion Course

If the course difference is less than the set limit, the ARPA and AIS target are displayed as one target.



Fusion Speed

If the speed difference is less than the set limit, the ARPA and AIS target are displayed as one target..



7.8 Deletion and Loss of Targets

Loss of Targets

An ARPA target is tracked automatically until

- it is deleted manually or
- it leaves the target tracking range of 24 NM or
- it is lost within the target tracking range of 24 NM.

An ARPA target is lost if, during five revolutions of the antenna, no correlation of the video can be found by the radar, or the detection probability falls below 50%.

An AIS target is tracked automatically until

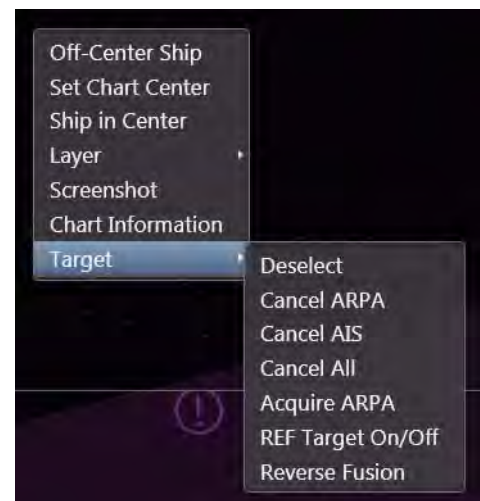
- it is deleted manually or
- it is lost.

A tracked AIS target is lost if the AIS electronics unit does not receive any more signals from that target within the specified time ¹⁾.

Deletion of a Target

Click on the target with the MORE key, and then choose the target type from the context menu and click on the desired action with the DO key.

- ☞ If an AIS target is deleted which is also tracked in the background as an ARPA target (See [chapter 7.7 on page A-65](#)), the hidden ARPA symbol re-appears. If it is to be deleted also, the process must be repeated for the ARPA target.
- ☞ This procedure also works vice-versa: If an ARPA target being tracked as AIS is deleted, the hidden AIS symbol re-appears.

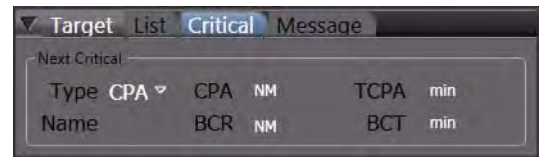


- ☞ For information about automatic target acquisition See [chapter 7.4 on page A-61](#)

¹⁾ The receive timeout is dependent on the navigation state and the speed of the AIS target.

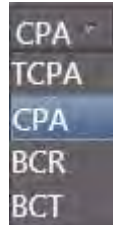
7.9 Critical Target

This group shows the most important data of the **Next Critical** target in the vicinity. It can be selected which criterion determines the most critical target. The data are updated every second.



Type

In this list, the criterion for automatic ranking of the most critical target is selected. The most dangerous target is always the one that has the closest distance to the own ship or the shortest time until a dangerous situation could take place. See below for the meaning of the abbreviations.



Name

Displays the Name of the target, if available in the received data.

CPA

The designation **C**losest **P**oint of **A**pproach means the minimum distance between the own ship and the target at the closest point of approach.

TCPA

The **T**ime to **C**losest **P**oint of **A**pproach means the time until the CPA is reached.

BCR

The **B**ow **C**rossing **R**ange means the distance between the own ship and the target when the target crosses the heading line of the own ship.

BCT

The **B**ow **C**rossing **T**ime means the time that will pass until the target crosses the heading line of the own ship.

7.10 Target List

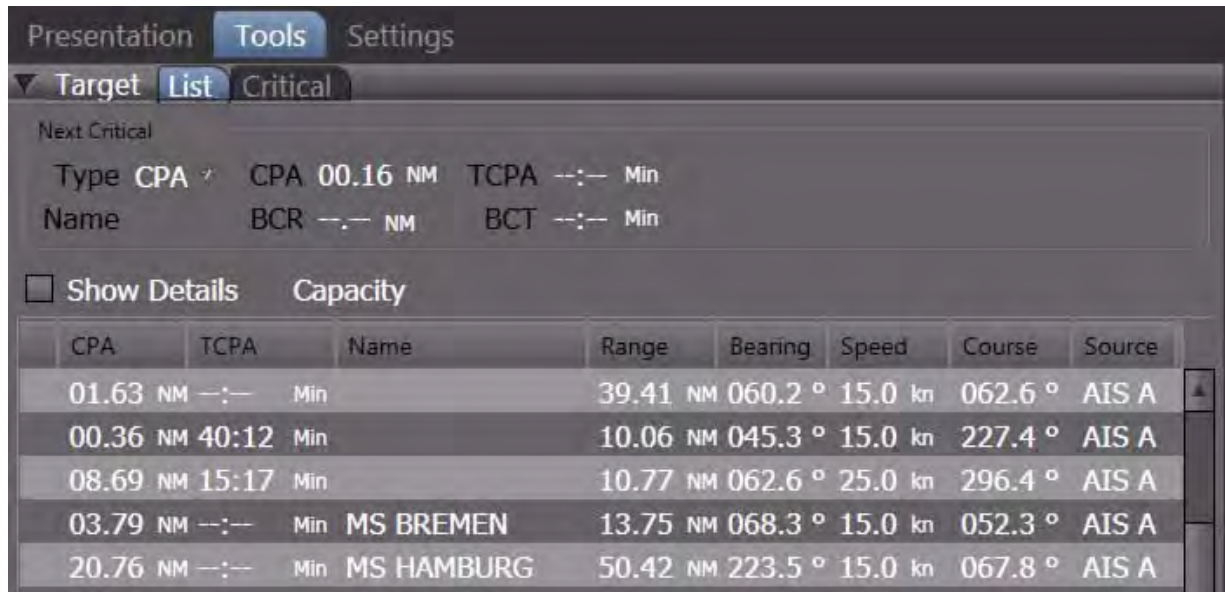


Fig. A / 13 The Target List

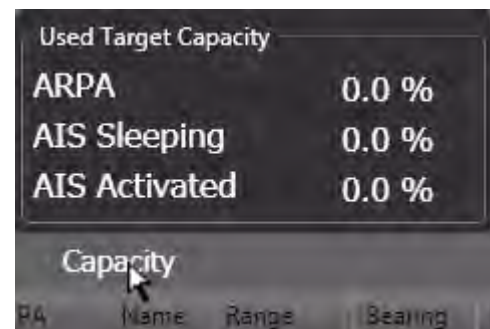
Additionally to the next critical (i.e. most dangerous target), a list of all targets available in the system ¹⁾ can be displayed. The columns of the displayed table are self-explanatory, they can be sorted ascending or descending by clicking on the appropriate title of the column. Sorting takes place in the instant of the click, afterwards the sequence of the entries remains static, even if the values of the sort criterion change.

If the pointer is moved on the depiction **Capacity**, an information is displayed showing the percentage of memory usage for targets. If 95% of the maximum capacity is reached, an indication is given. If the maximum capacity is exceeded, an alarm is given.

Maximum number of targets:

Type of Target	Maximum Number
ARPA	40
AIS Activated	40
AIS Sleeping	> 200

Table A / 13 Maximum Number of Targets



¹⁾ The list includes all tracked ARPA targets and all AIS targets selected for continuous display. See chapter 3.5.2 on page III-60. The most important target data can also be assessed directly in the PPI by holding the cursor on the target symbol. See chapter 7.2 on page A-59 for details.

If, in the PPI a target is selected whose data is to be displayed in the list, the target's data are accentuated with blue color, possibly the list must be scrolled in order to find the marked line.:

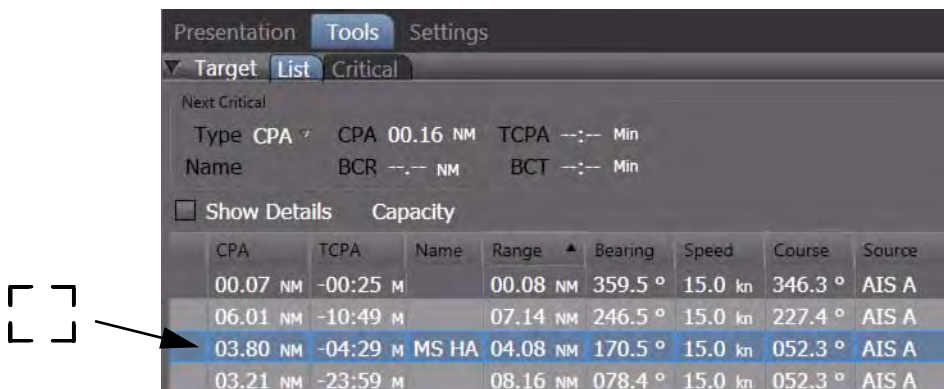


Fig. A / 14 Marked Target

Show details

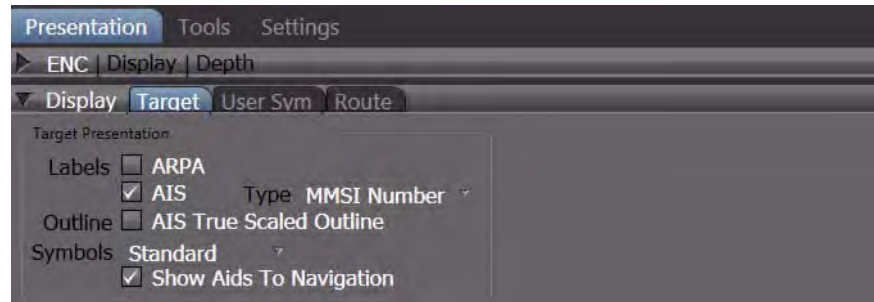
In order to display detailed data of the target (especially AIS targets), activate the **Show Details** control. The small windows underneath the marked data row will display more target data as available in the received data set.



Fig. A / 15 Target Details

7.11 Target Display

The **Target Display** tab shows information how the symbols are displayed on the radar and allows to set the system's behaviour in terms of displaying the symbols.



The **Display** tab is divided into 2 groups:

- **Target Presentation**
- **Own Ship Presentation**

Target Presentation

For the targets, the **AIS electronics unit** and the **ARPA electronics of the radar** are two independent sensors whose display functions and operating procedures take place on one and the same radar indicator.

Labels:

- **ARPA**

The target data received by the ARPA electronics of the radar can be displayed with labels consisting of the transceiver number selected for the MFD and the and target number.

- **AIS**

The target data received by the AIS electronics unit can be displayed with labels as selected under AIS Type.

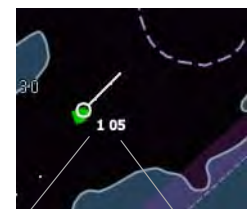
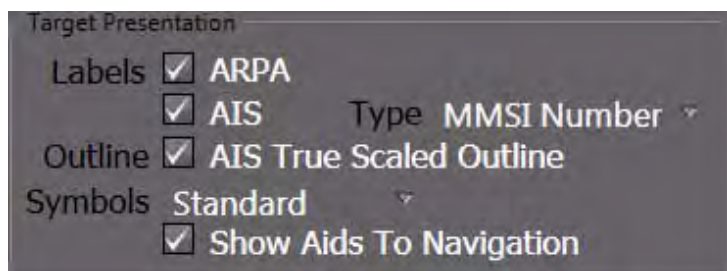
- **AIS Type**

- **MMSI Number:** Maritime Mobile Service Identity, definite identification of the AIS system (and hence of the target).
- **Call Sign:** The call sign of the target.
- **Ship Name:** Name of the target ship.

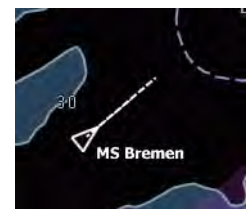
Outline:

- **AIS True Scaled Outline**

In case that the AIS target delivers its ship dimensions, it is possible to show/hide the true scaled outlines together with the AIS symbol. This is only possible if the selected target reports the heading information and the beam of the target symbol in the PPI exceeds 7.5 mm.



Transceiver Number Target Number



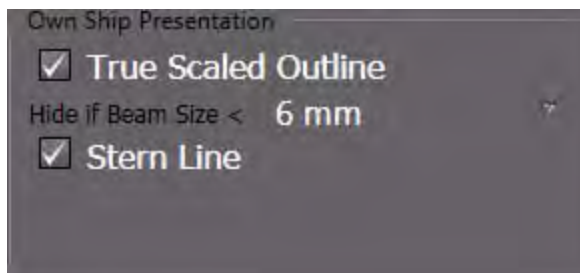
Symbols: Standard / Large

it can be selected to show **Standard** or **Large** AIS and ARPA target symbols.

Show Aids to Navigation

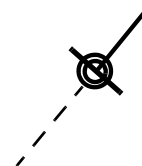
Aids-to-Navigation are virtual navigation marks which are reported by the AIS system. For their display, the same symbols are used as for the electronic chart of type ENC. In addition, they are marked by means of a blue circle having its centre at the position of the Aid-to-Navigation.

Own Ship Presentation



Minimized Symbol

The minimized own ship symbol consists of the Heading line and the Beam line surrounded by two concentric circles.



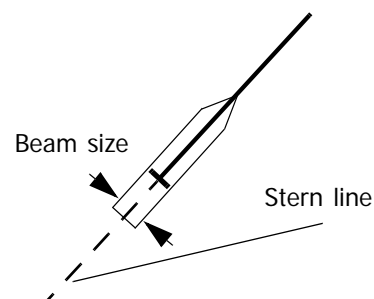
Minimized symbol

True Scaled Outline

In the smaller ranges ¹⁾ it is also possible to show the own ship true to scale with length and beam size parameters as stored in the ship configuration data. The True Scaled Outline cannot be displayed in larger ranges.

- **Hide if Beam Size < 3 / 6 mm**
Hides the **True Scaled Outline** of the own ship on the PPI if the beam size is displayed smaller than 3 / 6 mm.
Select 3mm if you want to see the true scaled ship in the larger ranges also.

Ship symbol with true scaled outline



Stern Line

This extension of the heading line in the backward direction is displayed as far as the edge of the PPI and can be switched on if necessary.

Vector, Plots and Prediction

Depending on the settings in the permanent area the own speed vector, a path prediction and the past position plot can additionally be displayed together with the own ship symbol. See chapter 3.3 on page III-49 for details. Settings for vectors, trails and plots made there are also valid for the presentation of targets.

¹⁾ Normally (depending on the size of the ship) 1.5 or 0.75 NM and below, if 3mm is selected.

7.12 Trial Manoeuvre

Trial manoeuvres are needed mainly for collision avoidance. In this process, a planned manoeuvre of the own ship is simulated and the effect of this manoeuvre on the targets being tracked or plotted can be checked in the PPI or in the chart area.

Before starting the manoeuvre simulation the present values for heading, course and speed as well as the complete currently valid target scenario is taken as a start point ¹⁾.

The trial manoeuvre can be specified in an associated dialog by

- simulation of a course change, including the radius to be used by the ship during the manoeuvre,
- the period of time up until the beginning of the simulated manoeuvre (the **Delay**) and by
- simulation of a speed change at the instant of the manoeuvre.


The simulation itself is started when the **Time** bar at the bottom of the dialog is operated.



There are two vector modes available, the **Relative** and the **True** Trial Manoeuvre:

- The manoeuvre can be observed with relative or true vectors. As during normal operation, the vector mode is to be set in the **Vector & Trails** group. This setting will also have an effect on the trails and the past position plots before the manoeuvre function is started.
- In both of the vector modes, the manoeuvre radius that can be set and the acceleration ²⁾ for the set speed-changes are taken into account additionally to the planned course change.
- At any time before or during the simulation, you can change between **T** and **REL** manoeuvre vector mode, without changing other simulation parameters.

☞ The target tracking / plotting and the manual and automatic target acquisition are not interrupted during the execution of a manoeuvre, but no new sleeping AIS targets can be activated manually. This means also that the target list under **Tools > Targets > List** at all times displays the currently valid data of the target tracking process and **not** the trial manoeuvre data.

☞ Contrary to targets already being tracked by the ARPA, radar targets which are in the state of "under evaluation"  (i.e. being in "acquisition status") will not be taken into account for the trial manoeuvre.

☞ As long as the Trial Manoeuvre is active, the **Dangerous Targets** function (ARPA and AIS) is automatically **On**, independently of the settings under **Settings > Targets > Dangerous Targets** and **AUTO ACQ AIS Targets** respectively.

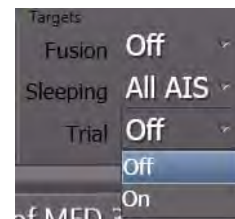
☞ It is recommended to use the trial manoeuvre function in relative vector mode in order to evaluate the change of the relative target data first. If the true vectors are used, it is recommended to select a speed sensor with water stabilisation (Set the stabilisation ,REF to **Water** in the **Vector & Trails** group).

¹⁾ Start values for own ship's heading, course and speed are taken from the values shown in the sensor displays on the permanent area. The course and speed data are depending on the selection of the CCRP.

²⁾ The min. and max. radius and the acceleration behaviour of the ship are entered at service level during setting-to-work.

Switching On the Trial Manoeuvre Dialog in REL Vector Mode

- Switch to **REL** in the **Vector & Trails** group on the permanent area.
- In the **Targets** group choose **On** for the **Trial** control.



In the Non-permanent area, the **Trial Manoeuvre** dialog window appears, with the following data:

- **Course:** The currently existing course (the course is changed when the ship is turning) ¹⁾
- **Speed:** The currently existing speed (the value is constant and taken as start speed) ¹⁾
- **Radius:** The radius with which the manoeuvre is to be simulated. If the dialog has not been used before, the minimum radius is displayed, otherwise it shows the last used radius.
- **Delay:** 0 minutes. Can be set for simulation of a delayed start of the manoeuvre.
- **Time:** 0 minutes. Must be set for simulation of the time instances during the manoeuvre.



The following changes occur in the PPI or chart area after activation of the trial manoeuvre function ²⁾:

- In the lower region of the application area a large **T** symbol is shown to draw the operator's attention to the fact that the trial manoeuvre display is switched on and that after starting the simulation by changing the time slider, consequently the symbols and vectors of the targets are no longer displayed in accordance with the real situation that actually exists at that time.
 - The vector display (of the targets) must be switched on during observation of the manoeuvre.
 - The vectors and the video trails (if any exist), are displayed **relative** and
 - the own ship is shown without vector but always with the correct present heading line.
 - Past position plots are **not** displayed during the trial manoeuvre, but (if **Plot** is in the switched on state) they are continuously built up in the back-ground and are visible again as soon as the trial manoeuvre is ended.
- ☞ Because the currently existing values were taken over, no manoeuvre has been simulated yet. As long as the Time bar remains at zero position the display content is still corresponding to the real situation.

Setting the Trial Manoeuvre in REL Vector Mode

In case the vector display during the trial manoeuvre is a relative display, a collision course can be recognised from the fact that the vector of a target is pointing towards the own ship symbol (constant bearing). A manoeuvre of your own ship must be simulated which avoids this constant bearing while at the same time fulfilling other conditions (e.g. keeping within the channel, avoiding shallow water and obstructions, avoiding other ships, etc.).

¹⁾ The resultant value used for the display of the own ship speed vector during simulation

²⁾ The radar video and the true or relative target trails are updated as normal and are not influenced by the manoeuvre simulation.

Depending on the used display range a suitable vector length should be set so that the results of the trial manoeuvre are clearly visible.

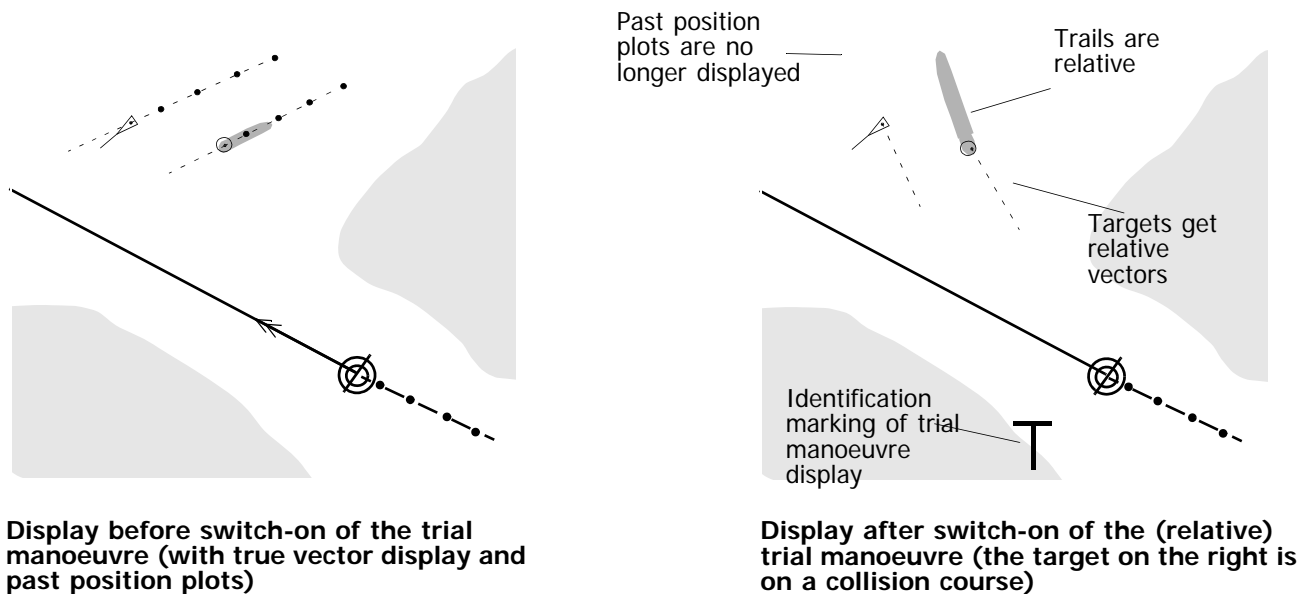


Fig. A / 16 Vector Display in Trial Manoeuvre Mode

- The general screen-stabilisation and the alignment of the heading line may remain unchanged, or can be set by the operator as required. With other words, the Trial Manoeuvre can be observed in True or Relative Motion and in Head Up, North Up or Course up orientation.

Simulating a Course Manoeuvre

Use the **Course** and **Radius** slider to set the desired amount of course change and the radius with which the manoeuvre is to be simulated.

- During adjustment, the simulated course change is displayed in form of a curved headline. A change of max. $\pm 180^\circ$ relative to your present course can be simulated. The heading and the present course is updated automatically if your ship is turning during the manoeuvre simulation.



After course and radius have been set, use the Time slider to simulate your ship sailing along the pre-planned course change. All displayed targets will move accordingly with their current speed and course and the change of their relative vectors will show the further development of the scenario step by step.

The time setting can be done continuously by moving the slider or (by clicking) stepwise in 10 sec increments up to 30 min complete duration.

- Because of the REL Vector Mode, the relative speed vectors are rotated and change their length by the simulated course-change. If one of the targets will change its status from dangerous to not dangerous and vice versa, this will be shown by a change of their symbol's colour.

Also during the trial manoeuvre the collision calculations ¹⁾ take place, which would indicate a dangerous target symbol in red colour as soon as the anti-collision limits are infringed.

Setting the Delay of the Simulated Manoeuvre

Use the **Delay** slider to set the time that is to pass before the simulated manoeuvre begins.

☞ The future situation at the point in time defined by the delay value is now displayed in form of a modified own ship track line ahead (along the present course direction) and the previously defined course change is shown at a distance ahead, calculated from the present speed and the delay time.

The manoeuvre simulation itself must be controlled as described above with a movement of the Time slider or clicking into the **Time** bar.

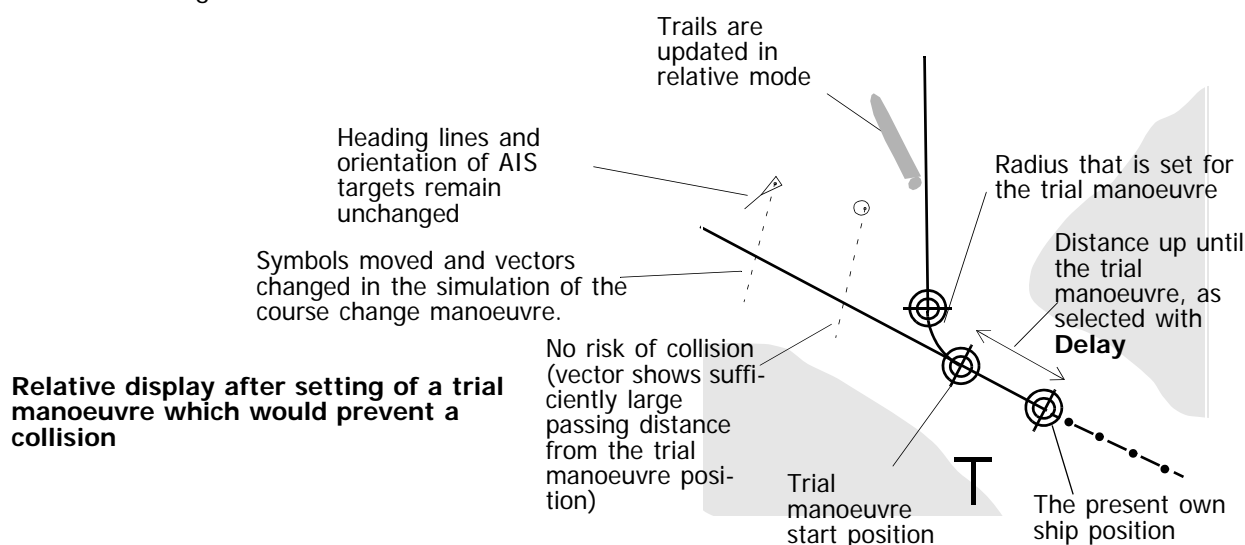


Fig. A / 17 Delay in Trial Manoeuvre

If no suitable manoeuvre can be found by means of these two settings, a speed change must be simulated:

Simulation of a Speed Change

Use the **Speed** slider to set the speed at which the ship is to travel from the beginning of the simulated manoeuvre onwards.

☞ Because of the REL Vector Mode, the simulated course-change causes a change in the directions and lengths of the target's speed vectors.

Rules for the Avoidance of Collision Courses:

1. There must be no speed vector of any of the targets pointing towards the own ship symbol of the trial manoeuvre.
2. All manoeuvres and parameter settings must take place in accordance with the collision avoidance rules and good seamanship.

¹⁾ The collision calculations of the trial manoeuvre simulation implement the same alarm limits for CPA and TCPA as set for the normal target tracking in the **Dangerous Targets** group of the **Settings > Targets** menu.

Checking the Trial Manoeuvre in True Vector Mode

In True Vector Mode, the trial manoeuvre is displayed with true vectors for the targets and own ship. Both the radius planned for the course change manoeuvre and the acceleration behaviour for the speed change that is set and the delay are taken into account. All settings made in REL vector Mode can still be changed in the True Vector Mode.

Switch-On of the True Vector Mode

The switch-over between True and REL Vector Mode is performed in the **Vector & Trails** group by clicking on the **REL** or **T** selection button.

- ☞ It is possible at any time to switch between the two vector modes without any loss of data or information. In both modes the same state of the manoeuvre is shown on the screen, if no other trial manoeuvre setting is changed.
- ☞ It is recommended to use the true trial manoeuvre together with a speed sensor giving speed through water. This can be selected as in normal operation mode of the system by selecting REF Water instead of REF Ground in the Vector & Trails group.
- ☞ Whenever it is not sure that the calculated data or the used sensor data are correct and stable, it is recommended to perform the Trial Manoeuvre in REL mode (see above).

As a result of the switch-over into True Vector Mode, the following changes occur:

- True vectors and true target trails are displayed. Past positions of targets remain invisible as long as the Trial Manoeuvre is running.
- Own ship and all targets are shown at their currently existing positions with their true vectors as long as the **Time** value is set to 0:00 min.
- The trial manoeuvre line is displayed. It represents the track on which the ship would perform the simulated manoeuvre. The **Radius** displayed in the manoeuvre dialog is taken into account for calculation of the course change.

The simulated manoeuvre-settings can now be changed in the same way as described above for the relative manoeuvre mode:

Use the **Course**, **Speed**, **Radius** or **Delay** slider to set the desired parameters with which the manoeuvre is to be simulated and move the **Time** slider to see the future development of the scenario.

Checking the Trial Manoeuvre

By means of **Time**, the instant of time that is to be considered can be set:

- Click on the **Time** bar slider and, with the trackball, vary the time instant that is to be displayed
- or -
- click before the slider to produce 10 sec time increments stepwise.

By continuous variation, a synchronised display of the simulated own ship positions and target positions takes place. If, for all time values, an adequate distance between own ship symbol and the target symbol is displayed, the trial manoeuvre will not show a dangerous approach.

Also during the true trial manoeuvre the collision calculations ¹⁾ take place, which would indicate a dangerous target symbol in red colour as soon as the anti-collision limits are infringed.

If necessary, any of the trial manoeuvre settings can now be changed and the check can be repeated.

¹⁾ The collision calculations of the trial manoeuvre simulation implement the same alarm limits for CPA and TCPA as set for the normal target tracking in the **Dangerous Targets** group of the **Settings > Targets** menu.

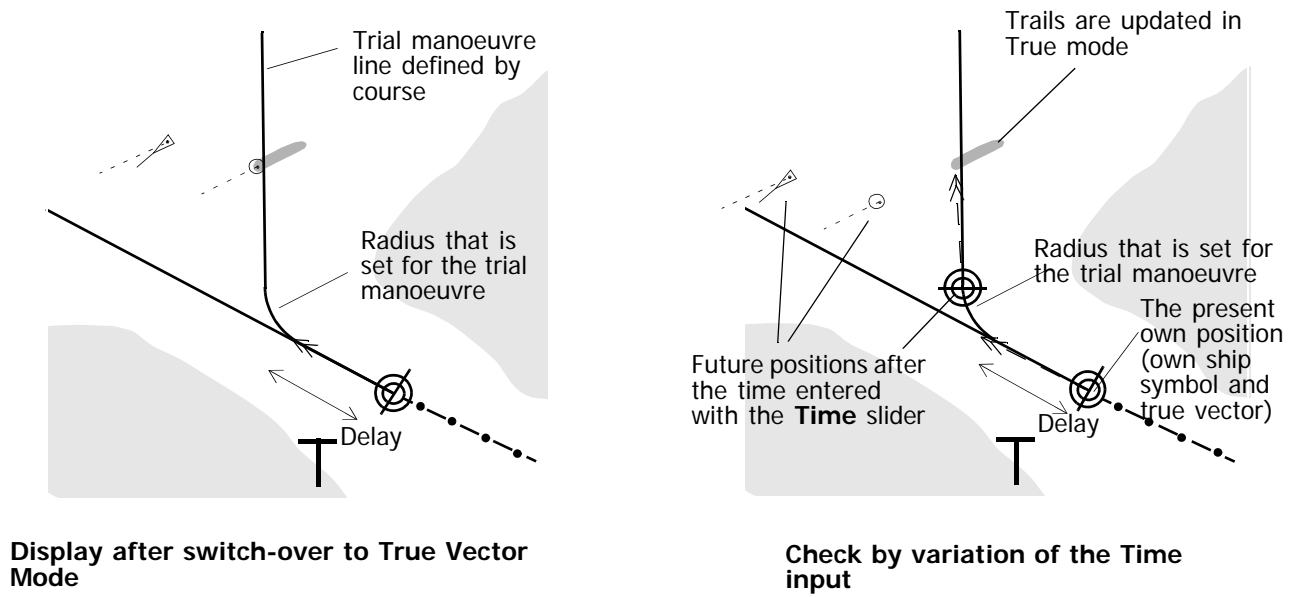


Fig. A / 18 Checking the Trial Manoeuvre

Switching Off the Trial Manoeuvre Display

Switching off is performed by pressing the **Close** icon of the **Trial Manoeuvre** dialog window.

The trial manoeuvre can also be switched off in the **Targets** group on the permanent area by selecting **Trial Off**.



7.13 Reference Target Tracking

If at least one fixed ARPA target ¹⁾ is selected as a reference target, the radar can determine the own ship's speed vector with the aid of this target's relative motion. By means of this "reference target tracking", the radar also acts as a speed sensor, and can be called up as such under **REF TGT Speed** in the COG/SOG sensor selection menu. It is recommended to use more than one target for own course and speed calculation in order to create as stable values as possible.

The resultant course and speed is calculated by averaging the relative speed data evaluated from all selected reference targets.

Selecting a reference target:

Click on the fixed ARPA target with the MORE key, and then click on **REF Target On/Off** (with the DO key) in the context menu.

The first reference target is given an **R1** as its target label. If there is more than one reference target defined, all reference targets are given an independent sequential number in addition to the letter **R** as prefix.

Cancelling the selection: Click on the reference target with the MORE key, and then click on **REF Target On/Off** (with the DO key) in the context menu.

- ☞ Up to five reference targets can be selected.
- ☞ The speed input "Reference Target Tracking" is treated as a ground stabilized speed sensor (speed over ground), displayed as COG/SOG data, but it is never used for calculation of relative course and speed of AIS targets (according to the IMO rules) ²⁾.
- ☞ The loss of a tracked reference target triggers the **Lost Target** alarm. See chapter 7.8 on page A-66.



If the last reference target is lost, a new speed sensor must be selected. See chapter 3.2.2 on page III-35.

If no new speed sensor is selected in time, the **Speed Invalid** alarm is triggered for the selection of another speed sensor by the operator.



CAUTION

During reference target tracking, it shall be checked repeatedly if the selected reference targets are still displayed as fixed targets. Loss of a tracked reference target may reduce the accuracy of the evaluated own speed and course, whereby the true data of other tracked targets may be deteriorated.

- 1) A fixed target is a tracked radar echo of a fixed object like a buoy, a light house, a landmark etc. In the true vector mode, it shows no or a very short vector. If a moving target is selected by mistake, the own speed determined will be incorrect. To ensure accurate determination of speed, several fixed targets should be selected as references. AIS targets **cannot** be selected as reference targets.
- 2) As long as **REF TGT Speed** is selected as COG/SOG input, the display of relative target data for AIS-targets is omitted.

7.14 ARPA Training

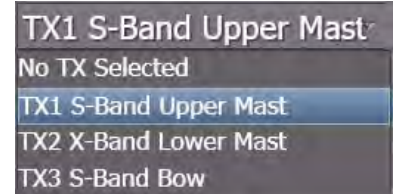
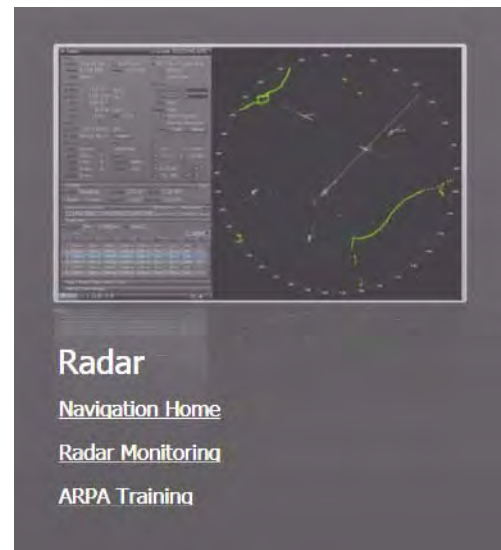


CAUTION

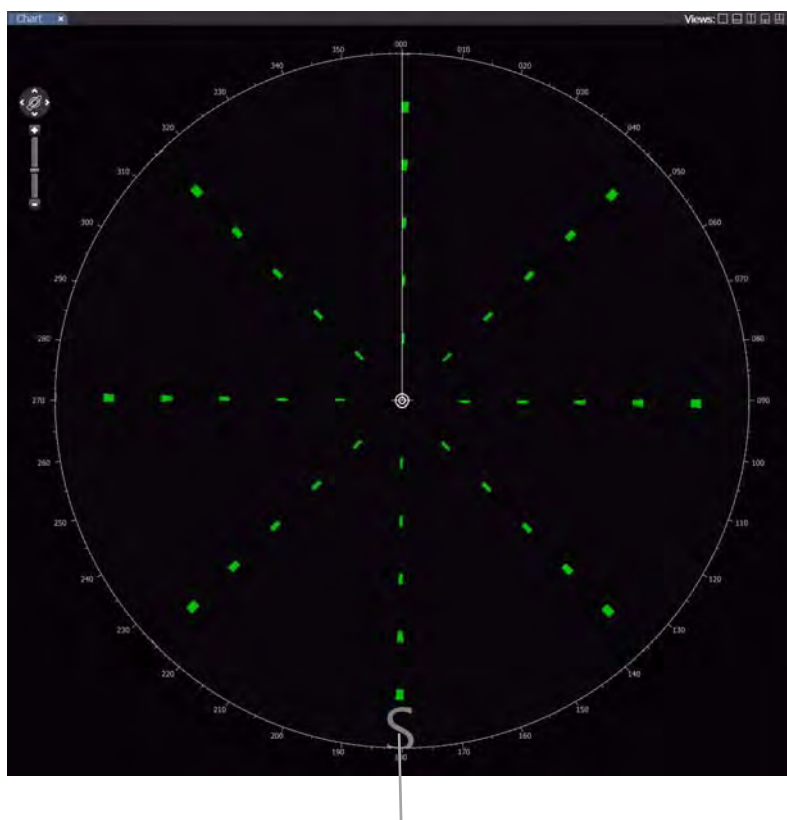
As long as the **ARPA Training** facility is in use, the radar picture will not show echoes received by the appropriate transceiver. All displayed echoes are artificial. For safety, make sure to keep an eye on another activated transceiver while using **ARPA Training**.

By means of the ARPA function test, the overall performance of the ARPA can be assessed. This should be done periodically.

The ARPA Training facility can be activated on the **Super Home** page. Beforehand, it must be ensured that a transmitter is chosen for use and at least in **Stand By** mode. See chapter 5.1.1 on page A-38 for details on the transceiver selection.



The radar picture turns into a spoke-pattern with artificial radar echoes:



The depiction indicates that this is a simulated picture.

Fig. A / 19 ARPA Training Display

- These echoes can be acquired manually for ARPA tracking.
- When the acquisition / guard zone is placed over one or more targets, automatic acquisition must take place, together with the associated symbols and alarms. The targets must be tracked automatically.
- All targets travel along with your own ship. Therefore, their true courses and true speeds must be the same as your own ship's course and speed.

It can be observed whether the tracking works correctly. Furthermore, the user can observe the target graphics and display of the ARPA data in the appropriate display windows and make himself familiar with this function.

To turn off the ARPA Training facility, navigate to the **Super Home** page again and click on **ARPA Training** again.


7.15 ARPA Malfunctions

There are a couple of possible reasons for which the ARPA cannot compute the target data correctly.

Possible alarm messages:

1. Heading sensor fault: **Heading Invalid** or **Heading Timeout**
2. **Magnetron Fault**
3. **No Headmarker**
4. **No Trigger**
5. **No Antenna Azimuth**
6. **No RADAR Video**

For further information regarding the alarms please [See chapter 2.2 on page V-11](#)

 In case that the compass system is faulty, the radar goes immediately into the Head-Up mode. All display objects and operating possibilities for which the heading information is required are no longer shown or are inactive. All ARPA and AIS targets are deleted from the screen at once. If the heading sensor failure is not corrected within 30 seconds, all tracking of targets is stopped. The additional reasons for the malfunction of the ARPA calculation are listed below.

