Saab TransponderTech

R4 Combined AIS & Navigation System

Operator Manual

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Disclaimer

Caution

No single navigation aid should ever be relied upon as the exclusive means for navigating a vessel. The navigator is responsible for checking all aids available to confirm his position. Electronic aids are intended to assist, not replace, the navigator.

Software

This manual reflects the capabilities of R4 Combined Display software version 5.2.0, R4 AIS Transponder software version 5.2.0 and R4 Navigational Sensor software version 6.8-S6.

Operators Manual, Part Number and Revision

Part number 7000 109-147, revision I.

This manual is a replacement for the earlier manual 7000 109-147 rev H.

Safety Instructions

Note the following compass safe distances:

Equipment	Standard Magnetic Compass	Steering Magnetic Compass
R4 Display	0.6 Meters	0.3 meters
R4 Transponder	0.2 m	0.1 m
R4 Navigation Sensor (GPS and DGPS)	0.6 Meters	0.4 Meters

Disposal Instructions

Broken or unwanted electrical or electronic equipment parts shall be classified and handled as ‘Electronic Waste’. Improper disposal may be harmful to the environment and human health. Please refer to your local waste authority for information on return and collection systems in your area.

Contact Details

For Information on New Products and Dealers:

Please visit our home page www.transpondertech.se

For Installation, Service and Technical Support:

Please contact your R4 Combined AIS & Navigation System dealer

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1 PRODUCT DESCRIPTION

1.1 System Overview

The R4 Combined AIS & Navigation System comes in two configurations: GPS and DGPS. Both configurations feature an R4 Display and an R4 AIS Transponder. The GPS configuration also features an R4 GPS Navigation Sensor and an MGA-2 GPS antenna, while the DGPS configuration features an R4 DGPS Navigation Sensor and an MGL-3 or MGL-4 combined GPS/Beacon antenna.

The **R4 Display** provides a graphical user-friendly interface to the system. Via the display it is possible to plot the location of other ships, aids to navigation, search and rescue vessels and current active route. Information about other vessels can be listed sorted by range and optionally filtered showing only vessels within a specific sector. The display also makes it possible to create, edit and modify routes and waypoints, navigate following a route, send and receive messages, view sensor data, perform setup as well as supervise the systems status.

The **R4 AIS Transponder** consists of a radio transceiver unit, a GPS receiver and a controller unit. The transceiver consists of one transmitter and three independent VHF receivers, two tunable TDMA receivers and one DSC receiver. The transmitter alternates its transmissions between the two operating TDMA channels and can also be used to reply to a DSC interrogation (ITU-R M.825-3, Annex 1). The controller unit creates and schedules data packets (containing dynamic, static and voyage related data) for transmission based on the IMO performance standard for AIS.

The R4 AIS Transponder shall be connected to the ship's sensors as required by the installation guidelines published by IALA. The R4 AIS Transponder can interface external navigation and presentation systems that support required IEC 61162-1 sentences as set out in the Installation Manual. The R4 Transponder is prepared for connection to Long Range systems like Inmarsat C.

The **R4 GPS Navigation Sensor** features a high- precision GPS receiver, capable of receiving SBAS (e.g. WAAS or EGNOS) differential corrections. The **R4 DGPS Navigation Sensor** has all the features of the GPS Sensor, as well as a dual channel beacon receiver for reception of IALA radio beacon DGPS corrections.

The R4 Navigation Sensor is connected to an antenna, either an MGA-2 GPS antenna or an MGL-3 or MGL-4 combined GPS/Beacon antenna. The MGL antennas are capable of receiving and interpreting both radio beacon and satellite signals.

The system provides two user configurable serial ports, of which one is bidirectional and one used only for output of data. There is also a binary Speed Log port, a navigation alarm output port, an AIS alarm relay as well as an alarm acknowledge input port.

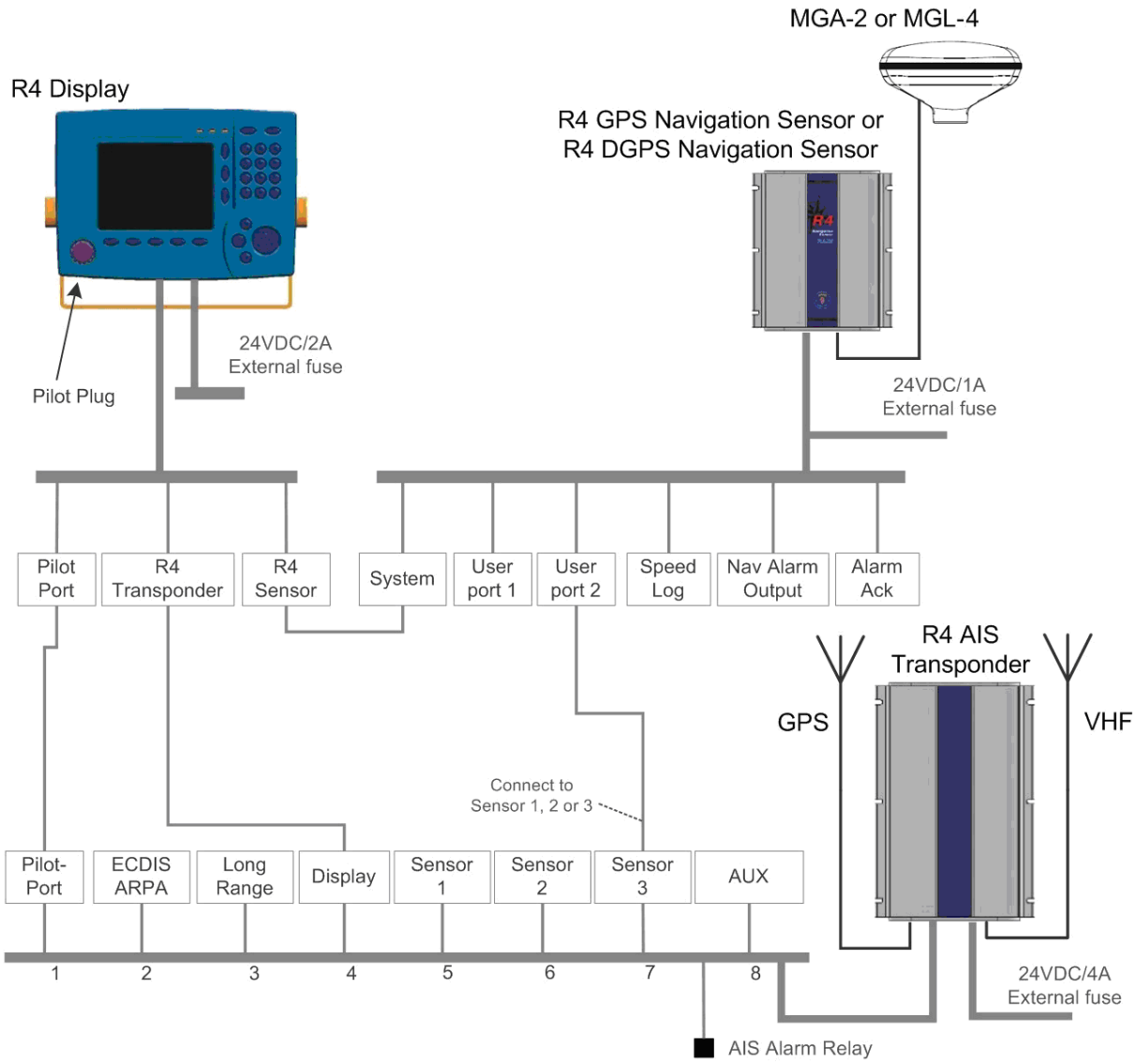


Figure 1 - Overview of the R4 Combined System

1.2 Main Features

The main features of the R4 Combined AIS & Navigation System are:

- High resolution, sunlight readable, 6'' graphic day and night display.
- Display capable of handling and visualizing both AIS and navigation information.
- Integrated AIS and navigation system providing ETA integration and combined AIS and navigation plot.
- Upgradeable without hardware modifications due to fully integrated DSP solution.

1.2.1 AIS Features

- User interface design centered on modes of operation corresponding to typical operator activities such as voyage planning and ship navigation.
- Broadcast of Dynamic, Static and Voyage related information.
- Standardized interface for connection to ship sensors e.g. GNSS, Gyro, Rate of Turn Indicator, ECDIS/ECS and ARPA.
- Plot capable of presenting up to 200 targets in vicinity of own ship and situation display with capability to view vessels in the most interesting bearing and range.
- Messaging views for generation and display of safety related messages and text messages.
- Mandatory pilot plug integrated in the display.
- VHF transceiver with one transmitter, three receivers.
- Channel management capability for areas without access to the worldwide allocated AIS frequencies.
- Possibility to generate Long Range AIS reply over satcom equipment for example Inmarsat C.
- 1W mode in accordance with requirements for tanker operations in port.
- Reception and processing of AIS messages 18, 19 and 24A/B as transmitted by AIS Class B ‘CS’ Transponders

1.2.2 Navigation Features

- Signal integrity monitoring calculations (RAIM) according to the IEC 61108-1 (2nd edition) standard. The RAIM function detects whether expected user defined navigation accuracy is achieved.
- Reception and use of differential corrections from SBAS, from the serial interface in RTCM SC-104 format and, in the DGPS configuration, from IALA radio beacons.
- Automatic or manual SBAS satellite selection modes.
- Navigational views with next waypoint information and cross-track error visualization.
- Display of latitude, longitude, speed over ground and course over ground.

- Up to five user defined views providing a large variety of graphical as well as numerical presentation options according to customer preferences.
- Capability to handle and store up to 2000 individually named waypoints and up to 100 different routes.
- Man Over Board (MOB) and Event Mark functionality.
- Two trip log counters with indication of average speed and accumulated time during motion.
- Anchor Watch position deviation alarm.
- Scheduled Alerts, user configurable time alarms and time to ETA alarms.
- Time frame related to UTC or user defined local offset.
- Input and output of IEC 61162-1 sentences configurable on sentence level and per port, providing control over interpreted, ignored and transmitted sentences.
- User interface design centered on modes of operation corresponding to typical operator activities such as voyage planning, status monitoring and ship navigation.
- Upgradeable without hardware modifications due to fully integrated DSP solution.
- Output of GPS positioning information on User port 1 and 2, enabling external systems to connect to and use the GPS information from the R4 Navigation Sensor.
- Meets the following standards:
    - IMO Performance Standard for GPS.
    - IEC 61108-1, second edition.
    - IEC 61162-1, second edition.

2 CONCEPTS AND TERMINOLOGY

This chapter describes some of the commonly used terms of this Operator's Manual, and the implied meaning when used in this manual.

Waypoint

A waypoint is a position on the earth's surface, represented by latitude and longitude, which is given a unique name. A waypoint is typically used for navigation direct to a certain position or as part of a route.

MOB Waypoint

A waypoint created when using the Man Over Board (MOB) functionality. The system can store up to 20 MOB waypoints at the same time, if more are created the oldest one is deleted. It is not possible to use MOB waypoints in routes.

Route

A route is a named, ordered sequence of waypoints, which together describes a path from the start to the end waypoint. The route that currently is being sailed is called the active route.

Active Route

The active route is the route currently being sailed and used for navigation. When starting to sail a route, a copy of the route is made into the active route. Changes made to the active route do not affect the source route, unless the active route is explicitly stored. Only one route can be active at any point in time.

Leg

A leg is the segment of a route between two consecutive waypoints. A route with the waypoints A, B and C has two legs: "A to B" and "B to C". For each leg in a route, the navigation algorithm and RAIM accuracy level can be set.

RAIM

RAIM is a GPS integrity monitoring scheme that evaluates the quality of the position data and is able (under normal circumstances) to detect a satellite malfunction that results in a large range error.

RAIM Accuracy Level

The RAIM accuracy level is the radius that is used to calculate current RAIM status.

RAIM Status

The RAIM status can be one of safe, caution and unsafe, and is indicated by the LEDs on the front of the R4 Display.

Navigation Algorithm

The navigation algorithm is the algorithm used for calculating the course to steer to reach the next waypoint. It is also used for calculating the distance to the waypoint. The navigation algorithm can be either great circle or rhumb line.

Great Circle Navigation

The great circle navigation algorithm calculates a course line that is the shortest path between two points on the surface of the earth. Using this navigation algorithm, course to steer when navigating towards a waypoint is not constant. The resulting track of this navigation algorithm will differ from the straight line drawn on a Mercator projected chart.

Rhumb Line Navigation

The rhumb line navigation algorithm calculates a course line that corresponds to a straight line on a Mercator projected chart, and cuts across all meridians at the same angle.

Waypoint Pass Criterion

The criterion used to determine when a waypoint in the active route is considered passed. The waypoint pass criterion can be any of Manual, Distance, Bisector Line and Perpendicular Line.

Manual Waypoint Pass Criterion

Using this pass criterion, the waypoint is only considered passed when the operator skips the waypoint.

Distance Waypoint Pass Criterion

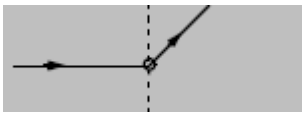
Using this pass criterion, the waypoint is considered passed once the ship has reached an imaginary circle around the waypoint. See illustration to the right. The radius of the circle is configurable.