7.16 AIS Malfunctions

There are a couple of possible reasons for which the RADAR or the AIS cannot compute or transmit the target data correctly:

- In case that the compass system is faulty, the RADAR goes immediately into the Head-Up mode and all AIS and ARPA targets are deleted at once on the PPI. The target list for the AIS targets remains available.
- If the UHF-Transceiver within the AIS electronics unit does not work correctly, no messages can be received and/or transmitted.
- In case that the internal GPS receiver within the AIS electronics unit does not work correctly, the position data of an external position sensor will be used for computation, if an external sensor is connected to the AIS electronics unit.

Anyway, appropriate alarm messages, warnings, or indications will be raised.

Possible alarm messages, warnings or indications ¹⁾:

1. TX Malfunction
2. Antenna VSWR exceeds Limit
3. Rx Channel n malfunction
4. General failure
5. MKD connection lost
6. External EPFS lost
7. No Sensor Position in use
8. No valid SOG Information
9. No valid COG Information
10. Heading lost/invalid
11. No valid ROT Information

For further information regarding these alarms please [See chapter 2.2.3 on page V-19](#)

[See chapter 1 on page F-3](#) for details on AIS in general.

¹⁾ The availability of the above mentioned AIS alarms depends on the maker and type of AIS electronics which is connected to the system.

8 User Symbols

8.1 Symbols

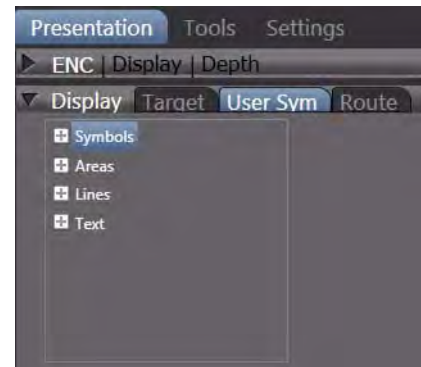
User symbols are individual user made chart objects which can be inserted into the chart database in order to supplement the official electronic charts.

The user made symbols of different kind are stored permanently in the common databases on all MFD with radar or ECDIS functionality. Deletion of selected symbols is the only method to remove User Symbols from the database.

The common database of the User Symbols can be stored on external memory devices like USB-Memory sticks. See [chapter 2.9 on page H-13](#) for details.

The User Symbols panel of the Display expander provides different object categories:

- Symbols (position fix, anchorage area, buoys and beacons, lights, landmarks, platforms, radio stations and wrecks etc)
- Areas (highlighted danger areas and feature areas)
- Lines (safety lines, feature lines and clearing lines)
- Events and Text (for free text information and cautions)



The following figure shows examples of user symbols:

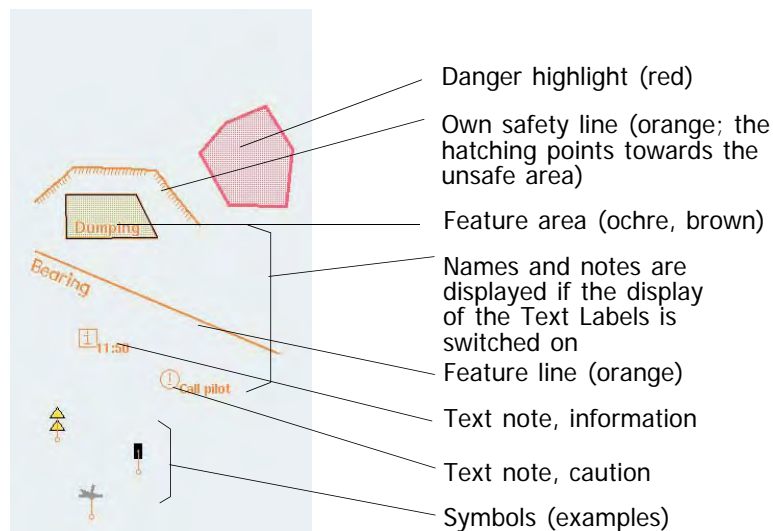


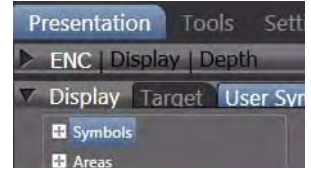
Fig. A / 20 User symbols on the electronic chart

Switching on and off the display of User Symbols: In Presentation > Display > User Sym, or by a **MORE** click into the PPI(Chart area under Layer > User Symbols)

Placing a symbol - graphic mode

With this method, the user symbol can be placed in the chart/PPI area by means of the trackball/mouse. The procedure is explained here by means of the user-symbol "beacon cardinal". It also works with all other user symbols.

Open the **User Symbols** part of the Display expander and click on the + in front of the desired category.



Symbols are so-called point objects which can have several different attributes.

A list of the symbols in the selected category will be shown.



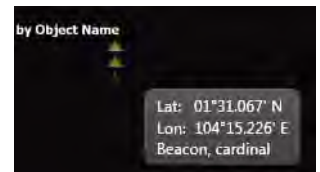
Use the vertical scrollbar to see the complete list.

Choose one symbol and select the appropriate checkbox if the symbol is to have a **Topmark** or an indication for a **Light**.

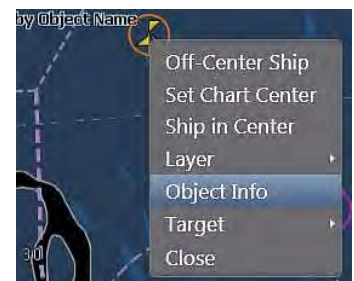
☞ Not every symbol can be set to have a topmark or a light.

A name for the object and additional information text can be entered in the text boxes.

Afterwards, click to highlight the desired symbol icon, move the pointer into the chart area and click again to drop the symbol at the desired position. The object will be shown with an object abbreviation in front of its name. In the example, **by** means buoy. If the pointer is moved upon the object, additional information is displayed.



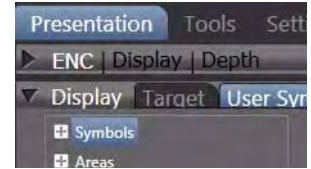
Clicking the object with **More** will display the context menu. Clicking on **Object Info** will open a new tab that displays detailed information about the object which has been created by the operator.



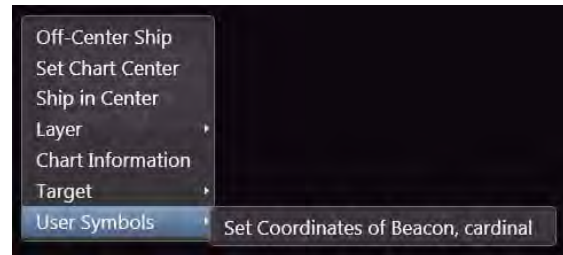
Placing a symbol - numeric mode

With this method, the user symbol can be placed in the PPI/chart area exactly at a desired position. The procedure is explained here by means of the user-symbol "beacon cardinal". It also works with all other user symbols

Open the **User Symbols** part of the Display expander and click on the + in front of the desired category.



After selection and dropping of an object in the PPI/chart area click **More** to open the context menu, in the context menu, click on **Set Coordinates** and enter the desired position in the pop-up window.



Click on **Set** to place the user symbol in the desired position.



Modification of the Location of existing Symbols - graphic mode

Each stored graphic element (a point symbol, a vertex of a line or area, a text note) has a geographic position which can easily be changed at any time.

- Move the cursor to the symbol or vertex until the Hand cursor is shown,
- click on it to select the point,
- click and hold the **Do** key on the selected point
- and move the cursor to the wanted position.
- Release the **Do** key to fix and store the new position.

Modification of the Location of existing Symbols - numeric mode

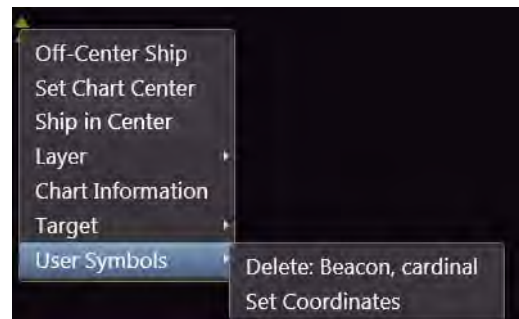
- Move the cursor to the symbol or vertex until the Hand cursor is shown,
- click on it to select the point,
- click on it with **More** to open the context menu,
- in the context menu, click on **Set Coordinates** and enter the desired position of the user symbol
- Click on **Set** to place the user symbol in the desired position.

Removing a symbol

In order to remove a **User Symbol** from the chart and even from the database, move the pointer above the symbol so that the pointer becomes a small hand, then click on the symbol so that it is marked with a small rectangle.



Then right-click the symbol in order to open the context-menu and choose **User Symbols** and **Delete <Symbol>** ¹⁾



¹⁾ <Symbol> is the designation of the symbol selected in the PPI/Chart Area

8.2 Areas

Editing of areas is following the same basic principles as shown above for Symbols (graphical point objects).

In the selection list under **Display, User Sym** open the list of available areas by a click on the (+) symbol.

Select if you want to create a **Danger highlight** or a **User's feature** by a click on the entry in the selection list.



Danger Highlight

A Danger Highlight is a red coloured filled area which can be monitored by the ECDIS' chart monitoring and the route monitoring functions.

Click on the **Danger highlight** icon first, and then click with **DO** in the PPI/Chart Area to set the first vertex of the area. The moving cursor is then followed by a connection line to the previously set graphical point of the area. In this way an area with 3 vertex points as a minimum can be set. There is no upper limitation for the number of points which can be created for one and the same area.

To **close the area** after the last vertex is set,

- click into the last connection line with **MORE** or
- set the last point directly on the first one

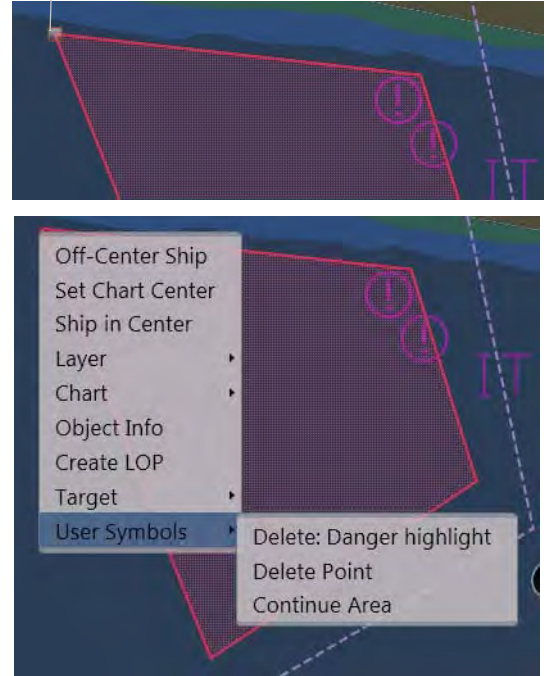
to end the edit mode and to complete (close) the created area.

Removing an area

is done by graphical selection on the screen by a click on one of the vertex points of an area. The handle shown at the vertex indicates selection of this area. A click with MORE on the handle or anywhere in the selected area shows the context menu where you must select Delete after a click on User Symbols. You have the option to delete one point only to change the shape (**Delete Point**) or to delete the complete area (**Delete: Danger Highlight**).

Modification of an area is also done via the context menu by selecting **Continue Area**. This creates a new point or a sequence of new points until the Modify mode is ended by a MORE click in the PPI/ Chart Area.

Handle



User's Feature

Editing of **Feature Areas** is following the same principles as shown above for Danger Highlights.

Several areas with different transparency (**No Fill / 25 / 50 / 75 %**) can be created and drawn on the electronic chart. In contrast to the Danger Highlight a Feature Area cannot be monitored by the ECDIS' chart monitoring and route monitoring functions.

I.e. a Feature Area is only a display option without connected alert function.

Removing and modification of existing Feature Areas is done in the same way as for Danger Highlights via the context menu (**Delete: User's Feature / Delete Point / Continue Area**).

8.3 Lines

Editing of **Lines** is following the same principles as shown above for Danger Highlight areas.

In the selection list under **Display, User Sym** open the list of available lines by a click on the (+) symbol.

Select if you want to create an **Own Safety Line**, a **User's Feature** line or a Clearing Line by a click on the entry in the selection list.

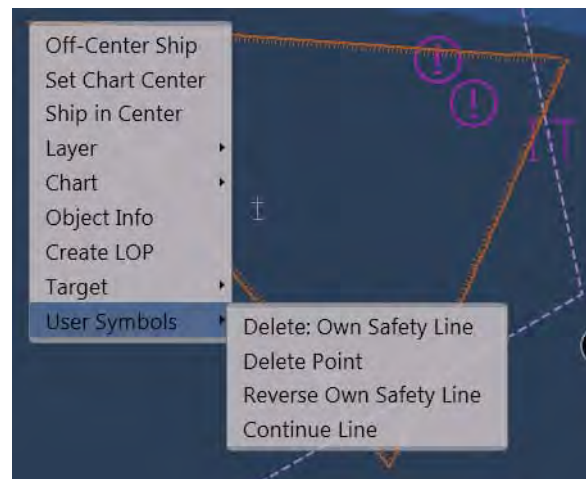


An **Own Safety Line** is a line with orange colour and with short hachure lines pointing to the dangerous side. It can be monitored by the ECDIS' chart monitoring and the route monitoring functions. You can create several safety lines at different locations each having a variable number of vertex points, but a defined start and a defined end.

Click on the Own Safety Line icon first, and then click with DO in the PPI/Chart Area to set the first vertex of the line. The moving cursor is then followed by a connection line to the previously set graphical point of the line. In this way a line with 2 vertex points as a minimum can be set. There is no limitation for the number of points which can be created.

To **end the line** after the last vertex is set, click into the last connection line with MORE to end the edit mode and to complete the created line.

The orientation of the own Safety Line (the dangerous / not dangerous side) can be changed by a click on **Reverse Own Safety Line**



User's Feature Line

Several line styles with 4 different patterns (solid / dashed / dotted / dashed-dotted) and 1 or 2 pixels line width can be created and drawn on the electronic chart. In contrast to the Own Safety Line the User's Feature Line cannot be monitored by the ECDIS' chart monitoring and route monitoring functions.

Removing and modification of existing Safety and Feature Lines is done in the same way as shown above for Areas via selection of the line on the screen and subsequent operation via the context menu by a MORE click on the selected line. You can choose to delete one single point or the complete line.



Clearing Line

Clearing lines (also called "Danger Bearing") shall indicate a limitation of the course to be steered in certain sea areas. For this purpose a

- NMT **Not More Than**
- and a
- NLT **Not Less Than**

line can be set. Select NMT or NLT and set the line as required. The course value not to be exceeded is calculated automatically and is indicated together with the line and a direction arrow. The clearing lines can only have two points (start and end point). To delete the line again, click on the start or end point and then with **MORE > User Symbols > Delete: Clearing Line** the deletion can be executed.

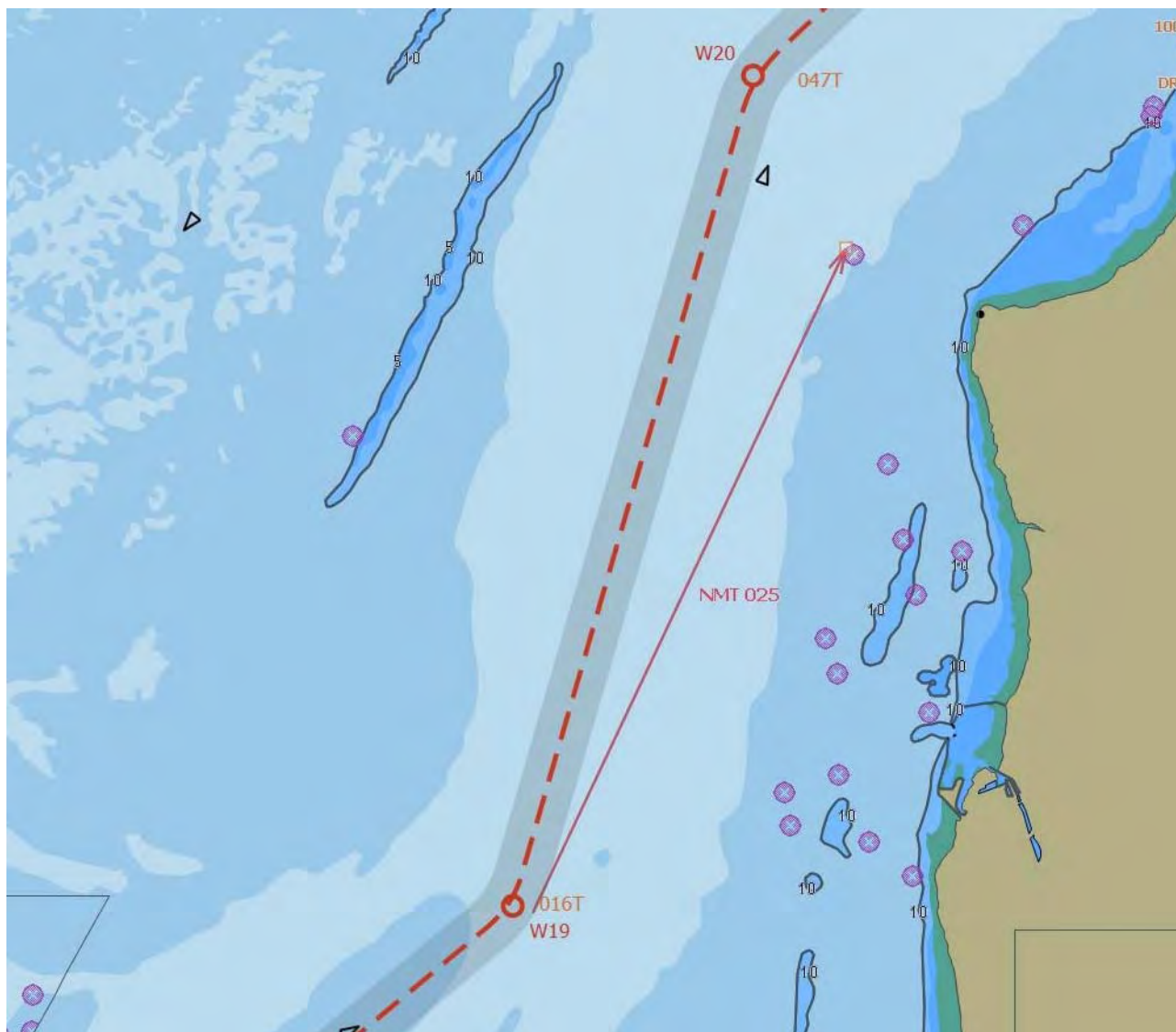





Fig. A / 21 Planned track with Clearing Line (Not More Than 025°)

8.4 Events and Text

Editing of Events and Text Notes is another feature of the user object editor. You can drop Events which have the  symbol and add text to it. Additionally you can drop either a text object as Information  or as Caution . The procedure is identical for both objects.

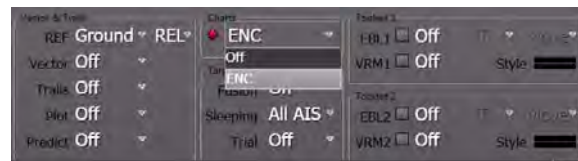
The description for setting, modification and deletion is equivalent to the operation of point symbols, i.e. you must select the relevant entry under **User Sym**, **Events** and **Text**, click on the respective icon, add a text and then click into the PPI/chart area where the text note or the event marker shall be located.

After selection and marking by the orange handle you can move the event marker or text note to another location or delete it from the screen and from the storage device.

9 CHARTRADAR (optional)

9.1 Overview

The RADARPILOT Platinum can be upgraded with the CHARTRADAR option. If this option is installed, the drop-down menu in the Charts group of the permanent area is selectable.



Select **ENC** in order to switch on the ECDIS chart in the background of the radar PPI. Select **Off** if you want to switch off the chart presentation permanently.

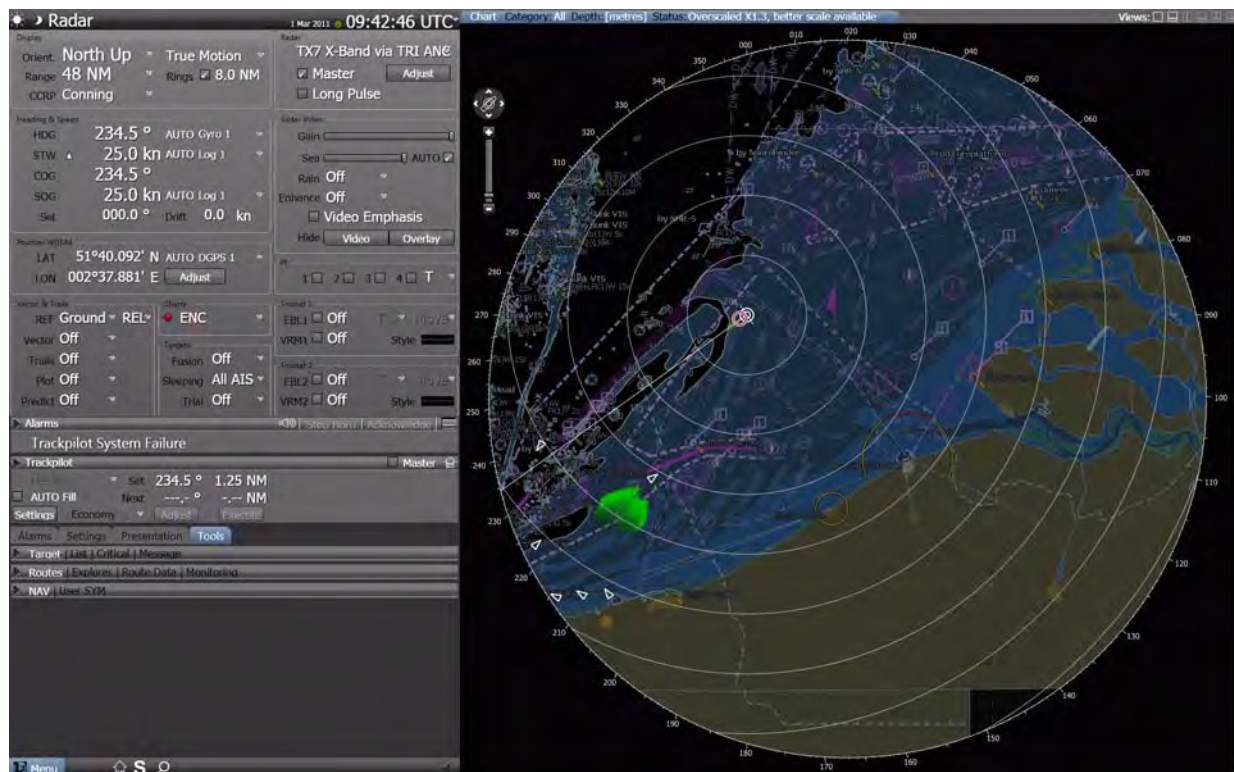


Fig. A / 22 Overview of the CHARTRADAR screen

The above screenshot shows a typical scenario with the own vessel sailing through the English Channel, course 235 deg at 25 kn. The operating of all the radar functions in the permanent area remains as it used to be in RADAR Mode. Also the tabs in the non-permanent area remain as they used to be.

Under the tab **Presentation** the new tab **ENC** is displayed and can be opened with the **Display** menu for setting of the chart objects (see chapter A - 9.3 on page A-97) and the **Depth** menu for setting of the depth safety lines in the chart (see chapter A - 9.4 on page A-102). Under the tab **Alarms** the new menu **ECDIS Alerts** is displayed and can be opened for activating i.e. safety contour alarm etc. (see chapter A - 9.8 on page A-107).

If the CHARTRADAR option is installed, the SOLAS category of the radar system is extended with the suffix C as follows:

With 22" TFT monitor: CAT 2 C

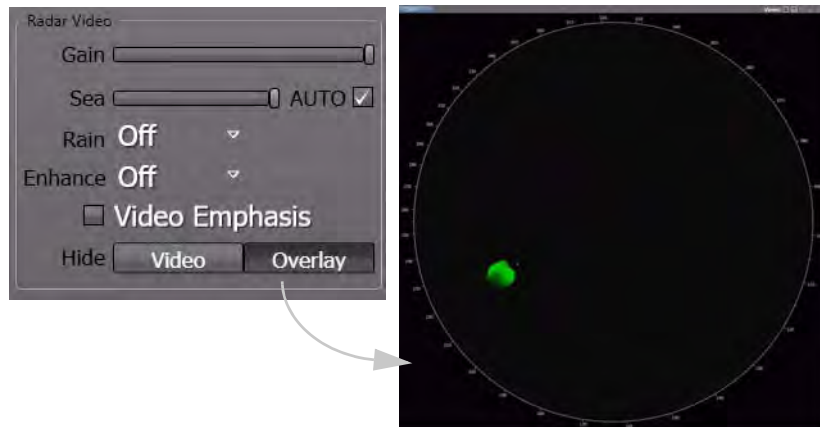
With 26" TFT monitor: CAT 1 C

9.2 Basic Adjustments

9.2.1 Temporary Hiding the Chart Background

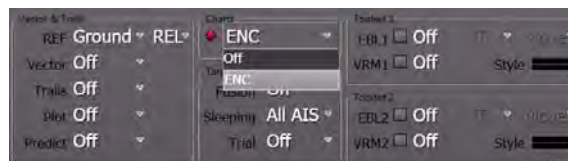
If ENC is set and the chart presentation shall be hidden just for a few seconds in order to identify details of the radar image, just press **Hide Overlay** in the **RADAR Video** group.

The result is an empty screen except for the radar video.



9.2.2 Selection of Charts

The drop-down menu in the **Charts** group of the permanent area provides access to the different charts that are installed on your CHARTRADAR system. Only vector charts are permitted for a char-tradar and only these are selectable. Raster charts (RNC) can not be used.



9.2.3 Matching the Chart with the RADAR Presentation

If the chart underlay is not matching the radar PPI, the user may adjust the position data of the position fixing device. This function is available from the permanent area in the **Position WGS84** group. For details please see [chapter III - 3.2.3 on page III-42](#).

9.2.4 References Used

The CHARTRADAR uses the same reference system for own ship's position, speed, heading, time, etc. as the RADARPILOT. The common reference point is called **Consistent Common Reference Point (CCRP)**. It can be selected from the drop down menu **CCRP** in the **Display** group of the permanent area (select **Conning** which is the default, or radar, or tracking). For details please see [chapter III - 2.1 on page III-16](#) ff and [chapter III - 3.1.4 on page III-28](#).

For Route Monitoring against ECDIS objects and user objects the CHARTRADAR uses the track control reference point which is typically at the bow of the vessel. This point is also called the system position. The guard sector (also called look-ahead sector) starts from there. For details please see [chapter III - 2.1 on page III-16](#).

9.2.5 Range Scale and Modes

The CHARTRADAR provides the same range scale as the RADAR from 250 m to 96 nm. The larger scales of an ECDIS with up to 800 nm are not available.

It provides also the same orientation as the RADAR with North Up, Head Up, and Course Up.

Further-on it provides also the same screen stabilisation as the RADAR with True and REL Motion. The Browse mode which can be found in ECDIS for planning tasks is not available.

9.3 Selecting the Objects to be Displayed in the Vector Chart

9.3.1 Overview

Symbols, areas, lines and labellings (collectively called objects in the following) are individually stored electronically in a separate data base and are displayed in the vector chart. **Object classes** (complete sets of similar objects) are grouped into **display groups**; for example, the object class **Restricted Areas** together with the object class **Military Practice Areas** and other similar object classes form the display group **Cautionary Areas**. An appropriate and, at the same time, uncluttered display can be achieved by selecting only those display groups which are required for the actual nautical task. Furthermore, for a number of objects (e.g. buoys), there is a choice between two symbol presentations. Irrespective of this, the number of text labels displayed can be influenced.

9.3.2 Categories of Display Groups

IMO has defined three categories for the selection of display groups that are to be shown:

- **Display Base:** Consists of the display groups which, as a minimum requirement, definitely have to be displayed. They can not be influenced by the user and they are shown all the time. They are normally not sufficient for safe navigation (only coast lines and obstacles).
- **Display Standard:** Contains the display groups which are normally necessary for voyage planning and voyage monitoring (all standard display groups as shown below)
- **Display All:** Contains above two categories and all other display groups which are available in the electronic chart

For the CHARTRADAR one further category is defined in the IEC 62388 test standard:

- **Display Primary:** The **Primary Chart Information Set** covers the display base plus fixed and floating aids to navigation (buoys and beacons, details on following page).

SAM Electronics finally has added a category named **Customized**. In this category, all settings can be made individually. See [chapter A - 9.3.4 on page A-98](#) for details.

The allocation of display groups into the three categories is basically described in IMO Res. MSC.232 (82) which has replaced the older recommendation A.817 (19) in the year 2008. Following this paper the **Base** category in Platinum contains display groups as follows:

- coastlines (high water)
- own ship's safety contour
- isolated underwater dangers of depths less than safety contour
- isolated dangers within safe water (i.e. overhead wires)

Further-on scale, range and north arrow, units of depth and height, and display mode are shown all the time.

The allocation for **Standard** and **All** in above resolution does not reflect the real existing object classes in the S-52 standard. So for the final definition of these groups the S-52 group names have been used. The selection list is shown in the screenshot on the right.



9.3.3 Select a Category

For the selection of one of the display categories open the tab:

Presentation->ENC->Display

and select the required category:

Base, Primary, Standard, All, or Customized.

If the latter is selected, the **Adjust** button is available and can be used to open the **Adjust Category Custom** menu as shown in the right hand screenshot. Now the display groups can be adjusted individually.



9.3.4 Select the Primary Chart Information Set (PCIS)

The PCIS includes coastlines, own ship's safety contour, and dangers to navigation as listed in IMO Res. MSC.232(82) for the Base category plus fixed and floating aids to navigation (buoys and beacons). For the display of this **PCIS** just select the **Primary** category.



WARNING

When vector charts are being used, it must be ensured at regular intervals (e.g. after a change of watch) that all of the necessary display groups are being displayed. Not even the Display Standard setting guarantees the completeness of the display.

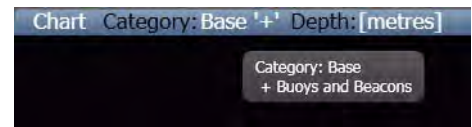
9.3.5 Indication of Category in the Status Line

The selected category (Base, Standard, All, Customized) is indicated in the top status line of the application area.

A plus sign ('+') after the category is shown, if additional groups have been selected.

A minus sign ('-') after the category is shown, if additional groups have been deselected.

Moving the cursor on top of the Category field opens a small information window with details about the selected or deselected groups.



9.3.6 Defining the Symbol Presentation

For symbols and areas, it is possible to define whether they should be displayed in the same way as on the paper charts or whether a simplified set of symbols optimised for display on the screen should be used. These settings are made in the menu **Presentation > ENC > Display**.



9.3.7 Setting the Display of Text Labels

The number of text labels displayed can be specified by means of the **Text** dropdown menu:

- **None:** No text
- **Few:** Only the most important text labels are displayed.
- **Normal:** The text labels that are normally adequate for navigation appear.
- **All:** All text labels contained in the chart appear.

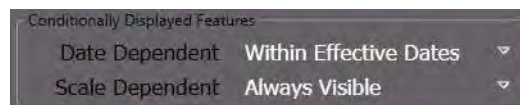
9.3.8 Switch on Additional Information

Check corresponding controls or select the appropriate dropdown-menus if required:

- **Light Descriptions:** Light descriptions are displayed
- **Extra Info Symbol:** Objects for which additional text information exists are marked.
- **Full length light sectors:** Light sectors are displayed true to scale
- **Indicate Data Quality:** Quality of chart data is indicated
- **Highlight Updates:** No, the last or all updates are highlighted, depending on the choice

9.3.9 Switch on Conditionally Displayed Features

The conditions for **Conditionally Displayed Features** can be set depending on different aspects:



- **Date dependent:** For objects which are not present continuously, e.g. buoys which are deployed seasonally, it is possible to define whether the display is to take place only at the time entered for it in the electronic chart. Select the corresponding entry if needed.
 - **Within Effective Dates:** Objects are displayed only during the time periods entered in the electronic chart.
 - **Always Visible:** Objects are displayed independently of the time periods entered.
- **Scale dependent:** For objects which are not present in all scales, it is possible to define in which of the scales they are to be displayed. Select the corresponding entry if needed.
 - **Within Effective Scale:** Objects are displayed only in the scale for which they have been defined.
 - **Always Visible:** Objects are displayed independently of the effective scale.

9.4 CHARTRADAR Application Area

The screenshot below shows the CHARTRADAR in Head-up mode.

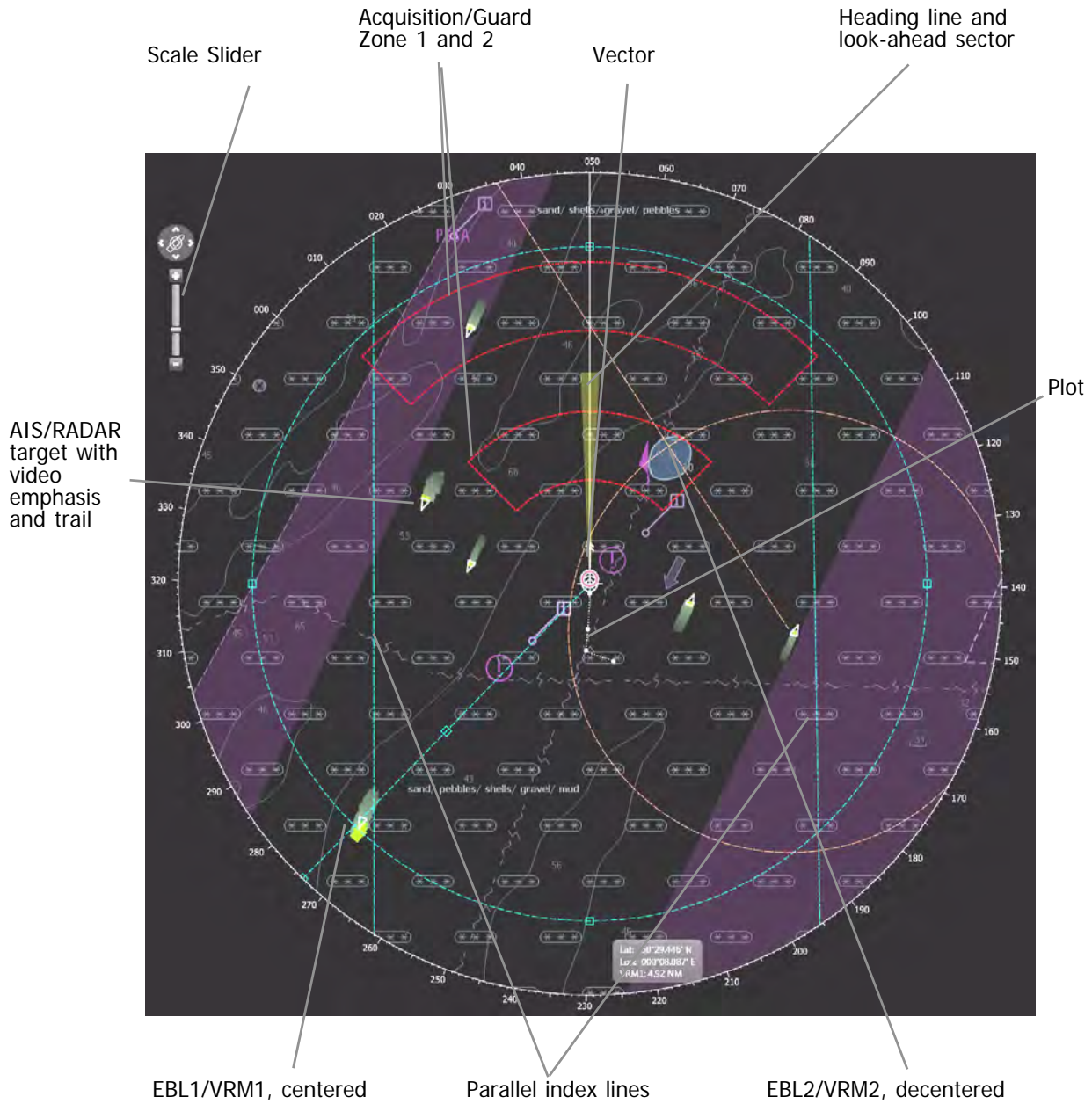


Fig. A / 23 CHARTRADAR Application Area with superimposed elements

9.5 Application Area Context Menu

A click with the More key in the application area opens the appropriate context menu.

In difference to the context menu in RADAR, additional entries are present and active.

- **Set Chart Center.** Right-Click a position in the PPI, in the opened context-menu click Set Chart Center. The center of the display will then be moved to the position that had been right-clicked before.
Exception: If the own-ship's position would be moved out of the PPI or even too far to the circular rim of the PPI, the center is only moved as far as possible. [See chapter A - 4.1 on page A-34](#) for details.
- Select **Layer** to set the brightness and visibility of the various layers forming the complete display (see screenshot beside). For the CHAR-TRADAR especially the brightness of the Chart information is important and can be set.
- **Chart Information.** In this window, information about different criteria of the chart database and the chart cells can be displayed. [See chapter III - 2.3 on page III-21](#) for details.



9.6 Setting the Depths Lines to be Displayed in the Vector Chart

In the display of the vector charts, it is possible to use colour to clearly distinguish the navigable areas from the non-navigable ones, depending on the draught of the ship. Navigable areas are displayed in black or darkgrey, non-navigable areas darkblue or blue. The boundary between navigable and non-navigable areas is the Safety Contour.

The Safety Contour is particularly important because it is also a basis for the ECDIS Monitoring and for the checking of the pre-planned route.

It is also possible to distinguish between two areas with different depth ranges, inside the navigable area as well as inside the non-navigable area :

- Within the navigable area, the **Deep Contour** differentiates between the adequately deep areas displayed in darkgrey and the deeper areas displayed in black.
- Within the non-navigable area, the **Shallow Contour** differentiates between the areas displayed in darkblue which are adjacent to the navigable area, and the even shallower areas displayed in blue.

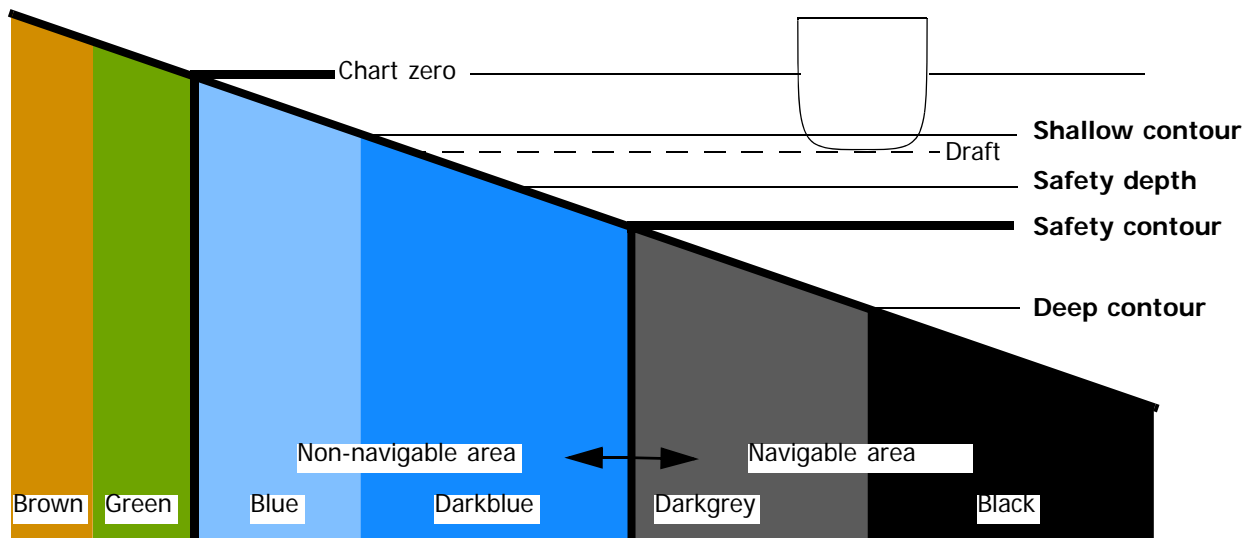


Fig. A / 24 Diagram of the depth contour system

Spot soundings from individual measurements are displayed more prominently if they project beyond a particular depth. This depth is set as the Safety Depth. This situation is shown graphically in the figure above.



CAUTION

Wrong or inadequate setting of especially the Safety-Depth and/or Safety Contour can give a wrong impression of navigable/non-navigable areas displayed on your chart. Both values shall be selected with sufficient safety depending on the draft of your ship.

The respective colour settings for the **Shallow** and **Deep Contour** as well as the **Safety Depth** and the **Safety Contour** are adjusted on the **Depth panel** of the **ENC** expander:

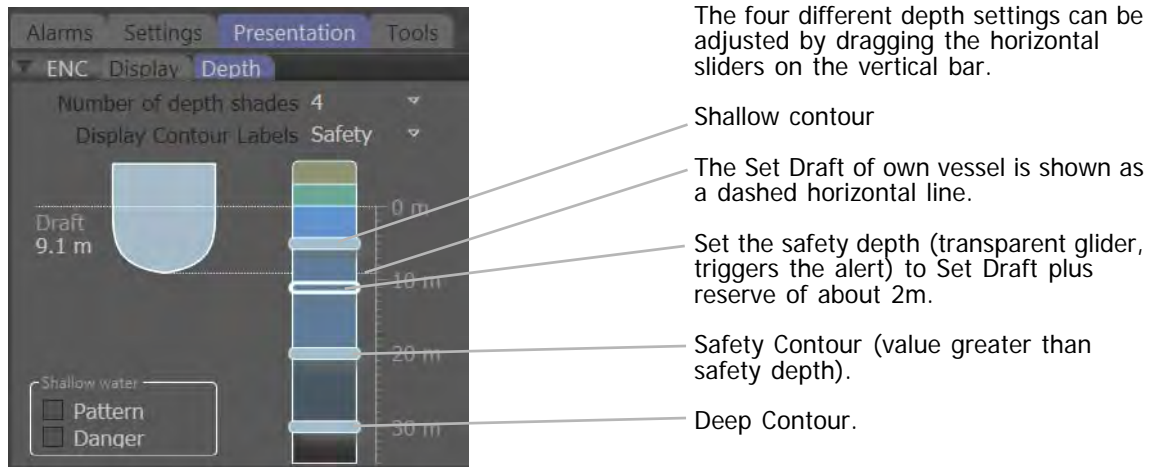


Fig. A / 25 The Depth Panel

On the electronic chart the colours indicate the depth as adjusted in the dialogue, from brown (land) to blue (shallow), grey (navigable) and black (deep).

Note:

The colours defined in this chapter are based on the ECDIS colour schemes "Dusk" and "Night" so that the radar video and the target graphics are not obscured. After a restart of the system all depth contour values are set in the same way they have been set before.

Shallow Water settings

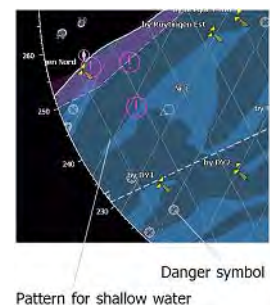
Non-navigable areas of vector charts can be marked by means of a pattern, particular dangers within non-navigable areas can be accentuated.

Pattern

Non-navigable areas (shallow water) can be displayed crisscrossed if this option is checked.

Danger

The display of the isolated danger symbols which are situated in shallow water can be switched on and off here. Those symbols are only displayed if the display category is set to Standard at least.



9.7 Setting the Own Ship's Draft

Open the own ship's draft menu in the tab:

-> **Settings** -> **Draft** and set **Fore** and **Aft** draft of your vessel. The larger of the two values will be displayed in the menu for setting the depth lines.

The set own ship's draft will only limit the adjustment of the safety contour in the depth line menu to the lower side. The safety contour slider can only be set to larger values. The ENC depth monitoring alarm is not affected by the own ship's depth, it is only affected by the set safety contour.

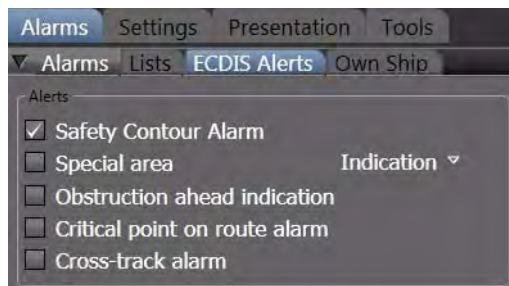


9.8 Activating the Chart Monitoring

Open the **ECDIS Alerts** menu in the tab:

-> **Alarms** -> **ECDIS Alerts**

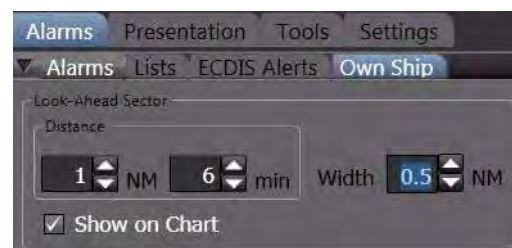
and check the required controls. At least the safety contour alarm should be set if an alarm shall be raised as soon as the vessel is sailing into shallow water. Further alarms or warnings can be set for approaching special areas, obstructions, wrecks, rocks etc. For details see [chapter C - 2.2 on page C-38](#).



9.9 Setting the Look-Ahead Sector

If one or more ECDIS alerts are set as described before, the chart monitoring is performed with the own ship's contour as a guard sector. This guard sector is extended by a look-ahead sector thus achieving an appropriate pre-warning time.

Open the **Own Ship** tab in the **Alarms** expander and set the **Distance** in terms of nautical miles (NM) as well as time (min) of the look-ahead sector (the first condition which applies, travel distance or time to dangerous object, will activate the alert). These two parameters for the distance (NM and min) will cover the speed of own ship as well as the following example shows:



Own ship is sailing 15 kn per hour.

The time is set to 6 min as shown in the screenshot above.

The alarm would be activated at a distance of $6 \text{ min} / 60 \text{ min} * 15 \text{ kn} = 1.5 \text{ NM}$

So this speed dependent alarm would already be raised at a distance of 1.5 NM and not at 1 NM as set as a minimum.

Define the **Width** of the look-ahead sector as well. Check the **Show on Chart** control if the look-ahead sector shall be visible in front of the own ship symbol or contour. The minimum settings are 0.5 NM, 1 min, and 10 m width meaning that the look-ahead sector is active at any time with a minimum size. Suppressing of alerts is only possible from the above ECDIS Alerts menu.

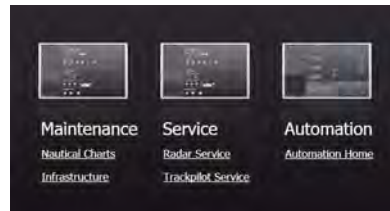
Once set, the appropriate ECDIS Alerts are raised every time the look-ahead sector touches a safety contour or obstacle. This chart monitoring process is independent whether the look-ahead sector is visible or not and even independent whether the chart visualization is switched on or not.

But of course the optional CHARTRADAR function with the corresponding ENC charts for the actual passage is required. For more details about the look-ahead sector see [chapter C - 2.2 on page C-38](#).

9.10 Chart Maintenance

For the maintenance of charts the separate application **Chart Maintenance** is accessible from the **Super Home** page.

First leave the CHARTRADAR or RADAR application by selecting the Super Home page. From here open the **Maintenance -> Nautical Charts** application. Follow the instructions given in the chapter H-Data Maintenance of the Electronic Charts.



Each new chart or update of an existing chart is completely checked during the loading process for corrupted data. If the data structure is not matching, the process is stopped, if single data for a cell are out of value range, a message is given and the operator can decide how to proceed. Finally the chart data are stored in an internal machine code on the CHARTRADAR. As this code has been thoroughly checked during loading, it can not cause any interruption or breakdown during the use of the CHARTRADAR.

☞ As long as the loading process with new chart data is running the system must not be used for navigation purposes.

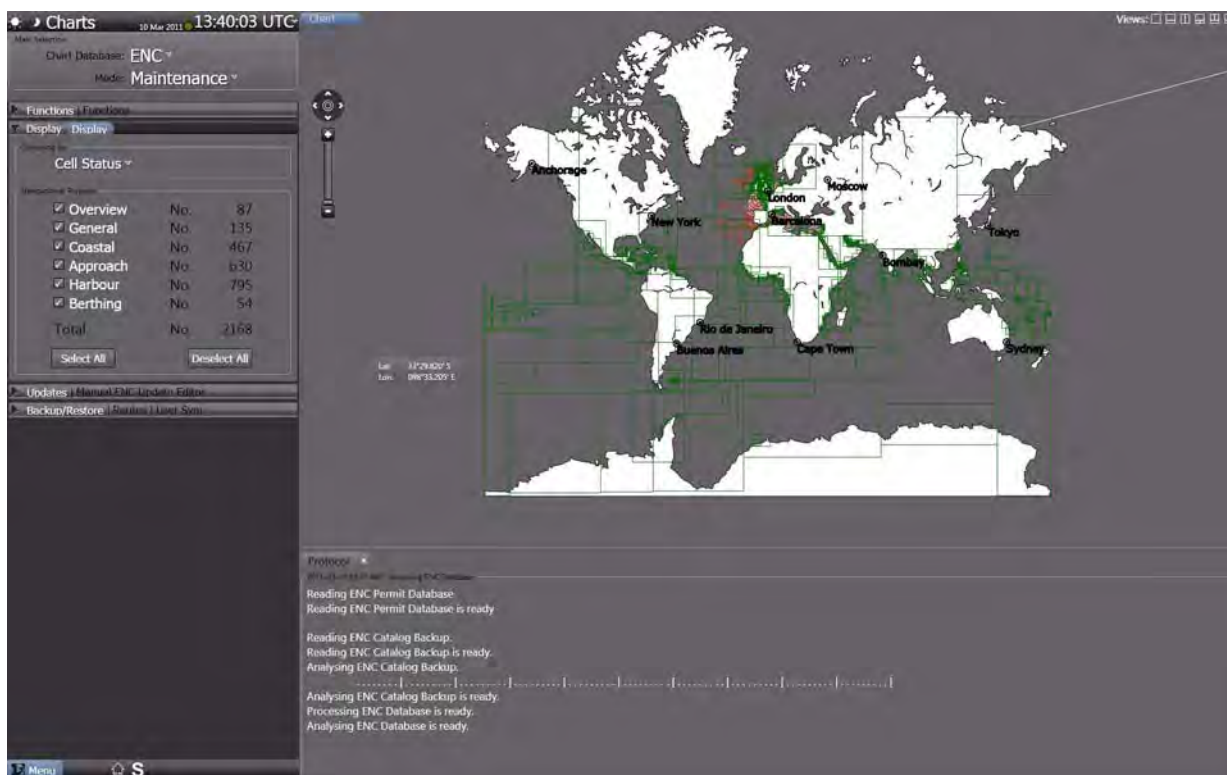


Fig. A / 26 Overview of the Chart Maintenance Screen

9.11 Main Differences between CHARTRADAR and Full ECDISPILOT

The ECDIS application, which is used for the CHARTRADAR is a subset of the software package used for the full ECDIS. The main differences can be summarized as follows:

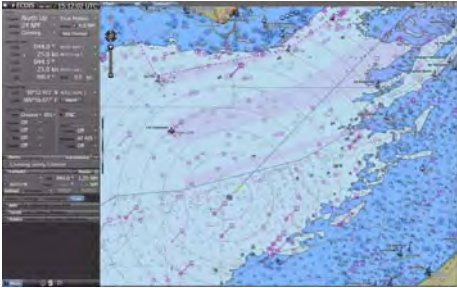
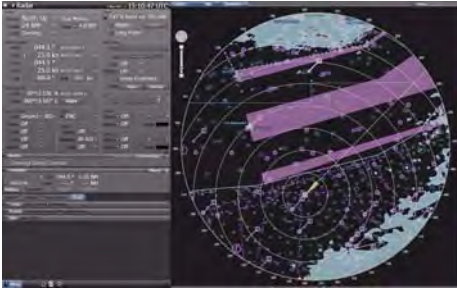



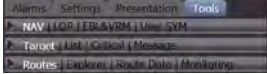
Function	ECDISPILOT	CHARTRADAR
Overview (the two screenshots show exactly the same position of own vessel and the same brightness settings)		
	The chart is presented in a full rectangle	The chart is presented in the radar PPI
Planning	With the Browse function any position in the worldwide chart can be shown in the centre	No Browse function selectable, the own ship remains always visible within the PPI, no planning
Presentation of radar video and chart	The ECDIS colour set according to IHO S-52 presentation library appendix 2 is used with colour sets for day, dusk, and night. The radar video is in the background and superseded by any ECDIS symbols	The radar video is always in the foreground, the ECDIS is presented as an underlay providing a dark background for radar video (colours are closely aligned to ECDIS dusk and night colour tables)
Presentation of no-chart data areas	An area with no-chart data of any kind is marked with the "no data" symbology defined in the IHO S-52 presentation library appendix 2/3.2.3(14) 	According to IEC 62388 Ch. 11.1.8.2 the no-data area is shown as the radar background, here in black 
Operating of radar	No operating of radar TX functions possible, corresponding side bar in permanent area is suppressed	Operating of radar TX functions possible, corresponding side bar is available 
Operating of navigation tools	LOP, EBL, &VRM and PI lines are available from ->Tools ->NAV tab 	EBL, VRM and PI lines are available from the radar function side bar in the permanent area, LOPs are not available
Display object groups	Can be displayed per category: Base, Standard, All and Customized. The last one provides individual selection of groups.	Same as ECDIS plus Primary category; Select Primary to set the Primary Chart Info Set (IEC 62388)
Display ECDIS Symbol Library Chart1	ECDIS Chart1 is a tab that can be opened in the application area, shows a legend of symbols used	No comparable function available, the symbol legend would cover the radar presentation, not permitted

Table A / 14 Differences between CHARTRADAR and ECDISPILOT

VOYAGE PLANNING AND MONITORING

1 Voyage Planning

Voyage planning and voyage monitoring (see chapter 2 on page C-35) are common functions for the integrated system.

The part of the (long-term and medium-term) voyage planning that can be performed on the system consists of

- generating and, if necessary, modifying the pre-planned route. See chapter 2 on page C-35
- procuring and updating the electronic chart for the voyage area. See chapter 1 on page H-3 for details.
- if necessary, generating User Symbols, i.e. additional user made symbols, lines and areas to be displayed on the chart area and to be used for monitoring purposes.
- performing the check and verification of the planned route against the electronic chart and/or against the user made chart objects.
- and -optionally- establishing a speed and time schedule by input of speed limitations, the time of departure and time of arrival, or by setting the of a planned speed for the entire route.

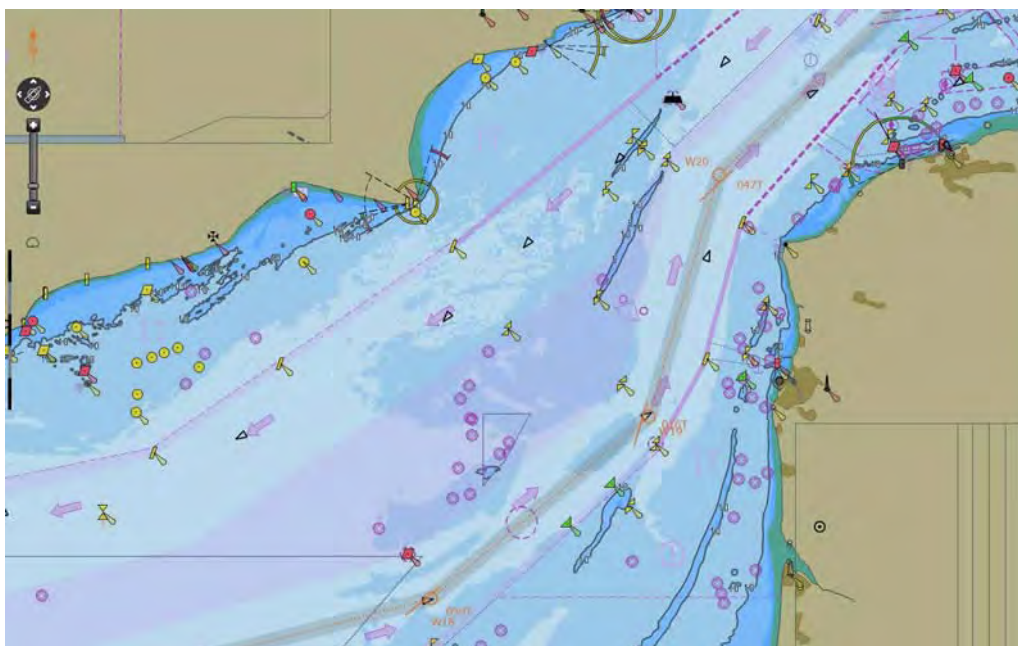


Fig. C / 1 Planned Route

Any route established during voyage planning can be activated as **System Route** for use on all MFDs configured for navigation. During voyage execution the route can be monitored automatically and can be used for automatic steering if a track control system (TRACKPILOT) is part of the system configuration.

1.1 Generation of Routes

The work on the pre-planned tracks by the so called **Route Editor** can be performed on any Multi Function Display in RADAR or in ECDIS mode, whichever is selected. These items of equipment will exchange the entered data with one another, so that (for example) a route that is generated on the ECDISPILOT can also be altered on any RADARPILOT. The same is valid for the RADAR and ECDIS modes on a MFD.

- ☞ It is generally recommended to perform route editing on the ECDISPILOT or in ECDIS mode, where the established route is displayed on the electronic chart. In many installations the workstation for planning is equipped with an alphanumeric keyboard which supports easy input of the numerous numeric and textual data required for route editing.

1.1.1 General Information about Pre-planned Tracks

Pre-planned tracks ¹⁾ are routes which are generated on the basis of waypoint sequences for a planned voyage and which are stored ²⁾ in the form of files sorted in folders containing route catalogs.

Routes can be used by the components of the system as follows:

- Routes can be displayed in the chart area on the ECDISPILOT and in ECDIS mode on a MULTIPLOT. In the planning mode the screen can be centered on any part of the route (Browse Mode)
- On any RADARPILOT and in RADAR mode on a MULTIPLOT, one or more routes can be selected and overlaid to the radar picture. The presently visible part of the pre-planned track is then displayed automatically on the PPI area.
- One of the displayed routes can be defined as the **System Route**, which is then effective for the entire system. With the aid of the TRACKPILOT, the ship can be piloted automatically along the pre-planned track contained in the route dataset. But even during manual control of course and speed, the diverse displays at the system components that refer to the System Route can be most helpful.
- If the **Planned Track Speed** is input at the beginning of the voyage, the system calculates a time schedule based on the speed settings contained in the planned route. Its purpose is to calculate the resulting estimated time of arrival. The estimated time elapsed (**ETE**) will also be displayed together with the planned speed value.
- If the **planned time of arrival (ETA)** is input at the beginning of the voyage, the system continuously performs a speed calculation while the ship is sailing along the route; this calculation is based on the **Departure and Arrival Time** set for the planned route, and its purpose is to achieve the required time of arrival at the end of the route by an appropriate speed setting.
- In both cases, the result, the **Calculated Speed**, is displayed in the **Route List**, and can be used by the operator as the current speed setting during manual speed control. The calculated speed values are in any case limited to the **MAX SPD** values defined for each leg of the route.
- In systems with integrated CONNING display (CONNING mode or CONNINGPILOT), the special **Active System Route** display can be used to monitor the time schedule along the route and for the selected **Arrival Point**.
- If the system is equipped with a SPEEDPILOT, the speed can also be controlled automatically while the ship is sailing along the System Route, in such a way that the calculated speed is achieved and the time schedule planning is thus fulfilled.

Geographical Position and Shape of a Route

A route is divided by **waypoints** into **segments** which are commonly named **legs** or track segments. The waypoints are the main construction elements of the route. Their positions are defined by geographical coordinates in the WGS84 system. See chapter C - 1.1.2 on page C-7 for details.

If it is planned that the ship will change course at a waypoint, the **radius** of the turn must be specified.

In this case, at the beginning of the manoeuvre computed on the basis of the specified radius, the track curve leaves the track line ³⁾ at the **wheel over point (WOP)**, and after completion of the manoeuvre it goes over to the next track line. The track curves shown are calculated based on the manoeuvring parameters defined for your ship on service level during the sea trials.

The geographical coordinates of the waypoints, together with the radii assigned to the waypoints, thus define the geographical position and shape of the pre-planned track including the track curves at the waypoints.

¹⁾ In this document, **pre-planned tracks** are also simply called **routes** if there is no danger of confusion.

²⁾ Any change of the route data, made on any MFD, is saved on all MFDs automatically.

³⁾ Track line is a line joining two consecutive waypoints, also called leg in this operating instructions

Routes each have a first waypoint and a last one. During editing, all waypoints are automatically numbered consecutively, beginning at 1 for the first waypoint. All route functions refer to this sequence.

Thus, a route can only be sailed in the **direction** for which it has been generated.

However, the direction of a route that has already been generated can be reversed by means of a simple operating step during editing and then processed further - see figure below.

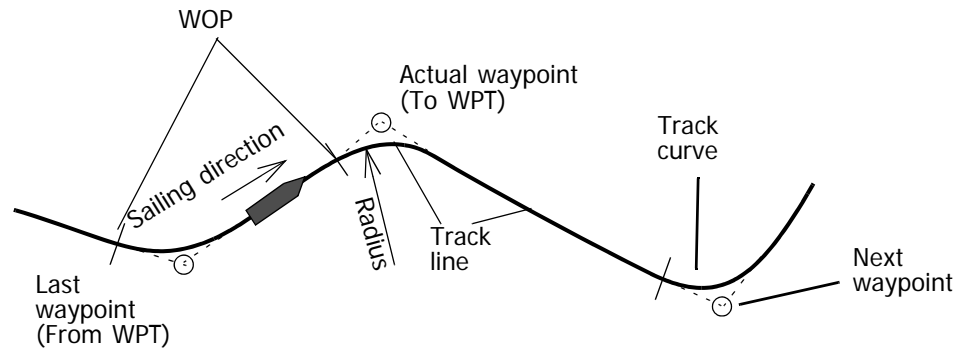


Fig. C / 2 Shape of the pre-planned track in the case of course changes

There is practically no limit to the number of waypoints that a route can consist of, or to the length of a route. Thus, the entire route between two ports can be defined as one pre-planned track. It can often be appropriate to **divide the entire distance up** into individual routes.

For example, if a port is approached from various directions along various routes, it might be appropriate to perform separation into the port-related segment that is identical for all routes and the part that is specific for the route concerned. In this way, the data relating to the port need to be input once only, and the maintenance of these data only has to take place in one dataset.

1.1.2 Generation, Handling and Administration of the Routes

During the **generation** of the pre-planned tracks, you can transfer the waypoint positions graphically, (in **Graphic mode**) from the electronic chart displayed on the chart area.

You can also edit the waypoint positions by alphanumeric input (in **Text mode**); all other data, like

- administrative data,
- notes to the waypoints,
- additional route parameters, and
- parameters for the track and speed control functions

must be edited in text mode anyway.

Editing in **Text mode** means data input in the **Waypoint List** and the **Route List** displayed as two linked tables shown in the lower part of the application area.

In Text mode, the following functions too are possible:

- During the generation of a route, waypoints - including all data assigned to a waypoint - can be taken over (copied with **Copy and Paste**) from routes that already exist.
- By means of the **Reverse** function, the direction of the route can be reversed, i.e. the first waypoint becomes the last one, and so on.

At any time you can change between graphical editing and text mode as long as the PPI/Chart area shows the relevant part of the pre-planned track being edited.

Once the route has been generated, it should definitely be **checked** with the special checking function available in the header of the Waypoint List.

The route that is checked must be **stored** in the form of a separate **file** ¹⁾ on the hard disk of the MFD and assigned to a **catalog**. During the editing process, you have to give the route a route name, by means of which the system - in conjunction with the catalog name - can clearly identify any route. So that you too can identify the parts of the route later, you should also give some important waypoints an appropriate **waypoint name** before you start the storing process.

If a route is to be displayed or modified on the system, you first have to **load** it. In this process, a route stored on the hard disk is **copied** into the main memory of the MFD. Each time you load or **reload** a route the results of the route check get lost, i.e. the check route function must be executed once more.

For **modifying** a route, you have all of the input possibilities that are also available to you for the initial generation process. After the modification, the route must be stored again. If this is done under the old **route name**, the old data set of the modified route is lost. If, during the storing process, you input a **new route name**, the modified route is stored additionally as a **new route**; in this case the original route continues to exist in unchanged form.

Although it is improbable, hard disk drives can get damaged or the data stored on them can be erased or be unreadable. So that, in such cases, the stored data are not irretrievably lost, it is absolutely essential to make a **backup copy** ²⁾ at regular intervals, i.e. before such an event can occur. After a hard disk fault or after the hard disk has been exchanged, the files can then be copied back²⁾ to the hard disk drive. This mechanism can also be used **to exchange files between the systems on different ships**.

If your system includes more than one MFD with navigation functionality, all routes generated on one MFD are also copied automatically to all other MFDs.

1) In the following, no distinction is drawn between the route and the route file.

2) On/from a removable device

USEFUL INFORMATION

Browse Mode on ECDIS

If you want to edit the route graphically on the electronic chart, it is advisable to switch into the **Browse** mode ¹⁾ in order to be able to show any part of the sea where the route shall be located. In the other display modes you are only able to plan a route with about 96 nautical miles distance to your own actual position.

Alternatively all inputs for route planning can also be made in **Text** mode, i.e. directly by alphanumeric inputs into the columns of the waypoint list (See chapter C - 1.1.3 on page C-9 for details).

General Note about Editing in the Waypoint List and the Route List

It is generally recommended to connect an alphanumeric keyboard (also called ASCII keyboard) to the MFD computer installed at the planning workstation or any MFD frequently used for editing and chart maintenance purposes.

In this case the system supports such well-known functions like copy and paste within the route editor; Copy by **Ctrl+C** and Paste by **Ctrl+V**. This can be applied on a whole line as well as on a data cell of a table or parts of it.

Coordinate System for Position Input (WGS84)

The position data that are input on the system have to refer to a particular coordinate system. It is not possible to choose between various coordinate systems or different geodetic datum.

Generally, the ECDIS programs (and also all connected RADAR / NACOS components) work internally with the chart datum **WGS 84**. Before position data referring to a different chart datum are input on the system, a conversion to WGS 84 must take place before input ²⁾.

A necessary prerequisite for correct conversion is that the chart datum used on the source of the position data (a paper chart, a waypoint list, etc.) is known to the operator!

Name of the Waypoint

At the left end of the header of the route window under "Find" you can enter any search text which is contained in the waypoint names. This search text is compared to the start of the text entries contained in the Name fields of the waypoints. With this function it is possible to have a fast access to the location of a known waypoint (with given name) in long lists. If you then double click on the found waypoint line or if you use the **Go to Waypoint** function, the chart center will jump to that position.

-
- 1) Browse mode is only available in ECDIS mode, i.e. in RADAR mode graphical route planning is limited to the display range selected for the PPI.
 - 2) The World Geodetic System 1984 is the actually used geodetic reference system for positioning. It is used world-wide as a common base for position data, specifically in the GPS satellite system and in GPS receivers. Also the position sensors connected to the system must send out their data based on the WGS 84 position datum. A position receiver not sending WGS 84 based data to the NACOS is automatically treated as invalid and the alarm "No WGS84 Position Datum in Use" will be given if you select it as position input.

1.1.3 Route Display Settings

Before route editing is started, the settings for displaying the route in the Application Area should be set. The display options for the route can be set under **Settings > Route**.

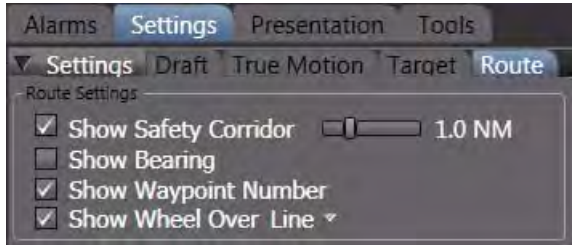


Fig. C / 3 Route Settings

Refer to the following picture to identify the items that can be superimposed as additional information to the route.

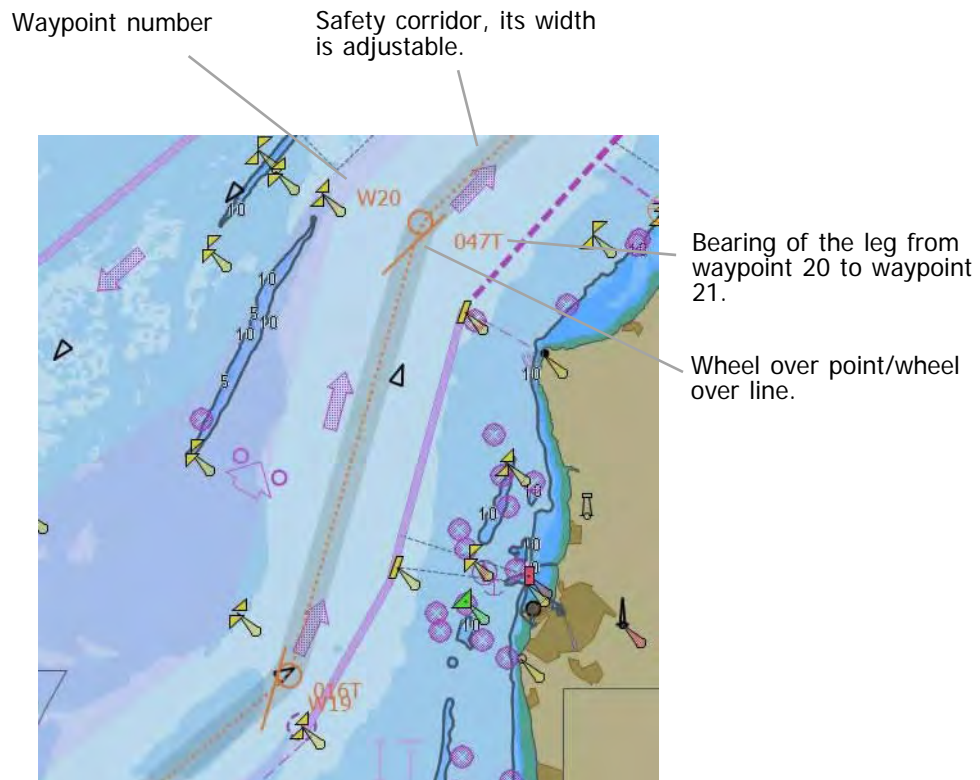


Fig. C / 4 Settings for the route display

1.1.4 Route Editing - Graphical

Route functions are started by selecting **Tools > Routes > Explorer** in the Non-Permanent Area.

The **Explorer** tab opens the controls for route planning, editing and handling.

This window is also called **Route Explorer** in this documentation.

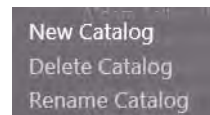


Fig. C / 5 Route Editing

From the **Folder** list, an existing folder can be clicked to be opened, its content is then displayed in the right part of the window. The names of the routes contained in the folder may be sorted ascending or descending by clicking the **Name** control.

It is also possible to create new folders or to erase or rename existing ones. Right-click in the Folder list to open up the context menu.

☞ The entries **Delete** and **Rename** are only possible when a catalog is selected.



To create new routes, click on **New Route** or open the context menu by right-clicking in the name list. To delete or to rename existing routes, right click in the **Name** list window to open up the context menu.

☞ The entries **Open Route**, **Delete Route** and **Rename Route** are only possible when a route is selected.



☞ A folder must be opened to be able to edit a new route.

Open an existing route

Mark a route name by clicking on it and then click **Open Route**, or click on the name in the list and then open the context menu and click on **Open Route**.

A route loaded on the MFD can display its waypoints and additional data as a list. For this purpose click with **MORE** on the route name and select **Waypoint List** from the context menu.

If you switch on the waypoint list on the radar, the PPI area will partly be covered by the list. Be aware that hereby the radar is displayed in a non-approved operating mode. It is therefore recommended to perform the route planning on the ECDIS or on the radar.

Its data is then displayed in the lower part of the application area in form of a waypoint list. The route is displayed graphically in the application area if the the route is part of the displayed chart area.

No.	Name	LAT	LON	RAD	ETA/ETD	ET Mode	PP Notes	From - To	DIST	BRG	calc. SPD	MAX SPD	CRS LIM	XTD LIM	Sail	Eco
1		62°44.097' N	007°11.163' E	0.70 NM	07 Oct 2011 11:32	Arrival		001 - 002	0.90 NM	257.2°	23.6 kn	25.0 kn	30 °	1000 m	GC	0
2	MOLDE LT.	62°43.885' N	007°09.138' E	0.50 NM	07 Oct 2011 11:35	Arrival	OC.(2) 8s	002 - 003	1.73 NM	260.5°	24.6 kn	25.0 kn	30 °	1000 m	GC	0
3	MEKGRUNNEN	62°43.604' N	007°05.492' E	0.60 NM	07 Oct 2011 11:39	Arrival	3.5m GRUNNE	003 - 004	2.76 NM	261.0°	19.3 kn	25.0 kn	30 °	1000 m	GC	0
4	RESBJORA	62°43.048' N	006°57.895' E	0.65 NM	07 Oct 2011 11:47	Arrival	ST-HEGDALSH	004 - 005	1.40 NM	354.9°	19.1 kn	25.0 kn	30 °	1000 m	RL	0
5	JULHOLMEN LT	62°44.028' N	006°57.705' E	0.60 NM	07 Oct 2011 11:52	Arrival	OC.(2)8s, O.20	005 - 006	2.63 NM	358.5°	23.6 kn	25.0 kn	30 °	1000 m	RL	0
6	HARDBRAKEN	62°46.740' N	006°57.553' E	0.60 NM	07 Oct 2011 11:58	Arrival	ST-HOGSNES 1	006 - 007	2.89 NM	008.3°	24.8 kn	25.0 kn	30 °	1000 m	RL	0

Fig. C / 6 Display of Route Data

When you close the Route Tab (i.e. the waypoint list) by a click on the **X** symbol also its display on the PPI/Chart area will be deleted.

If you want to use the existing route without modification, you must check the route with the existing system settings before it can be activated as the System Route (See **Check Route / System Route**.)

Create a new route

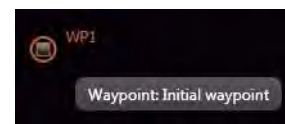
In the **Name** list window right-click in a free space to open the context menu and click on **New Route**.

You are then prompted to enter a route name; afterwards the first waypoint named **Initial waypoint** appears in the center of the screen or on the current ship's position if the ship is centered.

At the same time, you can select **Waypoint List** from the context menu so that the Route List window appears in the lower part of the application area.



Click on the waypoint symbol to mark it. The marked waypoint is displayed with a "handle" and can now be moved to the desired start point of the route.



Continue Route

To insert additional waypoints, click on the waypoint symbol to mark it. Then right-click on it to open the context menu.

In the context-menu, click on **Continue Route** to set the next waypoint.

From now on the cursor is displayed with a dashed connection line to the previously set waypoint and each click with **DO** adds a new waypoint symbol on the screen. Its position is added at the end of the waypoint list.



The function **Continue Route** is also available via the context menu if you select the first or last waypoint of the route. In this way more waypoints can be added before the first or after the last waypoint.

Insert a waypoint

To insert a waypoint before or after a specific point of the route, by a click with **DO** select the waypoint adjacent to the leg to be modified. Then click on the waypoint select marker with **MORE**, select **Route** in the context menu and click on

- **Insert After** to create a new waypoint on the leg after the selected point
- or -
- **Insert Before** to create a new waypoint on the leg before the selected point.

Direct Insertion of a Waypoint on a Leg

Click on the leg to select it; a marker is shown in the middle of this leg. Via the context menu you then have access to the function **Insert Waypoint** here.

In any case the new inserted waypoint will be set in the middle of the leg which then must be moved manually to the wanted position on the screen / in the chart. Alternatively, the wanted position can also be set or modified directly in the LAT and LON columns of the waypoint list. (See chapter 1.1.5 on page C-16)

Move a Waypoint

Click with **DO** on the waypoint symbol to select it. When the selection mark is shown, click on it and hold the **DO** key and then move the waypoint symbol to the intended position on the screen.

Add Waypoints

Click with **DO** on the first or last waypoint symbol of the route. With a **MORE** click on the selection marker the context menu is opened. Select **Route** and click on **Insert Waypoint**.

Adding a waypoint at the first or last waypoint will create a prolongation of the first / last leg with the same track course but with 50% of the length of the previous leg; move the added waypoint to the intended position on the screen to create the correct course and length of the new leg.

Delete a Waypoint


Click with **DO** on the waypoint symbol to select it. With a **MORE** click on the selection marker the context menu is opened. Select **Route** and click on **Delete Waypoint**.

Set and Move a Parameter Point


Select the leg of the route displayed on the screen and by a click with **MORE** open the Route context menu in the application area. A click on **Insert a Waypoint Here** first inserts a normal waypoint in the middle of the leg.

Select the new inserted waypoint in the list (check the waypoint number) and activate the PP (Parameter Point) checkbox. This waypoint will now be displayed with a small square symbol.

With the graphical cursor on this symbol and pressing down the **DO** key you can now move the parameter point along the preplanned track line. Releasing the **DO** key will fix the Parameter Point's position on the leg.

 Do not shift the parameter point into the curved part of the displayed route.

Repeat the above procedure in order to add more parameter points on a leg.

 Do not shift a new parameter point across already available parameter points.

Note:

The insertion of parameter points on a leg does not create any course change at these points.