Bisector Line Waypoint Pass Criterion

Using this pass criterion, the waypoint is considered passed once the ship has reached an imaginary bisector line of the angle between current and next leg. See illustration to the right.

Perpendicular Line Waypoint Pass Criterion

Using this pass criterion, the waypoint is considered passed once the ship has reached an imaginary line perpendicular to current leg. See illustration to the right.



3 GETTING STARTED

3.1 Front Panel Keys

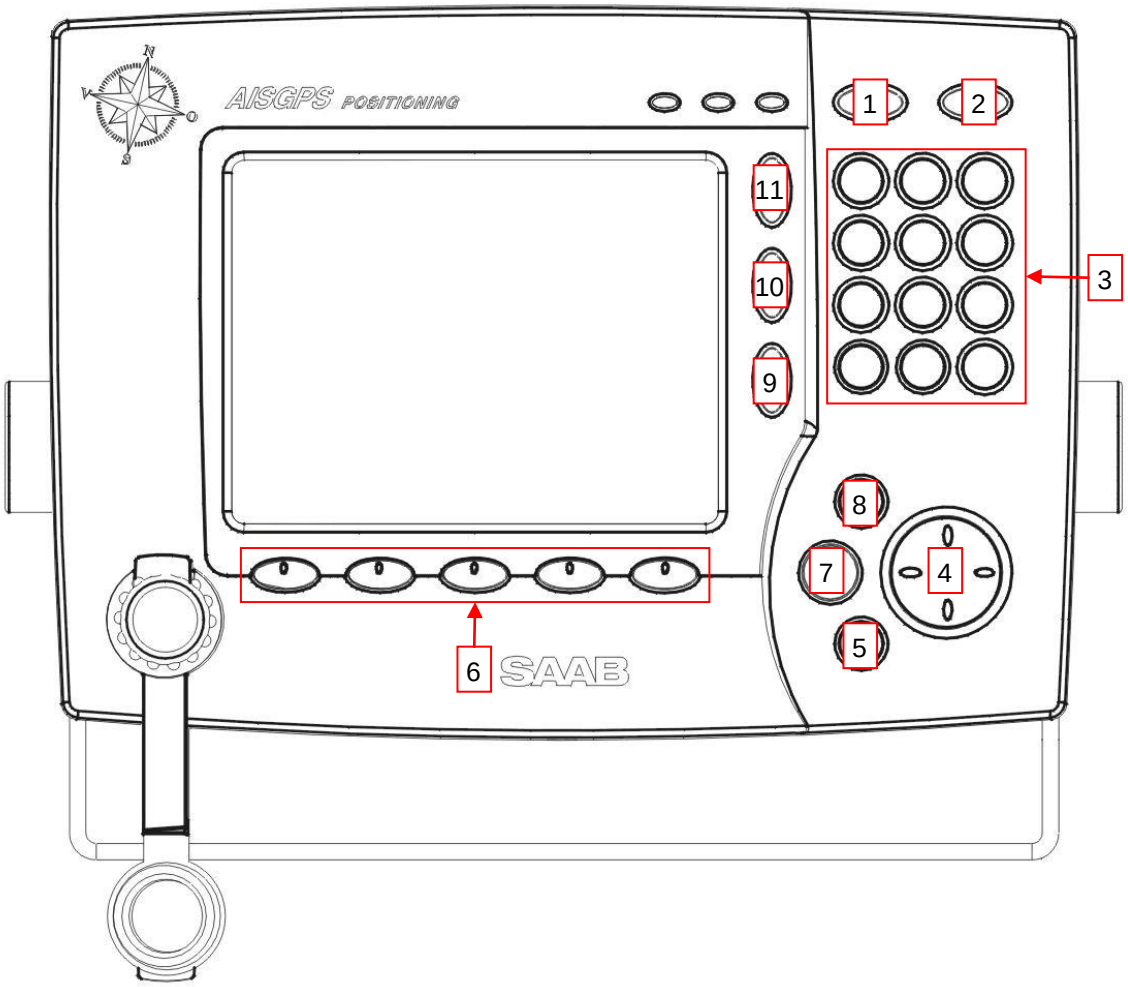


Figure 2 - Front Panel Keys

1 - STATUS

Used for fast change of the ship's navigational status.

2 - MODE

Used for changing mode of operation, which can be set to any of Navigate, Plan Voyage, Alarms & Msgs and Config.

3 - ALPHANUMERIC KEYS

These keys are used for entering text and numbers. To write a number in a numeric field press the key once. To write a character in a text field press once for the first character associated with the key, twice for the second character and so on.

4 - ARROW KEYPAD

∧ ∨ (Up and down on ***ARROW KEYPAD***) Moves the field and list highlight up and down and the cursor position when editing a field.

< > (Left and right on ***ARROW KEYPAD***) Jumps between pages in lists, moves the field highlight left and right and moves the cursor position when editing a field.

5 - ESC

Returns display to previous page, or restores a data field's previous value.

6 - FUNCTION KEYS

These keys have different functions depending on the current view. The function is displayed above each key on the screen. In some views, additional pages of function keys may be accessed with the ***PAGE*** key.

7 - ENTER

Used to start editing a field and for confirming data entry. Also used to view or edit a highlighted route, leg or waypoint.

8 - PAGE

Provides access to additional pages of function keys in certain views. A small arrow in the bottom right corner of the display is used to indicate that more pages are available.

9 - DISPLAY

Provides controls for fast configuration of backlight, contrast, LED illumination and button illumination. Two separate configurations are available, for day and night operation.

10 - MOB

Used to mark the spot of an event or when a person has fallen overboard. To mark an event, press the key momentarily. To activate the Man Over Board (MOB) function, press the key for at least 5 seconds.

11 - POWER

Used for turning the R4 Display on and off. To turn the power off, press and hold the key for 3 seconds.

3.2 How to Operate the R4 Display

3.2.1 Views and Function Keys

The user interface is built upon a number of views, organized in four different modes. The different views are reached with the function keys below the screen and the ***ESC*** and ***PAGE*** keys on the right side of the front panel. The mode is changed by pressing the ***MODE*** key followed by the function key corresponding to the desired mode.

Use the function keys to step into a specific view and ***ESC*** to get back one level. ***PAGE*** provides access to additional pages of function keys in some views. An example view is shown below. In the following sections of the manual the views of the R4 Combined AIS & Navigation System are described.

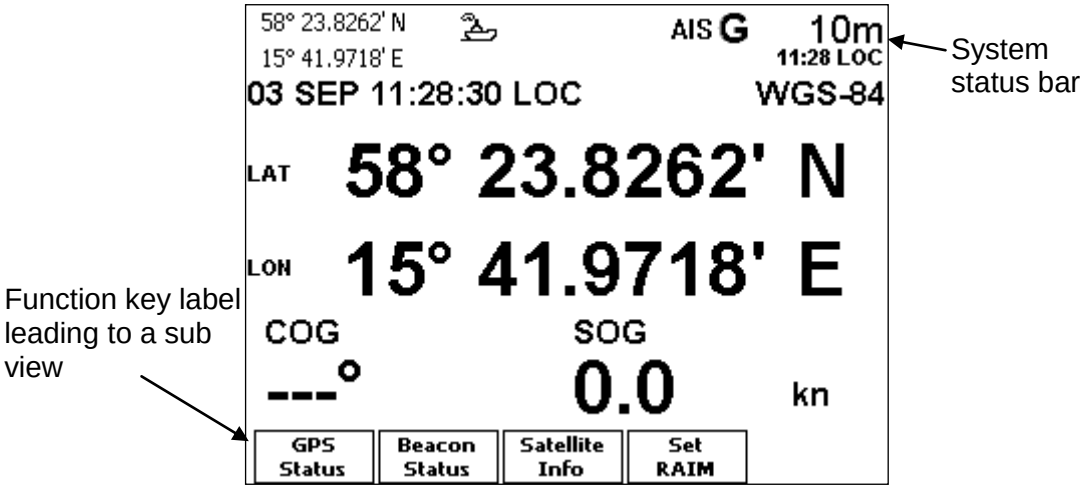


Figure 3 - R4 Display

The function keys are view-specific and the function of each key is specified with a label on the screen. Note that unlabelled keys are not active in that specific view. Also, in some views the function keys might serve as switches, e.g. toggling a parameter.

The status bar of the system is present in all views at the top of the screen, and further described in section 3.4 Status Bar on page 22.

3.2.2 Change Settings

Several of the views in the R4 Combined AIS & Navigation System contain parameters that can be edited. To edit a parameter, select it by using the ∧ ∨ < > keys and press ***ENTER***. Then enter data in one of four ways:

- **Numbers:** Press the ***ALPHANUMERIC KEY*** that corresponds to each digit. To delete a digit, press function key Backspace.
- **Text:** Press the ***ALPHANUMERIC KEY*** that corresponds to each character. Press the key once for the first character, twice for the second character and so on. Press the key marked with a dot twice, where allowed, to bring up a menu for entering special characters. To delete a character, press function key

Backspace. To change between upper and lower case letters, press function key ***Caps Lock*** (if present).

- **List of predefined values:** Use the ∧ ∨ keys to select between the predefined values.
- **Bar graph data:** Use the < > keys to increment or decrement the parameter.

Press ***ENTER*** when done. If desired, use the ∧ ∨ < > keys to select a new parameter to be edited, else press function key ***Apply and Exit***.

Use the ***ESC*** key to undo changes and to return to the previous view.

3.2.3 Alarm Pop-Ups

The R4 Display features alarm and alert pop-ups that can appear any time during operation. To acknowledge an alarm or alert message, press ***ENTER***. An example is shown below.

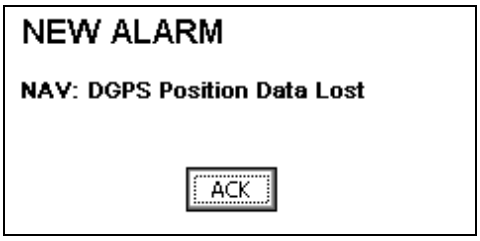


Figure 4 - Alarm Pop-Up

For more information on alarms and alerts see the Reference chapter, section 4.6 Alarm Pop-Ups on page 56. For alarm definitions see Appendix, section 5.1 Alarm Messages on page 180.

3.2.4 Turning On and Off the R4 Display

To turn on the R4 Display, press the ***POWER*** key. The LEDs on the display will blink momentarily, indicating that the R4 Display is starting up. Any alarm active when the display is started will be indicated by Alarm pop-ups, as described above. Press ***ENTER*** to acknowledge any present alarm and the corresponding pop-up will be removed.

The R4 Display will power up in the Navigate mode, showing the Position Target List view. The different modes and the basic operation of the R4 Combined AIS & Navigation System are described in the following sections.

To power off the R4 Display, press and hold the ***POWER*** key for 3 seconds, until the screen goes black.

3.3 System Modes

The user interface of the R4 Display has four different system modes, which each correspond to different types of user activities.

The four modes are Navigate, Plan Voyage, Alarms & Msgs and Config. Current mode is changed by pressing the ***MODE*** key, which will bring up the function key labels illustrated below. Press the corresponding function key to enter the desired mode.

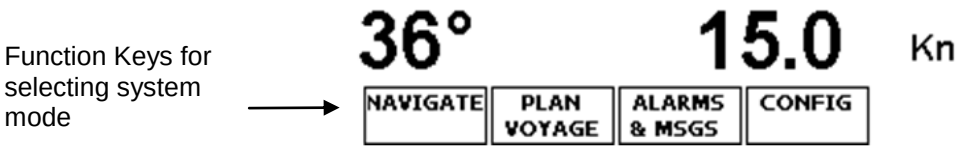


Figure 5 - R4 Display System Modes

The different modes are described below, with illustrations of typical mode views.

3.3.1 Navigate Mode

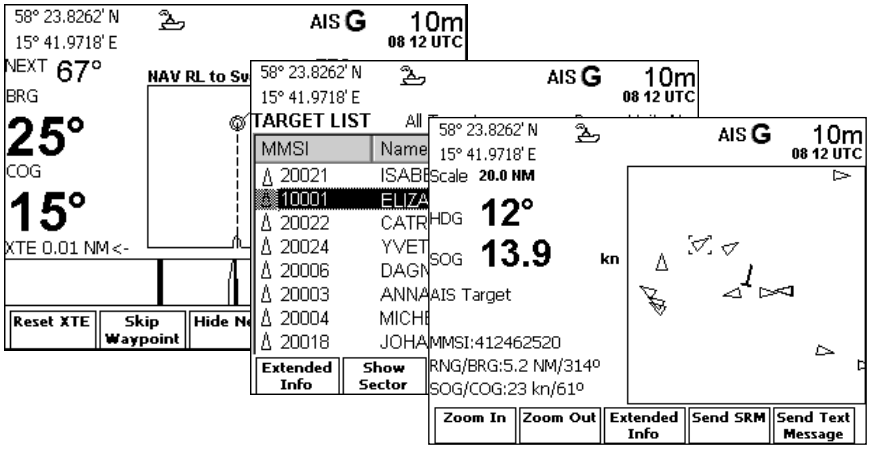


Figure 6 - Navigate Mode

The Navigate mode is used under normal ship operation. It supports viewing AIS targets, plotting AIS targets and the active route, viewing bearing and distance to the next waypoint, skipping waypoints, editing the active route, monitoring cross-track error and viewing sensor information such as current depth, speed, heading and position. It also supplies functions for viewing current GPS and Beacon status and own ship data. This mode is described in detail on page 57 and onwards in the Reference chapter.