With other words, a parameter point is not part of the course change alarm management (No Waypoint Approach and no Wheel Over Point alarms).

But by use of parameter points you can easily add changes of route parameters like

- Off Course Limit (**CRS LIM**) and Off Track Limit (**XTD LIM**)
- Sailing Mode (**Sail Mode**)
- Rudder Economy (**ECON**)
- Planned Speed (**MAX SPD**)

on different parts of a leg.

Changing the planned speed on a leg is done by changing the **MAX SPD** value, which then also changes the **Calc.SPD** value in the **Route List**.

Save and Save As

In contrast to editing User Symbols (See chapter A - 8 on page A-83), routes and the additional route parameters shown in the waypoint list are not automatically stored to the file system on the MFD-computer. Be sure to **Save** all your changes at the latest after completion of route editing. During long editing sessions intermediate saving of data is recommended ¹⁾.

1) See chapter "Backup/Restore of Map Data" on page H-13 for details on storing data on USB devices.


If you want to discard your changes made to the selected route, use **Save As** to store the version with the changed dataset under a new filename.


Check Route

The route to be used during the voyage must be checked by the program before distribution to the system.

A not successfully checked route cannot be activated as System Route.

If the selected route shown in Waypoint List in the lower part of the application area shall be used as System Route and "Not Checked" is indicated behind the check button click on the Check Route button before activation of the route.

 If the route has been reloaded anew, the check results are lost and the check route must be executed once more. In this way it is ensured that the check is repeated with the actually valid draft dependent depth contour settings of the most up-to-date electronic chart.

Clicking on the  button starts the verification of the pre-planned route as follows:

- check against the Safety Contour
- check against the chart objects with a depth less than the Safety Contour Value
- check against own Safety Lines and Danger Highlight areas.

The results of the route verification are shown in the Waypoint List by small icons in front of the waypoint numbers. Pointing on it with the cursor, gives additional information on the check-results as a tool-tip.

Clicking on these alarm icons opens another info dialog on the screen, where all detected hazards, limitations, etc. on the leg or at the waypoint are shown and described more detailed. For a step-by-step guide for route checking [See chapter 1.1.7 on page C-25](#).

System Route

After you have checked it, you can activate the route as pre-planned track by a click on the **Activate** button.

In this way the activated route will change its colour from orange to red and will from now on be distributed to all applications on all MFDs for system-wide use, for example for a connected autopilot or track control system.

The activated route is from now on handled as System Route until it is deselected again or until another one is activated.

The System Route has the following properties:

- it cannot be deleted from the screen,
- it cannot be modified or reloaded,
- it is used for chart and track monitoring as set by the operator under **> Settings > Route**
- it is used for calculation of all data shown in the Route Data window,
- it is sent cyclically to the TRACKPILOT and the (optional) SPEEDPILOT, which use the data of the System Route for their own calculations and control purposes (see also the relevant chapters of these operating instructions).

Alternative Routes

Even if you have selected the System Route, it is possible to load other routes from your catalogs and to display them as well as to edit, modify and save them without interfering with the activated System Route.

All loaded routes can be displayed with their Waypoint Lists in the lower part of the application area. Each route has an own tab showing the route name. Clicking on the respective tab of a route brings the selected Waypoint List into the foreground.

If another route shall be used as activated route, it must be loaded and checked beforehand.

It is sufficient to click on the **Activate** button on the tab of this route to change the activated route.

In some specific situations in the integrated system it might not be possible to deactivate or change the currently used System Route. This can be caused by the fact that one of the sub-systems is using this route for an automatic control function. Examples: Trackpilot in Track mode or Speedpilot in "Arrival mode".

Previously used routes can be switched off from being loaded and displayed on screen by clicking on the small cross in the **Route Name** tab of the waypoint list.

Copy a Route


If you want to create a copy of a loaded route, use **Save As...** in order to store it under another name to the same catalogue.

1.1.5 Route Editing - Text Mode

All inputs for route planning can also be made in text mode, i.e. directly by alphanumeric inputs into the lines and columns of the **Waypoint List** and the **Route List**.¹⁾

As in the graphic edit mode only the waypoint positions are put into the dataset, in any case all other additions to the route data must be made in text mode.

Direct entry of data into the waypoint list enables to create a route off-screen, for example in order to take over a route documented as a list of waypoint positions (LAT / LON data) on a sheet of paper.

 If you want to see the loaded or to be edited route on the screen you must switch to ECDIS in Browse mode and select the respective chart area where the route is located.

Under **> Tools > Route** create a new route or open an existing route to see the text window of the route to be worked on in the lower part of the application area.

For this purpose click with **MORE** on the route name in the **Route Explorer** and select **Waypoint List** in the context menu.

Operating functions in the Waypoint List (Overview)

Selection of a waypoint can be done with a **DO** click in the waypoint list line by line. In this case the selected line is shaded blue and in the context menu (click with **MORE** on the line) the following entries are provided:

Go to Waypoint	Ctrl + G	Corresponds to a double click in the line, see below.
Insert Before		As described in the chapters before
Insert After		
Delete Waypoint		
Reverse Order		Can reverse the sequence of waypoints (i.e. the sailing direction) ¹⁾
Copy Waypoint	Ctrl + C	Copies all data of the selected waypoint to a temporary buffer
Paste Waypoint	Ctrl + V	Copies the data in the buffer before the selected waypoint. The selected waypoint is shifted one line down.

¹⁾ The reversed route should be saved under a different name or even a different catalog. Be sure to check if the waypoint locations can be used unchanged in order to avoid wrong traffic separation zones or sailing against the recommended sailing direction, etc.!

Fig. C / 7 Route Editing - Context Menu

Double clicking on a line in the waypoint list is equivalent to **Go to Waypoint** in the context menu and centers the screen in ECDIS / Browse mode to the position of the selected waypoint.

In this way you can jump from waypoint location to waypoint location (i.e. step along the pre-planned track).

¹⁾ Working in the lists is comparable to many commonly used spreadsheet programs; a click into a selected data cell allows to enter numeric (radius and other parameters) or alphanumeric data (names and notes) within certain limits. These limits (for example min. and max. radius) are partly depending on configuration data made on service level.

Basic and Additional Parameters of the Route

Referring to the Waypoint and Route List displayed on the screen whenever a route is opened, this overview describes in a condensed form the complete parameters stored in the route data-set.

No.	Name	LAT	LON	RAD	ETA/ETD	ET Mode	PP	Notes	From - To	DIST	BRG	calc. SPD	MAX SPD	CRS LIM	XTD LIM	Sail	Eco
1	Ijmuiden Pilot	52°28.700' N	004°25.600' E	0.50 NM	23 Nov 2010 12:55	Calculated			001 - 002	8.19 NM	280.6°	20.0 kn	20.0 kn	10°	1000 m	RL	3
2	Buoy D 3	52°30.300' N	004°11.600' E	0.50 NM	23 Nov 2010 13:16	Calculated			002 - 003	18.45 NM	000.6°	20.0 kn	20.0 kn	10°	1000 m	RL	3
3	BOUY TX 1	52°48.600' N	004°11.900' E	0.50 NM	23 Nov 2010 14:03	Calculated			003 - 004	39.82 NM	027.4°	20.0 kn	20.0 kn	10°	1000 m	RL	3
4	BOUY VL 5	53°24.000' N	004°42.500' E	0.50 NM	23 Nov 2010 15:46	Calculated			004 - 005	13.66 NM	066.0°	20.0 kn	20.0 kn	10°	1000 m	RL	3
5	BOUY VL 9	53°29.500' N	005°03.200' E	0.50 NM	23 Nov 2010 16:21	Calculated			005 - 006	49.58 NM	071.8°	20.0 kn	20.0 kn	10°	1000 m	RL	3
6	BOUY TG 1-EH	53°45.000' N	006°22.600' E	0.50 NM	23 Nov 2010 18:28	Calculated			006 - 007	42.45 NM	076.7°	20.0 kn	20.0 kn	10°	1000 m	RL	3
7	BOUY TG 17/W	53°54.800' N	007°32.800' E	0.50 NM	23 Nov 2010 20:18	Calculated			007 - 008	10.01 NM	103.5°	20.0 kn	20.0 kn	10°	1000 m	RL	3
8	JADE/WESER F	53°52.500' N	007°49.000' E	0.50 NM	23 Nov 2010 20:43	Arrival											

Fig. C / 8 The Waypoint and Route List window

The basic parameters of each route are displayed in the left part of the window, which is also called **Waypoint List**.

1	No.	the waypoint sequence number in the route
2	Name	the name of the waypoint (optional)
3	LAT	the latitude (N / S value) of the waypoint position
4	LON	the longitude (E / W value) of the waypoint position
5	RAD	the radius in NM of the planned turn at the waypoint position
6	ETA/ETD	the Estimated Time of Arrival or the Estimated Time of Departure at the waypoint position
7	ET Mode	the calculation method or mode for the ETA (see chapter XYZ)
8	PP	the selection / indication of Parameter Points ¹⁾
9	Notes	is a field where notes (hints, cautions, warnings or additional info to a waypoint) can be given in text form

¹⁾ Parameter Points are points on a leg of the route without course change but with optional changes of one or more of the parameters valid for this leg after passing the parameter point. See chapter on page C-13 for details.

The additional parameters (calculated or set by the operator during route planning) of each leg of the route are displayed in the right part of the window, also called **Route List** ¹⁾

10	From - To	the waypoint numbers of the leg
11	DIST	the distance between two waypoints (i.e. the length of the leg)
12	BRG	the bearing between two waypoints (i.e. the track course of the leg)
13	calc. SPD	the calculated speed of advance on the leg (see also chapter "speed calc.")
14	MAX SPD	the maximum speed on the leg (set by the operator during route planning)
15	CRS LIM	the course limit valid on this leg ¹⁾
16	XTD LIM	the track limit valid on this leg
17	Sail	the sailing mode (RL or GC) on this leg (set by operator during route planning)
18	ECON	the rudder economy on this leg set for the TRACKPILOT

¹⁾ These parameters are also used by the TRACKPILOT (if installed in your system) in case AUTO Fill is switched on in the Next Data field on the TRACKPILOT expander. See also chapter TRACKPILOT for details.

Operating Functions and Settings of the Route Editor in Text Mode

The start-point of route planning in text mode is the same as in graphic mode.

Click on Tools, Routes, Explorer in the non-permanent expander, select a folder (i.e. a catalog) and select New Route or select Open Route if you want to modify an existing route.

The following description defines the steps necessary to create a new route in **text mode** starting from scratch. The operation steps relevant for modifying a previously created route are identical.

New Route

You are prompted to enter a name for the new route before you can continue.

The command **New Route** opens an empty waypoint list where the so called Initial Waypoint is automatically set to the center of the visible screen automatically. The created **LAT/LON** value should be moved or set to the intended start position.

Waypoint List

Click on **Waypoint List** in the context menu of a route name to open the waypoint list in the application area.

Edit the first Waypoint

Click with **DO** on the initial waypoint line to select it. By a click in the **LAT** and / or **LON** field open the position input and key in the intended value of the start position.

Enter a default or specific Radius

Click with **DO** on the initial waypoint line to select it. By a click in the **RAD** field open the radius input and key in the intended radius value in nautical miles. The radius can be set between the minimum and maximum radius specified for the system on service level.

Please refer also the chapter **Predefined Radius** under **Useful Information** on [page C-20](#).

With the radius set to another value than 0.00 NM the next following waypoints in the list will automatically inherit the same value until another value is set in one of the following Radius columns of a waypoint.

Add a Waypoint / Insert After

Click with **DO** on a waypoint line to select it. By a **MORE** click open the context menu. There click on **Insert After**; this will create a new waypoint with a distance to the previous one whereby the same course of the leg will be used.

Then click the **LAT** and **LON** fields to correct the position. If required also key in a new radius value in the **RAD** field after clicking it.

Add a Waypoint / Insert Before

Click with **DO** on a waypoint line to select it. By a **MORE** click open the context menu. There click on **Insert Before**; this will create a new waypoint in the middle of the leg with the same radius than set for the previous waypoint.

Then click the **LAT** and **LON** fields to correct the position. If required also key in a new radius value in the **RAD** field after clicking it.

¹⁾ The offset of ½ line between Waypoint and Route List indicates the validity of the data on the leg between the two adjacent waypoints.

Move a Waypoint by LAT/LON input

Click with **DO** on the waypoint line to select it. By a click in the **LAT** and / or **LON** field open the position input and key in the intended modified position. You may also move the waypoint graphically in the PPI/Chart area.

Delete a Waypoint

Click with **DO** on the waypoint line to be deleted. After another click into the line with **MORE** the context menu opens where you can select **Delete Waypoint**.

Copy and Paste

Selecting a line and with a **MORE** click and selection of **Copy Waypoint** in the context menu, all data of the selected waypoint are copied to a buffer. With **Paste Waypoint** a new waypoint will be created before this or another selected line.

Taking over from another Route


Select another route from any available catalog and copy the required waypoint. Then change back to the route to be modified and use the **Paste Waypoint** function of the context menu in order to insert the copied waypoint before any selected line.

Taking over of a complete Route

Load a route from any available catalog and save it to the same or another folder.

In another folder you may use the same name of the route; in the same folder you must use another name before saving it in order not to overwrite the original data.

The function **Save As...** is supporting this task.

 For the general functions **Save and Reload**, **Check Route**, **System Route** and **Alternative Routes** as well as **Reverse Route** please refer to the respective chapters under graphical route editing.

Useful Information

ECDIS and Browse Mode

- During route editing it is often advisable to use the Browse mode of the ECDIS. In this way you can at the same time observe the geometric constraints (for example: too large radius, too short leg, etc.) and the numerical parameters of the route when you establish the waypoint sequence.
- In Browse mode, by a double-click on the line of a waypoint dataset, the display screen of the application area (PPI or chart) is automatically centered on the selected waypoint. I.e. by clicking line by line you can "jump" along the route from waypoint to waypoint.
- In Browse mode you can also use the Zoom and Pan control or the other tools in the permanent area (like Range) and the application area (like Set Chart Center, etc.) to control the scale and the center position of the electronic chart.

General Note about Editing

All alphanumerical input fields are opened in the overwrite mode, i.e. you can directly type in the wanted value. If you only want to change a part of the value, click before the character or number to be changed and make your entry.

The Enter key or button, or a click somewhere else takes over the input you have made.

If the data input verification results in an error state, you will be asked by the system to change your data entry.

Some of the columns do not have alphanumeric entries but

- a selection menu (ETA/ETD: Arrival, Departure) or
- a check box or
- a selection bar (ECON).

Predefined Radius

- Already during editing the route, it is advisable to enter a radius for the first waypoint. This radius will be copied to all other added waypoints until you set another radius. In this way it can be verified "on-line" during editing if geometric constraints (matching of length of the legs, radius, and amount of course change) are violated.
- It is recommended first to use a sort of "default" radius for sailing with nominal speed which could later be adjusted for your needs and depending on the results of the verification of the route on the chart display. The default radius should create a rate of turn far below the maximum rate of turn you would normally accept for your ship under the planned loading conditions.
- The predicted steady state turn-rate at a waypoint caused by the planned radius can easily be estimated by the calculation

$$\text{ROT } [^\circ/\text{min}] \sim \text{sailing speed [kn]} / \text{radius [NM]}$$

Speed	Radius	ROT [estimated]
25 kn	1.00 NM	~ 25 °/min
25 kn	0.50 NM	~ 50 °/min
12 kn	1.00 NM	~ 12 °/min
10 kn	0.10 NM	~ 100 °/min

Table C / 1 Route Editing - Predefined Radius



CAUTION

Be sure not to plan too small Radius values at high speed which would cause too high and possibly dangerous turn-rates on your ship. ¹⁾

¹⁾ The maximum ROT and the minimum allowed radius at nominal speed should have been defined during the sea trials. Both values are parameters of the system configuration on service level. The radius input during route planning is limited by the parameters min. and max. radius.

Check Route Corridor

- with **Safety Corridor**

The pre-planned route can roughly be checked during editing already if an appropriate **Safety Corridor** is selected under **Settings > Route**. The displayed corridor around the route helps to support the operator during creation of the route when the display area covers the sea area of the route or of parts of it.

At any time during editing the width of the safety corridor can be adjusted for the visible part of the route. In any case it is then valid for the complete route.

If you use a new route for the first time it could be sufficient to define a general minimum passing distance (for instance 250 m or another safe value) in order to be on the safe side when the program checks the route for the first time.

Details, like adapting the radius, the track limit and other values could be adjusted following the messages about violations after the route checking function has been executed.

- with **Track Limit**

The pre-planned route contains a track limit (**XTD LIM**) which can be set differently for each leg of the route. By parameter points it can even be changed one or more times on the same leg.

By adapting the different track limit entries in the route to the sea area to be passed, you can support the built in route monitoring function as much as possible. In this way it is ensured that respective ECDIS alerts are given, when the cross-track alarm is activated under the **Alarms > ECDIS Alerts** expander. When the route is used for sailing with TRACKPILOT in Track Mode, deviations from the pre-planned track are activating respective alarms depending on the sea area and traffic separation zones.

Imported Routes

Imported route data taken over from the so called map/track data files of previous RADAR- or NACOS system generations can also be used again in the Platinum system.

The track number of those tracks will be used as a part of the route name.

For instance the track number 1330 and the track name STO_HEL will be combined to the route name "1330 STO_HEL" in the new system.

For details how to import/export your own user made symbols, [see chapter 1.1.9 on page C-34](#).

For details how to import/export your maps/tracks, [see chapter 2.9 on page H-13](#).

1.1.6 Details of the Waypoint Data

This section gives an overview about the meaning and use of all parameters and data being part of the route data-set. The shortcuts in parenthesis [] are those used in the headlines of the Waypoint and Route List on the screen.

Waypoint Number [No.]

Meaning: Serial number of a waypoint within the route; it is automatically allocated consecutively by the program, beginning at 1. It clearly identifies the waypoint within the route. It appears as a reference marker in all lists, in the chart area (if switched on), and in all other displays of the system which refer to the individual waypoint.

Name of the Waypoint [Name]

Meaning: Helps to identify the waypoint during the subsequent processing and during use while sailing along the route. It can be displayed or printed out in all lists, and can be shown in most displays of the system which refer to the individual waypoint.

Waypoint Position [LAT] [LON]

Meaning: Geographical WGS84 position of the waypoint

Editing: In the [LAT] and [LON] column.

Special features during editing: The hemispheres are input with **N**, **S** and **E**, **W**.

Radius [RAD]

Meaning: Radius in nautical miles with which the planned course change manoeuvre at a waypoint is to be performed. It can be set between the minimum and maximum radius value defined for the system on service level.

Estimated Time of Arrival / of Departure [ETA/ETD]

Meaning: Indication of the manual set or automatically calculated estimated time of arrival or departure time depending on the ET Mode set in the following column.

Estimated Time Mode [ET Mode]

Meaning: Defines the method how the ETA/ETD data are calculated by the system.

Editing: Under **ET Mode** in the **Waypoint List**; can be set to Departure / Arrival / Calculated.

If it is set to Calculated, no input can be made into the ETA/ETD column. If you do not want to use the **Planned Track Speed** function, the point of departure should be set to **Departure**, any point of arrival should be set to **Arrival**.

Parameter Point Attribute [PP]

Meaning: With the aid of a waypoint for which the Parameter Point attribute is set, new values for the route parameters Maximum Speed, Course Limit, Off Track Limit and Rudder Economy can be set differently within a straight track segment (the leg of a route).

Waypoint Notes [Notes]

Meaning:

Here, you can input information and instructions for the nautical personnel, which can be displayed on the MFD while the ship is sailing on the leg to this waypoint.

The consecutive waypoint notes shown on the screen can be used as an automatic notebook or can also be printed on in different list formats ¹⁾.

These waypoint notes, on operator request, also appear in the **Chart Information Window** on the chart (together with other waypoint related data).

Note:

If you use an alphanumeric keyboard during editing, in the Notes window you can "cut and paste" the text or parts of it for use in the same route for another waypoint (cut = Ctrl+C; paste = Ctrl+V).

From and To Waypoint [From - To]

Meaning: This column indicates the numbers of the From and To Waypoints, i.e. the leg designation between waypoint N and N+1. The columns following in the same line in the Route List are valid for this leg.

Waypoint Distance [DIST]

Meaning: This column indicates the distance in nautical miles between two consecutive waypoints, i.e. the length of the track segment between the From-waypoint and the To-waypoint. The calculation includes the curved track line defined by the radius and the course change at the waypoint.

Waypoint Bearing [BRG]

Meaning: This column indicates the bearing of the track line between two consecutive waypoints, i.e. the course over ground to be steered on the straight part of a track segment.

Calculated Speed [calc. SPD]

Meaning: This is the speed that is calculated for the track segment between two consecutive waypoints; it is calculated once for the **Planned Speed** mode or continuously in **ETA Mode**.

- In **ETA mode** (i.e. an arrival time has been set):

While the ship is sailing along the track, this speed is continuously computed and limited on the basis of the **Max. Speed** values.

- In **Planned Speed** mode (i.e. the **Planned Track Speed** has been set):

After the planned speed value has been **Set** by the operator, this speed is computed once for each leg, whereby the calculated values are limited by the **Max. Speed** values.

In any case the **Calculated Speed** is the speed with which the ship will have to sail in order to reach the destination at the planned estimated time of arrival and which can be used as the speed setting by the optional SPEEDPILOT in **Arrival Mode**.

Because the **Calculated Speed** is continuously shown in the **Route List** display window, it can also be adopted as a set point for the manual speed setting via the propulsion lever by the officer of the watch.

¹⁾ Printing functions and **Waypoint Notes** displays are not yet available in the system.

Maximum Speed [MAX SPD]

Meaning: The **Maximum Speed** defined for a leg is used by the system as the speed limitation for the **Calculated Speed** between each From waypoint and To waypoint (i.e. each leg).

This limitation by the **MAX SPD** values takes place leg by leg with manual setting of the **Planned Track Speed** as well as during the frequent recalculation in **ETA mode**.

Course Limit [CRS LIM]

This route parameter is only relevant in systems equipped with a TRACKPILOT.

Meaning: Alarm limit of the TRACKPILOT for the difference between set course and actual course (the course deviation). It also influences the possibility of switching the TRACKPILOT over to Track mode and the corrective actions performed by the TRACKPILOT if the ship deviates from the track, [see chapter "G - TRACKPILOT" on page G-1](#).

Track Limit [XTD LIM]

Meaning: Alarm limit of the system for the deviation from the route (the off-track distance to the track line is indicated as XTD in meters). The track limit also influences

- the ECDIS monitoring, see Section 4.4
- the checking of deviations from the System Route.
- the possibility of switching the TRACKPILOT over to Track mode,
- the control precision of the TRACKPILOT in Track mode,
- the filtering and monitoring of the external position-data by the TRACKPILOT in Track Mode.

Sailing Mode [Sail]

Meaning: This setting specifies whether the track segment between two waypoints is to be computed and used as the basis for steering with the TRACKPILOT and displayed on the chart as a **Great Circle** or as a **Rhumb Line**.

The default setting defined by the program is the Great Circle mode (a new route starts with GC mode on each leg). In contrast to a Rhumb Line, which is steered with constant course, on a Great Circle track the entire distance is shorter and small course changes are about to happen when the ship is following the pre-planned GC track.

Rudder Economy [Eco]

Meaning: Optimization of the TRACKPILOT between precision of control and frequency of rudder movement, depending on the prevailing conditions like the sea state and the wind. Low values for **Eco** means high rudder gains and vice versa ([see chapter "G - TRACKPILOT" on page G-1](#)).

To simplify manual adjustments during use of the TRACKPILOT, this value should only be entered for the first waypoint and at the boundary between a protected area (harbour, river, canal) or other confined waters and an unprotected area (open sea).

1.1.7 Checking of Routes

This chapter contains the detailed back-ground knowledge and a step-by-step instruction about the checking of routes during their creation with the **Route Planning** tool and before using them as the **System Route**.

A necessary prerequisite for achieving the required safety in the use of the pre-planned track is that, before being used, the route is carefully checked. This check should take place immediately after the route has been created or changed, i.e. before storage, and it must be repeated each time after a route has been reloaded from the memory.

☞ A route which has not been checked by the program cannot be activated as the System Route.

During this check, the track lines and the radius based track curves must be subjected to a **geometrical** check and a **check against the electronic chart** and the **User Symbols** (i.e. the user made chart objects). These checks must take place one after another under program control. The geometrical check is already done during editing, while the verification against the electronic chart and the user made chart objects is done with the actual safety settings each time the check function is called by the operator.

The check against the electronic chart is started by clicking the **Check button** in the route- and waypoint list (also called **route window** in this chapter). Before the start of the check against the electronic chart it is necessary to create the conditions for the execution of the check against the electronic chart and the User Symbols; [see chapter 1.1.7.2 on page C-29](#).

1.1.7.1 Geometrical Check

This check takes place already during route editing and it is independent of the used electronic chart or the availability of user made chart objects. It only verifies if the geometric construction of the straight track lines and the track curves calculated from the different planned radius values are fitting together.

Possible construction errors are:

- A radius is too short, i.e. shorter than the lower limit value that was set for it at service level. If no radius was input at the first waypoint, the program uses a default value ¹⁾ as the input value for all radii, which must be changed to the required value by the operator.
- A radius is too long, i.e. longer than the upper limit value that was set for it at service level.
- A radius is too long, so that the distance to the next waypoint is too small that the curve planned in this way does not fit and can probably not be executed with this radius at this waypoint.
- There is a parameter point situated in the curve area of the track. To make certain that the changes made by means of the parameter point are indeed effective in the desired track section, parameter points should generally be located outside the curve area.



Fig. C / 9 Radius at waypoint 5 does not fit

¹⁾ For the time being the default radius is the average between min and max radius, which have been set on service level.

How the geometrical errors are made visible during editing:

- If the **Safety Corridor** is not switched on during route editing, the only visible fault indication is the unexpected shape of the track line and the fact that the track curve is not shown at the right place. In any case the curved path will be calculated and shown on the screen with the correct radius as set in the waypoint list. Curves not fitting correctly are shown with a red stripe
- If you perform the **Check Route** function during editing, the results of the route check are made visible by displaying alarm or warning icons in the route list for segments which are erroneous.
- Additionally, in case of not corrected errors, clicking on the **Activate** button opens a detailed fault description including the relevant waypoint numbers and the erroneously checked route will not be accepted as **System Route**.

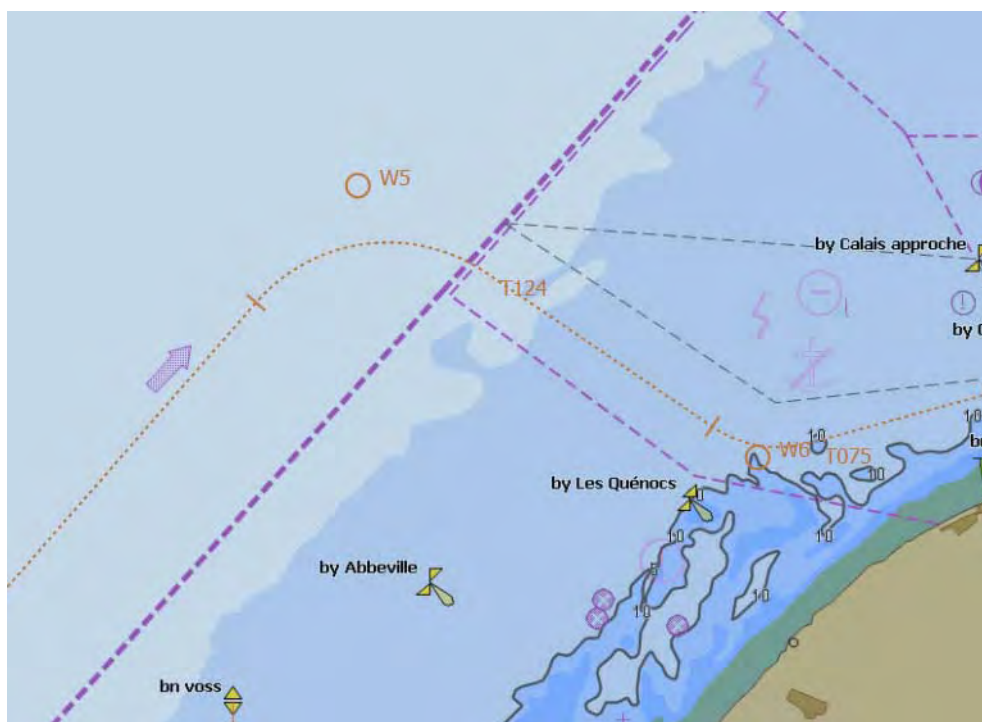


Fig. C / 10 Modification of waypoint 5 and 6, both radius values reduced

Correcting the Route

If a part of the pre-planned track is not displayed correctly or if it is marked with a red coloured stripe, a fault message is given or an alarm icon is shown in the route window, the following can be performed to correct the faults:

- In the waypoint list, the concerned line to which the fault message refers can be double-clicked in order to show it in the center of the display area.
- For the purpose of error free editing, you can modify the relevant section of the route directly on the screen or you can correct its numerical data in the route window.

If appropriate, modify the relevant waypoint or parameter point positions and / or the radius and verify the route again.

As soon as

- a waypoint has been added or deleted,
- one of the waypoints or parameter points has been moved or modified, or
- a radius value has been changed

the route is automatically being marked unchecked in the status field adjacent to the **Check Route** button. Thereafter the route must be checked again.



CAUTION

As long as the route under construction shows any fault and is not readily corrected, it should not be stored in the catalogs normally used for voyage execution in order to prevent any unintended use by other users of the system.

Continuing / Ending the Check

If none of the graphical fault indications or messages mentioned appears any more, the check against the electronic chart and the user made chart objects (User Symbols) can be started now.

If the check against the electronic chart and the User Symbols was prepared beforehand and done already in parallel to the geometrical check of the editing process, the route should be stored; it can now be used by the system without reloading it.

- ☞ In any case, before later reuse of a previously planned route, the check against the eventually updated chart and the possibly modified User Symbols must be repeated after the relevant settings for the Safety Contour and Own Safety Lines or Danger Highlights have been verified or adapted to the prevailing conditions (see also the following chapter).



Fig. C / 11 Modified route, activated as System Route, displayed with Safety Corridor

1.1.7.2 Check against the Electronic Chart and the User made Chart Objects

This chapter contains details and a step by step instruction how to perform the check of the geometrically correct route against the electronic chart, the optional raster charts or paper charts.

This verification of the planned route against charted objects must be performed before it can be made the System Route. After each reload or any change of a route the checking must be repeated after the relevant safety settings (Safety Contour) have been adapted to the prevailing conditions.

Preparation

1. In the menu **Presentation > ENC > Depth**, set the **Safety Contour** correctly
2. Set the type of the electronic chart against which the check is to be performed, preferable to **ENC**.
3. Switch on the display of the user made symbols, lines and areas in the context menu of the PPI/Chart area under **Layer > User Symbols**.
4. Adjust the **Range** setting so that cells of the electronic vector chart or raster charts ¹⁾ which contain the nautically relevant information for the planned route are displayed.
5. If a vector chart is used, check whether chart cells having the appropriate navigational purpose are present for the entire track, at least over the width corresponding to the **Safety Corridor** setting or to the Track Limit contained in the route data-set:
 - Correctly set the display of the chart objects in the ENC that are to be displayed
 - With the **Set Chart Center** or the **Pan and Zoom Control** function, step along the route to be checked.

For those chart areas of the planned route which are not covered by suitable data cells, all nautically relevant objects along the route must be marked by means of Own Safety Lines or Danger Highlights.

To verify this, also the raster charts can be used if installed on your system - see step 6.

If there is no suitable raster chart available, the check must be performed manually against the paper chart. For this purpose, the pre-planned track, including the track limits, must be entered in the paper chart and checked on that chart visually.

6. If raster charts are used, then ²⁾ all nautically relevant objects along the route must be marked by means of own Safety Lines or Danger Highlights for the entire track, at least over the width corresponding to the track limit.

For this purpose, virtually sail along the route to be checked using the Set Chart Center or the Pan and Zoom Control functions.



CAUTION

The checks mentioned in steps 5 and 6, and the editing of the own chart objects, especially of the own safety lines and danger highlights, must be performed with care so that the necessary level of safety can be achieved.

¹⁾ Raster charts are not yet available in the PLATINUM system.

²⁾ This is prescribed for ships with DNV approval and using raster charts.

Performing the Check



The check against the electronic chart must be started manually after the geometrical check was successful. In this check, after a click on the **Check Route** button, the geographical shape of the track¹⁾ is compared with the data of the vector chart and with the user chart objects **Own Safety Line** and **Danger Highlight**.

For the execution of the check, the display settings mentioned above under **Preparation** are not important.

What is important is the selection of the type of electronic chart and the setting of the **Safety Contour**²⁾, see also above under **Preparation**.

For the verification of the route, the chart cells with the highest precision available on the system are used as the basis. They might therefore differ from the cells used for the display. Because of this, messages might occur which initially contradict the presentation of the pre-planned track in the vector chart³⁾.

The results of the verification process are made visible

- in form of red rings  shown along the route
- by small alarm icons  in front of the lines in the waypoint and route lists.

Pointing on the colour markings in the chart or on the alarm icons in the list opens the respective tool tips describing the detected violation between the route and the electronic chart (if vector charts are used) and the user made chart objects.

Correcting the Track


Select **ECDIS** and **Browse mode** to be able to verify the complete route on screen.

If a waypoint is double clicked or it is selected and then in the context menu **Go to Waypoint** is clicked, the respective waypoint to which the message refers is shown at the centre of the chart area.

Verify the causes for the violation and decide about the changes to be made to avoid it.

If appropriate, modify the relevant segment of the route and start the check again.

When the entire pre-planned track is shown without red ring symbols along the route and no alarm icons are shown any more in route window, the check program did not find any violations.

 It may happen that errors or warnings remain displayed but in reality there is no serious problem going along that route. The quality of the check-results is mainly depending on the contents of the electronic charts.



CAUTION

Vector charts which have not been approved for navigational use or were not updated by the user might contain errors.

Successful checking of the route on the basis of such vector charts does not guarantee that the ship can sail safely along the route.

It is under the responsibility of the operator to use a planned route for navigation, irrespective if it was checked by the system successfully or with errors.

- 1) The track considered during checking also includes the area corresponding to the actually set **Safety Corridor**.
- 2) The Safety Contour information of the ENC or other vector charts is not available in raster charts and must therefore fully be replaced by manually generated Own Safety Lines and Danger Highlights.
- 3) To clarify supposed contradictions of this kind, it is helpful to switch to a different range setting and to use the Chart Info box where required.

1.1.7.3 Computation of Sailing Times

The system computes the sailing times that will occur if the track is sailed at a **Planned Speed** or at a **variable speed**, depending on the **Departure Time** and the **Arrival Time** (planned time of arrival). In both cases it also calculates the effect of a speed limitation set by the route parameter **MAX SPD** available for each leg of the pre-planned track. This computation is done each time when you enter a route parameter which is changing the route distances, the relevant speed values or the ETA/ETD values.

- If you set the **Planned Speed** for the complete voyage, the system calculates a time schedule based on the speed settings contained in the planned route. It results in the displayed estimated time of arrival (**ETA**) for each waypoint in the route and the entire sailing time under **ETE**.
- If the **planned time of arrival (ETA)** is input at the beginning of the voyage, the system performs a speed calculation for the complete route. This calculation is based on the **Departure** and **Arrival Time** set for the planned route, and its purpose is to display the required speed for each leg in order to achieve the required time of arrival at the end of the route.
- In both cases, the result, the calculated speed for each leg, is displayed under **calc. SPD** in the **Route List**, and can be used by the operator as the current speed setting during manual speed control. The calculated speed values are in any case limited to the **MAX SPD** values which may be defined differently for each single leg of the entire route.
- Additional to the time and speed data in the waypoint and route list, and independent of the calculation method the estimated time elapsed (**ETE**), i.e. the entire sailing time will be displayed to the right of the **Planned Speed** controls.
- In a system equipped with SPEEDPILOT, the calculated speed values of the route can also be controlled automatically while the ship is sailing along the pre-planned track. In this case each calculated speed value of a leg will be used as the set-point for the speed controller and the planned time schedule is thus fulfilled, if nothing unforeseen happens in between.

Initial Time Schedule

If you load or reload a route, or a new one has been created, the program will set all calc. SPD values to maximum speed (i.e. to the MAX SPD values contained in the route). At the same time a time schedule will be calculated based on these speed values and the first and last waypoint will contain the implicitly resulting departure and arrival time.

Time Schedule with ETA

In order to adapt the initial time schedule of the route to your demands perform the following steps:

1. Select the departure point from the waypoint list and in its **ET Mode** field set the mode to **Departure**.
2. Enter time and date of departure in the ETA/ETD field; this will result in an adapted time schedule, using the speeds shown in the calc. SPD column.
3. Select the arrival point from the waypoint list and in its **ET Mode** field set the mode to **Arrival**.
4. Enter time and date of arrival in the ETA/ETD field.

This will result in an adapted time schedule by changing the speeds shown in the calc. SPD column but keeping the departure time.

As long as the MAX SPD values of the planned route are not achieved, the adapted time schedule will follow your settings for the ETD and ETA (refer also to the **Notes** below).

Time Schedule with Planned Speed

In order to adapt the initial time schedule of the route to a constant speed for the entire route or to a specified speed profile, perform the following steps:

1. Select the arrival point and in its **ET Mode** field set the mode to **Calculated**.
2. Verify or change the maximum speed values in the **MAX SPD** fields according to your needs.
3. In the **Planned Speed** field enter the required speed value and click on **Set**.

This will result in a new calculation of the time schedule for the entire route based on the set departure time and the planned speed value, but taking into account those legs which have a speed limitation set by the MAX SPD values.

If the route contains an arrival point in the ET column and the Planned Speed is entered, you will get a warning that this will be changed to Calculated and the arrival time is lost.

With **[Clear]** you can make the Planned Speed invalid, so that the time schedule can be recalculated based on the set arrival and departure times.

Notes:

If the maximum speed is achieved in all **calc. SPD** columns, the arrival time cannot be made shorter. In this case an earlier arrival time will also lead to an earlier departure time. In the same way a later departure will create a later arrival time.

If you must achieve an earlier arrival time and an earlier departure is not possible, the MAX SPD values could be increased until an upper limit is reached, which is specific for your ship under the prevailing conditions.


1.1.8 Completing the Generation of the Route

The new or modified route must be stored in the file system of the MFD so that the data that were input during or after checking of the route will not be lost as soon as the route is switched off or the system is shut-down.

Ending the Generation of a New or Modified Route

The route window must be switched on and visible.

1. You can enter additional notes to each single waypoint in the **Note** input fields of the waypoint list.
2. In the **header** of the waypoint list or in the context menu of the **Route Expander** click on [Save] and the new or modified route data-set will be stored with all data which have been entered until then under the indicated **Route Name**.

 If you have modified a route and want to keep the original route unchanged you must enter another route name for the original route before you save the modified one. This is done by a MORE click into the catalog field of the **Route Explorer** where **Save As...** must be clicked. When specifying the route name, pay attention to the following:

- Each route is assigned to a catalog. Within the catalog, the route is clearly identified by means of the route name, i.e. within a catalog the same route name can only be assigned once.

1.1.9 Import / Export Routes

2 Chart and Route Monitoring

During the voyage, the ECDIS subsystem of each MFD integrated in the navigation system performs a number of nautical checks at short intervals of time. This process is running on all indicators with RADAR-PILOT ¹⁾ and ECDISPILOT functionality as well as on the MULTIPLOT.

If defined criteria, based on the ECDIS performance standards, are infringed, an appropriate alarm is given when the respective monitoring function is in the switched on state under the relevant alarm settings.

The entire implemented monitoring functionality can be divided into route monitoring and chart monitoring.

Route monitoring

- is performing the monitoring of deviations of your own ship from the System Route, displayed in the PPI/chart and
- is watching the approach to critical points on the System Route.

Additionally the results of the **Check Route** function in combination with the monitoring strip defined by the **Safety Corridor** remain available to the operator for the **System Route** also during voyage execution.

Chart monitoring

is including the checks of own ship's position (defined by the **ship's outline** ²⁾), its movement ahead in course direction (defined by the **Look Ahead Sector**) relative to

- the chart objects contained in the vector chart and
- the user chart objects **Own Safety Line**, **Danger Highlight** and many of the symbols ³⁾ which are available in the User Symbols database.

Alarms and Warnings for activation of the different monitoring functions are selected in the Alarms expander via the **ECDIS Alerts** selection menu. The alarms can be activated independently by selection of

- Safety Contour Alarm
- Special Area (Indication or alarm)
- Obstruction ahead indication
- Critical point on route alarm
- Cross-track alarm

in the Alerts menu.

1) On RADARPILOT Chart Monitoring is only possible if it is configured as a Chartradar on service level.

2) The parameters for the ship's outline have been defined on service level.

3) Only those user-made symbols which are classified as obstructions (like buoys, beacons, lighthouses, landmarks, etc.) generate an alarm in the monitoring process.

An alarm given in the Alarm Line and in the Alarm List and referencing chart objects ahead or at the own ship's position can be caused by several different violations of chart objects being touched or crossed:

- Each basic alarm reason (i.e. each type of object related alarms) creates a circular symbol showing the location of the violation by the own ship contour or the look ahead sector.
- Holding the cursor on the circular symbol, opens the chart alarm list with detailed descriptions for this location. The additional alarm text information is taken from the chart database (i.e. is part of the official electronic charts) or from the user made own chart objects.

Preconditions

So that this Chart Monitoring can serve its purpose, namely increasing the nautical safety, the following prerequisites must be fulfilled:

- The best possible sensors for position and speed over ground must be selected.
- By means of a comparison between the available position sensors, a check must be performed to ensure that the selected position sensor is supplying correct and accurate position data.
- If a vector chart is used, it must be available for the entire navigated area. Otherwise, own safety lines and danger highlights must be made available in the **User Symbols** data base for the missing areas.
- If a raster chart is used, own safety lines and danger highlights for all potentially dangerous areas and objects must exist for the entire navigated area.
- The safety contour value must have been set correctly. [See chapter 5.7 on page B-57](#) for details.
- The used route must have been successfully checked and reasonable settings for the track limit (i.e. the monitoring strip for the deviation from route alarm) must have been made for each leg.
- The latest relevant nautical warning information received by radio must be taken into account, possibly by the editing of own safety lines or danger highlights or by manual ENC update (see chapter Chart Maintenance).
- The check of the used planned route should, if necessary, be repeated after incorporation of the received warning information.
- The alarm criteria must be correctly set - see the following sections.
- In the case of doubt and once per year, the monitor performance must be checked. [See chapter B - 3.3 on page B-14](#) for details.

2.1 Route Monitoring: Own Ship against the System Route

Monitoring of the Cross Track Distance

If the deviation of the own ship's position from the pre-planned track is greater than the **Cross-track alarm** limit set in the System Route under **XTD LIM** for the current leg, the alarm message **Deviation from Route** appears.

The activation of the relevant alarm function takes place under **Alarms > ECDIS Alerts > Cross-track alarm**. The off-track limit value currently valid for the actual leg is displayed in the **XTD LIM** column of the route list. The currently measured off track distance (i.e. the transverse deviation from the track line) is indicated numerically on the **Route Data** Expander and graphically on the **Conning Display**¹⁾.

Alarm on Approaching the present Waypoint

When the probable travelling time needed to reach the wheel over point (WOP) of the next planned course manoeuvre at the **To-Waypoint** defined by the System Route becomes less than the value of the look ahead distance or the time displayed under **Alarms > Own Ship**, the alarm message **Approach to Waypoint** appears.

In addition, by switching off the function **Critical point on route alarm**, the output of this alarm can be suppressed for this MFD, even if the other route related alarms are not suppressed.

USEFUL INFORMATION

The Connection with the TRACKPILOT²⁾


The monitoring of the own ship against the System Route is performed independently of the ECDIS sub-system by the TRACKPILOT as well (if the TRACKPILOT is switched on). During this process, both programs operate with independent limit-values.

The TRACKPILOT always checks with its own user set limits against the track which is valid for its operating mode, i.e. depending on its steering mode (Heading, Course or Track mode). The equivalent route related alerts of the TRACKPILOT are only activated if the ship is steered automatically in Track mode (i.e. along the System Route).

For the case that the **AUTO Fill** function is activated, the TRACKPILOT will also use the **XTD Limit** taken from the System Route, i.e. the same value as used for route monitoring by the ECDIS sub-system.

In case of course or position deviations from the pre-planned track and depending on the situation, the alarms **TP Course Limit Exceeded** and **TP Track Limit Exceeded** are given, and the approach to the WOP is announced by the **TP Waypoint Approaching** alarm.

Additionally, 30 seconds before starting a course change in Track mode, the **TP WOP Execution** alarm will be given by the TRACKPILOT.

 The order to reduce the number of alarms during sailing in Track Mode, it is advisable to switch off the **Cross-track alarm** and the **Approach to Waypoint alarm** of the ECDIS.

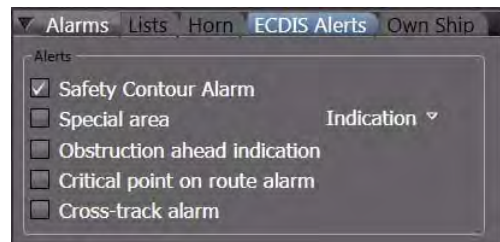
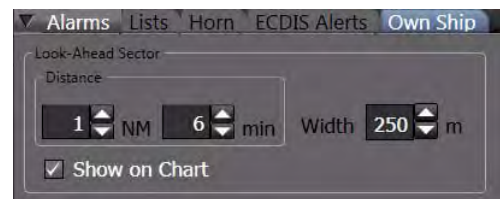
1) The Conning Display is an optional system component or an optional display mode on the MFD.

2) This information is not relevant for systems without TRACKPILOT.

2.2 Chart Monitoring: Own Ship against Vector - / User Chart Objects

Look-Ahead Sector/Alerts

Two different expanders provide a collection of settings usable for chart and route monitoring during voyage execution. The route related alerts are only activated if a **System Route** has been activated for the system.



Look-Ahead Sector

Show on Chart activates a virtual sector in front of the ship, formerly known as "guard sector".

For this ECDIS Monitoring function and independent of the visibility of the sector, the program constructs a monitoring sector (look ahead sector) with an adjustable sector width and a length which can be defined here.


In the example shown here, the sector has a length of one mile and a width of 250m at its end ¹⁾.

The guard sector opens out from own position in the direction of the ship's movement (i.e. the COG/SOG vector) and is carried along with the ship.

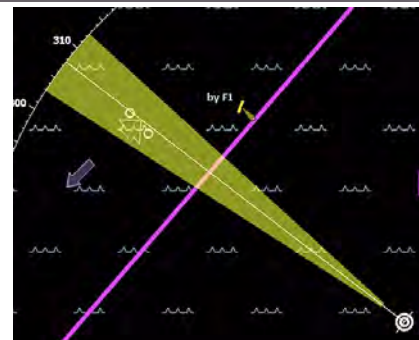
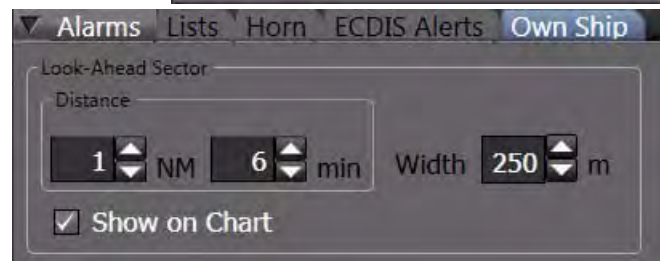
The monitoring is performed both with the guard sector and with own position (i.e. the own ship contour).

It takes place for several objects which are entered in the electronic chart or are stored as User Symbols. The monitoring is therefore independent of whether the display of these objects is switched on or off. Which chart objects or which user symbols are to be monitored is specified in the relevant performance standards.

Whenever a monitored object is within the defined range of the sector or it touches or overlaps the ship's contour, the corresponding alarm is raised. See below under **Alerts**.

 Even when the function **Show on Chart** is switched off, in any case the defined guard sector monitors against the objects under **Alerts** in the frame below.

It might be an advantage to suppress the guard sector monitoring if the speed is very low or the ship is stationary.




¹⁾ The **Look-Ahead Sector** length can be defined by a time or a distance setting, whereby the value resulting in the longer distance ahead will be used. With the time setting, the length of the guard sector is dependent on the own ship's speed.

Alerts

Different alerts can be switched on and adjusted for the purpose of own ship and route monitoring.

- If selected, **Safety Contour Alarm** raises the **Crossing Safety Contour** alarm. For the setting of the Safety Contour see [See chapter 5.7 on page B-57](#).

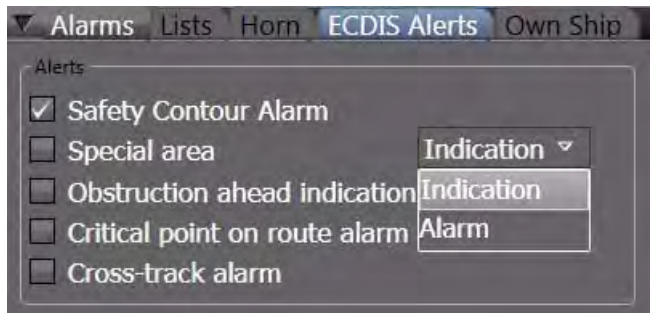
- If selected, **Special Area** raises the **Area with Special Conditions** alarm.

 It can be chosen whether this notification will be raised as an alarm with buzzer or as an indication only.

- If selected, **Obstruction ahead indication** raises the **Crossing a Danger** indication.
- If selected, **Critical point on route alarm** raises the **Approach to Waypoint** alarm.

If in the switched on state, this alarm will be announced automatically before your ship is passing the next waypoint on the activated route. The pre-warning distance or time can be set under Alarms > Own Ship > Look-Ahead Sector. [See chapter C - 2.2 on page C-38](#) for details. The waypoint **Notes** field in the opened waypoint list can be used to transfer information concerning this point on the route to the operator.

- If selected, **Cross-track alarm** raises the **Deviation from Route** alarm if the maximum allowed cross-track distance between pre-planned track and current position is exceeded. The monitoring limit can be set during route editing in the XTD LIM column of the waypoint list. [See chapter C - 1.1.6 on page C-22](#) for details)



Switching the Alarms on

Click on **Alarms, ECDIS Alerts** to switch the different monitoring functions on or off. These selections can be done independently of each other.

2.2.1 Monitoring on the Basis of a Vector Chart

Warning against Sailing into an Area of Insufficient Depth

When a **Safety Contour** (See chapter 5.7 on page B-57) or another area with insufficient depth (less than the set safety contour value) is touched by the guard sector, e.g. an object belonging to the object class Land Area, the **Crossing Safety Contour** alarm appears in the alarm list. As soon as the own ship contour is situated on the safety contour or on one of the other above-mentioned areas, the alarm likewise appears.

The safety contour is formed from all objects of the object classes Land Area and Intertidal Area and from the objects of the object classes Depth Area or Dredged Area whose depths are equal to or the next size greater than the value entered in the menu **Presentation > ENC > Depth** under Safety Contour.

For this monitoring, the cells with the highest precision available in the chart database are used. They might be different from the cells being used for display. It is therefore helpful to use another display range for an additional visual check and to use the Info Box.

The setting of the guard sector for this monitoring process is performed in the same way as described above in the menu **Alarms > Own Ship**. The output of the safety contour alarm can be generally suppressed by means of the **Safety Contour Alarm** checkbox under **Alarms > ECDIS Alerts**.

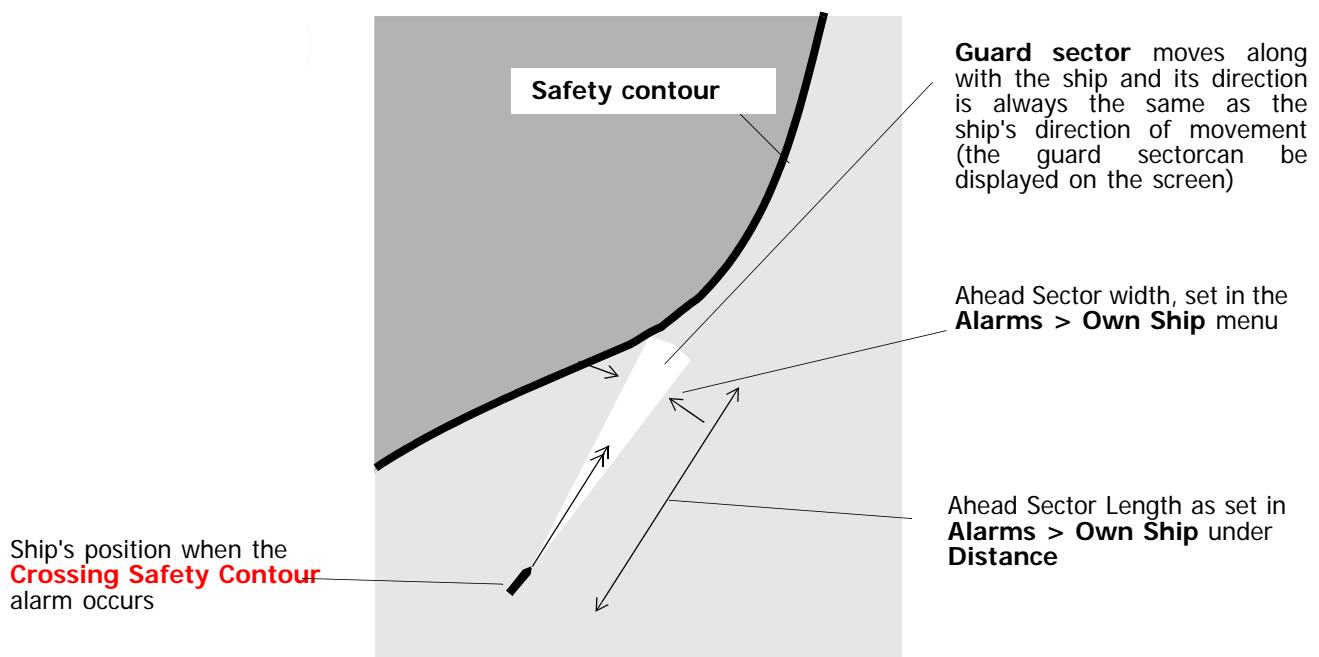


Fig. C / 12 Generating the Chart Alarm with the Guard Sector (example: Safety Contour alarm)

Warning about Running over a Potentially Dangerous Object

If the guard sector touches an object from a series of object classes specified in the program based on the ECDIS Performance Standards, such as Restricted Area, Caution Area, Traffic Separation Zone or Buoys, Beacons, etc., the alarm **Area with Special Conditions** or **Crossing a Danger** appears in the Alarm List. These alarms also appear if objects are touched which belong to particular object classes and are provided with depth information (e.g. Underwater Rocks, Wrecks) and whose depth is less than the value entered under Safety Contour in the menu **Presentation > ENC > Depth**.

The setting of the guard sector for this monitoring process is performed in the same way as described above in the menu **Alarms > Own Ship**. There, the output of the above mentioned alarms can be generally suppressed by means of the checkboxes **Special Area** and **Obstruction ahead indication**.

For the **Special Area** alert monitoring, the priority in the alarm list can be set to alarm or to indication level. Indications are announced without activation of the buzzer.

2.2.2 Monitoring against User Symbols

If an **Own Safety Line** is touched or crossed by the guard sector, the **Obstruction Ahead** alarm appears in the Alarm List. The alarm appears only if the own safety line is touched from within the safe area. The non safe side of the area behind the safety line is indicated by small hachure lines.

The same alarm is issued if one of the user-made **Symbols** (e.g. buoys, beacons, wrecks or other underwater hazards) is touched by the look-ahead sector.

If an area belonging to the object class **Danger Highlight** is touched by the guard sector, the alarm **Area with Special Conditions** appears.

Activation of the guard sector for this monitoring of the user-made chart objects is performed in the menu **Alarms > ECDIS Alerts** where also the other alarms can be activated or suppressed.

User Chart Objects on Raster Charts

☞ Because the user-made own safety lines, danger highlights and symbols are available independently of the chart type, this part of the chart monitoring process can also be performed if raster charts are used ¹⁾.

It is urgently recommended ²⁾ that, if raster charts are used, the dangerous areas and objects and (for example) traffic separation zones should be marked by means of own safety lines or danger highlights in order to support the navigator with a basic automatic chart monitoring function.

USEFUL INFORMATION

Details of the Chart Monitoring Alarms and Indications

Supplementing information about the chart monitoring results is shown in combination with a circular symbol in the chart or by opening the Info window at this location after clicking with MORE into the chart. If you hold the cursor on a circular symbol, a tool-tip window is shown, containing the chart alarm list with all violations found in the chart at this position.

Repetition of the Alarms



CAUTION

An alarm is only repeated if an object belonging to a different object class is touched or if the same object class is touched within a smaller distance or time.

If, for example, the ship is sailing along a line of buoys and is too close to them, the alarm **Crossing a Danger** appears only for the first buoy, but it can be acknowledged and remains in the alarm list until this type of violation is no longer found within the guard sector. Thereafter a new violation can activate the same alarm again.

¹⁾ Raster Charts are not yet available in the Platinum ECDIS

²⁾ On ships with DNV approval this is a compulsory requirement.

CONNINGPILOT platinum

1 Operating the Conning

1.1 General

The functionality of Conningpilot is available in the system in different implementations

- On the second monitor connected to a main MFD. In this case operation is executed by the same keyboard and trackball which is connected to the main MFD, by moving the cursor to the screen area of the second monitor.
- As one of the additionally available operating modes on a MFD.

In general, different conning display functions can be configured for different conning monitors, but the operation of each display function is identical on all screens.

Depending on the system configuration the conning display can present and operate functions for navigation, automation, machinery, maintenance and service.

For a description of conning functions of Automation/Machinery please refer to

1.2 An Overview of the Screen

Similar to each other screen layout, the conning display window is divided into different screen areas which can be combined in different ways.

Tabs for the quick access to the appropriate windows, available after the window has been displayed at least one time.



Links for the quick access to the appropriate windows

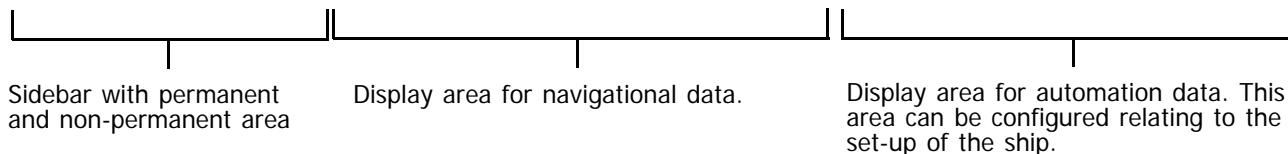


Fig. D / 1 Overview of the Conning screen

As a minimum, three different views of the **Conning** screen are available:

- **Conning Home.** It shows the most important conning data for open sea navigation according to the settings of the operator. It is divided into a **Navigation** part and an **Automation** part.

-
- **Conning Display Waypoint List** provides a combination of the most important conning data and the actual waypoints of the present system route. It is divided into two parts as well.
 - **Docking Display.** In this display, the movement of the ship is visualised with detailed data for heading, rate of turn and speed.

Other Display selections may be available depending on the ent system configuration and the available sensors and interfaces.

1.3 Conning Display - Navigation

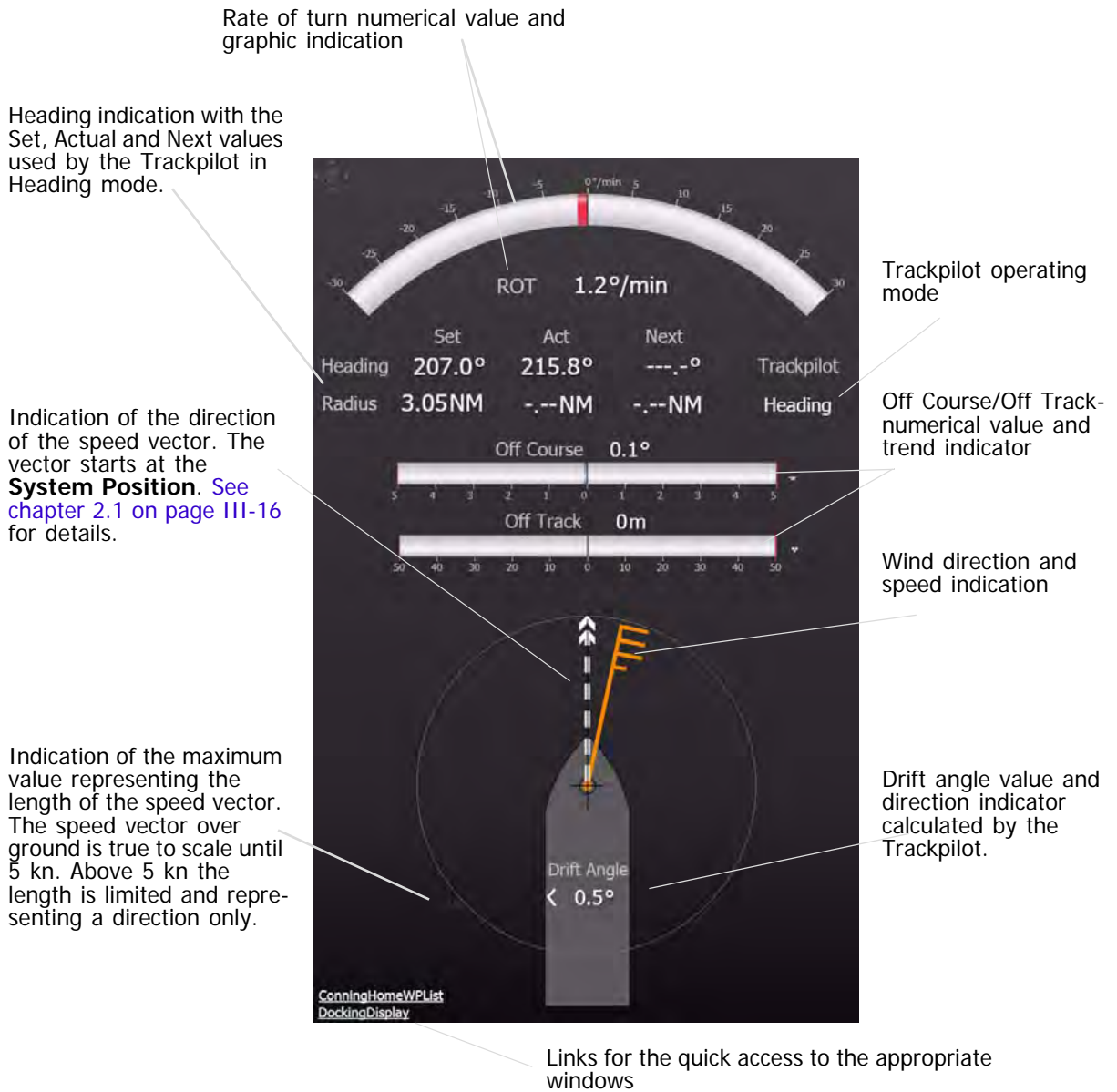
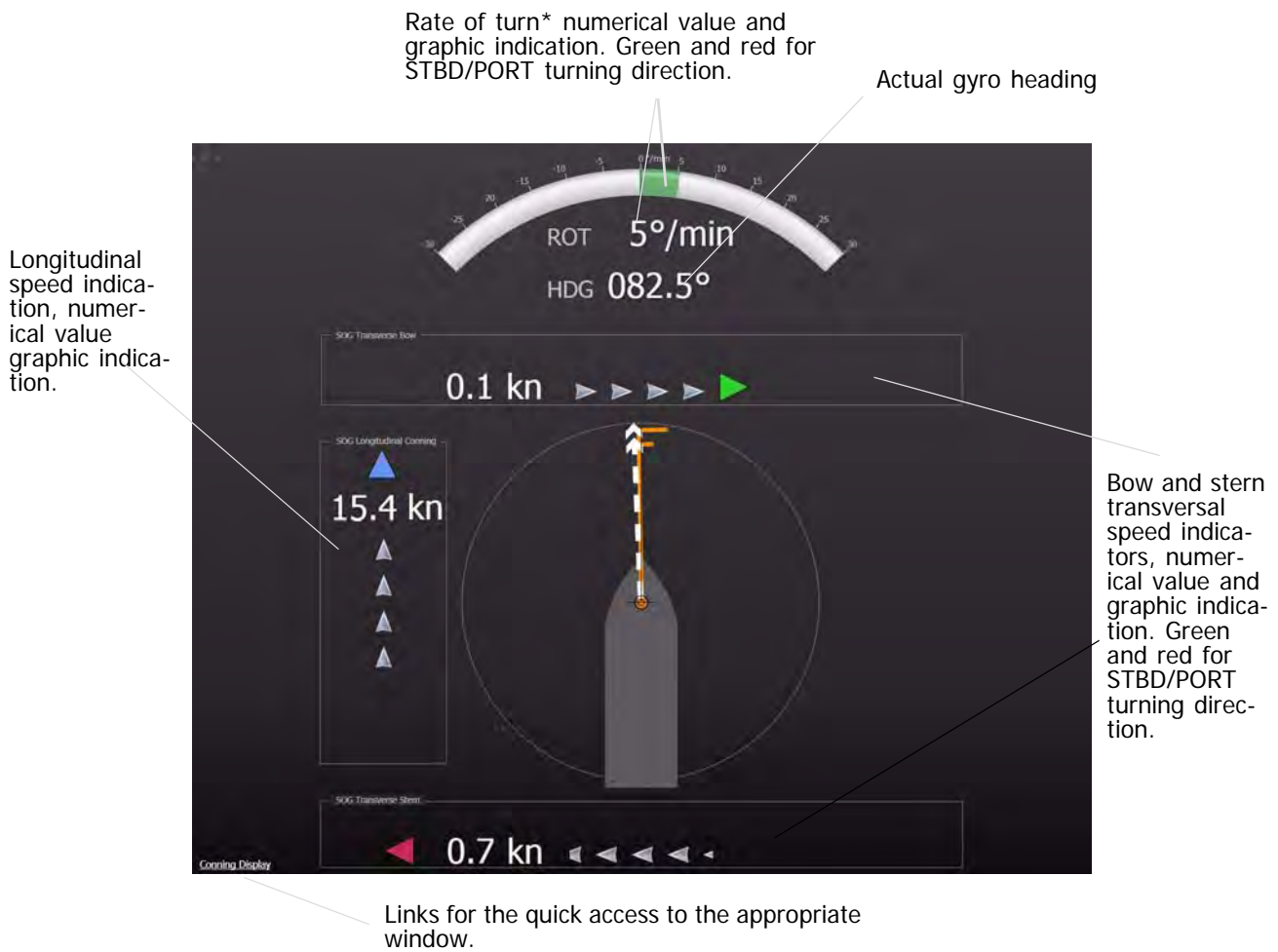


Fig. D / 2 Conning Display

The Conning Display - Navigation is displayed together with the automation data in the **Conning Home** window. The window is opened per default when Conningpilot is started, it is also accessible by the appropriate tab or link. For the automation part of this display see [chapter D - 1.6 on page D-10](#).

1.4 Docking Display




* : The indicated ROT value (numerical and graphics) is calculated by the system from the gyro-heading received from the selected heading sensor.

Fig. D / 3 Docking Display

The Docking Display is shown in the entire Application Area.

In the example above, bow is moving transversal in starboard direction, stern is moving to port. The direction is indicated by the green and red triangles respectively at the appropriate side of the display as well as by the light-grey arrows, which are moving into the appropriate direction.

1.5 Conning Home Waypoint List

 Subject to changes, or yet described

Active System Route data

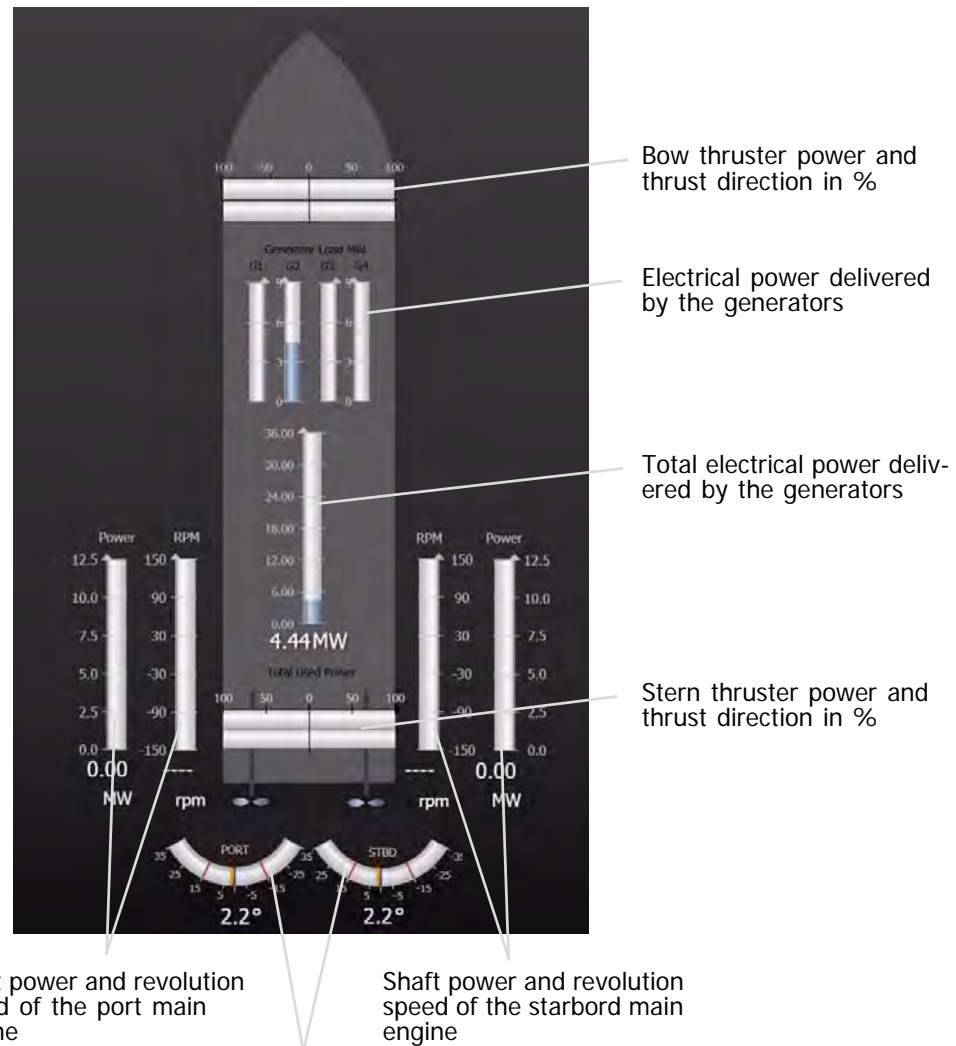
Active System Route					
Name: Test 1			Destination: WP 5		
Distance: 67.3NM			ETA: 21 Apr 08:08:19 UTC		
WP	Waypoint Name	CTS	Distance	Speed	ETA
---	---	---, °			
1	Initial waypoint	68.4°	47.7NM	25.0kn	21 Apr 05:26:46 UTC
2	---	45.3°	9.8NM	25.0kn	21 Apr 05:50:24 UTC
3	---	1.8°	4.5NM	25.0kn	21 Apr 06:01:12 UTC
4	---	29.5°	11.3NM	--,-kn	21 Apr 06:28:25 UTC

Fig. D / 4 Conning Home Waypoint List

The upper part of the **Conning Home Waypoint List** is similar to the main conning display, but the outline of the ship and the ship's speed vector and wind indication are replaced with a table that displays the data of the **Active System Route**.

The waypoint list shows the courses, leg distances and calculated speed data for the actual next legs of the route. The **ETA**-column indicates the arrival times at the waypoints calculated by the system. Additionally, the planned and actual **ETA** at the specified **Arrival** point is shown together with the calculated **Delay** or **Spare** time of the time schedule.

1.6 Conning Display - Machinery



Rudder angle from the rudder angle sensor.*
The thin red lines indicate the rudder limit set by the operator with the configuration manager tool. The orange line indicates the set value of the active Trackpilot.

* : In systems with Trackpilot. Values delivered by the Trackpilot Interface.

Fig. D / 5 Conning application area for automation data

The **Conning Display - Machinery** is displayed together with the navigation data in the **Conning** window. The window is accessible by the appropriate tab or link. For the automation part of this display see [chapter D - 1.6 on page D-10](#).

 The figure above is only an example. It may vary significantly from the display on your system!

1.6.1 The Rate of Turn Indication

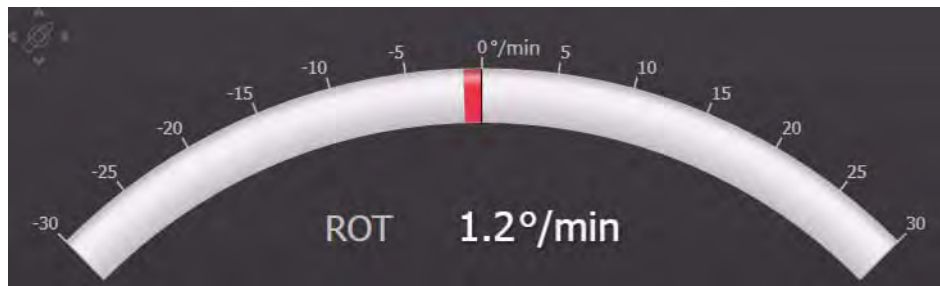


Fig. D / 6 The Rate of Turn Indication

The **Rate of Turn** value is computed from the change in the gyro heading values supplied by the compass system. Displayed as numerical value and graphical indication.

Red bar to the left: Ship is turning to port.

Green bar to the right: Ship is turning to starboard.

1.7 Conning Sidebar - Permanent Area

The permanent area consists of only one group, the **Ship Attitude**.



Fig. D / 7 Conning Sidebar in the Permanent Area

- **Heel**

The transversal inclination of a vessel due to the action of the wind, a greater weight upon one side, etc., usually transitory. Positive values indicate a heeling to STBD.

- **Trim**

The longitudinal inclination of a vessel due to greater weight at the bow or stern, etc., usually transitory. Positive values are present if the bow is "up".

The **Ship Attitude** window may, depending on sensor availability, also contain the **Draft** forward (at bow) and the **Draft** aft (at stern).

1.8 Conning Sidebar - Non-permanent Area

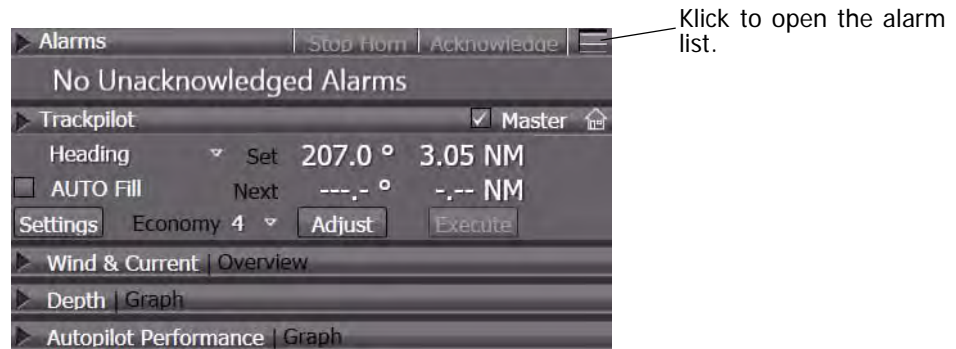
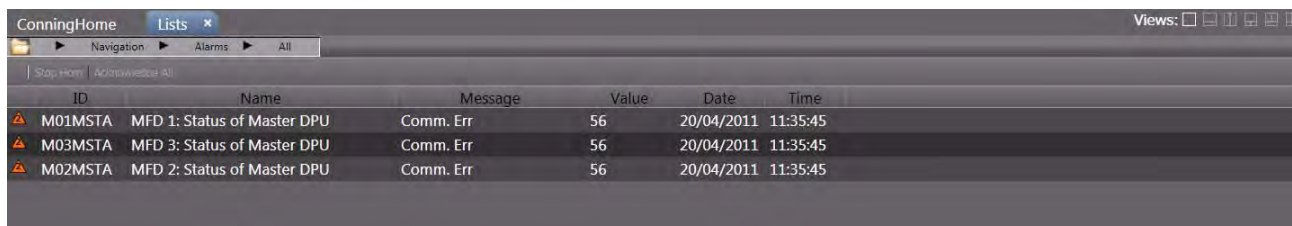


Fig. D / 8 Conning Sidebar in the Non-Permanent Area

- The **Alarms** expander shows the oldest not acknowledged alarm and provides alarm management, including an **Alarm List**, which opens in the application area.
- The **Trackpilot** expander contains the same information as described in the appropriate chapters, [see chapter G - 1 on page G-3](#) for details.
- The **Wind & Current** expander displays an overview of the actual wind and current data
- The **Depth** expander shows the run of the measured waterdepth within the last time period (default 10 minutes)
- The **Autopilot Performance** expander provides control graphics for the autopilot in form of a rudder recorder.

1.9 The Alarm List on Conning



ID	Name	Message	Value	Date	Time
M01MSTA	MFD 1: Status of Master DPU	Comm. Err	56	20/04/2011	11:35:45
M03MSTA	MFD 3: Status of Master DPU	Comm. Err	56	20/04/2011	11:35:45
M02MSTA	MFD 2: Status of Master DPU	Comm. Err	56	20/04/2011	11:35:45

Fig. D / 9 The Alarm List of Conning

The alarm list shows detailed information about the present alarms. Contents and operation of the alarm list is the same as on the non-permanent area. [See chapter V - 1 on page V-3](#) for details on the alarm list.