3.3.2 Plan Voyage Mode

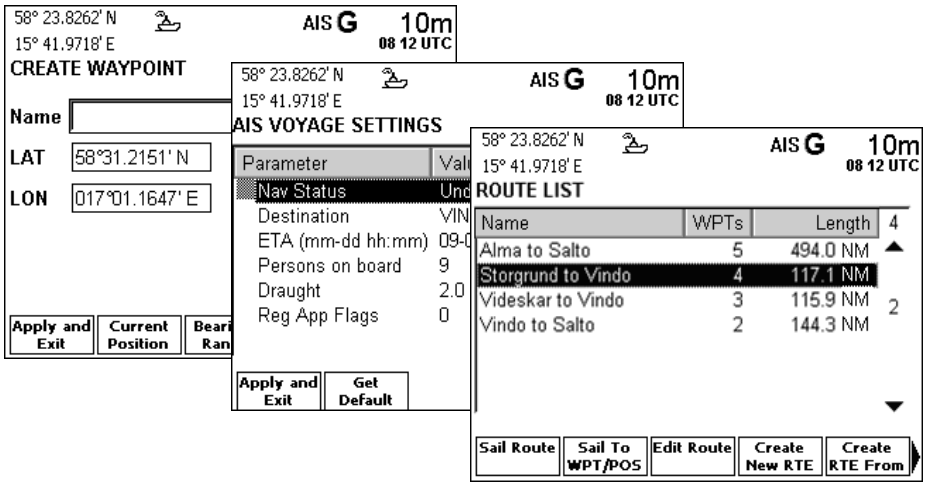


Figure 7 - Plan Voyage Mode

The Plan Voyage mode supports viewing, creating and deleting waypoints and routes, entering voyage information and starting to sail a route or sailing directly to a specific location. This mode is described in detail on page 91 and onwards in the Reference chapter.

3.3.3 Alarms & Msgs Mode

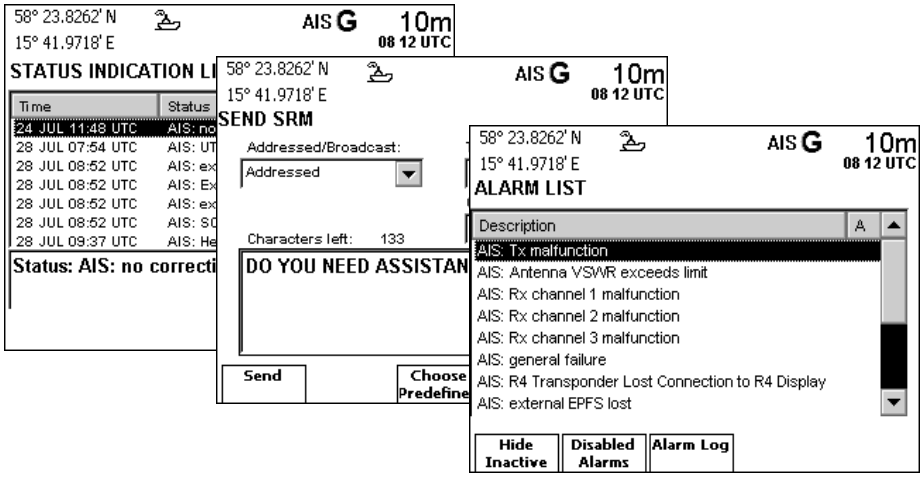


Figure 8 - Alarms & Msgs Mode

The Alarms & Msgs mode supports functions for monitoring current system status and sending/reading messages. This includes functions for viewing present and previous alarms, clearing the alarm log, sending SRMs and Text messages as well as viewing received SRM, Text and DGPS messages. This mode is described in detail on page 122 and onwards in the Reference chapter.

3.3.4 Config Mode

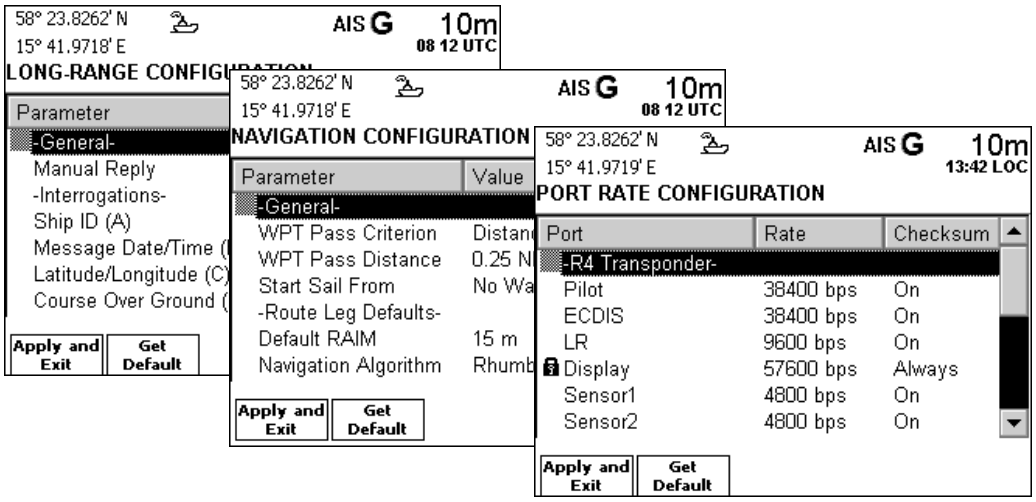


Figure 9 - Config Mode

The Config mode comprises functions used to setup and configure the R4 Combined AIS & Navigation System. It includes functions for modifying visual and sound settings, navigation settings, AIS settings, disable and enable different alarms, used units, GPS and beacon settings, serial port settings and viewing system information. This mode is described in detail on page 139 and onwards in the Reference chapter.

3.3.5 Functions Accessible Regardless of Mode

Functions associated with the ***MODE***, ***DISPLAY***, ***MOB*** and ***POWER*** keys are accessible regardless of mode. These keys provide functionality for switching system mode, changing display settings, marking the position in case of accident (MOB) or other event (event mark) and for turning the display on and off.

3.4 Status Bar

The top of the screen of the R4 Display always displays a summary of the system's status. See illustration below.

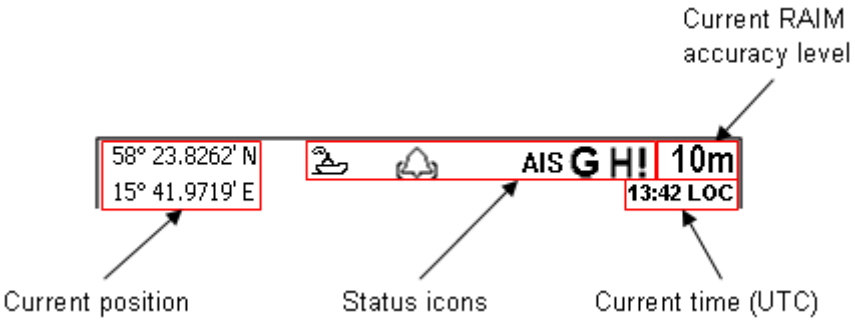


Figure 10 - Status Bar

If a valid navigation position is available, it is displayed to the left. The position shown in the status bar is always that of the R4 Navigation Sensor. The status icons are displayed in the middle, and to the right current RAIM accuracy level (in meters) and time is shown. It is possible to select whether displayed time shall refer to UTC or a local time frame defined by an offset setting in the Time view as described in section 4.11.2 Time Config on page 142.

As an option, the position displayed in the status bar may be replaced by the name of the waypoint the system currently is navigating towards. Which data to display can be selected in *Config* mode by the *'Status Information'* parameter in the *Nav Config* view (See section 4.11.4 Nav Config on page 145).

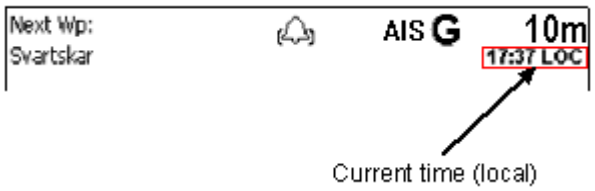


Figure 11 - Status Information

3.4.1 Status Icons

The status icons that can be displayed are:

- Unread AIS message (safety related message or text message)
- Unread Long Range message (auto reply)
- Unread Long Range message (manual reply)
- Unread DGPS message.
- Active alarms
- 1W mode (Available only if Ship Type = Tanker and Navigational Status = Moored)

AIS status, being one of:

- AIS functionality available
- No communication with the R4 AIS Transponder

Navigational status, being one of:

- Navigational status is undefined
- At anchor or moored
- Under way using engine
- Navigational status is one of: Not under command, Restricted manoeuvrability, Constrained by her draught, Aground, Engaged in fishing, Under way sailing, Reserved for future use.

Redundant operation status, being one of:

- Redundant operation active.
- Redundant operation active. Synchronizing from external unit.
- Redundant configuration has been enabled, but no communication is established

GPS status, being one of:

- DGPS based on external differential corrections applied through the User 1 port.
- DGPS based on corrections from the internal radio beacon receiver (DGPS version).
- DGPS based on SBAS differential corrections.
- Navigating without differential corrections.
- No valid position information.
- No communication with the R4 Navigation Sensor.

! DGPS Integrity Alert, displayed immediately to the right of GPS status when active.

H! HDOP status indication (active if HDOP is above 4).

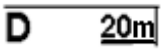
The icons are also described in section 4.2 Icon Description on page 51 in the Reference chapter.

3.4.2 RAIM Accuracy Level

The RAIM accuracy level specifies (in meters) the desired position accuracy used to calculate current RAIM status. RAIM is a GPS integrity monitoring scheme that evaluates the quality of position data and compares it to the specified accuracy level.

The LEDs on the front of the R4 display will show the RAIM status. The green LED indicates safe state; the calculated position accuracy is better than the set accuracy level. The yellow LED indicates caution state; the system is unable to safely determine if the position accuracy is better or worse than the set accuracy level. The red LED indicates unsafe state; the calculated position accuracy is worse than the set accuracy level. The LEDs and RAIM states are further described in section 4.1 "Status LEDs" on page 49.

The used RAIM accuracy level is the latest specified accuracy level, either specified manually or by a leg setting in the sailed route. An underlined accuracy level indicates that a manually entered RAIM level overrides RAIM levels set in the active route. This is illustrated in the figure to the left.



For details of this and on how to set current RAIM accuracy level, see page 69 in the Reference chapter.

3.5 Show Current Position

The Position view shows current position, speed over ground (SOG) and course over ground (COG) as reported by the R4 Navigation Sensor. If no position information is available from the R4 Navigation Sensor, the view shows the last available values and the time they were acquired. For details on this view, refer to the Reference chapter, section 4.8.3 Position on page 63.

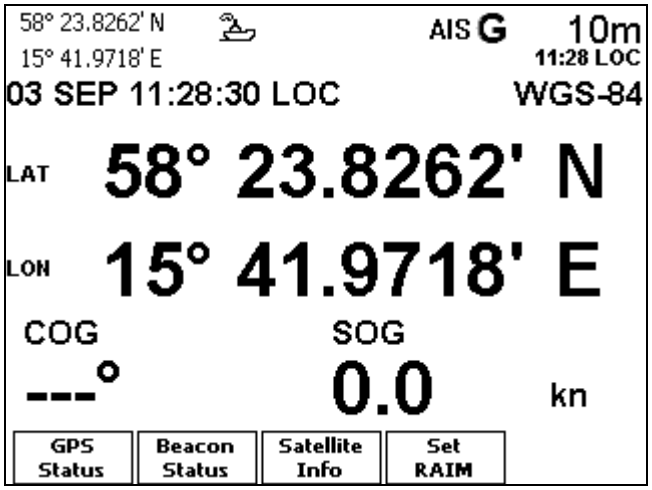


Figure 12 - Position view

The view is present in Navigate mode, accessed by pressing ***MODE*** followed by the function key **NAVIGATE**. The view is then accessed by pressing function key ***Position***.

3.6 View Remote Ship Information

The R4 Display will power up in *Target List* view. This view, also referred to as the *minimal display*, is accessed by pressing function key **Target List** when in the top view of the *Navigate* mode. The mode is reached by pressing ***MODE*** followed by function key **NAVIGATE**. The view displays a list of all targets sorted by range from own ship (closest first). The list includes MMSI, ship's name, range (RNG) and bearing (BRG). The total number of ships in the list will be shown in the upper right corner of the list and the index of the currently selected ship will be shown on the right side. By pressing the **Show Sector / Show All Targets** function keys the list will show either the targets within a bearing interval, or all targets. When showing targets within a particular bearing sector, the start bearing will be close to own ship direction (COG or HDG if available). Each sector covers 30° and moving through the sectors is done in 15° steps by using the function keys **-15°** ← and **+15°** →.

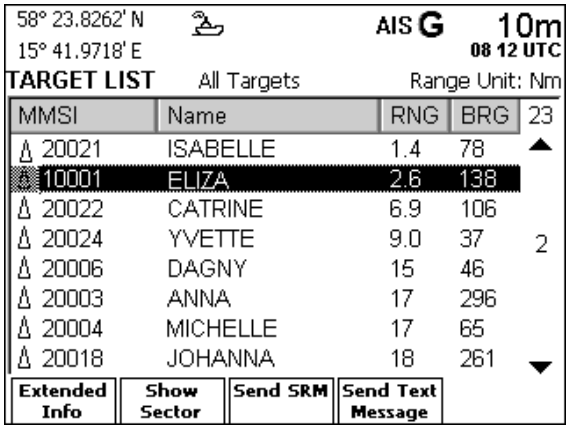


Figure 13 – Target List

For extended information about a target in the list, select the ship with the ∧ ∨ key and press function key **Extended Info** or ***ENTER***.

The *Extended Information* view includes static, dynamic and voyage related data for the selected target. The first page displays ship information for fast navigational decisions. Press **Show Next** to change the information shown in the view's lower part. For details, see section Target List on page 60 and section Extended Info on page 61.

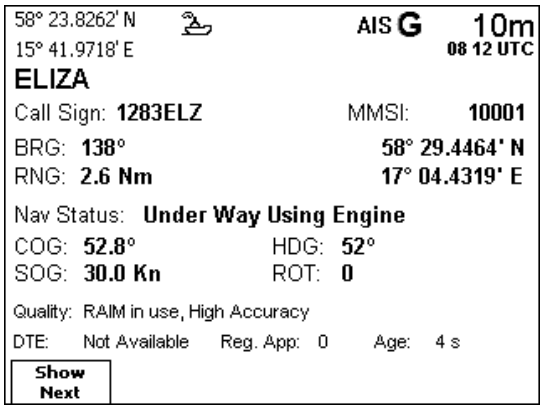


Figure 14 – Extended Info

Press ***ESC*** to return to *Target List* view.

Function keys **Send SRM** and **Send Text Message** in the *Target List* view are used to send a safety related message (SRM) or a text message to the selected target. For more information about AIS messages, see Reference chapter section AIS Messages on page 126.

3.7 View Plot of Targets

The location of targets relative to your own ship are visualized in the *Plot* view. The view is accessed when in the top view of the *Navigate* mode by pressing function key **Plot**. Use the ***ARROW KEYPAD*** (∧ ∨ < >) to select any of the targets on the display. The arrow keys can also be used to select targets in diagonal direction. Brief information about the selected target is shown to the left. Use the **Zoom in** and **Zoom out** function keys to zoom in or out.

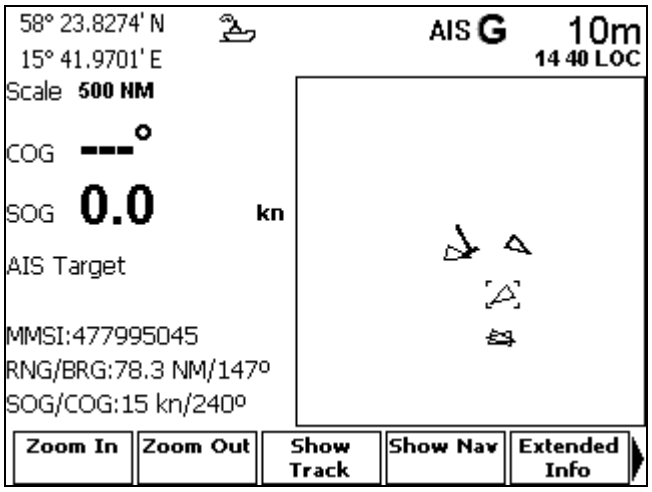


Figure 15 – Plot view

For extended information about a target select it using the ∧ ∨ < > key and press function key **Extended Info** or ***ENTER***.

The own ship target is displayed as a 'T' shaped symbol. Class B targets are indicated by a 'B' appended to the target icon (not shown in the figure above).

Press function key **Send SRM** or **Send Text Message** in order to send a safety related message (SRM) or a text message to the selected target. For more information about AIS messages, see Reference chapter section AIS Messages on page 126.

3.8 Enter and Read Voyage Related Information

Voyage related information (for transmit via AIS) is displayed in the *AIS Voyage* view. The view is present in the *Plan Voyage* mode which is accessed by pressing the ***MODE*** key followed by function key **PLAN VOYAGE**. The view is then entered by pressing function key **AIS Voyage**. Voyage related data includes destination, estimated time of arrival (ETA) and number of persons aboard.

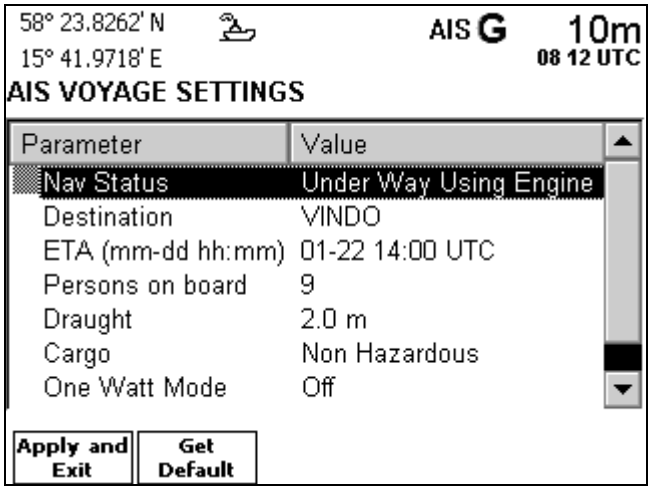


Figure 16 – AIS Voyage Settings

The parameters “Cargo” and “1 W mode” are available for special ship types only. For more information see Reference chapter, section AIS Voyage on page 93.

3.9 Fast Setting of Navigational Status

The ship’s navigational status can be quickly set in the *Navigational Status* view. This view is reached by pressing the ***STATUS*** key. The status is set by pressing the appropriate function key. Use the ***PAGE*** key to toggle between the different navigational status alternatives.

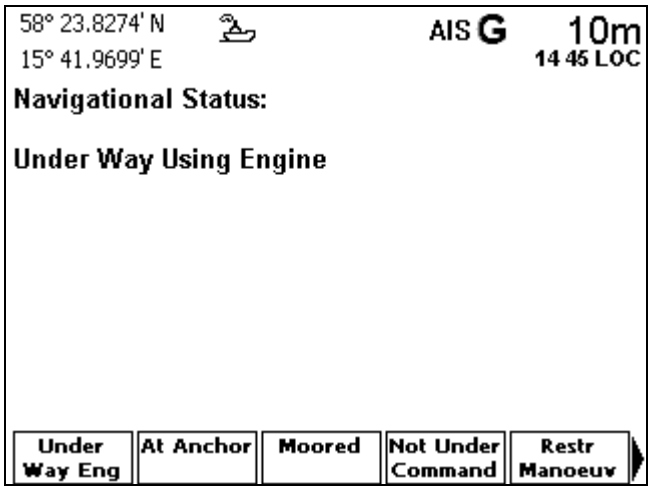


Figure 17 – Navigational Status

Note: When ship type is “Tanker” and navigational status “Moored” this view also contains a function key for toggling “1 W mode”.

3.10 Handling Safety Related Messages (SRM) and Text Messages

Safety related messages (SRMs) and text messages can be sent to specific targets (addressed messages) or broadcast to all targets. Handling of messages is supported by the *AIS Messages* view accessible in the *Alarms & Msgs* mode. This mode is reached by pressing ***MODE*** followed by function key **ALARMS & MSGS**. The view is then reached by pressing function key **AIS Messages**.

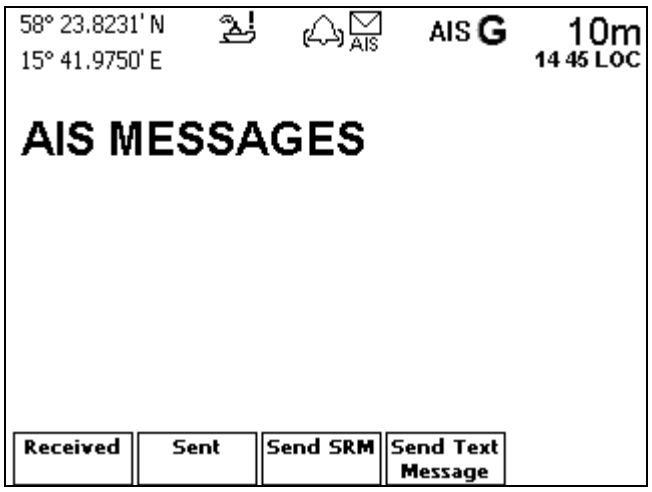


Figure 18 – AIS Messages

3.10.1 Read Received Messages

Received messages can be accessed in the *Received Messages* view. To enter the view, press function key **Received**.

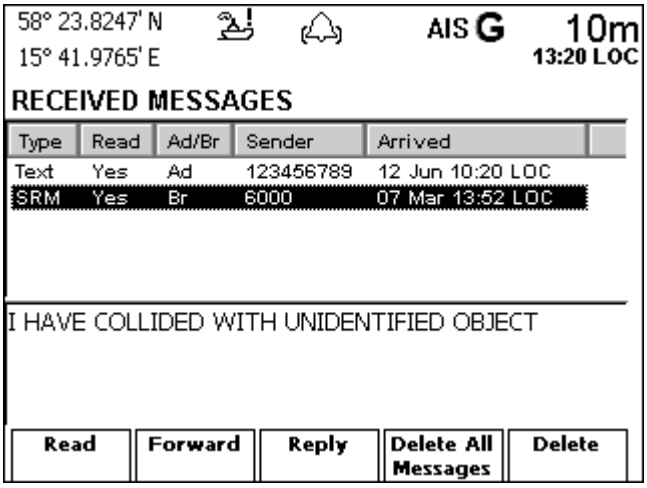


Figure 19 – Received Messages

Select a message with ∧ ∨, press function key **Read** to see the entire message. For more information, see Reference chapter, section AIS Messages on page 126.

3.10.2 Send SRMs

SRMs are composed and sent in the *Send SRM* view. To get to this view, press function key **Send SRM**.

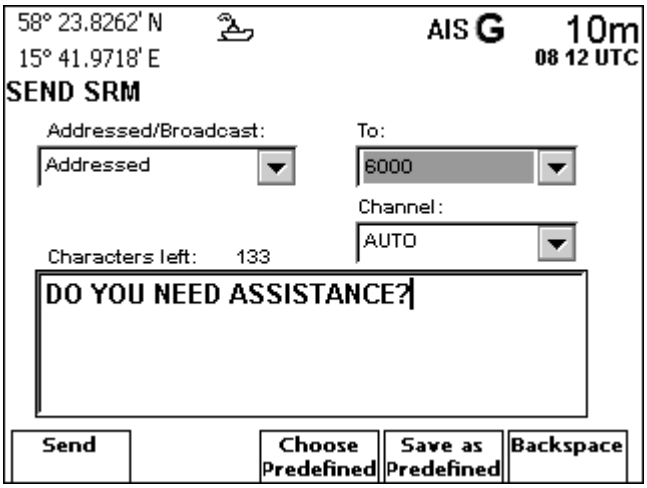


Figure 20 – Send SRM

The message can either be composed manually, or taken from a predefined list. For more information about how to create and send a safety related message see Reference chapter, section Send SRM on page 129.

3.10.3 Send Text Messages

Text messages are composed and sent in the *Send Text Message* view. To get to this view, press function key **Send Text Message.**

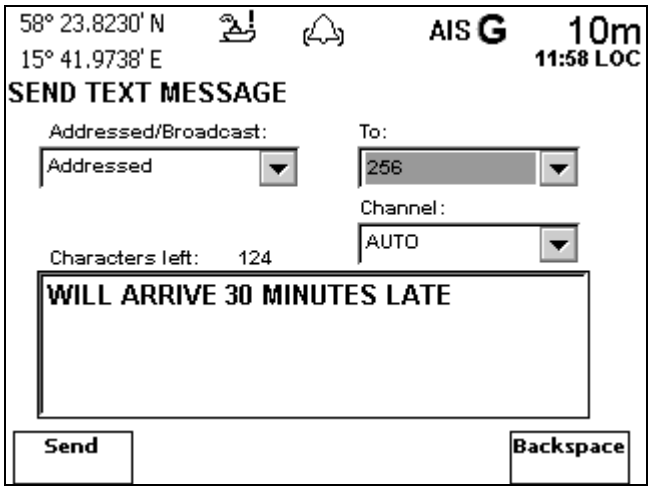


Figure 21 – Send Text Message

Adressed text messages can not be received by Class B targets. For more information see Reference chapter, section 4.10.4.4 Send Text Message on page 131.

3.11 Create Waypoints

Waypoints are the basis for ship navigation. A waypoint is a position on the earth surface that is given a unique name and stored in the memory of the R4 Display. Waypoints can be entered in several different ways, and used for building routes as well as for direct navigation to a specific position.

Creating waypoints is performed in the *Waypoint List* view in Plan Voyage mode. Plan Voyage mode is accessed by pressing the ***MODE*** key followed by the **PLAN VOYAGE** function key. The Waypoint List view is then accessed by pressing function key **Waypoint List.**

3.11.1 Create New Waypoint

Access the Waypoint List view as described above. Press the function key **Create New WP**. The *Create Waypoint* view is displayed.