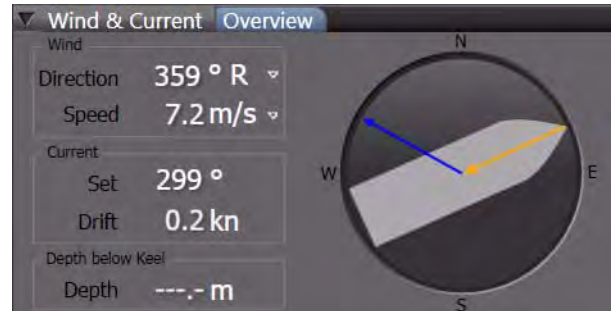
- ☞ In contrast to the other display modes on the MFD, on the Conning Display the alarm list covers the entire application area; the list can not be opened in the non-permanent area in Conning mode.

1.9.1 Wind and Current

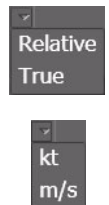
This expander contains three groups as a minimum. ¹⁾

- **Wind**

Displays the direction and speed of the actual measured wind, delivered by an anemometer.



The wind direction can be set as relative or true, the unit for the wind speed can be set as knots or m/s.



- **Current**

Displays the direction and speed of the actual measured current. Those values are always true and in kn. Current data can only be calculated if SOG and STW data are available and valid.

- **Depth below transducer**

Shows the value of the actual measured depth below transducer delivered by the depth sensor. ²⁾ The depth history is shown in the Depth expander.

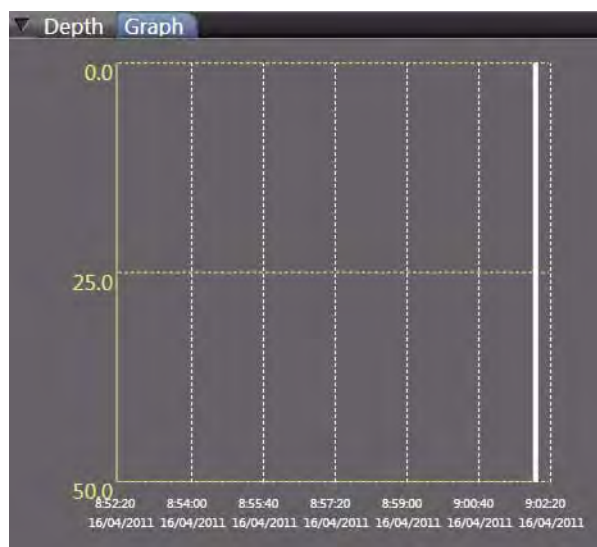
¹⁾ If available and connected to the system, other environmental data like water and air temperature can be indicated.

²⁾ Depending on the depth sounder connected, also the **Depth below Keel** can be indicated.

1.9.2 Depth

The **Depth** expander shows the run of the measured waterdepth within the last time period.

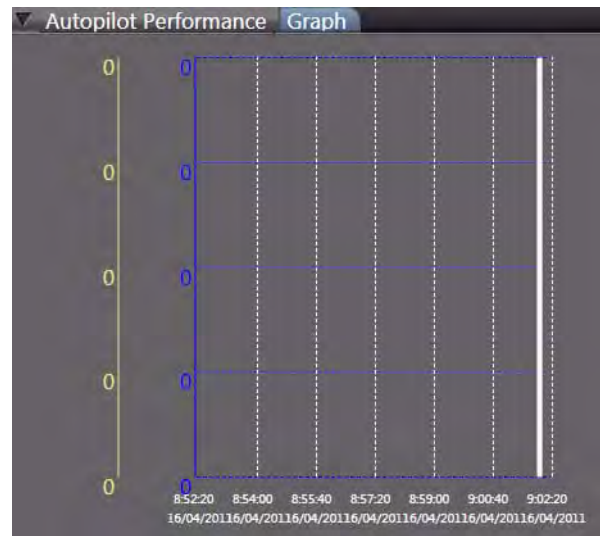
(to be continued)



1.9.3 Autopilot Performance

The **Autopilot Performance** expander provides control graphics for the autopilot. The parameters like time period and scale can be set by the operator.

(to be continued)



SENSORS

1 AIS

1.1 AIS Summarized Briefly

In addition to the ARPA electronics, the Universal Shipborne **A**utomatic **I**dentification **S**ystem (AIS) automatically provides the ship's nautical officers with important information about nearby vessels or other relevant objects within VHF range.

The AIS system transmits own ship data cyclically via two defined VHF channels and receives the same data of the other ships and objects that are equipped with AIS systems.

1.2 Overview of Functions and Operating Procedures

Targets and Other AIS Objects

With regard to the objects that can be detected by the AIS system and transferred to the radar indicator, a distinction is drawn between the following:

- AIS targets: ships that are equipped with an AIS system
- SAR aircraft: search-and-rescue aeroplanes or helicopters
- Aids-to-Navigation: navigation marks, e.g. beacons and buoys
- Base stations: Equipment for controlling the AIS system, e.g. as a component of a traffic control centres.

The AIS targets and SAR aircrafts can be activated and tracked, as well as the radar/ARPA targets. [See chapter 7.1 on page A-56](#) for details about ARPA and AIS target handling.


All AIS objects can be displayed on the PPI, and in ECDIS mode they can be displayed throughout the entire chart area. The data of the individual monitored targets can be displayed in detail.

Safety Messages

Via AIS systems, safety messages ¹⁾ can be communicated if necessary, which are then passed on by all receiving AIS systems as a message or an alarm to their display units. The procedures for dealing with the safety messages received are described in section 3.3.

Monitoring/Setting of the Own Ship Data Transmitted

Most of the information transmitted from your own AIS system is generated automatically by the system. However, some items of information (e.g. ship's draught, hazardous cargo, destination, ETA) have to be defined by the operator by inputs to the AIS operating unit.

 Because these data are voyage dependent, their input to the AIS unit should be assured by including them in the nautical check list.

Setting of the communication technique (channel selection, bandwidth, transmission power etc.) usually takes place fully automatically. In very rare cases, however, manual setting procedures too might be necessary for the channel management.

The Type of your own AIS System

The interface between an AIS transponder electronics unit and the display/operating unit (here, RADAR-PILOT or ECDOSPILOT) is standardised. Any type approved class A transponder can be connected to the Platinum system. All the display related functions as described in the subsequent chapters can be controlled from the RADARPILOT/ECDISPILOT user interface.

Installation settings like MMSI, GPS antenna location etc. are not standardised, they are set with the corresponding MKD (minimum keyboard display) which comes along with an AIS transponder system. For the Platinum AIS transponder system 3410 there is no MKD required. The initial configuration can be carried out with the Platinum Integration Manager SW Tool.

¹⁾ Also called safety related messages in the relevant regulations.

1.3 Setting the Voyage Data

Most of the data that are sent by the own AIS system for the purpose of target data display on other ships (**own AIS data**) are generated automatically by the system (e.g. identification data, position etc.). However, some items of information (e.g. ship's draught, cargo, destination, ETA) have to be defined by the operator.



CAUTION

The following data must be entered at the beginning of every voyage, and must (if necessary) be updated during the voyage to ensure correct and up-to-date information to be sent to other ships.

Select Settings > AIS > Voyage Data to enter the tab. Check and adjust the displayed information as required for your voyage.

DEST

Destination of this voyage

ETA

Estimated time of arrival at the specified destination

Persons on Board


The number of persons on board.

STATE

Navigational state as specified in the rules. For example "Under Way using Engine", "At Anchor" etc.

CARGO

Prescribed information about the cargo as specified in the rules. For example "None", "Hazardous Goods Class A" etc. The available choice depends on the type of ship set in the basic configuration of the Platinum system. In case the present ship is a passenger vessel, this group would be named **Passenger** instead of **Cargo**.

 In the fields **State** and **Cargo** it is only possible to choose between specified entries. This is done in the list which appears after clicking on the field concerned. As long as the cursor is situated on the field **State** or **Cargo**, a small window appears below this field, containing information about the entry.

Field	Value	Action
DEST	HAMBURGER ALSTER	Adjust
ETA	28 Apr 2011 10:15:00 UTC	Adjust
Persons on Board	0	Adjust
State	Under Way using Engine	▼
Cargo	No Additional Information	▼

SOLAS Chapter VII - Carriage of dangerous goods

requires among other things the declaration of hazardous substances contained in the cargo.

MAPOL Annex II - Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk

defines the following categories for hazardous liquid substances:

Category A - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a major hazard to either marine resources or human health or cause serious harm to amenities or other legitimate uses of the sea and therefore justify the application of stringent anti-pollution measures. Examples are acetone cyanohydrin, carbon disulphide, cresols, naphthalene and tetraethyl lead.

Category B - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea and therefore justify the application of special anti-pollution measures. Examples are acrylonitrile, carbon tetrachloride, ethylene dichloride and phenol.

Category C - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a minor hazard to either marine resources or human health or cause minor harm to amenities or other legitimate uses of the sea and therefore require special operational conditions. Examples are benzene, styrene, toluene and xylene.

Category D - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a recognizable hazard to either marine resources or human health or cause minimal harm to amenities or other legitimate uses of the sea and therefore require some attention in operational conditions. Examples are acetone, phosphoric acid and tallow.

1.4 Setting the transmitter / Transmitter Status

In this tab, the status of the AIS transponder and additional information are shown.

It is possible to prevent the AIS from transmitting completely.

The **Long-Range Interrogation Mode** can be set here.




Transmitter

Select **On** or **Off**.



CAUTION

The transmitter should not be switched off except in justified exceptional cases, because when it is switched off, own ship can no longer be detected as a target by other ships and cannot participate in the communication between ships, equipped with AIS.

 The status **Transmitter On/Off** is stored with date and time and can also be called up after an accident at sea.

Long-Range Interrogation Mode

The AIS system can also be interrogated about own ship data (e.g. own AIS data) by another system, e.g. a SatCom system. Because this interrogation can take place over longer distances than the VHF range, it is called "long-range interrogation".

The interrogating station specifies which data are requested. The reaction of the AIS electronics unit can be set by means of the **Long-Range Interrogation Mode**.

- ON: The interrogation(s) are replied as specified
- OFF: No alarm appears, no reply is sent
- MANUAL: In the case of an interrogation, the **AIS Interrogation** alarm appears. By acknowledgement, the **AIS Interrogation** dialog appears. The reply is sent with the **Reply** button or is instead prevented with the **Close** button.
- AUTO: In the case of an interrogation, the reply is sent automatically. For the purpose of information, the **AIS Interrogation** alarm appears; it should be acknowledged in the usual way.

Status Information

The fields **UTC** to **DIM D** contain status information about own navigational sensors whose data are transmitted as own AIS data and the reference point of the position reported.

UTC

The status of the internal clock of the transmitter. (**Clock Ok** or **Clock Lost**)

POSN

Depending on the connected systems, several different indications are possible.

- **External GNSS....** means that the GPS receiver connected externally to the AIS electronics unit is being used for this purpose. **DGNSS** is also possible, if differential mode is used by the position fixing device.
- **Internal....** means that the internal GPS receiver in the AIS electronics unit is being used for this purpose.

SOG/COG

Information about the source of the transmitted SOG/COG data. (**External** or **Internal**)

HDG

Status of the heading data (**Valid** or **Invalid**)

ROT

Indicated as **Valid** or **Invalid**,

- **Other source** means that an approved ROT sensor is not being used, and so only the direction but not the rate of the heading change is transmitted. In this case, only the direction of turn (port/starboard manoeuvre) can be displayed on the receiving system.

The fields **DIM A** to **DIM D** show the distance of the reference point to bow, stern, port and starboard side in meters. The reported position is referenced against this point. Further on the size of the own ship can be derived from this information.

1.5 Channel Management

The AIS system cannot function unless all AIS systems communicate on the same VHF channels and unless the communication bandwidth and the transmission level are correctly set. The settings needed for this are normally made automatically as described in the following.



CAUTION

It is also possible to make a setting manually, but this should only be done in exceptional cases and following the advice of a local administration received by radio, publications, etc. and only after having informed the ship's command personnel accordingly. For manual setting, see chapter "Displaying the Channel Data Set" on page F-11.

VHF channels 2087 (161.975 MHz) and 2088 (162.025 MHz) are used worldwide for the two AIS channels.

As default values, AIS channel A uses the VHF channel 2087, the AIS channel B uses the VHF channel 2088, and for both channels, the bandwidth setting is **Auto**, and transmission is performed with power level **High**. Every mobile AIS station operates on these two channels. A mobile AIS station is thus capable of receiving two messages, from two different stations concurrently, provided that it does not transmit at the same time.

In particular geographical regions or situations, i.e. due to local RF interference, it is necessary to deviate from these settings. The necessary values are received via the AIS channels from a local VTS centre, harbour administration etc.

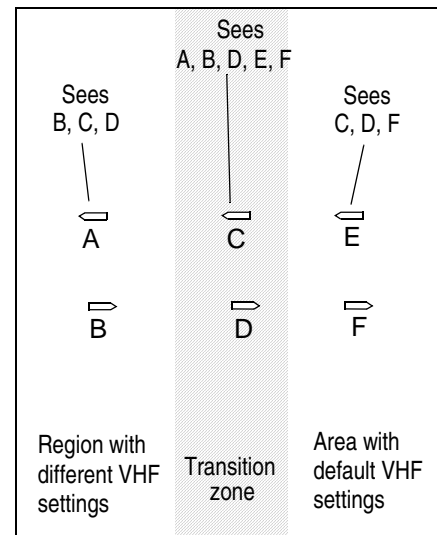
These data also contain the information about the region in which these settings are to be used, including the transition zone surrounding that region.

The switch-over is performed automatically when the ship is located in the transition zone. This is done in the following steps:

- As soon as the ship reaches the boundaries of the transition zone, one AIS channel is set to the different VHF settings (with the other AIS channel remaining unchanged) and the alarm Channel management changed is shown. As a result, the targets situated inside and on either side of the transition zone are now seen and the ship is also seen by these targets; see the diagram.
- On leaving the transition zone, the second AIS channel is also switched over to the different VHF settings.

The general effect is that a ship which is not located in the transition zone does not see any targets located behind the transition zone.

The transponder is capable of managing 8 different zones automatically. Each zone is described by the South-West and North-East corner of a rectangle.



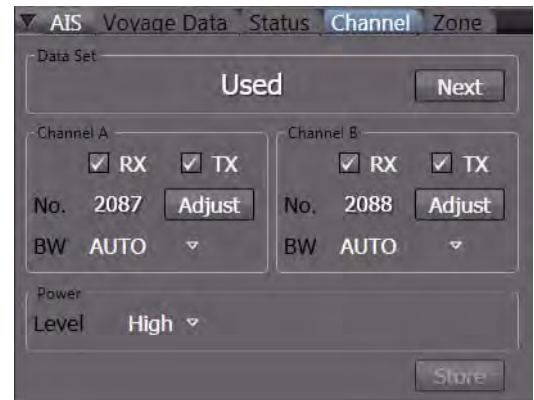
Each zone may have different channel management settings. Administrations may set your AIS by special messages automatically to a certain locally required setting. You can check these settings, which are stored in your AIS, by opening the tabs for channel and zone. You can toggle from one to the next settings by using the **Next** button. Although manual setting is also available, it is strongly recommended not to use the manual function. This should only be done on special advice of a local administration i.e. by radio or other means if the automatic function is not available from coastside. There is a severe risk,

that due to manual setting the own ship is no longer visible to other ships as an AIS target and that you will not see any other AIS targets on your system. Normally, the default setting should be on channels 2087 and 2088 and should have no position entered. Bandwidth is on **Auto**, Power is on **High**.

Displaying the Channel Data Set

- Used: The data currently being used by the AIS electronics unit
- Not Used: Data are currently not being used by the AIS electronics unit.
- Edited: The displayed data have been altered manually but have not yet been stored.

By clicking on **Next**, the next data set (channels, bandwidth, mode, power, geographical region and transition zone) can be displayed.



Channel A and Channel B

Switch on the transmitter (TX) and/or the receiver (RX) as required by checking the box accordingly. For special purposes and by advice of an administration select the radio channel and bandwidth.



WARNING

Changes on the settings of the VHF channels, bandwidth or geographical data in use (by entering a data set) shall be done by authorised and well skilled personnel only. Each change may have a serious influence on the VHF communication between AIS systems.

BW - Bandwidth

The Bandwidth can be set to **Auto** or **12,5 kHz**.

Power

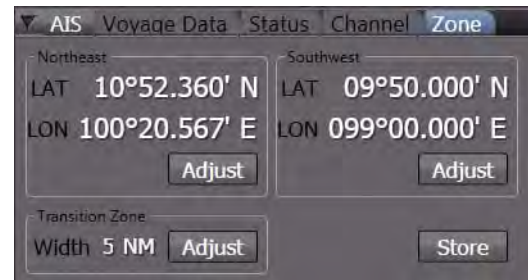
Can be set to **High** or **Low**. During the loading and unloading of tankers, the transmission power of the AIS transmitter must be reduced for safety reasons. At anchor and during mooring it might be necessary as well.

Finally click on the **Store** button to store the set data.

Displaying the Zone Data

The Zone Tab shows the zone related information of the eight data sets for channel and zone which are stored in the AIS transponder.

Select **Settings > AIS > Zone** to enter the tab. The first two groups for Northeast and Southwest show the diagonal corner points of the zone. The next group shows the transition zone as described in the introduction to this chapter. The default values for the corner position are empty fields. Any entries should only be made on advice of an administration as explained before. Any values might also have been set automatically by received AIS command messages from a local VTS centre. They will become active if the own vessel reaches the defined zone.



1.6 Receiving AIS Messages

The AIS unit can receive safety related messages from other ships. These messages are transmitted to the system and stored in the MFD until up to a maximum number of 50 for a certain time period.

If the maximum number of messages is reached, the oldest messages will be deleted automatically.

New messages generate a warning in the alarm system in order to alert the operator of viewing the message text in the target related message list.

New Safety Message

When the AIS electronics unit receives a safety message, this is sent to the connected interface and the **New AIS Safety Message** warning appears in the alarm list of the MFD. By acknowledgement the warning disappears from the list.

The operator must open the safety message list via **Tools > Target > Message** in order to have access to all received and temporarily stored messages.

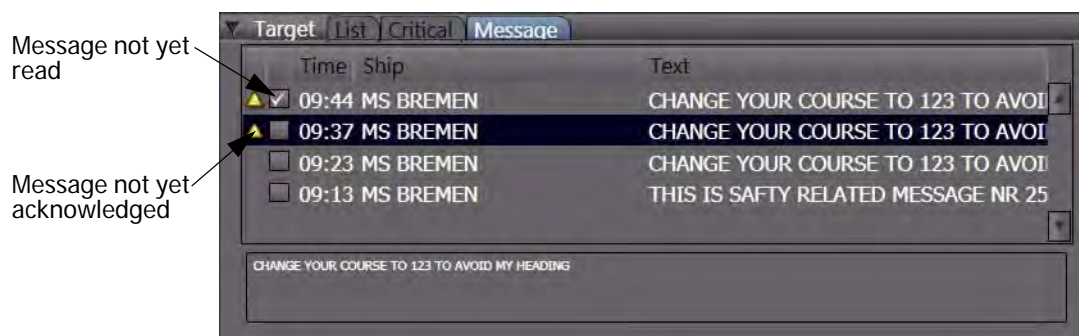


Fig. F / 1 AIS Message List after receiving a new safety message

- ☞ The list is sorted according to the receive time of the messages; the latest (newest) entry is shown at the top of the list. The sorting sequence of the list cannot be changed.
- ☞ Any message from the same source with the same text as already received will not be stored again, but its time marking in the list will be updated. In this way it will show up in the first line again.
- ☞ The receive time, the identification data of the transmitting AIS object and the start of the text are shown above the message. The complete text is enclosed in the frame below the list of messages.
- ☞ By a click into a line of the list you can select the message to be shown in the text window.
- ☞ In the first column of the list a yellow alarm icon is shown if the related message alarm is not yet acknowledged. Additionally all new (unread) messages have a marker in the second column until the message has been selected and shown in the text window.

Operating in the List

The width of the columns in the list can be modified if required, but none of the columns can be made completely invisible. If the lines get longer than the width of the window, a horizontal slider will be shown which can be used to move to invisible parts of the window.

A vertical slider is shown if the number of list entries does not fit into the window. Scroll to the top of the list to see the newest (last received) message.

OPTIONAL APPLICATIONS

MAINTENANCE

1 Performance Monitor

Note:

The Performance Monitor is only present in systems with Radar Platinum.

Background

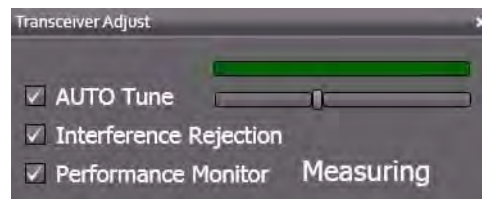
The performance monitor provides the operator with a simple go/no-go tool to check the transmitter performance as well as the receiver sensitivity in one step. It comprises a small test oscillator and a microwave diode with amplifier. Both modules are installed under a hole in the gearbox. The hole is hermetically sealed with a transparent plastic cover.

The diode receives the radar pulse which is transmitted by the magnetron via waveguide and scanner into the air. The received signal is amplified and gives an indication about the function of the complete transmitter path.

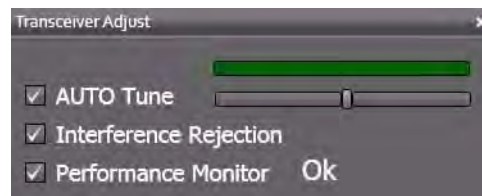
The test oscillator transmits a pulse at about 1 msec after the main pulse. This pulse lies outside the display space and is not visible in the radar image. It simulates a target being far away. This signal is picked up by the scanner and gives an indication of the proper function of the complete receiving path.

Test

The selected transceiver's performance can only be tested by the MFD which is selected as Master for it. If Master is not selected, the **Adjust** control will be insensitive. Click the **Transceiver Adjust** control, the corresponding submenu will open. Check the control for **Performance Monitor**. Wait for a minute, the result will be shown as follows:



- If the sum of both indications from TX and RX path together is ok, the test is shown with an Ok in the Transceiver Adjust box.
- If the sum of both indications from TX and RX path is degraded, the test is shown with a Critical result.
- If the sum of both indications from TX and RX path is degraded by more than 10 dB, the test is shown with a Most Critical result.



Switch off the performance monitor by closing the Transmitter Adjust box.



CAUTION

During the test, the radar is fixed to 12 nm and cannot be switched to another range. Do not start the performance test with a cold transceiver, wait 30 min after switching-on. The test result could be disturbed by heavy snowfall or rain, shading the hole in the gearbox. The test result could also be disturbed by other transceivers on-board. They should be switched off.



CAUTION

If "Most Critical" is shown as the result, this means that the performance quality of the radar system is no longer adequate for safe radar operation. Request service!

- ☞ Not only the magnetron that is being checked with this test but also the toothed belts of the antenna gearing are expendable parts. Therefore, if the test shows that the magnetron has reached the end of its useful life, the toothed belts shall be checked and must be exchanged as well during the necessary service work.

2 Data Maintenance of the Electronic Charts

2.1 General

The electronic charts for your NACOS Platinum System are stored separately on each MFD (workstation). They have to be updated in regular intervals.

After initial installation from the base media the charts are updated typically in a weekly schedule from the update media. During the update process the already installed charts are checked and it might be necessary to insert the base media again if requested by the update application during the update process

The update can be carried out for each MFD separately by using update media like CD ROM, USB-Stick, or portable USB drive. The procedures will take some time, because the chart cells are processed on the MFD, in case of ENC charts they are also decrypted and converted into an internal file format. This improves the chart presentation speed during later ECDIS operation.

For practical reasons it is recommended to perform the time-consuming update from media on the ECDIS planning system. Once this MFD has been updated, the other MFD's in a network can be updated by a simple and faster network action.

☞ The initial installation can take several hours. Even an update may require a considerable length of time. Therefore, perform this task in good time before the start of the voyage.

☞ The chart maintenance work must be carried out so that the databases of all MFD's always have the same status. This is ensured if the notes given here are observed and the sequences described are followed.

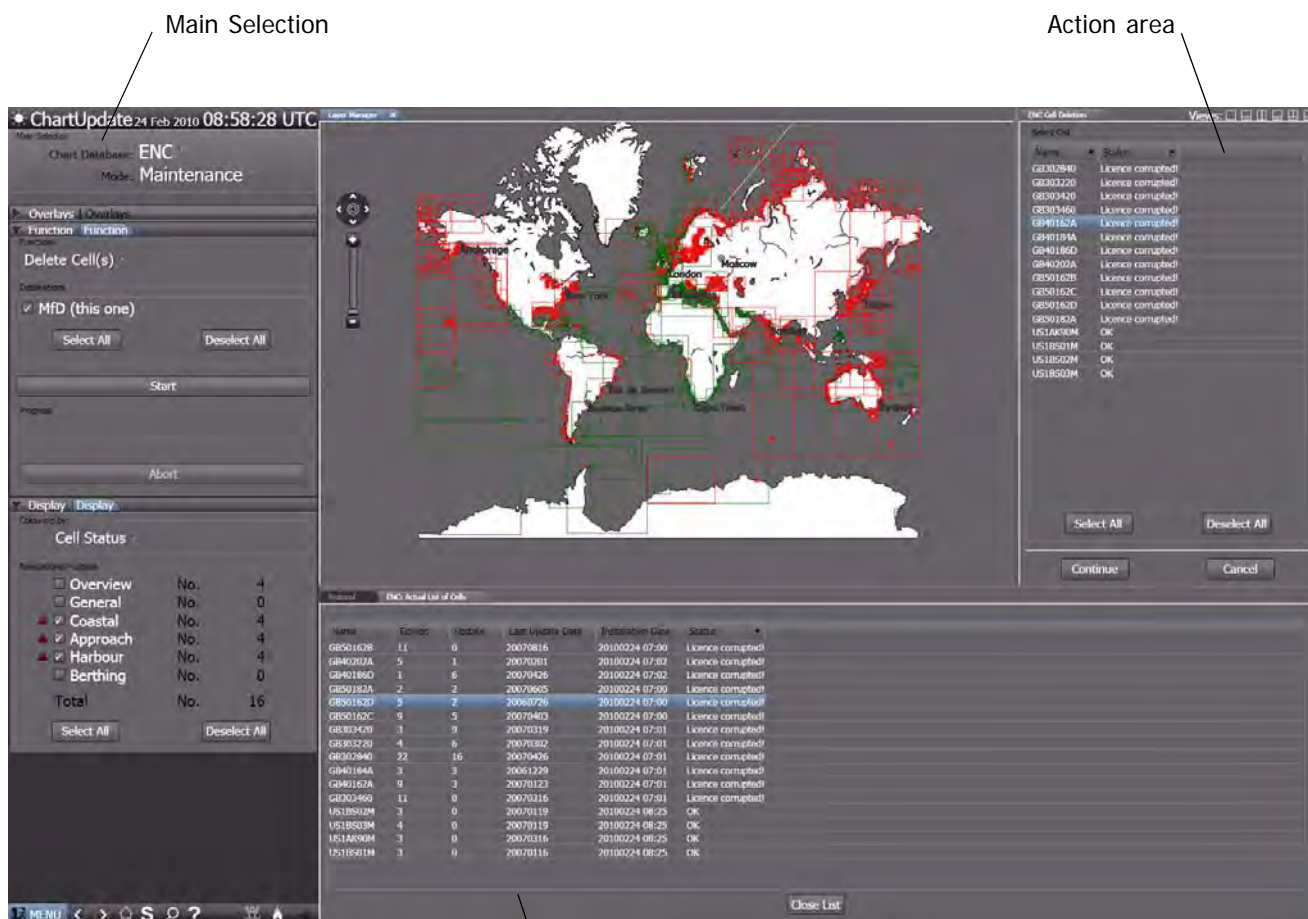
- An easily determined indication of unequal states of the databases of the MFD's is when the numbers of cells/ charts displayed for one MFD is different from the others.
- An update of a chart cell can only be performed if the base information for this cell has been installed before. Also the update sequence must not be interrupted. If one update has been missed in the past it is not possible to add a new update. In that case carry out the base update again.

2.2 Starting Chart Maintenance

Navigate to the Super Home menu and click on **Maintenance > Nautical Charts**.

As a result, the world chart together with a main selection sidebar, a protocol window, and an action area appears.

If the chart maintenance is started for the first time after power-on of the electronics unit, the database will be checked automatically. Any errors will be displayed in the protocol window underneath the world map.



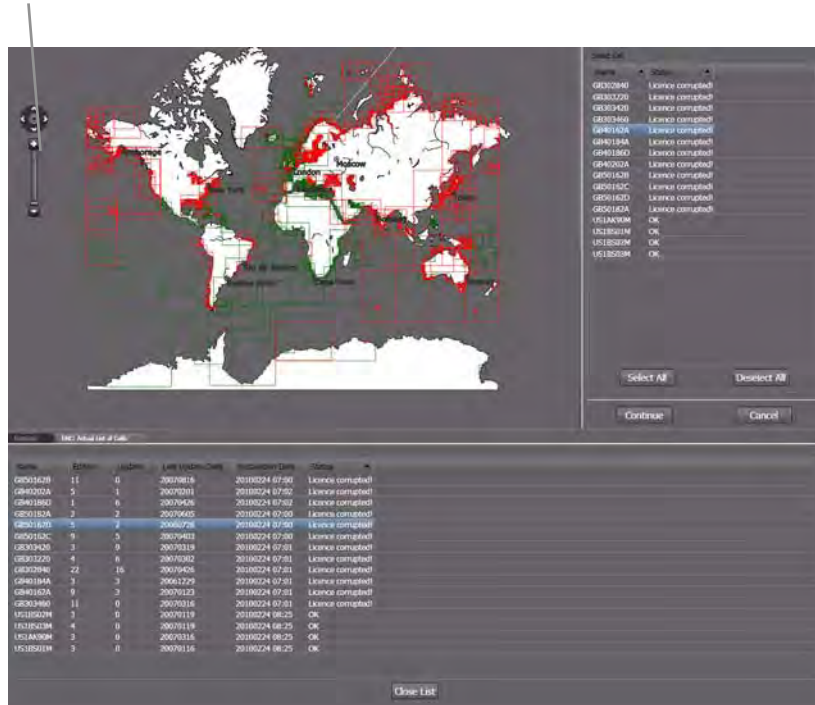
Background operation

To use the MFD for other purposes while prolonged maintenance sequences are running automatically, just navigate to the main menu and choose the appropriate application.

As soon as the Chart Maintenance program running in the background needs an operator action, a message is shown.

2.3 Chart Maintenance Application Area

Pan and
Zoom Control



Action area:
List of cells/
permits to be
deleted

Information
area:
Protocol and/
or actual list
of cells/
permits

This screen shows an overview of the installed charts and their states. Depending on the settings of the **Mode in Main Selection**, the cells appear with a coloured border. See [section 2.8](#) for details.

The **Pan and Zoom** control can be used in the same way as described in [see chapter A - 4.1 on page A-34](#).

The **Actual List of Cells** (or permits) shows detailed information about the kind of cells or permits selected in the **Display** expander. It can be chosen how the data are to be sorted (ascending/descending) according to the details. Click the column header of the appropriate detail to sort according to it.

If **Mode** is set to **Maintenance** and Function is set to **Delete Cell(s)/Permit(s)**, the list of cells / permits to be deleted is opened in the top right corner.

2.4 Update of Charts from Media

Insert your latest update media, either CD ROM or USB stick or portable USB drive. It may be either a base update (all chart cells) or a weekly update (a few chart cells only).

Open the **Functions** menu from the side bar.

Check **Chart database**, set to ENC or ARCS depending on the charts which you want to update.

Select **Mode**, the default setting is **Display**, set to **Update**. Once the mode has been set to **Update** the **Functions** menu is modified with subgroups for **Source** and **Destination** as shown in the next screenshot.

Select the **Functions**, the default setting is **Choose Function**, set to **Update ENC Database** or to **Update ARCS Database**.



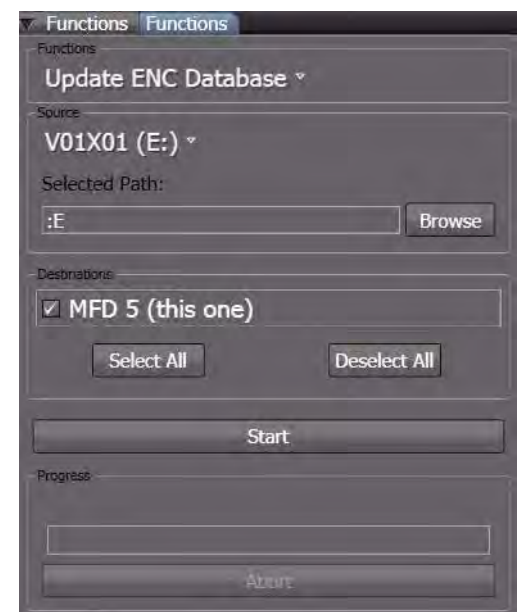
Select the **Source** for the update. It could be either a CD ROM, a removable USB Stick, or USB drive. In the example here a CD ROM has been selected. If the media has a label, it is shown, here it is V01X01 (another workstation (MFD) may be selected as well, but only, if on that workstation the update has already been performed).

Check the **Selected Path**. Platinum will display any chart data laying on top of the directory automatically. If nothing is found, open **Browse** to search manually for the subdirectory with the chart data.

The **Destinations** entry is set per default to the present workstation (**this one**), where the update is carried out. No other selection is possible and required.

Press **Start** to activate the update if it is not started automatically.

A protocol of the update is shown in the bottom of the main application area. Message windows as described on the next page will appear in the overview chart to inform about the progress and any obstacles.



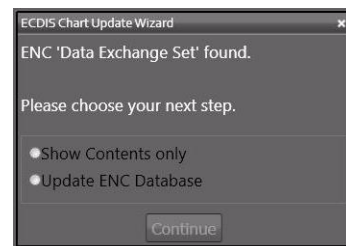
During the update you will be asked to insert one after the other the base media (i.e. ARCS RC 1 to RC 11), and after that the update media again. Just follow the instructions given on the screen.

Some of the above steps like selecting the Update Mode will be started automatically if an appropriate update CD is inserted. Just follow the instructions on the screen.

2.5 Messages during Chart Update

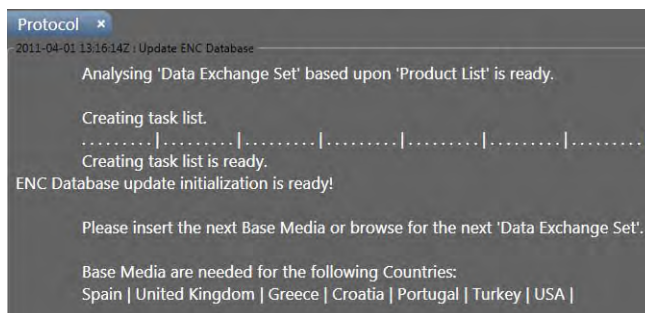
ENC or ARCS Data Exchange Set found

If an update has been performed before and the media is inserted again, it is not started automatically but the **Chart Update Wizard** appears. It informs the user that chart data are available on the media. Select either **Show Contents** or **Update** and the procedure is continued as before.



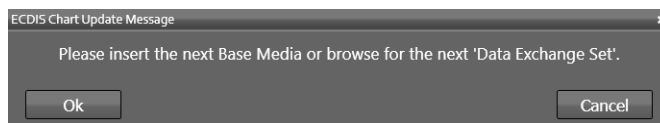
Base Media are Needed

If the weekly update comprises information for cells, which have not been installed before on your MFD, the base media for those countries, which are listed in the bottom of the protocol window have to be inserted. In case of ARCS you are asked to insert one of the base media CDs (RC1 to RC11).



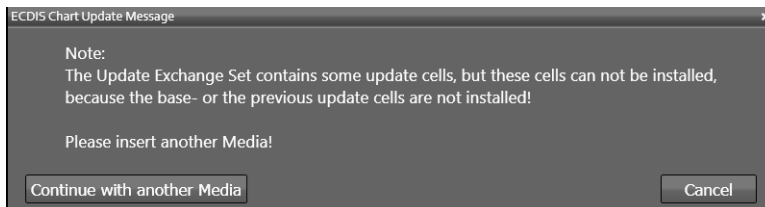
Insert Next Base Media

During the update process for the base media this message will appear if another base media (CD or other) with the remaining base cells has to be inserted .



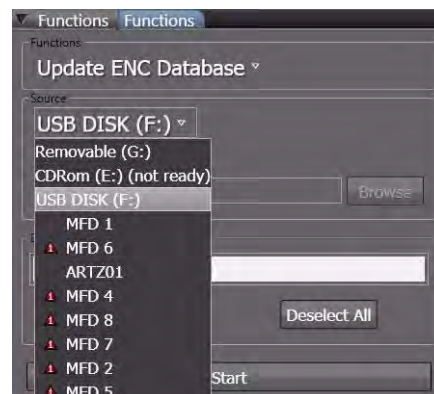
Update Cells can not be Installed

If an update media is inserted and base cells are still missing or have not been updated to the previous update, a warning is given. Load the corresponding base cells.



Update another MFD in the Network

Enter the maintenance menu on that MFD (workstation), which shall be updated. Follow the instructions as given before. Select as a source the workstation, which has been updated already from an update media. Start the procedure by clicking **Start**.



2.6 Display Charts which are on a Media or a MFD (workstation)

Insert your media, either CD ROM or USB stick or portable USB drive as shown under Update of Charts from Media. If your charts to be examined are already stored on the internal drive of your MFD or another MFD, just skip this step and continue.

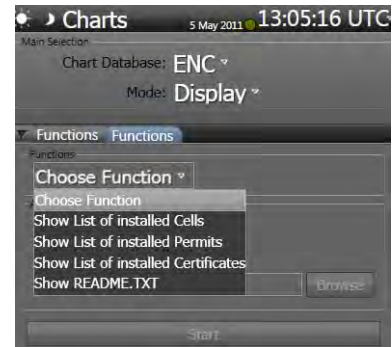
Open the **Functions** menu from the side bar.

Verify that **Chart database** is set to the correct chart type, ENC or ARCS.

Verify that **Mode** is set to its default setting (**Display**), just leave it to **Display**.