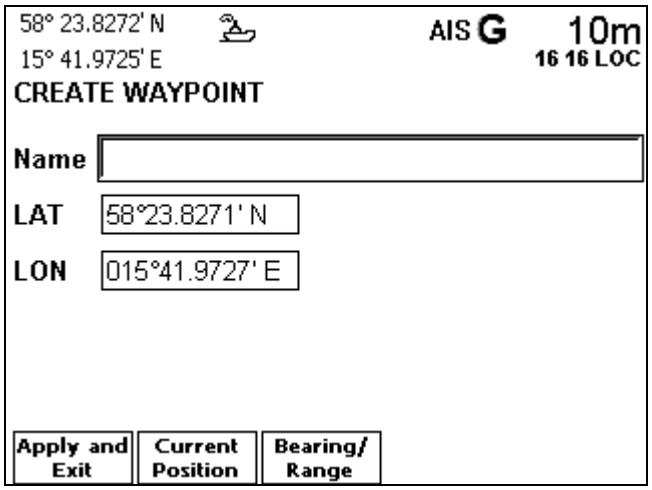


Figure 22 - Create Waypoint view

To name the waypoint, select the Name field using ∧ and press ***ENTER***. The field becomes editable and the following function keys are displayed.

Figure 23 - Function keys

Enter a descriptive name for the waypoint you are creating, using the alphanumeric keypad. Use the ***Backspace*** function key to erase characters, and the ***Capslock*** function key to change between upper and lower case letters. Press ***ENTER*** when done.

The Lat and Lon values are per default set to the latitude and longitude of current position. If a different position is desired, select each field to modify using ∧ ∨, press ***ENTER*** and use < > keys to select the digits to alter. Enter new digits using the alphanumeric keypad and press ***ENTER*** when done.

To create the waypoint, press function key **Apply and Exit**.

3.12 Sail to a Waypoint

The R4 Combined AIS & Navigation System supports sailing directly to a waypoint. Starting to sail to a waypoint is done in *Plan Voyage* mode, just as creating waypoints. The mode is accessed by pressing the ***MODE*** key followed by the **PLAN VOYAGE** function key. The Sail To function is present in the *Route List* view, accessed by function key **Route List**. The view is illustrated below.

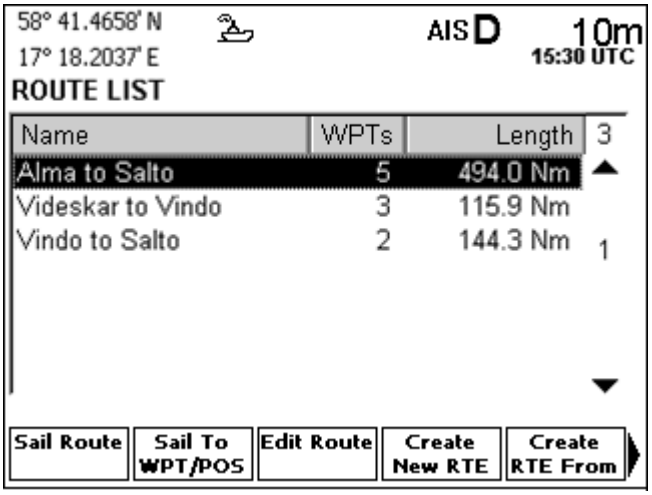


Figure 24 - Route List view

The *Route List* view can also be accessed from the Navigate mode as follows. Press the ***MODE*** key followed by the **NAVIGATE** function key. Then press the ***PAGE*** key in order to access a second page of function keys that includes the **Route List** key.

In the Route List view, press the function key **Sail To WPT/POS** to sail to a specific location. The following view is displayed.

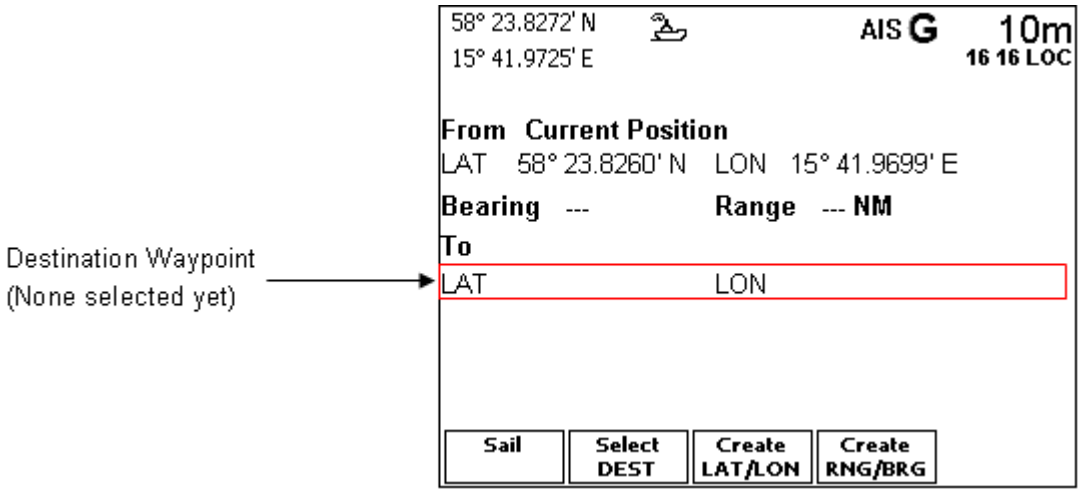


Figure 25 - Sail To WPT/POS view

To select the destination waypoint, press function key **Select DEST**. This brings up the Select Waypoint view.

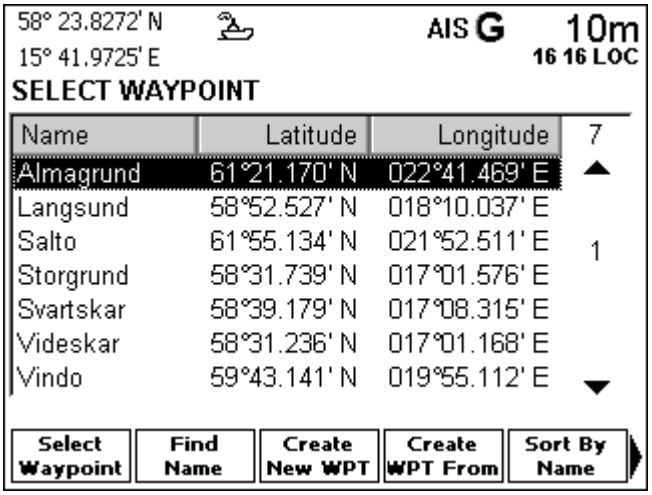


Figure 26 - Select Waypoint view

Use the ∧ ∨ keys to highlight the desired waypoint. The find and sort functions, described in the Reference chapter in section 4.8.11 Route List on page 91, can also help in finding the correct waypoint. Once the desired waypoint has been highlighted, press function key **Select Waypoint** to select it as destination.

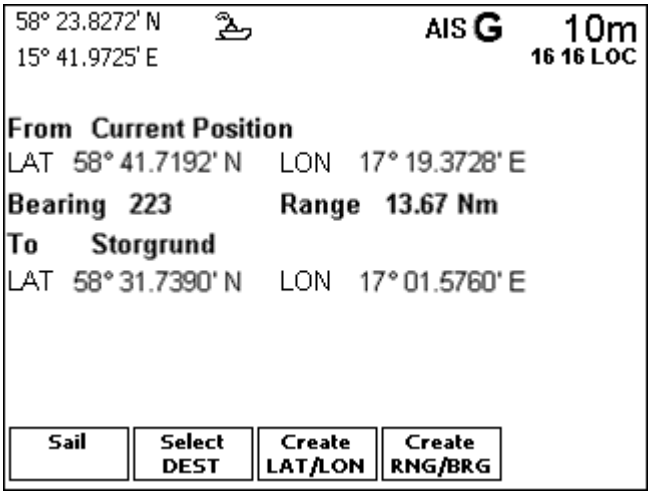


Figure 27 - Selected Waypoint

Press function key **Sail** to start sailing to the selected destination. The Nav view is shown, as described and illustrated in section 4.8.4 on page 70.

3.13 Create Route

A route is a sequence of waypoints, which is used to navigate from a start waypoint to an end waypoint. The R4 Navigation System supports up to 100 different routes.

Planning and creating a route is done in the Plan Voyage mode. This mode is accessed by pressing Mode followed by the function key **PLAN VOYAGE**. The *Route List* view is then accessed by pressing function key **Route List**. The view lists all existing routes in the system, with information on the number of waypoints and length of each route. For a detailed description of the *Route List* view and all its function keys, refer to section 4.9.3.

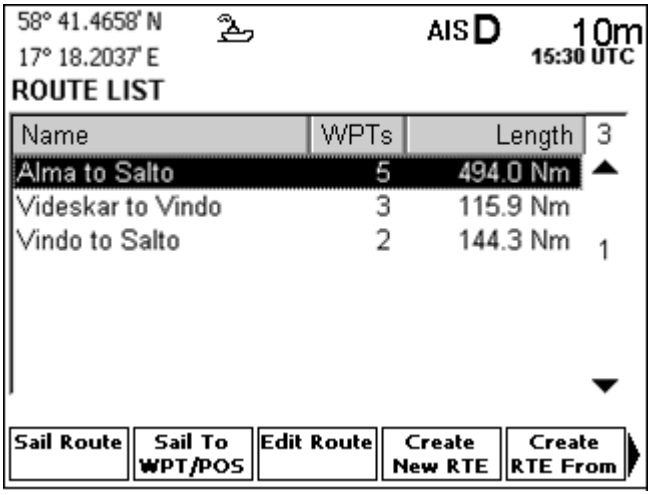


Figure 28 - Route List view

Create a new route by pressing the function key ***Create New RTE***. The Create Route view is displayed. Use ∧ ∨ to select the Name field and press ***ENTER***.

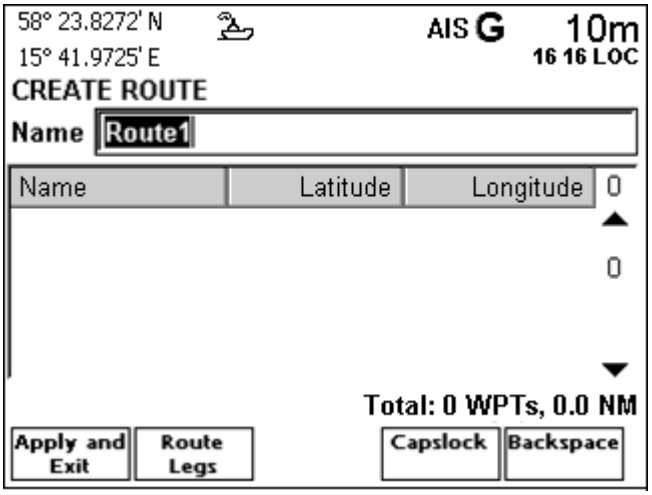


Figure 29 - Create Route view

Enter a descriptive name for the route you are creating, using the alphanumeric keypad. Use the ***Backspace*** function key to erase characters, and the ***Capslock*** function key to change between upper and lower case letters. Press ***ENTER*** when done.

Once a name for the route has been entered, press ∨ to bring focus to the still empty waypoint list of the route. This brings forth the function keys for modifying waypoints in the route, as visualized in the following figure.

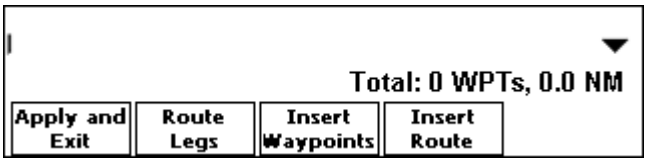


Figure 30 - Function keys for modifying waypoints

A walk-through on how to insert waypoints into the route is given below.

3.13.1 Insert Waypoints into the Route

To insert waypoints into an empty route, press function key ***Insert Waypoints***. Once pressed, the Insert Waypoints view is displayed.

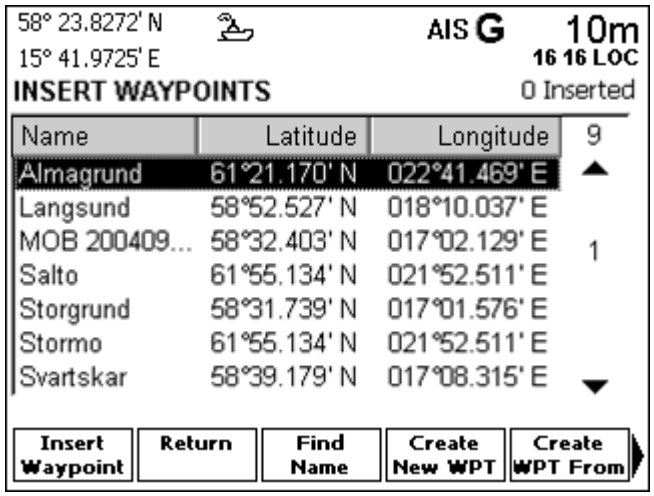


Figure 31 - Insert Waypoints view

The view lists all existing waypoints in the system, sorted alphabetically. The view is described in detail in section 4.9.4.2.

If the desired waypoint exists in the list, use ∧ ∨ to highlight it and press the ***Insert Waypoint*** function key.

If no suitable waypoint exists, create one by pressing the ***Create New WPT*** function key. The Create Waypoint view is shown. Enter a name for the waypoint and its position, as previously described in section 3.11. Once the waypoint has been created by pressing ***Apply and Exit***, the Insert Waypoints view is shown again. Use ∧ ∨ to highlight the created waypoint and press the function key ***Insert Waypoint*** to insert it into the route.

Add more waypoints to the route by repeating the procedure(s) described above. Once a waypoint has been inserted, a number will appear in a small box to the right of the waypoint indicating the insertion order into the route.

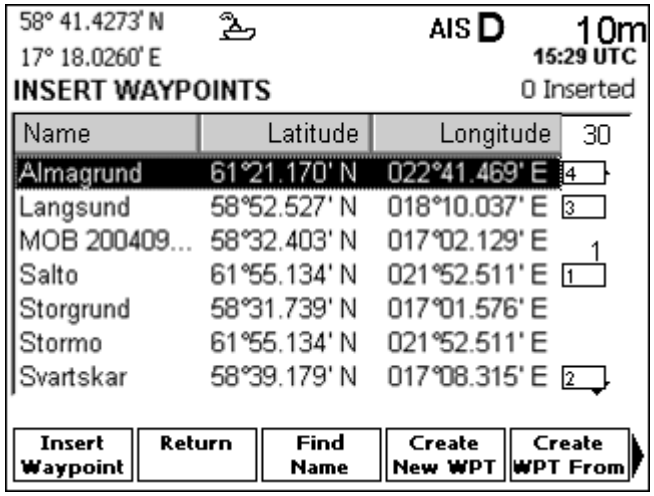


Figure 32 - Insert Waypoints view

When all (or a suitable number of) waypoints have been inserted press the ***Return*** function key. The Create Route view is displayed again with the waypoints added.

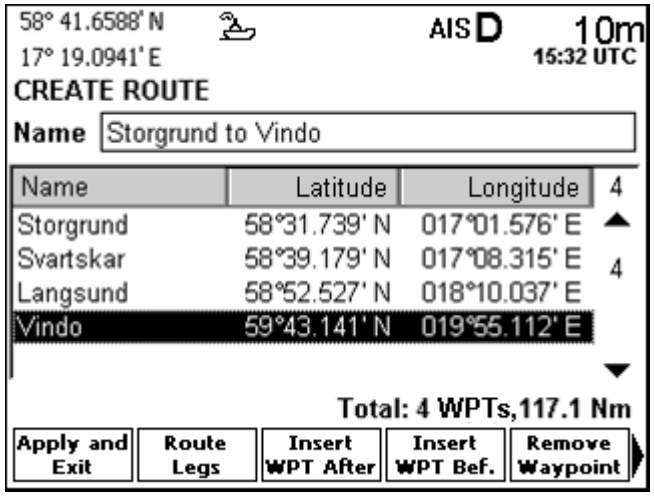


Figure 33 - Create Route view

To insert more waypoints into the route, select the desired location for the waypoint in the route and press one of the function keys ***Insert WPT After*** or ***Insert WPT Before***. The former inserts waypoints after the highlighted position, whereas the latter inserts the waypoints before the highlighted position. Repeat the procedure described above to select and insert desired waypoints.

3.13.2 Adjusting Navigational Algorithm and RAIM Accuracy Level

To modify the settings for the legs in the route, press function key ***Route Legs*** while remaining in the Create Route view. This makes the view display the legs in the route, as illustrated below.

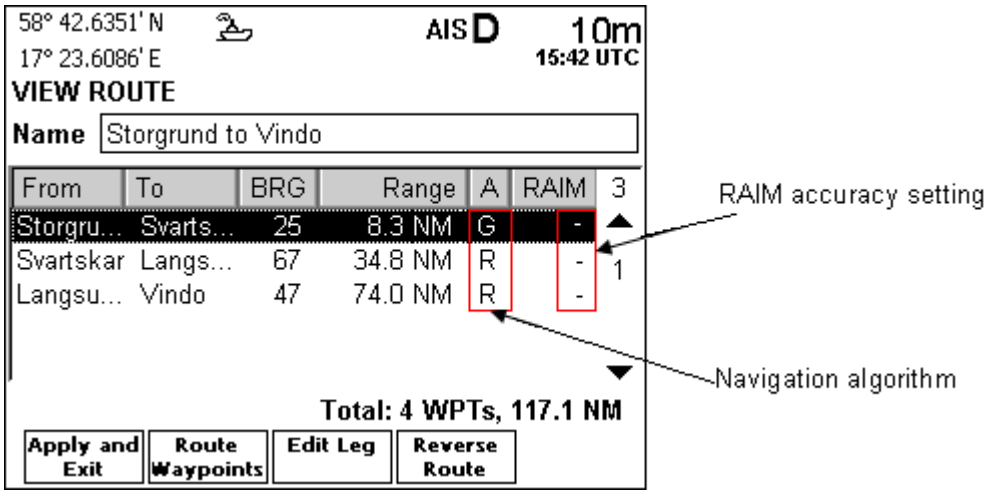


Figure 34 - Route Legs

The column marked “A” indicates the navigation algorithm set for each leg. An R indicates rhumb line and a G great circle navigation. The “RAIM” column shows the RAIM accuracy setting set for each leg. A “-” indicates that sailing the leg leaves the present

RAIM level unchanged, while a number indicates that a RAIM accuracy level has been set for the leg.

Use ∧ ∨ to highlight the leg to adjust settings for. Once highlighted, press ***ENTER***. This brings up the Edit Leg view.

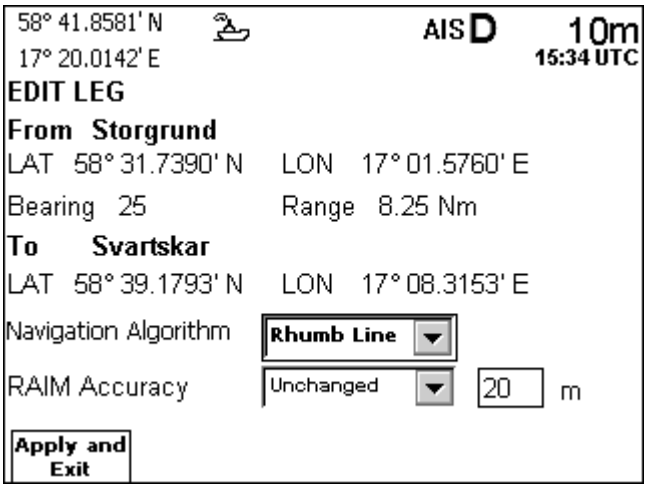


Figure 35 - Edit Leg view

To modify the navigation algorithm, select the ***Navigation Algorithm*** field using ∧ and press ***ENTER***. Select the desired navigation algorithm using ∧ ∨ and press ***ENTER*** again when done.

To set a RAIM accuracy level for the leg, use ∨ to select the RAIM Accuracy field and press ***ENTER***. Use ∨ to select the Level entry and press ***ENTER***. A box to enter the accuracy level appears, as illustrated to the right.

Use > to bring focus to the box and press ***ENTER***. Use the alphanumeric keypad to enter the desired accuracy level. Use the ***Backspace*** function key to erase digits. Press ***ENTER*** when done.

Press ***Apply and Exit*** to store the changes.

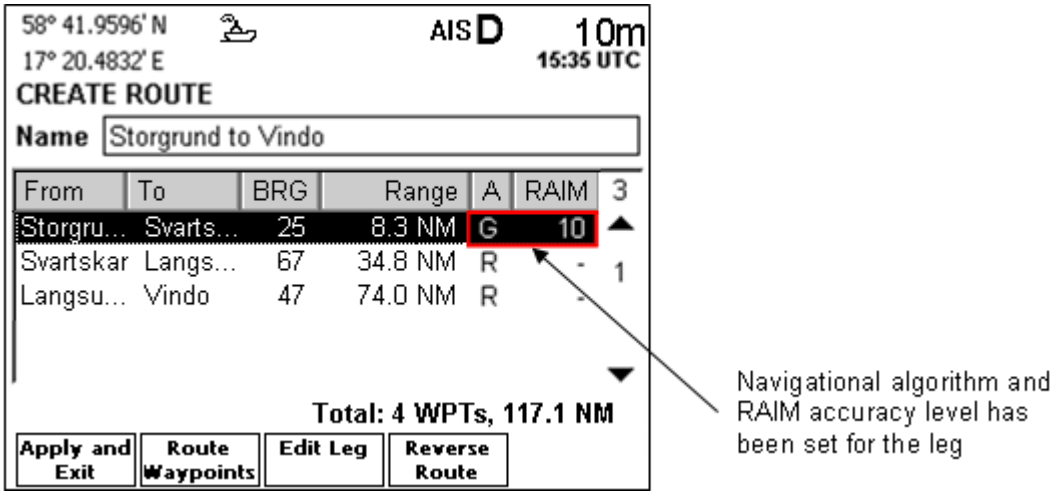


Figure 36 - Navigational algorithm and RAIM accuracy level

3.13.3 Finish Creating a Route

Once the correct waypoints exist in the route and navigation algorithm and RAIM accuracy level have been specified for the legs where necessary, finish creating the route by pressing function key ***Apply and Exit*** in the Create Route view. This brings up the Route List view again, with the newly created route included.

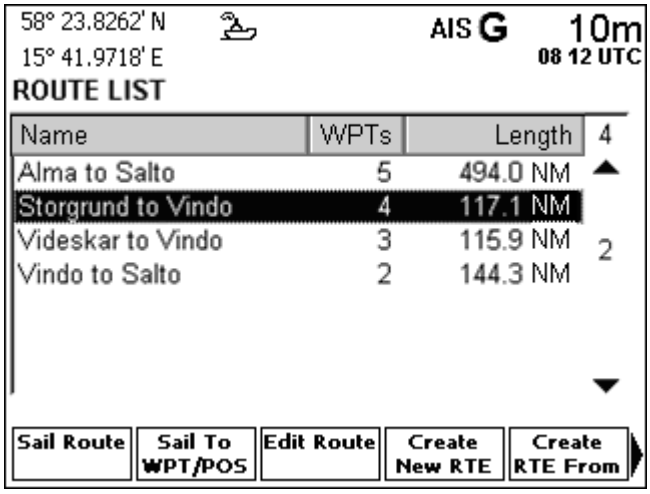


Figure 37 - Route List view with newly created route

3.14 Review an Existing Route

To review the details of an existing route, go to the Route List view. The view can, if in another view in the Plan Voyage mode, be accessed by pressing the ***ESC*** key a few times until the top level view of the mode is reached, followed by the ***Route List*** function key. The mode is accessed by pressing ***MODE*** followed by function key ***PLAN VOYAGE***.

Select the desired route using ∧ ∨ and press the ***ENTER*** key. The View Route view is displayed.

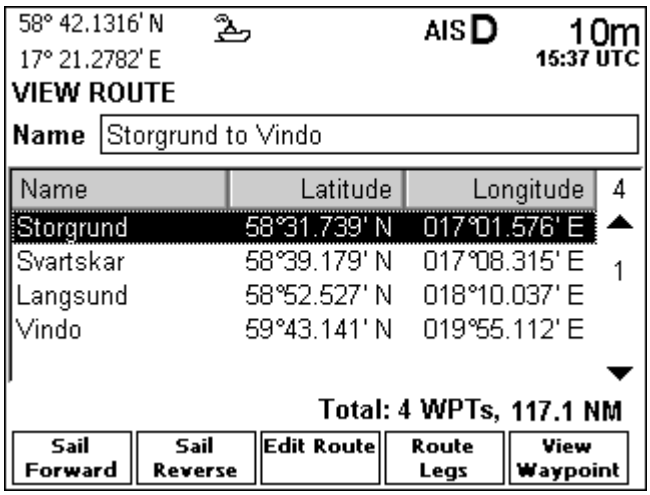


Figure 38 - View Route view

When first entered, this view displays the waypoints that the route is made up of. To walk through the route, use ∧ ∨ to scroll through the list. To view the full name, position and

time of creation for a specific waypoint, highlight the waypoint using ∧ ∨ and press ***ENTER*** or the ***View Waypoint*** function key. The View Waypoint view is displayed as illustrated below. To leave the view and get back to the View Route view, press ***ESC***.

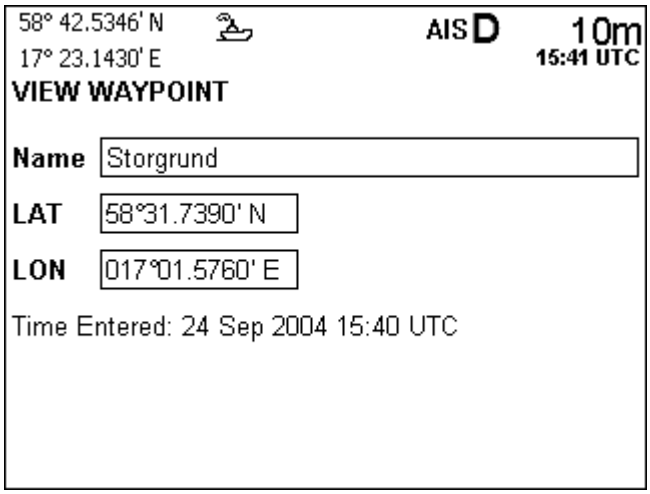


Figure 39 - View Waypoint view

Press function key Route Legs to display the legs the route is made up of. The following view is shown.