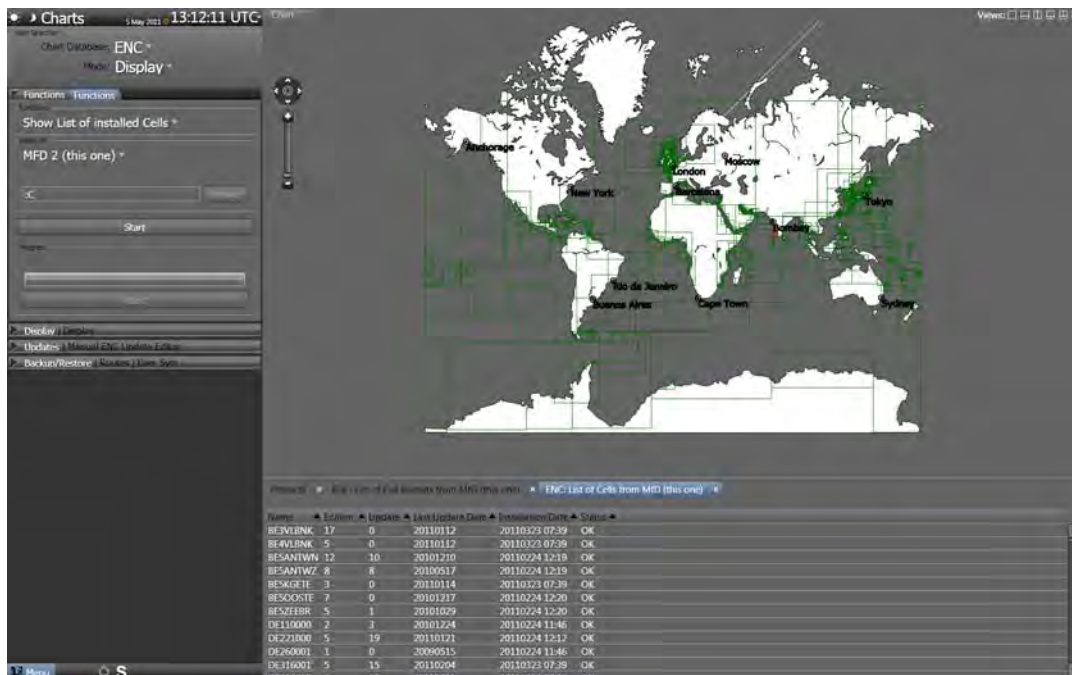
Select **Functions**, the default setting is **Choose Function**, set to one of the shown options.

Select **Apply on** to choose the drive (**this MFD, another connected MFD, CD drive, USB stick**, etc.) where your chart data to be examined are stored.



Check the **Selected Path**. Platinum will display any chart data laying on top of the directory automatically. If nothing is found, open **Browse** to search manually for the subdirectory with the chart data.

Click on **Start** to confirm the settings and list up the cells or permits in a new tab of the protocol window. At the same time the corresponding cells are marked with green squares in the world chart. Depending on your selection the installed cells or the installed permits will be shown in the list.



2.7 Maintenance of Charts on your MFD (workstation)

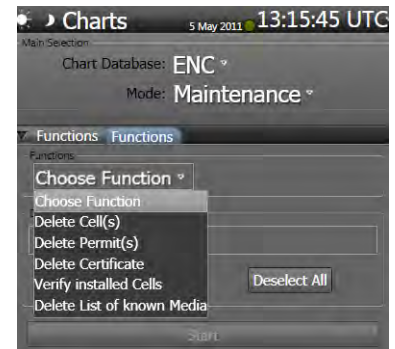
Open the **Functions** menu from the side bar.

Verify that **Chart Database** is set to the correct chart type, ENC or ARCS.

Set **Mode**, to **Maintenance**.

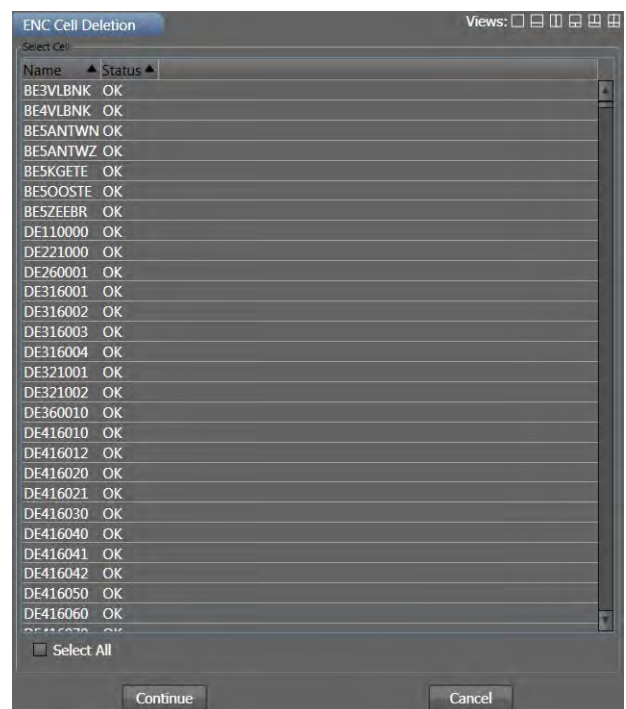
Select **Functions**, the default setting is **Choose Function**, set to one of the shown options.

Destination is set per default to the hddisc of your MFD. It can not be changed. Maintenance can only be performed for this MFD.



Click **Start** to activate the maintenance procedure. Depending on your selection the cells, permits, or certificates are listed on the right top side of the screen and can be deleted individually. It is recommended to delete all those cells, permits, and certificates which have been expired or are no longer valid.

Further-on the installed cells can be verified. The result is displayed in the protocol window.



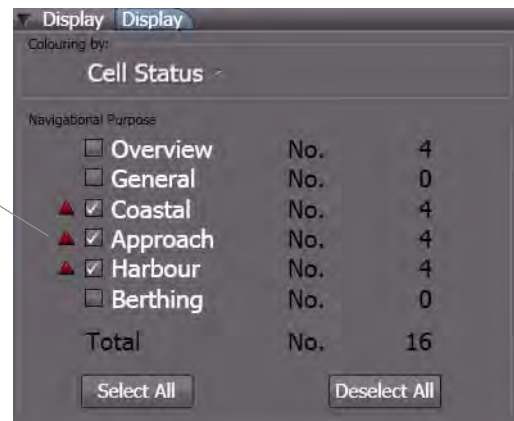
2.8 Display Expander

The display expander is used to set up the display of the cells and for information about the number of installed cells.

If an alarm indicator, a small triangle, is displayed in front of one of the chart types, an error has occurred when the appropriate data have been checked.

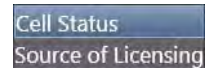
It is a good idea to do this for each kind of navigational purpose charts one by one in order to decrease the amount of cells to be checked.

Alarm indications



Colouring by

The cells displayed in the overview are shown with a coloured frame. Depending on the settings in **Colouring by**, the cell status or the licensing status are concerned for the choice of the colour.



Cell Status

Red	An error has occurred while the data have been checked
Green	Chart is okay

Source of Licensing

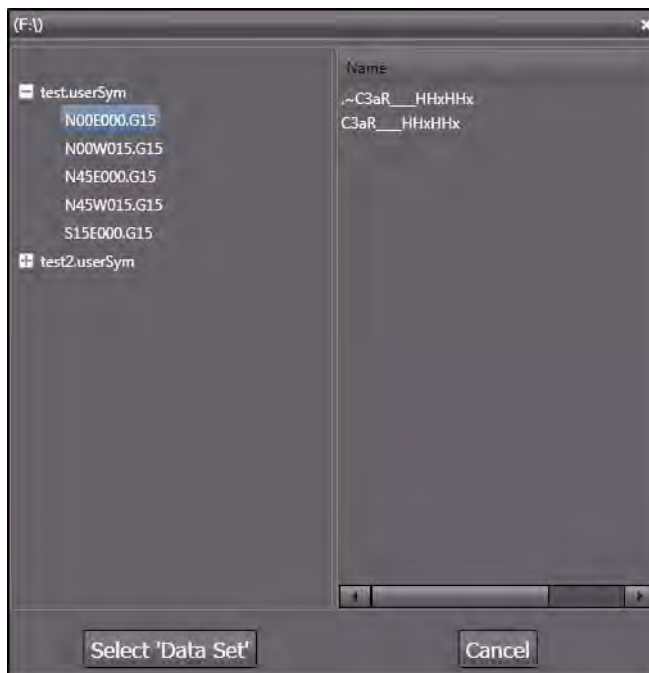
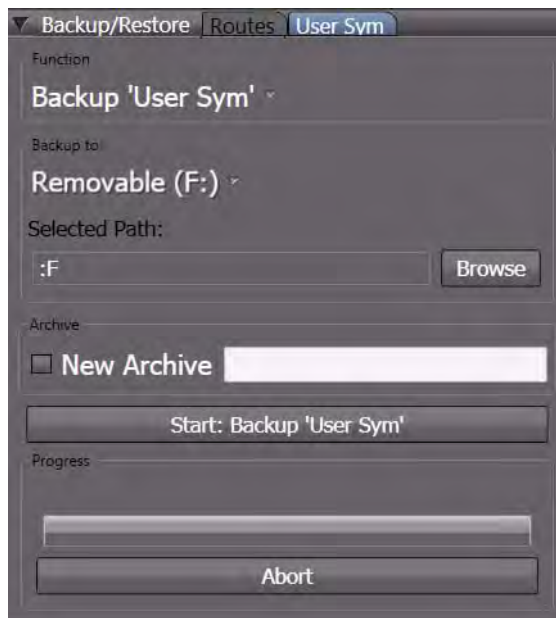
Yellow	The license of the chart has been checked unsuccessfully
Green	Chart is okay

2.9 Backup/Restore of Map Data

The user-defined **Routes** and also the **User Symbols** can be saved to devices like CD-ROM or USB memory sticks. This makes it possible to transfer those data to other systems or replacement modules.

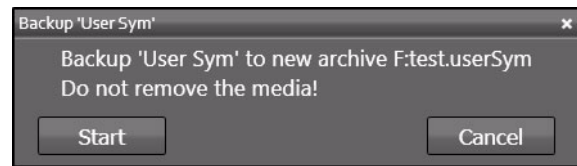
In order to backup routes or user defined symbols, follow these instructions:

1. In the tabs of the expander, chose whether to backup **Routes** or **User Sym**
2. In the **Function** group, select whether the data are to be backed up or restored. (The following example refers to the backup-function. The restore-function works similar, but the **Archive** group is then inactive.
3. Under **Backup to:** choose the device which is to be used as backup/restore media.
4. Select the path and, if an existing file is to be used, choose the file in which the data are to be stored. Click **Browse** to open a window in which the backup file and/or path can be selected
- or-
5. If a new archive file is to be added, check **New Archive** and enter the desired name.
6. Click on **Start: Backup <data>**. (<data> represents the chosen type of data, Routes or User Sym)

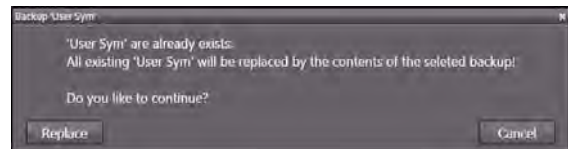


Browser window which works similar to the WINDOWS Explorer

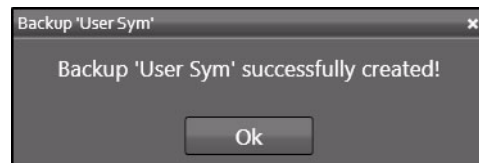
7. Confirm the security advice clicking **Start**.



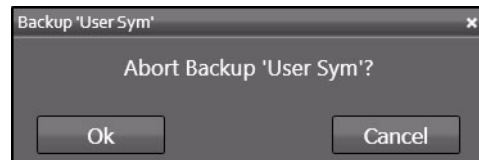
8. If the backup file already exists, the replacement of this file must be confirmed.



9. A message window is shown after the backup has been finished.



10. If it is desired, the backup progress can be stopped by clicking on **Abort** in the tab window. The abortion must be confirmed.



3 Manual ENC Update Editor

It is possible to edit the ENC charts and only these by means of a chart editor. The edited elements of the chart are stored as a separate file. The ENC chart file itself is not modified. If the manually updated chart is opened, the corresponding chart is displayed and in addition to the ENC Manual Update.

Opening the Chart Editor

In **Super Home** click on **Nautical Charts**.

The Overview of the installed charts is opened. This may take some time, because the database is checked before the charts are displayed.

If no installed charts are displayed (no rectangles appear on the screen), open the **Functions** expander and set **Apply On** to **MFDn (this one)**.

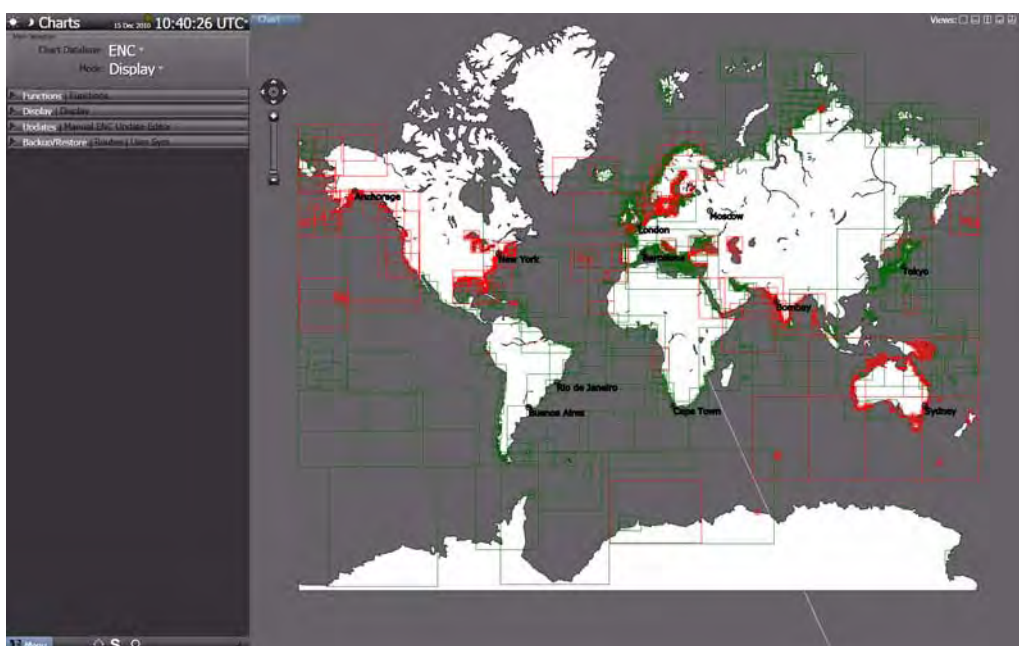


Fig. H / 1 Nautical Charts Editor - Overview

Use the **Pan and Zoom** control and/or the **Set Chart Center-function** in order to navigate to the cell that is to be updated. As already known, the chart can be shifted using the drag-and-drop functionality by means of the **More** button.

As soon as the desired cell is displayed, click it with **More** and choose **Manual ENC Update Editor > Select ENC Cell >** and click the cell that is to be updated.

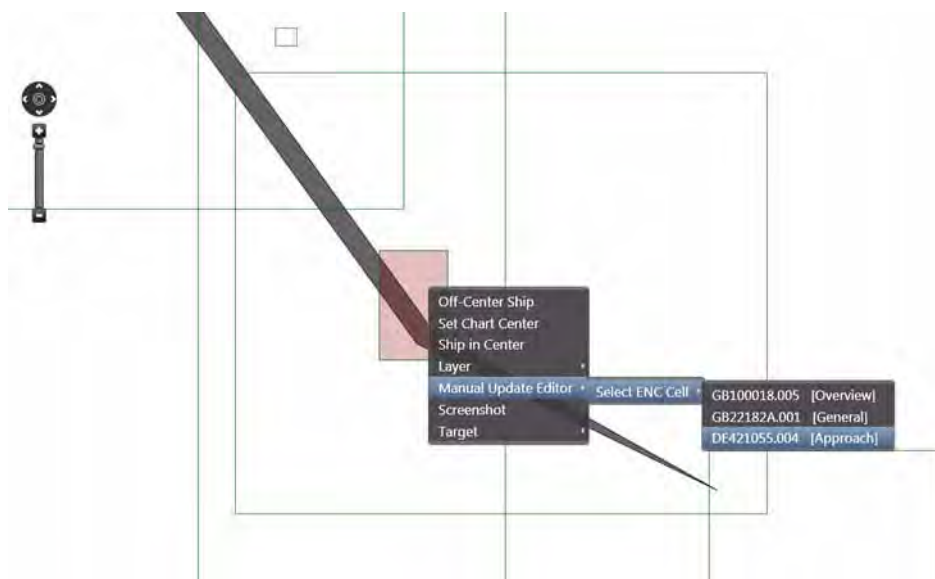
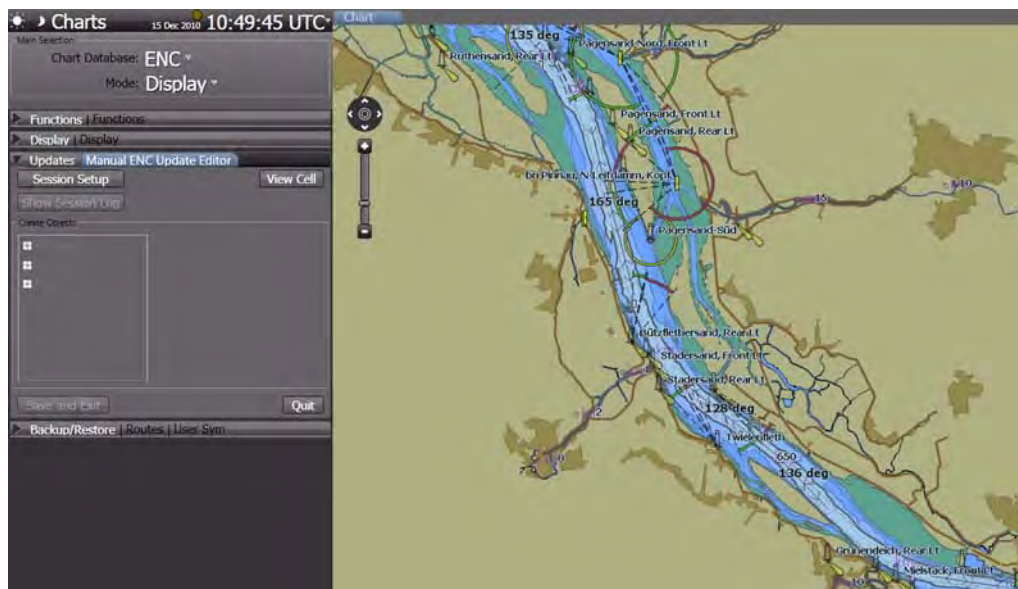


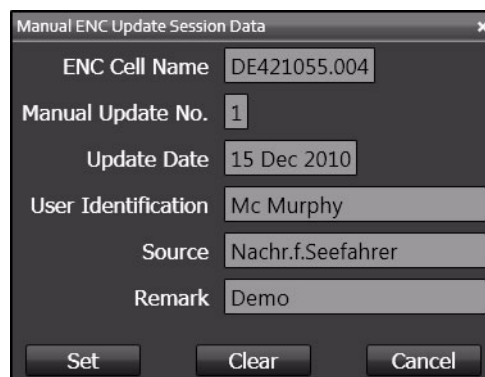
Fig. H / 2 Selecting a cell

The cell is displayed then. If it is not already opened, open the **Updates** expander.



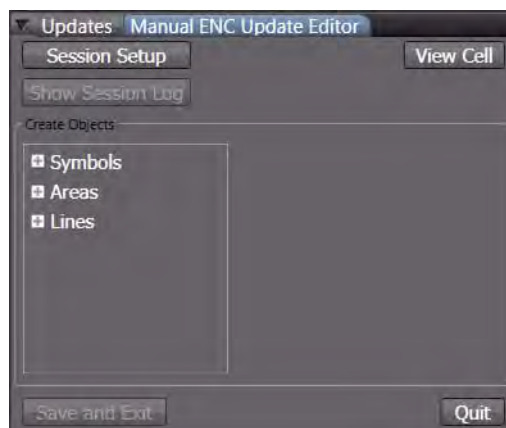
The cell and its chart data can be updated now.

Click on **Session Setup** in the **Update** expander and enter the **Manual ENC Update Session Data**. Then, click on **Set**. A click on **Clear** will erase all entered data, **Cancel** will close the window without any further action.



In the editor window the entries for the categories of objects which can be edited are now active.

A click on **View Cell** will display the chosen cell with maximum size, so that editing is as easy as possible. Whenever the display of the cell has been resized or shifted, a click on **View Cell** will display the cell again with maximum size.

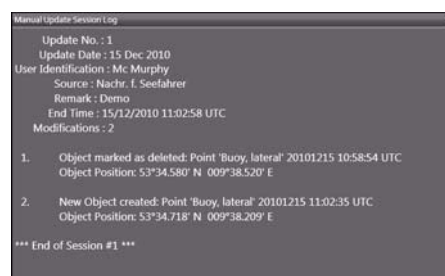


A new object can be placed now or existing objects can be modified. This works in the same way as the usage of **User Symbols**. See [chapter A - 8 on page A-83](#) for details. The update session can be ended clicking on **Quit**.

All actions are stored in the session log, as long as the session has not been ended by a click on **Save and Exit**. Once an update action has been carried out, the control **Quit** changes its name to **Undo and Abort**. Using this control will lead to abortion of the update process without changes.

If the operator activates another application like RADAR or ECDIS while the manual ENC update is done, the performed actions of the manual update do not get lost, in fact, all alterations will still be present when the operator returns to the manual update editor.

To view the session log, click on Show Session Log.



4 Hardware Maintenance



⚠ DANGER

HIGH VOLTAGE!

DANGER OF FATAL INJURIES

NEVER assume that a circuit is dead – Always check it for safety's sake! Contact with live parts can cause serious or fatal burns and inner injuries by electrocution. This particularly applies to the Outstation cabinets which may contain components to which 230 VAC or 400 VAC are applied.

Capacitors and tubes can store dangerous voltages for several hours, even when they have been disconnected from the supply voltage.

If these operating instructions require you to remove safety systems for maintenance work or repair, be sure to reinstall them after finishing work. Only remove safety devices if this is necessary for the maintenance work or repair. This particularly applies to covers and ground cables.

4.1 Periodical Checks

4.1.1 Limited-Lifetime Devices

Within the radar system there are some devices or parts of units which have a limited lifetime. The devices and their presumed lifetime are listed below. It must be considered that these devices shall be checked periodically and exchanged if necessary.

📖 For more information about the change of components like magnetron or toothed belts please refer to the technical documentation

Device	Approx Lifetime	Procedure
Magnetron	X-Band ~6000 - 8000h S-Band ~9000 - 16000h	Monthly carry out the check of the performance monitor as described. See chapter H - 1 on page H-3 for details.
Toothed belts	12 months	Every 12 months or when the magnetron is exchanged, change the toothed belt as described in the technical documentation. Every time the gear box is opened. Check for mechanical damages as fissures or fractures on the surface and for visible parts of the weft, especially at the edges. If such damages are visible, the belts must be exchanged.

Table H / 1 Limited-Lifetime Devices

4.2 Check of the Colour Reproduction

The colour reproduction produced by the monitors must be correct. In the case of doubt and once per year, the monitor performance must be checked based on the Chart1 presentation. [See chapter 3.3 on page B-14](#) for details.

5 SW Version and Updates

5.1 SW Version

The SW version can be accessed from the Super Home page by opening the Menu on bottom left side and clicking on About.

The About Information Window shows data as follows:

- Designation of the equipment with NACOS Platinum series
- Machine name of the display electronics, i.e. MFD 01
- SW version number and built number of the application SW package for the display electronics
- SW version number and if applicable built number of the connected data processing unit DPU 2010 or DCU 2010

5.2 SW Updates

Software updates can only be carried out by authorized service personell. For more information with regards to software updates of ECDIS Systems or complete NACOS Systems please contact:

NACOS_update@sam-electronics.de.

ALARMS

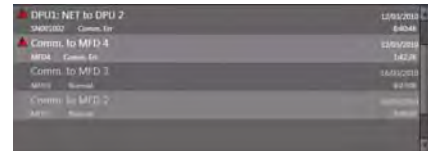
1 General Information

In NACOS Platinum all alarms will generally be indicated in the same way in all cases. Both alarms from the automation system and alarms from the navigation system are shown in the same place and in the same way but their availability on the different MFDs is depending on their specific configuration.

It has been chosen to indicate the different states of an alarm by different symbols in dedicated colors. Furthermore, the alarms have different audible indications emitted by the buzzer which is installed in every MFD.

The symbols will be used in the following manner:

- Placed in front of the alarm line in Alarm Lists



- Placed in front of the label in the permanent area of RADAR and ECDIS as status indicators on other places of the HMI.



If the automation system is configured for the MFD, symbols will also be used as follows:







- As a separate symbol in Mimic Diagrams for binary alarms. (e.g. used for a level switch in a tank).
- As a symbol placed behind the Unit of an analogue value displayed on a Mimic Diagram (e.g. used for display of a temperature with a limit).
- As a symbol placed beside a Function Block symbol (indicating the state of machinery components, e.g. pumps, valves, generators etc).

Alarms and Warnings can be accompanied by a sound signal. The possible sounds emitted by the buzzer are as follows:

Sequence	Meaning	Description
————— ...	Alarm (Priority 1)	Permanent tone
— — — — — ...	Warning (Priority 2)	tone (1 sec), pause (1 sec), tone (1 sec), pause (7 sec) as warning(s) but suppressable
— — — — — ...	Warning (Priority 3)	

For warnings with priority 3 the sound can be deactivated by the operator (see xyz).

1.1 Colour code for the alarm indications:

Green 	Indication of an exceeded limit that shall not raise an alarm (Alarm priority 4).
Yellow 	Input from the process is disconnected in the software, and the value is entered manually by the operator
Yellow 	Incidents and (pre)warnings, usually alarm priority 3. For alarms of this priority, the acoustic alarm can be switched off
Orange 	Warnings and alarms that require immediate action, usually alarm priority 2
Red 	A serious event that has not been solved yet, usually alarm priority 1
Yellow & red 	A value that had been entered manually by the operator has caused an alarm priority 1

Examples for alarm indications:

	Binary Alarm	Alarm List	Analog value with alarm Property Sheet	Analog value in Mimics	Function Block with alarm
Normal	(n.a.)	(n.a.)	Label 78.6 °C ▾	78.6 °C	 (Running Stopped)
Device Fail / Sensor Fail		 Alarmline	Label --- °C ▾ 	--- °C 	
Manual Cutout / Auto Cutout		 Alarmline	Label 78.6 °C ▾ 	78.6 °C 	
Event		 Alarmline	Label 78.6 °C ▾ 	78.6 °C 	
Alarm Prio 3		 Alarmline	Label 78.6 °C ▾ 	78.6 °C 	
Alarm Prio 2		 Alarmline	Label 78.6 °C ▾ 	78.6 °C 	
Alarm Prio 1		 Alarmline	Label 78.6 °C ▾ 	78.6 °C 	
Manual Set, Normal		 Alarmline	Label 78.6 °C ▾ 	78.6 °C 	
Manual Set, Alarm Prio 3		 Alarmline	Label 78.6 °C ▾ 	78.6 °C 	
Manual Set, Alarm Prio 2		 Alarmline	Label 78.6 °C ▾ 	78.6 °C 	
Manual Set, Alarm Prio 1		 Alarmline	Label 78.6 °C ▾ 	78.6 °C 	
Manual Set, State					 (Running Stopped)

Fig. V / 1 Alarm Indications

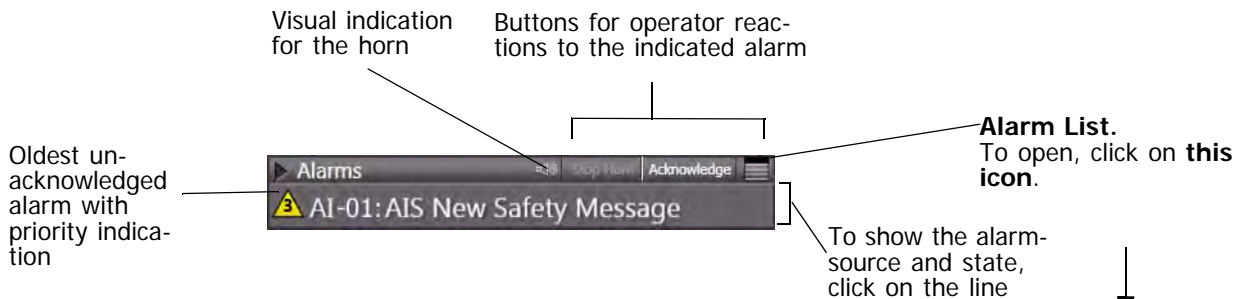
A flashing symbol for any alarm means that this alarm has not been acknowledged yet. A steady symbol indicates an acknowledged status of an alarm, but that the cause for the alarm is still present.

An alarm can be of the following types:

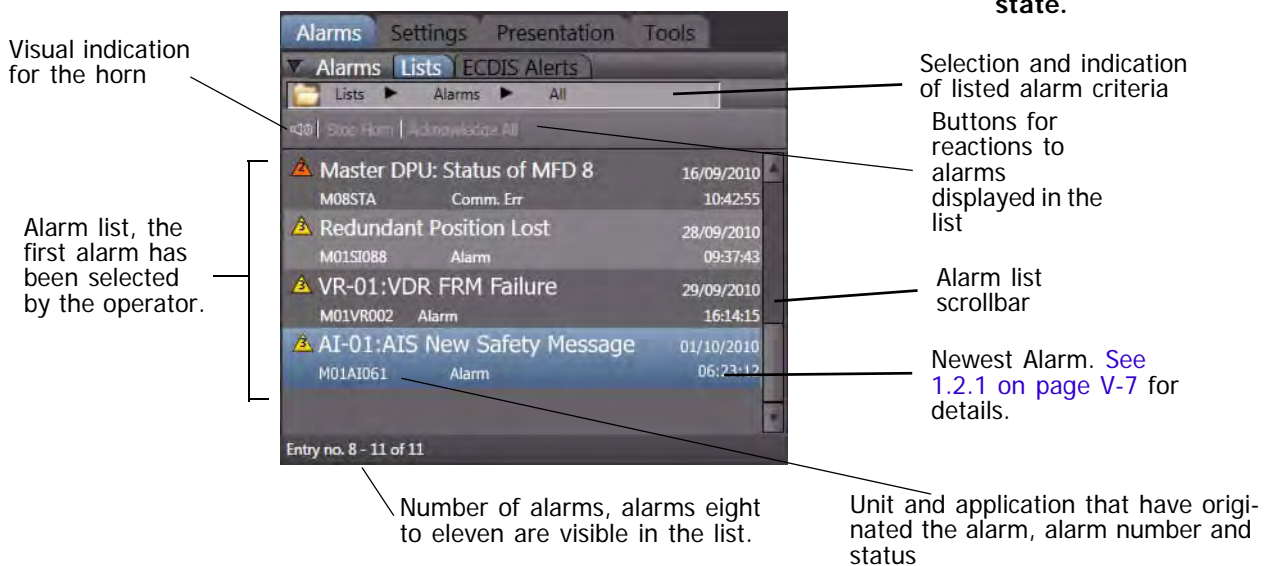
State	Symbol	Explanation/Remarks
Normal	-	No errors in hardware/software and no limits exceeded
Device fail		Error in the Control and Supervision system, the indication is invalid
Sensor fail		The value received from the sensor is outside the legal limits
Manual Cut Out		Alarm function is switched off by the operator. Alarm will never occur even if limits are exceeded. Manual Cut Out is normally not used for Function Blocks
Event		Indication of an exceeded limit that shall not raise an alarm (Alarm priority 4). This case is normally not indicated in the Mimic Diagram. In some cases an indication for a binary input is displayed (e.g. Heater switched on)
Alarm priority 3		Alarm with lowest priority. The alarm is indicated by a triangle (like a traffic sign) in yellow. Inside the triangle the alarm priority is indicated by the number 3, to improve readability for people with color blindness (since prio 1 and 2 are also triangles)
Alarm priority 2		Alarm with middle priority. The alarm is indicated by a triangle (like a traffic sign) in orange. Inside the triangle the alarm priority is indicated by the number 2, to improve readability for people with color blindness (since prio 1 and 3 are also triangles)
Alarm priority 1		Alarm with highest priority. The alarm is indicated by a triangle (like a traffic sign) in red. (red is mandatory for highest priority alarm). Inside the triangle the alarm priority is indicated by the number 1, to improve readability for people with color blindness (since prio 2 and 3 are also triangles)
Manual Set		Input from the process is disconnected in the software, and the value is entered manually by the operator. In this case a blue circle is added behind the actual alarm symbol, and for analogue values the font is exchanged by a script font. For Function Blocks it is possible to make "Manual Set" for both the alarm and the process feedback, so you may have a blue circle behind the alarm icon and/or behind the state symbol
Manual Set Alarm priority 3		This is the same as the Manual Set described above. For this value an alarm with priority 3 has occurred and is now indicated.
Manual Set Alarm priority 2		This is the same as the Manual Set described above. For this value an alarm with priority 2 has occurred and is now indicated.
Manual Set Alarm priority 1		This is the same as the Manual Set described above. For this value an alarm with priority 1 has occurred and is now indicated.

1.2 Overview of the alarm window

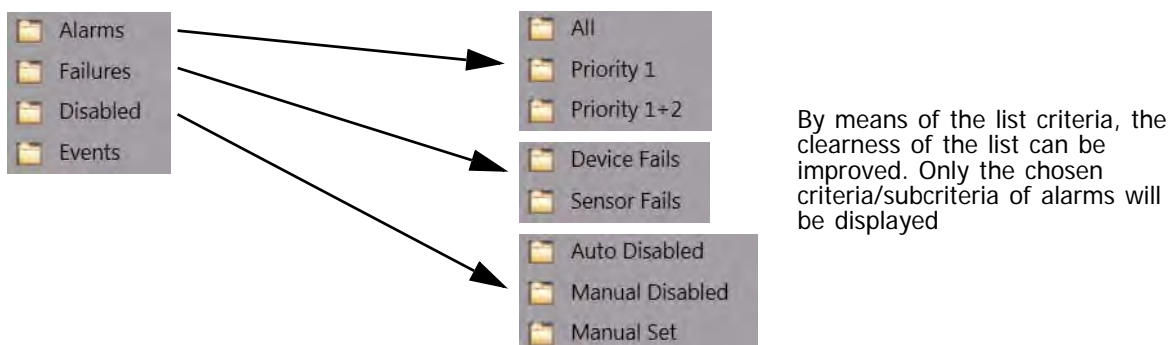
Alarm Line:
(The alarm with highest priority is indicated here)



Alarms List:

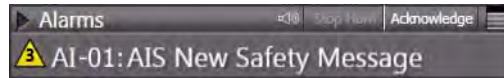


List Criteria:



☞ If the alarm list is opened by the **Alarm List** icon (see above) or by a click on the **Alarms** Tab, it always shows the complete list of alarms, warnings and indications, independent of the previously made selections of filters or priorities in the list. The list then shows the **newest** alarm entry at the **bottom** of the alarm window.

1.2.1 Example of an alarm



Additionally to the alarm designation, supplemental information are displayed for each active alarm in the list. In this example, MFD **M01** has originated the alarm:



The alarm number is **M01AI061**, where **AI** ist the indication for the AIS unit, **061** is the internal fault number. See list of alarms for further information.

The status is **Alarm**, which means that the alarm is still active (in alarm state).


Status indications can be for example:

- Normal
- Alarm
- Sens Fail (Sensor Failure)
- Dev. Fail (Device Failure)
- Comm. Error (Communication Error)
- Ch. Error (Channel Error)
- SW. Error (Software Error)

2 Alarm Management

2.1 Behaviour when an Alarm comes up

Whenever an alarm is raised, the processing is a two-step action:

1. Switch off the acoustic alarm, if there is one. Use the **Stop Horn** button in the GUI
or press the  button on the keyboard, if it is available.
 - ☞ Some alarms do not trigger the acoustic alarm. This depends on the settings made in the configuration database of the Integration Manager.
 - ☞ Some alarms can only be switched off at the MFD that has originated the alarm. For example, a **Trackpilot** alarm can only be acknowledged at the MFD that is set as **Trackpilot Master**.
2. Immediately obtain information about the causes of the alarm or warning, about the system state and about possible system reactions, and - if necessary - immediately perform all necessary actions for the avoidance of possible danger.
3. Remove the cause of the alarm or warning: If an alarm has occurred due to a cause that can be removed, that cause must be removed as quickly as possible; see also [section V - 2.2: "List of Alarms"](#). Alarms with priority 4 disappear when the cause disappears. Acknowledgement is then unnecessary. Alarms with priority 1, 2 and 3 must be acknowledged in any case.
4. The alarms with priority 1 and many alarms of priority 2 and 3 must be acknowledged if the situation allows or requires such acknowledgement. There are two possibilities to acknowledge alarms:
 - Click on **Acknowledge** in the alarm line
 - Click on **Acknowledge All** in the heading of the Alarm list

If alarms or warnings are also distributed to other items of equipment within the system, or if the system deviates from the behaviour described above, e.g.

- if the alarm cannot be acknowledged at all or throughout the entire system, or
- if acknowledgement causes something to be initiated or enabled, or
- if an acknowledged alarm is repeated for as long as the cause of the alarm continues to exist.



These situations are mentioned in [section V - 2.2: "List of Alarms"](#).


Removing acknowledged alarms from the list is done automatically by the system, in case the alarm reason is no longer valid, or the application or operating mode has been switched off.

2.2 List of Alarms

This chapter lists and describes all available pre-defined alarms, warnings and indications of the navigation system, i.e. Radar, ECDIS and the optional Trackpilot, as well as the AIS and the optional VDR.

Legend:

In front of each entry in the alarm list the priority is shown with the respective symbol  ... .

Indications (events) are marked by the symbol  on the screen, but not in the list on the next pages.

2.2.1 Navigation Sensor Alarms

This chapter describes the navigation sensor alarms available in the system. The main navigation sensors used for the heading, speed and position instruments are monitored depending on the "sensor selection mode". Those sensors which are available twice or more in the installation can be supported by an automatic selection mode.



CAUTION

The automatic selection mode is the default setting after start or restart of the system.

- If the selection mode is **AUTO** the switching over to another sensor of the same type is done without any alarm or warning.
In AUTO mode the switch over to a manual sensor (Manual Speed or Manual Position) is only accompanied by an alarm if the manual data have not been set before.
- If the **Manual** selection is chosen the switching over to the backup sensor must be done manually after the respective alarm or warning has been given.
In the meantime (until a new sensor has been selected) the system is using the last valid values of the disturbed or faulty sensor which produced the alarm.
It is required to perform the switch over to the new sensor as soon as possible, but not before its data have been checked for plausibility and correctness.



CAUTION

In any case (in manual or automatic selection mode) the set data for the sensors running in manual mode must be checked regularly and a real sensor must be selected as soon as possible.

Note:

- Depending on the status of the navigation sensors it may be possible that selected display or operation modes of the system are no longer available or may not be allowed by the approval authorities.
- Details are given below as required in the explanations to the different sensor alarms.

Ground Speed Invalid



The selected COG/SOG speed sensor is sending invalid data. Another speed sensor will have to be selected by the operator. At present, the speed that was last sent as the valid speed is being used. Dashes are shown in the speed display field.

Special features: The alarm is distributed over the entire system. Acknowledgement is possible on any MFD.

Ground Speed Timeout



Data are no longer being received from the selected COG/SOG speed sensor. Another speed sensor will have to be selected by the operator. At present, the speed that was last sent as the valid speed is being used,

-or-

The DCU connected to the system has failed. Acknowledgement is possible on any indicator.

Special features: The alarm is distributed over the entire system. Acknowledgement is possible on any indicator.