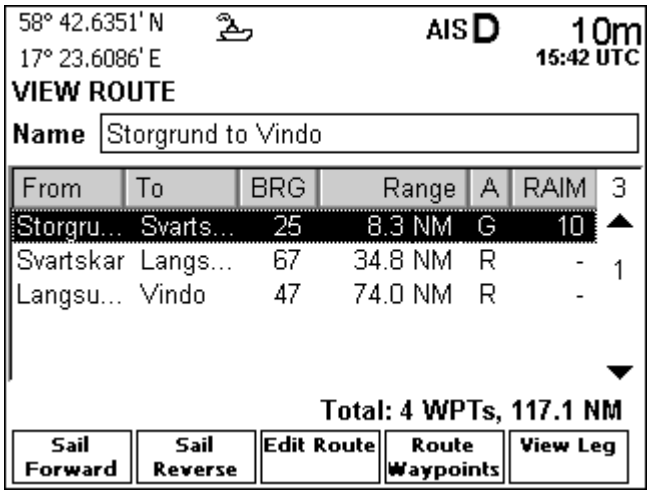


Figure 40 - Route Legs

Use ∧ ∨ to scroll through the list. For each leg, the initial bearing to head on each leg is shown, as well as its length. The navigation algorithm and any RAIM level set on that leg is also displayed. To get details of a specific leg, select it using ∧ ∨ and press ***ENTER*** or the ***View Leg*** function key. The View Leg view is shown, as illustrated below.

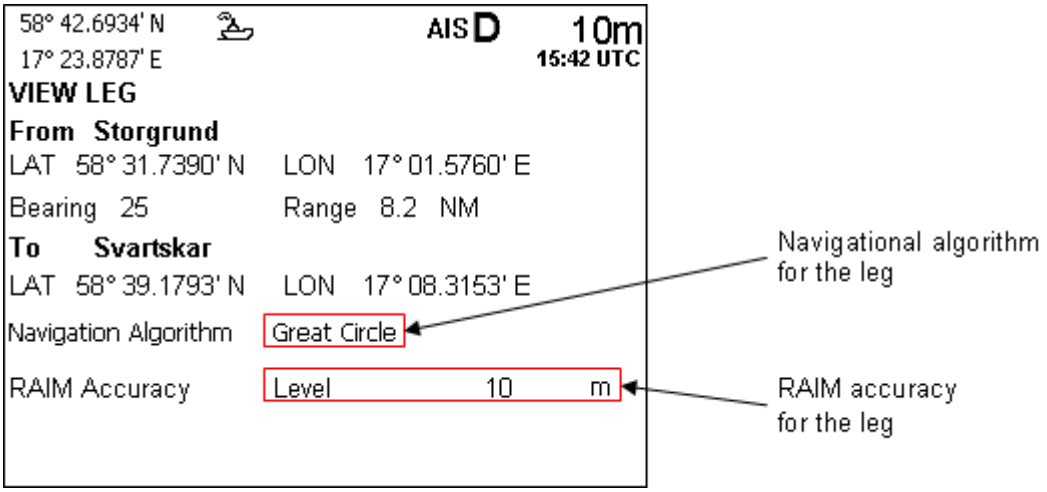


Figure 41 - View Leg view

Press ***ESC*** to return to the View Route view.

When done reviewing the route, press the ***Sail Forward*** or ***Sail Reverse*** function keys to sail the route, or press the Esc key to return to the Route List view.

3.15 Start Sailing a Route

Access the Route List view. The view is present in Plan Voyage mode, accessed by pressing the ***MODE*** key followed by the ***PLAN VOYAGE*** function key. If in another view in the mode, pressing ***ESC*** a few times will bring up the top level view of the mode with function keys for accessing the main views of the mode. Press function key ***Route List***.

A short-cut to the Route List view is also available by a function key at the second page of the top level view in Navigate mode as described on page 57 of this manual.

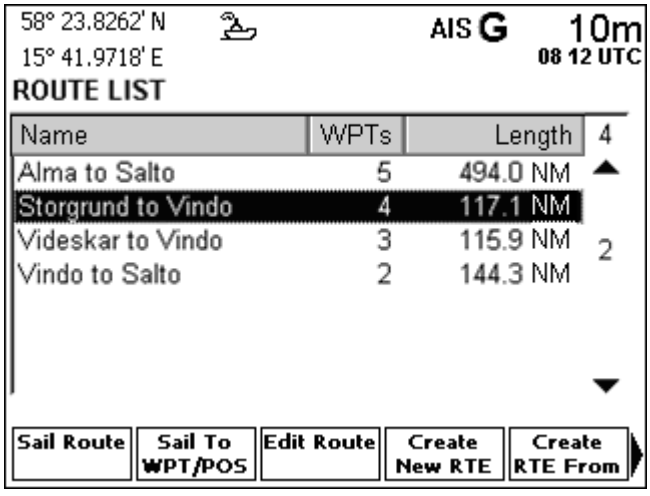


Figure 42 - Rout List view

Highlight the route to sail using ∧ ∨, and press the function key ***Sail Route***. The Sail Route view is displayed as illustrated below.

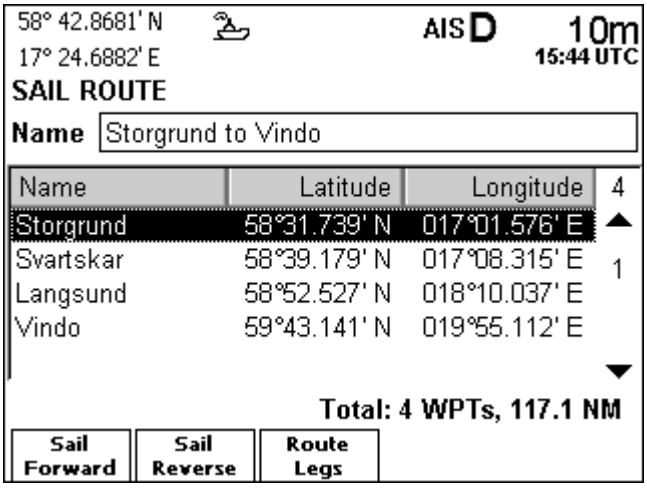


Figure 43 - Sail Route view

Press function key ***Sail Forward*** to start sailing the route in the direction it is shown. Use Sail Reverse to sail the route in its reverse direction.

Once a route is to be sailed, a copy of the selected route is made into the active route and the Nav view is displayed, as illustrated below.

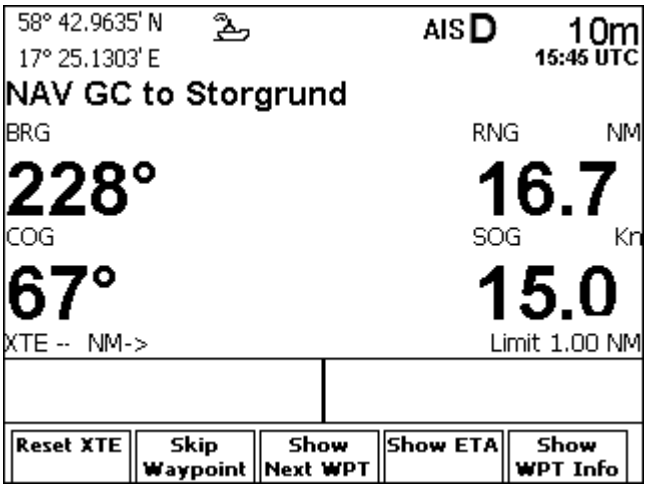


Figure 44 - Nav view

For information on how to navigate following a route, see the next section.

3.15.1 Navigate Towards a Waypoint and Follow a Route

Navigating towards a waypoint and on a route is done in Navigate mode. To enter this mode, press the ***MODE*** key followed by the function key ***NAVIGATE***. If in another view in this mode, press ***ESC*** a few times to bring up the top view of the mode. Press function key ***Nav*** to show the Nav view. This view contains several vital functions to aid the operator in navigating towards waypoints and following routes. The view is illustrated below.

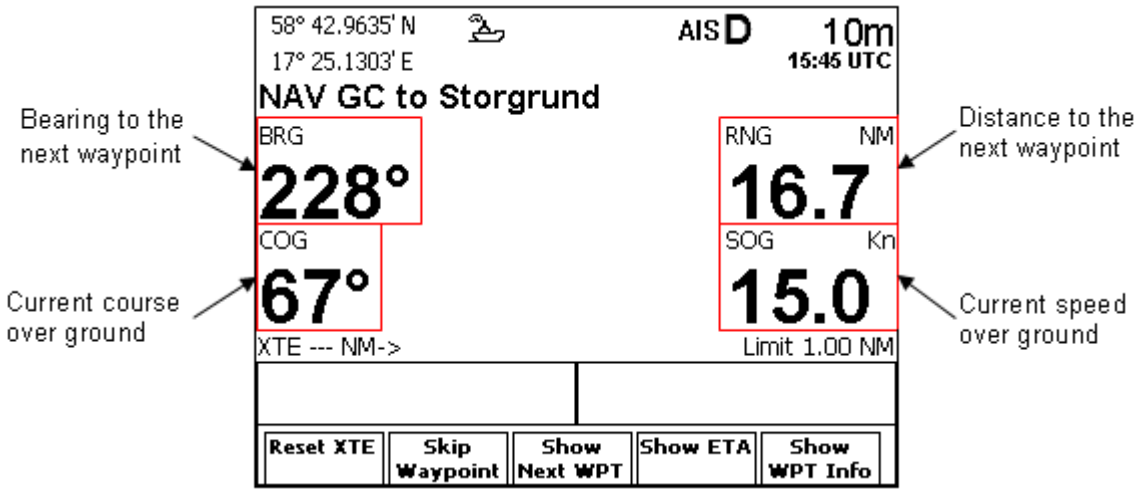


Figure 45 - Nav view

When sailing towards a waypoint using the Sail To function, and when sailing towards the first waypoint of the active route, the view shows distance and bearing towards the next waypoint. When having passed the first waypoint of the active route, the view also starts displaying current cross-track error.

To navigate towards the next waypoint, keep current course over ground (COG) close to the bearing to the next waypoint (BRG). In the lower rectangle, current course deviation is illustrated by the distance between the bold vertical bar and the thin center line. To steer to the next waypoint, make the bold vertical bar stand over the center line. The rectangle can represent a course deviation of ± 30°.

Once the first waypoint of the active route has been reached, the view begins displaying current cross-track error. The cross-track error is the distance between current position and the planned track, and is visualized by the distance between the boat symbol and the thin center line. The cross-track error scale of the rectangle is visualized by the Limit value. See the illustration below.

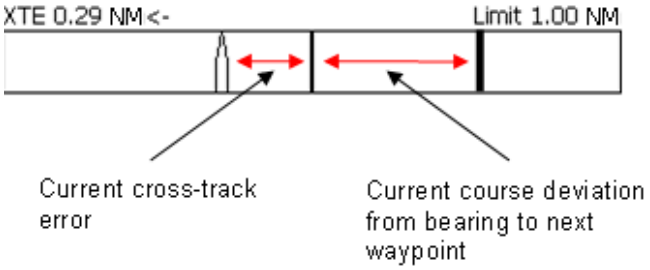


Figure 46 - Cross-track error and course deviation

To more quickly reduce the cross-track error, steer back towards a point on current leg closer to you than the next waypoint. While steering back to current leg, current course indicator should stand on the opposite side of the center line compared to the cross-error symbol, as illustrated above.

If desired, current cross-track error can be set to zero by pressing the function key ***Reset XTE***. It is also possible to manually skip the next waypoint by pressing function key ***Skip Waypoint***.

The view is described in detail in section 4.8.4 Nav on page 70 in the Reference chapter. The cross-track error limit is configured in the Nav Config view, described in section 4.11.4 on page 145.

3.15.2 Plot the Active Route

The position of the ship and the active route can be graphically visualized in the Plot view. To enter this view press the ***MODE*** key followed by the function key ***NAVIGATE***. If in another view in this mode, press ***ESC*** a few times to bring up the top view of the mode. Press function key ***Plot***. The view plots the waypoints and legs of the active route. The waypoint currently used for navigation is indicated by a double circle. The plot also visualizes cross-track error limit of current leg, as shown below.

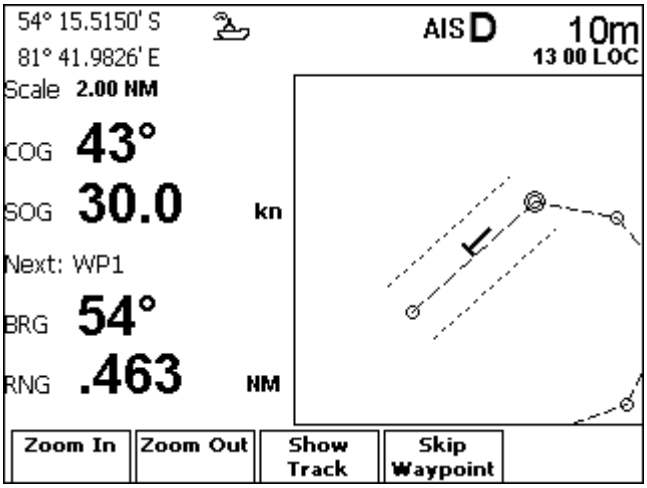


Figure 47 - Cross-track error limit of current leg

Use the function keys ***Zoom In*** and ***Zoom Out*** to increase or decrease the scaling of the plot. By pressing the function key ***Show Track*** the sailed track is shown as well. Refer to page 81 for a detailed description of the view.