Ground Speed Valid



The speed sensor which had given the **Ground Speed Invalid** or **Ground Speed Timeout** alarm is again sending valid data.

Special features: The warning is distributed over the entire system. Acknowledgement is possible on any MFD.

Heading Invalid ¹⁾



The heading sensor system has failed, or is reporting incorrect data,

-or-

The DCU connected to the system has failed.

Special feature: The alarm is distributed over the entire system. Acknowledgement is possible on any MFD.

Remedy: Check the compass system, the signal transmission and the DCU.

When the TRACKPILOT is in an active steering mode, this alarm is repeated as **TP Heading Sensor Fault**, which can be acknowledged finally on the TRACKPILOT Master only.

Heading Timeout ¹⁾



Data are no longer being received from the selected heading sensor or from the DCU. Another heading sensor will have to be selected by the operator if available.

Special feature: The alarm is distributed over the entire system. Acknowledgement is possible on any MFD.

When the TRACKPILOT is in an active steering mode, this alarm is repeated as **TP Heading Sensor Fault**, which can be acknowledged finally on the TRACKPILOT Master only.

¹⁾ All display objects and operating possibilities for which the heading information is required are no longer shown or are inactive. If the cause of the alarm is not corrected within 30 seconds, the tracked targets are deleted on the radar system.

Heading Valid



The compass system is again sending valid data.

Special feature: The alarm is distributed over the entire system. Acknowledgement is possible on any MFD.

Low Position Quality ¹⁾



The selected position sensor has reported a greater position-deviation than is usual for this type of sensor.


Special feature: The warning is distributed over the entire system.

Remedy: Check the position sensor; select some other position sensor.

New POSN Sensor Selected




The sensor selection for the connected position sensors is operating in AUTO mode and the previously used sensor is invalid or data are no longer received via the sensor interface. The new selected sensor is indicated with its data, status and mode in the position instrument display.

 If you want to use another sensor than the automatically selected one, you must go to manual selection mode by a click on the required sensor in the position sensor menu. A reactivation of AUTO mode can only be done by the operator (Click on AUTO in the menu).

New HDG Sensor Selected




The sensor selection for the connected heading sensors is operating in AUTO mode and the previously used sensor is invalid or data are no longer received via the sensor interface. The new selected sensor is indicated with its data, status and mode in the heading instrument display.

 If you want to use another sensor than the automatically selected one, you must go to manual selection mode by a click on the required sensor in the heading sensor menu. A reactivation of AUTO mode can only be done by the operator (Click on AUTO in the menu).

New SOG Sensor Selected




The sensor selection for the connected SOG sensors is operating in AUTO mode and the previously used sensor is invalid or data are no longer received via the sensor interface. The new selected sensor is indicated with its data, status and mode in the SOG instrument display.

 If you want to use another sensor than the automatically selected one, you must go to manual selection mode by a click on the required sensor in the SOG sensor menu. A reactivation of AUTO mode can only be done by the operator (Click on AUTO in the menu).

New STW Sensor Selected



The sensor selection for the connected STW sensors is operating in AUTO mode and the previously used sensor is invalid or data are no longer received via the sensor interface. The new selected sensor is indicated with its data, status and mode in the STW instrument display.

 If you want to use another sensor than the automatically selected one, you must go to manual selection mode by a click on the required sensor in the STW sensor menu. A reactivation of AUTO mode can only be done by the operator (Click on AUTO in the menu).

¹⁾ This alarm can only appear if activated on service level; it is required for ships with DNV NAUT-AW approval.

No Valid Position Sensor



The position sensor selection is working in AUTO mode and has temporarily switched to dead reckoning (DR) mode,

-or-

The DCU connected to the system has failed. Acknowledgement is possible on any indicator.

Special feature: As soon as possible the system will automatically switch to a valid position sensor and deactivate this warning.

Remedy: Check/repair the the connected position sensors.

No WGS84 Position in Use



The selected position sensor

- is no longer reporting the WGS84 position datum

or

- is reporting another position datum than WGS84.

As a consequence the indicated and plotted positions could have deviations to the WGS84 system.

Remedy: Check the position sensor and the data sentences transmitted to NACOS. Ensure correct transmission of the position datum sentence.

Position Invalid



The selected position sensor is sending invalid position data. Another position sensor will have to be selected by the operator. During the transition period, the system determines the position by dead reckoning (i.e. is internally temporarily switched to Estimated Position).

Special features: The alarm is distributed over the entire system. Acknowledgement is possible on any MFD.

Position Timeout



Data are no longer being received from the selected position sensor,

-or-

The DCU connected to the system has failed.

Another position sensor will have to be selected by the operator. During the transition period, the system determines the position by dead reckoning.

Special features: The alarm is distributed over the entire system. Acknowledgement is possible on any MFD.


Position Valid



The position sensor which had given the **Position Invalid** or **Position Timeout** alarm is again sending valid data again.

Special features: The warning is distributed over the entire system. Acknowledgement is possible on any MFD.

Redundant Gyro Differs


 The difference between the headings of the selected heading sensor and of the redundant heading sensor exceeds a specified alarm limit.

Special features: This warning can occur simultaneously on more than one of the system's items of equipment.


Remedy:

- Check the available heading sensors, their mode and data

Redundant Gyro Lost

 No valid heading is received from the redundant heading sensor. The heading monitoring no longer takes place while the cause of the warning still exists.

Redundant Position Differs


 The difference between the positions of the selected position sensor and of the redundant position sensor exceeds a specified alarm limit.

Special features: This warning can occur simultaneously on more than one of the system's items of equipment.


Remedy:

- Check the available position sensors, their mode and data

Redundant Position Lost


 No valid position is received from the redundant position sensor. The position monitoring no longer takes place while the cause of the warning still exists.

Water Speed Invalid

 The selected STW speed sensor is sending invalid data. Another water speed sensor will have to be selected by the operator. At present, the speed that was last sent as the valid speed is being used.

Special features: The alarm is distributed over the entire system. Acknowledgement is possible on any MFD.

Water Speed Timeout

 Data are no longer being received from the selected water speed sensor or from the DCU. Another water speed sensor will have to be selected by the operator. At present, the speed that was last sent as the valid speed is being used.

Special features: The alarm is distributed over the entire system. Acknowledgement is possible on any MFD.

Water Speed Valid

 The speed sensor which had given the **Water Speed Invalid** or **Water Speed Timeout** alarm is again sending valid data.

Special features: The warning is distributed over the entire system. Acknowledgement is possible on any MFD.

2.2.2 RADAR Alarms

ACQ Zone Overflow

A target has been acquired automatically in the guard zone. It cannot be tracked, because the maximum number of targets ¹⁾ are already being tracked.

Remedy: Check the acquisition/guard zone; delete targets.

ARPA TGT Capacity Limit



100% of the maximum number of ARPA targets are being tracked.

Remedy: Delete at least one unimportant target.

Check ARPA Target Capacity



95% of the maximum number of ARPA targets are being tracked.

Remedy: Delete at least one unimportant target

Dangerous Target



The target situated at the displayed red flashing symbol has become a dangerous target, because the CPA and TCPA values have become smaller than the limits that were set for them.

Lost Target ²⁾



The tracked target situated at the displayed lost target symbol has got lost.

Special feature: For this warning it is possible to switch off the acoustic signal.

Magnetron Fault



The selected transceiver is reporting magnetron overcurrent.

Special feature: Acknowledgement is performed by switching the radar over to stand-by.

Remedy: Switch the transceiver over to stand-by, and then switch it back to radar operation. If the warning occurs repeatedly, request service.

No Antenna Azimuth



The azimuth angle information of the antenna is missing.

Remedy:

- If the antenna is not rotating: check the ship's mains and/or the antenna fuse or circuit-breaker. If the antenna is rotating: request service.
- Select another radar transceiver

No Headmarker



The antenna's headmarker signal is missing.

Remedy:

1) ARPA targets and AIS targets together

2) For AIS targets the Lost Target warning can be disabled in the Settings - Target menu.

-
- If the antenna is not rotating: check the ship's mains and/or the antenna fuse or circuit-breaker. If the antenna is rotating: request service.
 - Select another radar transceiver

No Radar Video

The system is in a faulty condition, such that the radar video cannot be generated.

Remedy:

- Check the radar transceiver
- Check the antenna
- Select another radar transceiver

Request service.

No Trigger

The radar transmission trigger is missing, the radar video cannot be displayed.

Remedy:

- Check the radar transceiver.
- Select another radar transceiver

Target AUTO-Acquired

A target which is not yet being tracked has been acquired automatically in the acquisition/guard zone.

TGT Entered Guard Zone

A target which is already being tracked has entered the acquisition/guard zone.

2.2.3 AIS Alarms

Depending on the type of AIS connected to the system, not all alarms and warnings listed below may be supported.

Nevertheless all AIS alarms which are implemented in the NACOS Platinum are listed here completely.

The AIS related target alarms and warnings are documented in the chapter **Radar Alarms**, they are not repeated here.

The following warnings and alarms are only available in the system, if an AIS receiver is connected.

AIS Ch.Man. Not Accepted



The settings made for the channel management have not been accepted by the system.

Remedy: Check the settings.

AIS Check TGT Capacity

95% of the maximum number of AIS targets are being tracked.

Remedy: Delete at least one unimportant AIS target.

AIS External POSN Lost



The AIS system does not receive a valid position sensor information and falls back to its internal position sensor.

Remedy: Check the sensor and the cabling.

AIS General Failure



The AIS has stopped the transmission caused by an internal fault.

Remedy: Call service as soon as possible. The AIS system must be exchanged probably.

AIS GPS Antenna Failure



The GPS antenna of the AIS does not work correctly.

Remedy: Check the GPS antenna and the antenna cabling (short circuit or missing contact at the connectors). No immediate action is required, AIS is normally fed by an external GPS receiver from the integrated bridge system.

AIS GPS ANT Short Circ.



The internal check of the GPS receiver has detected a short circuit in the coax wire between the antenna and the receiver.

Remedy: Check the GPS antenna cable.

AIS GPS Receiver Fault



The GPS receiver of the AIS has detected an internal malfunction.

Remedy: Call service at the next possible harbour. The transmitter is still operable, your vessel will still be visible for other ships, but you might not see other AIS targets.

AIS TGT Capacity Limit

100% of the maximum number of acquired AIS targets are being tracked.

Remedy: Delete at least one unimportant AIS target.

AIS New Safety Message

The AIS has received a safety message.

The safety message can be read under > **Tools** > **Target** > **Message**.

AIS No Valid COG

The AIS system has no valid course over ground information.

Remedy: Check the connected sensor and cabling. (Typically the COG information from an integrated bridge system which is derived from a GPS sensor, the AIS will continue to work but will transmit less information to other ships.)

AIS No Valid Heading

The AIS system has no valid heading information from the sensor.

Remedy: Check the heading sensor. (Typically the heading information from an integrated bridge system which is derived from the gyro, the AIS will continue to work but will transmit less information to other ships.)

AIS No Valid Position

The AIS system has no valid position information from internal position sensor

Remedy: Check the cabling and the antenna of the internal GPS sensor. (Typically the position information from an integrated bridge system which is derived from a GPS sensor, the AIS will continue to work with its own sensor, but the position, which is sent out to other ships might not be as accurate as before)

AIS No Valid ROT

The AIS has no valid rate of turn information from the sensor.

Remedy: Check the sensor and the cabling. (Typically the rate of turn information from an integrated bridge system which is derived from the gyro, the AIS will continue to work but will transmit less information to other ships)

AIS No Valid SOG

The AIS has no valid speed over ground information.

Remedy: Check selected speed sensor. (Typically the SOG information from an integrated bridge system which is derived from a GPS sensor, the AIS will continue to work with its own sensor, but the speed, which is sent out to other ships might not be as accurate as before)

AIS Offline

Remedy: Check the AIS system. It might be possible to eliminate the fault by switching the voltage supply to the AIS electronics unit off and then on again at the ship's mains.

AIS Oper. Unit Offline



The indicator electronic does not communicate with the AIS electronics unit. The AIS continues operating.

Remedy: Check the cabling and connection between RADAR and AIS system.

AIS RX Ch. A Malfunction



The AIS stopped the transmission on the channel A.

Remedy: The AIS system must be exchanged.

AIS RX Ch. B Malfunction



The AIS stopped the transmission on the channel B.

Remedy: The AIS system must be exchanged.

AIS RX DSC Malfunction



The AIS stopped the transmission on the channel 70.

Remedy: The AIS system must be exchanged.

AIS TX Malfunction



The AIS system stopped transmission.

Remedy: Check the AIS system. Check the antenna and the antenna cabling (short circuit or missing contact at the connectors). Call the service at the next possible harbour, be aware that your ship might not be visible for other ships as an AIS target.

AIS VSWR Limit Exceeded




The AIS system continues operation: The VSWR (voltage standing wave ratio) checked by the AIS is out of range. The distance from where your own ship is visible for other ships as an AIS target is significantly reduced to a very few miles only.

Remedy: Check the AIS system. Check of the AIS UHF antenna, antenna cabling and connectors.


2.2.4 ECDIS Alarms


Approach to Waypoint

 The ship is approaching a critical point on the pre-planned track, for example the WOP (wheel over point), which is indicating the approach to the next course change manoeuvre on the route.


Special feature: This alarm can be activated or suppressed on the Alarms expander under **ECDIS Alerts** with the selection of **Critical point on route alarm**.

Area w. Special Condition


 The chart monitoring detected an area with special conditions (for example a user made Danger Highlight Area) ahead of the own ship's position.

 For this alarm it is possible to select whether it is supposed to be an alarm with priority 1 or an indication.


Area w. Special Condition

 For this indication it is also possible to select whether it is supposed to be an alarm with priority 1 or an indication.


Crossing a Danger

 An obstruction, a wreck, rock with depth below the user selected safety depth or Aids to Navigation or a user made Safety Line will be crossed soon or is touched by the guard sector set for the ECDIS..

Crossing Safety Contour

 The ship or its guard sector has actually crossed a depth limit for which this alarm has been activated in the **Alarms > ECDIS Alerts** dialog.

Deviation from Route

 The current position of the ship deviates from the planned position according to the route that has been computed by the Route Editor. The limits of the cross track deviation can be altered in the XTD LIM column of the Route Editor.

2.2.5 Trackpilot Alarms

The following list of alarms, warnings and indications contains all alarms for all operating modes (Heading, Course, Track) of the TRACKPILOT. In systems with Heading mode only, alarms of the Course and Track mode are not initiated.

TP Astern Speed



The TRACKPILOT is in the activated state and the selected speed sensor is producing negative (astern) speed data (which the TRACKPILOT cannot process).

WARNING: While this alarm is present, the steering gear is not being driven by the TRACKPILOT.

When the **TP Astern Speed** alarm appears, it is necessary to immediately change to some other speed sensor or to switch over to manual steering.

Special feature: The alarm cannot be acknowledged. It is repeated and disappears when its cause has been eliminated.

TP Backup Navigator Alarm

The **TRACKPILOT Alarm** signal was generated.

Causes for generating the **TRACKPILOT Alarm** signal: See 2.2.6 on page V-32.

Special feature: As long as the **TP Backup Navigator Alarm** alarm has not been acknowledged, the **TRACKPILOT Alarm** signal remains active.

TP Change Position Sensor



While the system is in Track mode,

- the selected position sensor has not transferred any valid data for a longer period, or
 - a switch-over has taken place to a position sensor which is not transmitting valid data, or
 - a switch-over has taken place to a position sensor which is not permitted as a continuous sensor for Track mode.
- or -

While a position sensor is being used which is not permitted as a continuous sensor for Track mode, a switch-over to Track mode has taken place.

Special features: Until the cause of the alarm has been eliminated, the alarm is repeated after 1 minute. The **TP Track Mode Fault** alarm appears after 10 minutes if the cause of the alarm has not yet been eliminated

Remedy: Select a position sensor with valid data, or a permitted position sensor.

TP Course Limit




The set course limit has been exceeded.

Remedy:


- Increase the course limit or
- wait until the TRACKPILOT has eliminated the course deviation, or
- switch over to manual steering.


TP Deactivated

 The TRACKPILOT has been deactivated and is no longer controlling the rudder. The ship must be steered manually or by another autopilot.

NOTE: This alarm is optional and must be configured on service level if required by the class or the owner.


TP Drift Angle Limit

 The pre-set drift limit value for the Trackpilot has been exceeded; for correct course or track-keeping, a larger compensation angle is needed.

 Even after acknowledgement, the drift angle contained in the actual course is limited for the TRACKPILOT to the drift limit setting.

Remedy: Increase the drift limit value or switch over to Heading mode or to manual steering.


TP End of Track

 The ship, sailing in Track mode, will pass the last waypoint of the System Route in 60 seconds.

Special features: Acknowledgement causes a switch-over to Course mode; the ship's course has to be set manually from now on.


If the alarm is not acknowledged within 30 seconds, the **Trackpilot Alarm** signal is generated for the purposes of triggering an external alarm. See 2.2.6 on page V-32.

TP GC Course Change

 Track mode is switched on and the sailing mode is set to Great Circle. In order to remain on the Great Circle, a course change is necessary which exceeds 3 degrees or half of the set Course Limit. The new course is displayed as **Next** course in the TRACKPILOT data display.

Special features: Acknowledge with **Execute**. Regardless of whether this alarm is acknowledged or not, the planned change of the course takes place at the WOP.


TP Heading Change Due to Drift

 The ship is sailing in Course mode or Track mode and a drift change of more than 5° has occurred as a result of switch-over (manual or automatic) of the selected SOG speed sensor.

Special feature: Up until acknowledgement takes place, the TRACKPILOT uses the longitudinal and transverse speeds that were valid before the alarm. After acknowledgement, the TRACKPILOT uses the new longitudinal and transverse speeds, so that a heading change which is of the same order of magnitude as the drift difference occurs automatically.

Remedy: Select Heading mode to avoid any heading change caused by a switch over of the speed sensor.

TP Heading Sensor Fault

 The **TRACKPILOT** is in the activated state and the compass system or its transmission unit has been switched off, is reporting incorrect data, or has failed.

- or -

With the TRACKPILOT in the activated state, the gyro heading value

- has jumped by more than 1 degree between two high speed transmissions.



CAUTION

While this alarm is present, the steering gear is not being driven by the TRACK-PILOT. When this alarm appears, a switch-over to manual steering must be performed immediately.

Special features:

- Acknowledgement causes switch-over to Heading mode and acceptance of the displayed gyro heading value. The currently existing heading value is taken over as the set value.
- In addition, acknowledgement can force the TRACKPILOT to generate larger rudder angles.
- If the cause of the alarm has not been removed (i.e. the gyro heading is still invalid), the alarm is repeated even after acknowledgement.

If the alarm is not acknowledged within 30 seconds, the TRACKPILOT Alarm signal is generated for the purposes of triggering an external alarm. See 2.2.6 on page V-32

Remedy (after the switch-over to manual steering has taken place):

Check the compass system; if possible at the compass system, select another heading source. Check the displayed heading before use.

TP High Rudder Limit (high ROT) ¹⁾



The TRACKPILOT internal monitoring function of the rudder limit, set by the operator, has determined that with this maximum rudder deflection at the currently sailed speed a high rate of turn above the limit would be produced.

Special feature: This warning cannot be acknowledged, it will disappear if the cause for this warning has been eliminated.

Remedy: Decrease the rudder limit or reduce the speed.

TP Low Rudder Limit ²⁾



The rudder limit is set so low that - during Track mode - the next course-change possibly cannot be performed with the planned radius.

Remedy: Increase the rudder limit, increase the radius, or leave the Track mode.

TP Low Speed



The speed reported by the selected speed sensor is so low that the TRACKPILOT might not be able to steer the ship correctly.

Special feature: Acknowledgement causes a switch-over to Heading mode.

Remedy: Switch over to manual steering.

TP Low Track Limit²⁾



The track limit setting is lower than the expected average position-error of the selected position sensor.

Remedy: Increase the track limit or select a more accurate position sensor.

¹⁾ This alarm can only appear if activated on service level; for this function a maximum allowed ROT value must be set in the system configuration.

²⁾ This alarm can only appear if activated on service level; required for ships with DNV NAUT-AW approval.

TP Low Water Speed



The speed through the water (STW) of the selected sensor is so low that the TRACKPILOT might not be able to steer the ship correctly.

This alarm can only appear if a speed sensor providing STW is installed but has not been selected as system speed input.

Remedy: Switch over to manual steering, if it is obvious, that the TRACKPILOT is not able to steer the ship correctly.

TP No Master MFD Selected



There is no MFD defined as the TRACKPILOT Master by user selection.

Special features: Acknowledgement can also be performed by clicking on the **Master** button or by pressing the **TrackPilot Master** key on the keyboard.

The MFD on which acknowledgement takes place is automatically switched to act as the TRACKPILOT Master.

TP Position Drift ¹⁾



Since the beginning of the long-term position drift computation in Track mode, a difference has built up between the dead reckoning position and the position given by the position sensor, and this difference is greater than a limit value which depends on the set track limit ²⁾ or on the sensor selection.

Special feature: Acknowledgement restarts the position drift calculation with a difference of zero.

Remedy:

- Select a more accurate position sensor or speed sensor or correct the manual set and drift input.
- Select **Manual DR** (Dead Reckoning) instead of the position sensor and check the navigation sensors presently used.
- Switch over to Course mode or Heading mode.
- Increase the track limit. ²⁾

TP Position Jump



During steering in Track Mode a position jump (e.g. mode change of the sensor, new sensor selection or manual position adjust) exceeding the set track limit (or, if the track limit is set to a low value, a position jump exceeding a value which depends on the sensor type) has been detected.

Special feature: By acknowledgement, the new position is accepted.

Remedy: Increasing the track limit increases the tolerance with regard to position jumps and strengthens the filtering of the received position-data.


¹⁾ Depending on the system configuration this alarm can be switched off on service level.

²⁾ In the case of ships with DNV NAUT-AW approval, the limit value depends not on the track limit but on the selected speed sensor and on the selected position sensor.

TP Reduced Radius



The Track mode is in the switched-on state, but the set radius for the next turn is too large to enable the ship to reach the next leg by means of the manoeuvre that is planned at the TO-waypoint. For this reason, the TRACKPILOT will reduce the radius to such an extent that the course change can be performed.

 A reduced radius can result in an increased ROT during the planned turn.

Remedy: Switch over to Course mode or Heading mode.

TP Rudder Error



The rudder engine is not obeying the instructions from the TRACKPILOT, or is not doing so with sufficient accuracy.

Special feature: The message initially appears as an indication without an acoustic signal. If the cause of the fault continues to exist for more than 10 seconds, the acoustic alarm signal appears additionally and the priority is increased to Alarm (1). The alarm can be acknowledged, but is repeated for as long as the cause of the fault continues to exist.



CAUTION

If this alarm is present for a longer time, it is necessary to switch over to manual steering.

Remedy: Check the steering gear, the rudder pumps and the TRACKPILOT interface.

TP Rudder Feedback Differs



The signal of the main rudder feedback unit deviates by at least 5 degrees from the signal received from the redundant rudder feedback unit.

Remedy: Switch over to manual steering. Check the rudder feedback units (wiring, signal, mechanical function).

TP Rudder Limit



The set rudder limit value has been reached; with this rudder limit, the activated manoeuvre can most probably not be performed without a deviation

- or -

The present rudder angle lies outside the rudder limit.



CAUTION

In Track mode on ships with DNV NAUT-AW approval, limitation by the set rudder limit is ignored when a planned manoeuvre is being performed (i.e. during the turn at the waypoint) ¹⁾.

¹⁾ This function must be enabled on service level.

Remedy:

- Increase the rudder limit or
- wait until the rudder angle becomes less than the rudder limit or
- switch over to manual steering.

TP Rudder Relay Failure

An error has occurred in the relay controlled rudder control system.

Remedy: Switch over to manual steering. Check the rudder control system (wiring, steering relays etc.).

TP Rudder Synch. Error

The rudder angles of the two rudders controlled by the TRACKPILOT differ by at least 5 degrees.

Remedy: Switch over to manual steering. Check the rudder control system and the synchronism of the rudders.

TP Short Radius

So that the planned manoeuvre can be performed with the actually set radius, the expected rudder angle would have to be larger than the maximum value that the TRACKPILOT can apply.

Remedy: Increase the radius or switch over to manual steering.

TP Speed Jump

The speed transferred from the selected speed sensor has jumped by more than 5 knots.

Special feature: Up until acknowledgement takes place, the TRACKPILOT uses the longitudinal and transverse speeds that were valid before the alarm. After acknowledgement, the TRACKPILOT uses the new longitudinal and transverse speeds.

Remedy: Check the new speed value. If it is correct, acknowledge the alarm; otherwise, select some other speed sensor before acknowledgement.

TP Speed Sensor Fault

The TRACKPILOT is in an active steering mode and the selected speed sensor is reporting incorrect data or has failed; steering with the drift angle taken into account is not possible.

- or -

The TRACKPILOT had been operated in Track mode and the selected sensor is reporting incorrect data or has failed or Manual Speed has been selected as the speed sensor. When the alarm appears, the system is automatically switched over to the Heading mode.

Special feature: For as long as no valid speed data are being received, the alarm is repeated.

Remedy: Select some other speed sensor or change to manual steering.

TP Track Data Error

The TRACKPILOT reports transfer errors or data errors of the activated System Route or the route was deactivated by the operator.

**CAUTION**

If this alarm appears, the data of the pre-planned track are unreliable. The track data must not be used for navigation.

Remedy: Switch to Course mode or Heading mode or manual steering. Check the waypoint data, of the activated route. Deactivate and activate the route again.

TP Track Limit



The track limit value set by the operator or taken from the activated route has been exceeded.

Remedy:

- Increase the track limit or
- allow the ship to steer back to the track or
- steer the ship with the joystick or
- select manual steering.

TP Track Mode Aborted ¹⁾



By operation of the joystick, the Mode buttons or the Mode keys (HDG, CRS) on the keyboard, the TRACKPILOT was switched from Track mode to Course Mode or Heading Mode.

TP Track Mode Fault ¹⁾



The system was in Track mode, but the speed data, position data or waypoint data are no longer available or valid during sailing in Track mode.

- or -

The set course limit or the set track limit is exceeded for the track that was just recalculated.

- or -

The system was in Track mode and the latitude 85° has been exceeded.

The system therefore automatically switches over to the Course mode.

Special features: If the alarm is not acknowledged within 30 seconds, the **TRACKPILOT Alarm** signal is generated additionally for the purposes of triggering an external alarm. See 2.2.6 on page V-32.

Remedy: Select some other speed or position sensor or define a new route as the System Route or - after the course deviation or track deviation has fallen below the limit - activate Track mode again.

TP Waypoint Approaching



The early course change indication announces, that the WOP of the TO-waypoint will be reached in XX seconds.

XX = advance warning time which, according to section V - 2.2.4: "ECDIS Alarms" , has been entered for the occurrence of this alarm in the TP-Settings dialog under **WPT Approach**.

The distance and the time to go to the WOP as well as the Next track course and radius are displayed in the **Route Data** display.

TP WOP Execution



In Track mode the next WOP (the starting of the course change on the leg) will be reached 30 seconds after this warning or alarm appears.

Special feature: Acknowledge with **Execute**

¹⁾ On ships with DNV NAUT-AW approval, this alarm also appears if the **Chart Monitoring Offline** or **Conning System Offline** alarm occurred.


CAUTION

Regardless of whether this alarm is acknowledged or not, the planned change of the course takes place at the WOP.

If the planned change of the course is not to be executed: Switch over to Course or Heading mode and steer with the joystick or appologize a manual steering mode.

If the preceding **TP Waypoint Approaching** warning has been acknowledged, the **TP WOP Execution** alarm appears initially as a warning, with a low intensity acoustic signal. If the **TP Waypoint Approaching** warning was not acknowledged, the **TP WOP Execution** alarm appears together with an intensive acoustic signal.

If the warning **TP WOP Execution** is not acknowledged within 30 seconds, an intensive acoustic signal is generated even if the **TP WPT Waypoint Approaching** alarm was acknowledged beforehand. If not acknowledged 30 seconds after appearance of the WOP alarm, the **TRACKPILOT Alarm** signal is generated for the purpose of triggering an external back up navigator alarm. See 2.2.6 on page V-32.

- ☞ If the manoeuvre period from one wheel-over point to the following one is less than 30 seconds, the **TP WOP Execution** alarm of the second wheel-over point does not appear until after the first wheel-over point has been passed but already during execution of the first manoeuvre.

TP Trackpilot Failure


The TRACKPILOT reports an internal fault, and is no longer controlling the rudder.


CAUTION

When this alarm appears, a switch-over to manual steering must be performed immediately.

- ☞ Until the cause of the alarm has been eliminated, the status **FAILURE** is shown in the operational mode field of the TRACKPILOT data display as well as on the Conning display.

Remedy (after the switch-over to manual steering has taken place):

- Attempt to reconnect the Trackpilot to the steering gear.
- Restart the TRACKPILOT (See 2.8 on page G-49 for details).
- Check the TRACKPILOT electronics unit, the TRACKPILOT Interface and their power supply.

If installed, switch over to the second TRACKPILOT.

Trackpilot System Failure



a) For systems with one TRACKPILOT

The communication between the MFD and the TRACKPILOT has failed.



CAUTION

When this alarm appears, a switch-over to manual steering must be performed immediately.

☞ Until the cause of the alarm has been eliminated, the word **FAILURE** is shown in the operational mode field of the TRACKPILOT data display.

Remedy (after the switch-over to manual steering has taken place):

- Restart the TRACKPILOT (See 2.8 on page G-49)
- Check the TRACKPILOT electronics unit, the TRACKPILOT Interface and their power supply.

b) For systems with two TRACKPILOTs, a TRACKPILOT is connected to the steering gear

The communication between the MFD and the activated TRACKPILOT has failed.



CAUTION

When this alarm appears, a switch-over to manual steering or to the other TRACKPILOT must be performed immediately.

Special Feature: Through the acknowledgement, the other TRACKPILOT is selected but not activated.

Remedy:

- Activate the other TRACKPILOT.
- Restart the TRACKPILOT which has generated the alarm. (See 2.8 on page G-49)
- Check the TRACKPILOT electronics unit and the TRACKPILOT Interface of the TRACKPILOT which has generated the alarm.

c) For systems with two TRACKPILOTs, no TRACKPILOT is connected to the steering gear

The communication between the MFD and both TRACKPILOTs has failed.

☞ Until the cause of the alarm has been eliminated, the word **FAILURE** is shown in the operational mode field of the TRACKPILOT data display.

Remedy:

- Restart both TRACKPILOTs (See 2.8 on page G-49)
- Check both TRACKPILOT electronics unit, both TRACKPILOT Interface and their power supply.

2.2.6 Trackpilot Alarm Signal Outputs

Additional to the alarms, warnings and indications of the TRACKPILOT on the MFD, there are different alarm outputs available on the interconnection board of the TRACKPILOT-Interface. The designations and functions of these isolated relay outputs are listed below.

Please refer to the Technical Manual for more information.

Trackpilot Failure Alarm

The **TRACKPILOT** interface puts out this signal if

- there is no operating unit switched to act as the TRACKPILOT Master for more than 30 sec (the **TP No Master MFD Selected** alarm has been triggered), or
- the **TP Heading Sensor Fault** alarm has been triggered, or
- the **TP Astern Speed** alarm has been triggered, or
- the **TP Trackpilot Failure** alarm has been triggered, or
- the **Trackpilot System Failure** alarm has been triggered, or
- the **TRACKPILOT** electronics unit or the **TRACKPILOT** Interface unit has been switched off, or
- the supply voltage of the **TRACKPILOT** Electronics unit or of the **TRACKPILOT** Interface unit lies outside of the specification.

TRACKPILOT Power Alarm

The **TRACKPILOT** interface activates this signal if

- the **TRACKPILOT** Electronics unit has been switched off, or
- the supply voltage of the **TRACKPILOT** Electronics unit lies outside of the specification.

TRACKPILOT Alarm

The **TRACKPILOT** Interface outputs this signal if

- the **TP Heading Sensor Fault** alarm appeared 30s ago and this alarm has not been acknowledged
- in **Track Mode** the **TP Change Position Sensor** alarm appeared 1-2 minutes ago and has not been acknowledged
- a wheel-over point has been passed but the **TP WOP Execution** alarm for this wheel-over point has not been acknowledged, or
- the **TP End Of Track** alarm appeared 30 seconds ago and this alarm has not been acknowledged, or
- the **TP Track Mode Fault** alarm appeared 30 seconds ago and this alarm has not been acknowledged.

In addition, at service level, it can be specified which of the following reasons are to cause the output of this signal too:

- The **TP Waypoint Approaching** alarm appeared 30 seconds ago and this alarm has not been acknowledged.
- The **TP Track Limit** alarm has been triggered. ¹⁾
- The **TP Course Limit** alarm has been triggered. ¹⁾

At service level, the signal output can be set for the **TP Track Limit** and **TP Course Limit** alarms in such a way that it takes place after a delay of 30 seconds.

The **TRACKPILOT Alarm** signal disappears as soon as the cause of the alarm is remedied or the alarm that triggered the TRACKPILOT Alarm signal has been acknowledged.

At service level, it is possible to define that the **TP Backup Navigator Alarm** alarm appears at the TRACKPILOT Master as soon as the **TRACKPILOT Alarm** signal is triggered. With this setting, the **TRACKPILOT Alarm** signal remains active until the reason for the TP Alarm is no longer valid and the **TP Backup Navigator Alarm** alarm is also acknowledged ²⁾.

TRACKPILOT Rudder Alarm

The TRACKPILOT interface outputs this signal if

- the **TP Rudder Feedback Differs** alarm has been triggered, or
- the **TP Rudder Relay Failure** alarm has been triggered, or
- the **TP Rudder Sync. Error** alarm has been triggered.

¹⁾ DNV requires BN alarm, issued 30 sec after TL and CL alarm without acknowledgement by the operator.

²⁾ The Trackpilot Alarm contact is used as the required system's back-up navigator alarm output in installations with a connection to external Bridge Alarm/Watch Alarm Transfer systems.

2.2.7 VDR Alarms

The following warnings and alarms are only available in the NACOS Platinum system, if a VDR DEBEG 4300 or 4350 is connected via its LAN interface.

VDR Backup is running

In the voyage data recorder, an incident backup is running.

Special feature: The indication cannot be acknowledged. It disappears when the backup has been finished.

This indication can occur simultaneously on more than one MFD.


VDR FRM Failure

 The Final Recording Medium is defective, or the data transfer to it is faulty.

Special feature: This warning can occur simultaneously on more than one MFD.

Remedy: Check the VDR.


VDR Integrity Failed

 A fault or failure has been detected by the BITE (Built-In Test Equipment) of the VDR.

Special feature: This warning can occur simultaneously on more than one MFD.

Remedy: Carry out a restart of the VDR; see page 175. Check the VDR.


VDR Main Power Failure

 The uninterruptible power supply (UPS) of the VDR is no longer being supplied with power by the ship's mains. The VDR is supplied with power by the UPS for at least 2 hours.

Special feature: This warning can occur simultaneously on more than one MFD.

Remedy: Secure the supply of power from the ship's mains to the UPS.

VDR Microphone Failed

 The microphone test automatically performed by the VDR has shown that at least the recording function of one of the microphones is faulty.

Special feature: This warning can occur simultaneously on more than one MFD.

Remedy: Check the VDR.

VDR Offline

 The system has no contact to the voyage data recorder.

Special feature: The warning cannot be acknowledged. It disappears when its cause has been eliminated.

Remedy: Check the VDR and the LAN connections.

2.2.8 Machinery Alarms

System Alarms

Besides the alerts delivered by the different applications running on the MFD or which are received from the connected equipment, sub-systems and sensors, there is a list of alarms, warnings and indications which can additionally be issued by the integrated system and displayed on any MFD.

These alerts are not connected to any application but to a system monitoring process running partly on each MFD and on the Data Processing Unit.

The possible systems alarms are very much depending on the installed system structure and components available on board and they are therefore part of the configuration database created for your ship.

The following list of alarms can therefore only be an example, covering the most probable alarms which can be expected on small systems as shown in [Figure I / 2](#) (an IMO RADAR Set with 2 RADARs) or larger systems as shown in [Figure I / 4](#) (a system for large ships).

Master DPU: Status of DPU 2

The DPU or DCU which is currently running as the master has detected a problem with the secondary DPU.

Master DPU: Status of MFD (1 ... N)

The DPU or DCU which is currently running as the master has detected a problem with one of the installed MFDs. (1 ... N) is indicating the range of identification number of the MFDs.

DPU 1: SIO card 1 Channel (n)

The DPU or DCU has detected a problem with one of the installed serial I/O cards.
(n) is indicating the channel number on the SIO.

DPU 1: SIO card 2 Channel (n)

The DPU or DCU has detected a problem with one of the installed serial I/O cards.
(n) is indicating the channel number on the SIO.

DPU 1: SIO on CPU Board

The DPU or DCU has detected a problem with the on-board serial I/O channel.

Module 01C2C001 (SIO 2010) err

The serial I/O module with the identification 01C2C001 is reporting an internal error.

Note:

As soon as you add a Monitoring and Control System (MCS) as part of the NACOS Platinum, the number of integrated and ship dependent monitoring and alarm functions will be increased significantly. In this case refer also to the Commissioning Protocol which includes the complete list of alarms for the system installed on your ship. This document should also be available in printed form in the ship's files.

The alarm priority of these alarms is generally defined by the system configuration which is only accessible by the so called Integration Manager, an offline tool for the manufacturer's commissioning and service organisation. The output of this tool is a database which is loaded into the system (the MFDs and the DPUs) after the database has been adapted to the system structure and its interfaces.

Refer to the part D Machinery MCS Platinum in these operating instructions for a comprehensive description of the MCS integrated alarm system with all its sub-functions and possible settings.

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List of Abbreviations

A

ABS Absolute (Bearing)
AIS Automatic Identification System
ANSI American National Standards Institute

B

BCR Bow Crossing Range
BCT Bow Crossing Time

C

COG Course Over Ground
CPA Closest Point of Approach

D

DR Dead Reckoning

E

EBL Electronic Bearing Line
ECDIS Electronic Chart Display and Information System
ENC Electronic Navigation Chart
ESD Electrostatic Discharge ,
ETA Estimated Time of Arrival

G

GUI Graphical User Interface

H

HDG Heading

I

IBS Integrated Bridge System
IEC International Electrotechnic Commission
IHO International Hydrographic Organization
IMO International Maritime Association
INS Integrated Navigation System
ISO International Standardisation Organisation

M

MMI Man Machine Interface

N

NACOS Navigation Automation Control System
NMEA National Marine Electronics Association

O

Outstation

P

PI Parallel Index

PPI

PPI Plane Position Indicator, the Radar picture

R

REL Relative (Bearing)

RM Relative Motion

S

SOG Speed Over Ground

SOG Speed over Ground

STW Speed Through Water

T

TCPA Time to Closest Point of Approach

TFT Thin Film Transistor, a kind of Monitor

TM True Motion

U

UI User Interface

V

VRM Variable Range Marker

DOCUMENT HISTORY

1 Document History

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