3.15.3 View the Active Route

To see the total and remaining length of the active route, enter the Active Route view from the top level view in Navigate mode by pressing function key ***Active Route***. The view also illustrates the remaining waypoints of the route and includes functions for editing the active route, setting an ETA target and manually selecting which waypoint in the route to navigate towards. It is also possible to end the active route by pressing the function key ***End Route***. Optional views with display of additional information are also available.

The view is described in detail in section 4.8.5 Active Route on page 74.

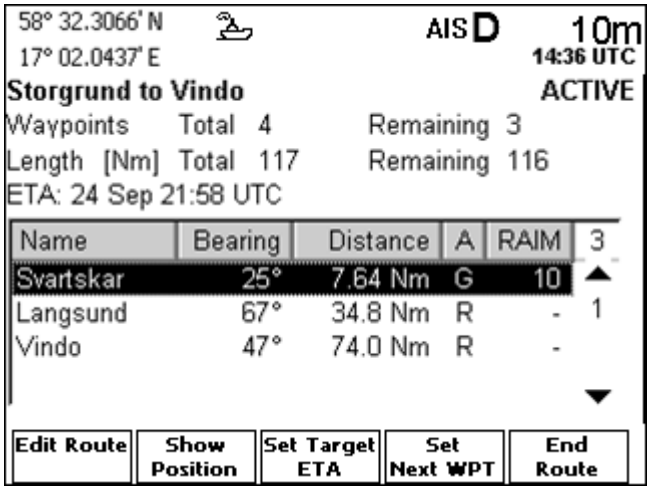


Figure 48 - Active Route view

3.16 Alarm and Status Lists

Current alarm status can be viewed under the *Alarm List* view, in the *Alarms & Msgs* mode. To enter the mode, press the ***MODE*** key followed by the **ALARMS & MSGS** function key. Then press function key **Alarm List** to enter the view. Active alarms are marked with an exclamation mark (!).

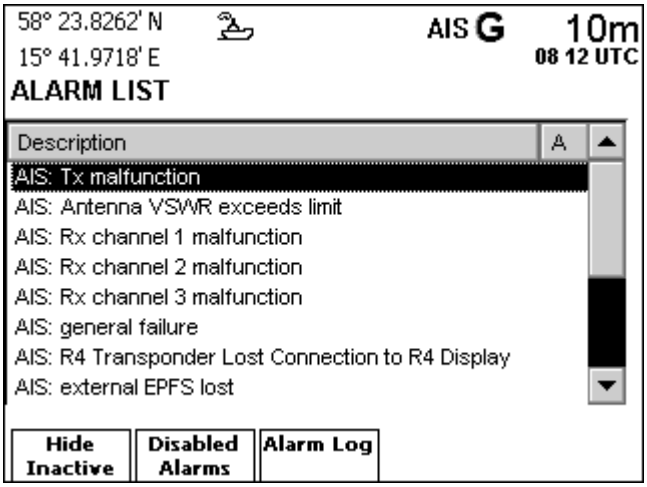


Figure 49 – Alarm List

On entrance, the view only shows status of enabled alarm. To show alarms that have been disabled, press the function key **Disabled Alarms**. For more information on alarm messages see Appendix, section 5.1. The *Alarms & Msgs* mode and associated views are described on page 122 and onwards.

Current status of indications and the latest events are listed in the *Status List*. To enter this view press function key **Status List** in the *Alarms & Msgs* mode. For a list of status messages see Appendix, section 5.2.

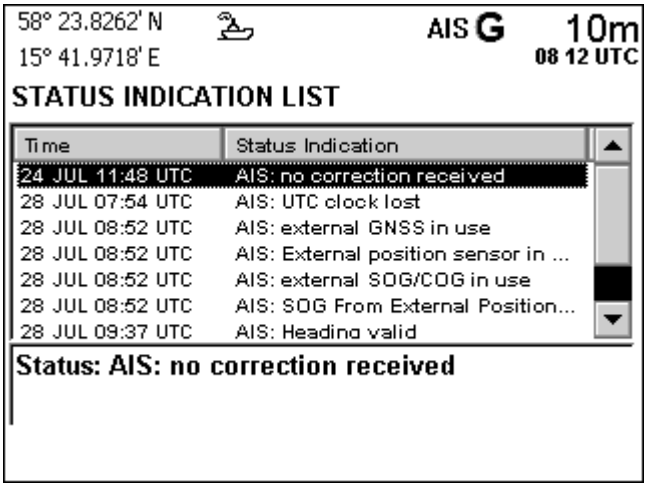


Figure 50 – Status Indication List

3.17 Visual Settings

The display backlight, contrast, LED illumination, button illumination and day or night settings can be changed in the Visual Config view. Changes made in this view directly affect the corresponding visual setting.

To enter this view, press the ***DISPLAY*** key. The following view is shown:

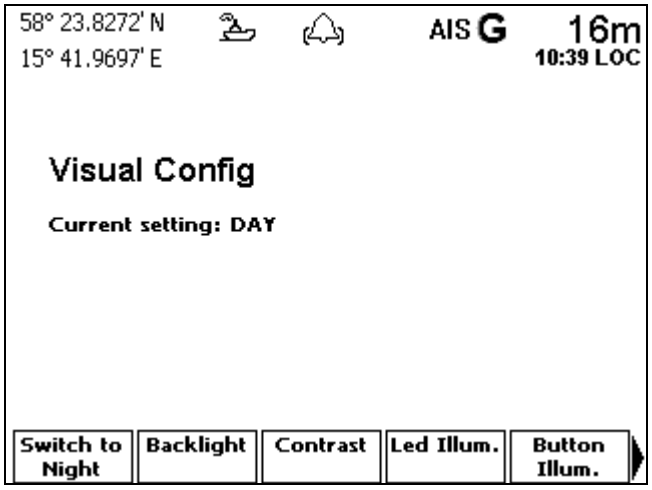


Figure 51 - Visual Config view

To change between day and night settings, press ***Switch to Day*** or ***Switch to Night***. The day and night settings are stored separately, so different settings can be specified for day and night operation. To change backlight, contrast, LED illumination or button illumination, press the corresponding function key. Regardless if the ***Backlight***, ***Contrast***, ***Led Illum.*** or ***Button Illum.*** function key is pressed, a view with a bar graph is shown as illustrated below.

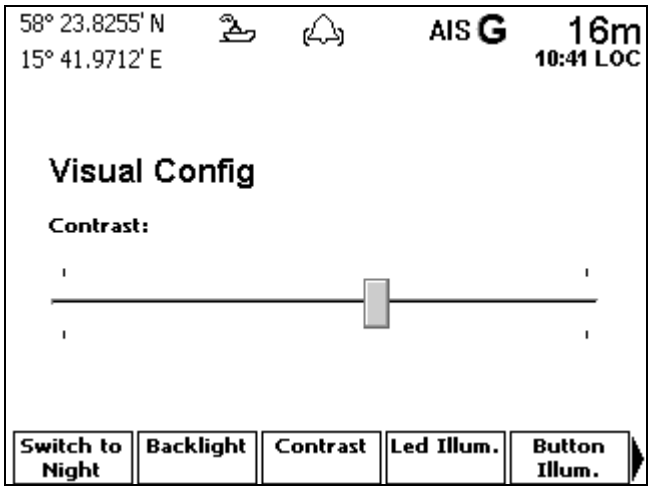


Figure 52 - Visual Config view, bar graph

Use < > to decrease or increase the value of the selected setting. The corresponding screen or illumination setting is directly affected as the bar is moved.

To restore the settings to factory default, press ***PAGE*** in order to view a second page of function key. Press the function key ***Restore Default***. A confirmation dialog appears, press ***ENTER*** to confirm.

To exit the Visual Config view, press ***DISPLAY*** or ***ESC***.

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4 REFERENCE

4.1 Status LEDs

The following sections describe the status indicating light emitting diodes (LEDs) of the R4 Display, R4 Navigation Sensor and R4 Transponder.

4.1.1 R4 Display LEDs

The three LEDs located above the screen of the R4 Display are used to indicate the RAIM accuracy status of the R4 Navigation Sensor's current GPS position.

Green LED (Safe state)

The green LED indicates, when lit, safe state. It is lit if the probable position error is less than the RAIM accuracy level with more than 95% certainty.

Yellow LED (Caution state)

The yellow LED indicates, when lit, caution state. It is lighted if the system cannot safely determine if the position accuracy is better or worse than the current RAIM accuracy level. It is also lit if no position is available.

Red LED (Unsafe state)

The red LED indicates, when lit, unsafe state. It is lit if the position error exceeds the current RAIM accuracy level with more than 95% certainty.

4.1.2 R4 Navigation Sensor LEDs

PWR LED

The red LED marked "PWR" indicates, when lit, that power is applied to the R4 Navigation Sensor.

GPS LED

The yellow LED marked "GPS" indicates, when continuously lit, that the R4 Navigation Sensor has obtained a solid GPS lock.

CORR LED

The yellow LED marked "CORR" indicates, when continuously lit, that the R4 Navigation Sensor has achieved a solid radio beacon lock or a SBAS lock with a bit error rate (BER) better than 150. If the SBAS BER is higher than 150 but the receiver is still locked, this LED will blink showing that the lock is marginal. This LED is also lit while using external DGPS corrections input through the User 1 port.

DGPS LED

The green “DGPS” LED indicates that the R4 Navigation Sensor has achieved a differentially corrected position. It is continuously lit when the range residuals in the position solution have settled below a threshold value.

4.1.3 R4 Transponder LEDs

The following LEDs, located on the front of the R4 Transponder, indicates its current status and radio link activity.

Green LED

The green LED indicates that power is applied to the R4 transponder.

Yellow LED

A flashing yellow LED indicates that the R4 Transponder is receiving data.

Red LED

A flashing red LED indicates that the R4 Transponder is transmitting on the radio link (transmission starts approximately 1 minute after power on).

4.2 Icon Description

The following sections describes the different icons that can appear on the screen of the R4 Display.

Message Symbols:

Unread AIS message (safety related message or text message)

Unread Long Range message (auto reply)

Unread Long Range message (manual reply)

Unread DGPS message.

AIS Status Symbols:

AIS functionality available

No communication with the R4 AIS Transponder

Navigational Status Symbols (Own Vessel Icons):


Navigational status is undefined


At anchor or moored


Under way using engine


Navigational status is one of: Not under command, Restricted manoeuvrability, Constrained by her draught, Aground, Engaged in fishing, Under way sailing or Reserved for future use.

Redundant Operational Status Symbols:


Redundant operation active.


Redundant operation active. Synchronizing from external unit.


Redundant configuration has been enabled, but no communication is established

GPS Status Symbols:


DGPS based on external differential corrections applied through the User 1 port.


DGPS based on corrections from the internal radio beacon receiver (DGPS version).

DGPS based on SBAS differential corrections.


Navigating without differential corrections.


No valid position information.


No communication with the R4 Navigation Sensor.

DGPS Integrity Alert, displayed immediately to the right of GPS status when active.


HDOP status indication (active if HDOP is above 4).

Miscellaneous Symbols


Active alarms


1W mode (Available only if Ship Type = Tanker and Navigational Status = Moored)

Target Symbols (Target List and Plot)


Own ship (plot view)


Ship (class A)


Ship (class B)


Base Station


SAR


Aids-to-Navigation

4.3 Adjust Settings

If desired, some presentation and navigation characteristics of the R4 Display can be adjusted to the user's preferences. The most central parameters that can be adjusted are briefly described below.

Maximum number of targets in Target List and Plot

The maximum number of targets that can be shown in the *Target List* and *Plot* views can be adjusted. See section 4.11.5.4 "AIS Display" on page 152.

SOG and COG Smoothing

The R4 Navigation System supports smoothing of SOG and COG values for more stable readings. See section 4.11.8.1 "GPS Config" on page 159.

Source of Differential Corrections

The R4 Combined AIS & Navigation System can be set to use IALA radio beacon (DGPS version only) or SBAS differential corrections. It is also possible to turn off the use of differential corrections or use external corrections in RTCM SC-104 format received on the User Port 1. See section 4.11.8.1 "GPS Config" on page 159.

Beacon Receiver Tuning Mode (DGPS version only)

The tuning and bit rate modes of the R4 DGPS sensor internal beacon receiver can be set to manual or automatic modes as described in section 4.11.8.2 "

Beacon Config” on page 162.

Maximum Age of Differential Corrections

The maximum allowed age of differential corrections can be configured. Default is 120 seconds. See section 4.11.8.1 “GPS Config” on page 159.

Adjust Enabled and Disabled Alarms

Enable alarms for those alarm conditions that indications are desired for. Per default, several of the alarms are disabled. Alarms that are invalid in the specific system configuration can remain disabled. If not, such alarms will always be active. Adjusting alarms is described in section 4.11.6 on page 157.

Route Leg Default Navigation Algorithm

The default navigation algorithm for created legs can be set to one of Great Circle and Rhumb Line. The factory default is Rhumb Line. The different algorithms are described in chapter 2, and selection of default algorithm in section 4.11.4 “Nav Config” on page 145.

Waypoint Pass Criterion

The waypoint pass criterion can be set to one of Manual, Distance, Bisector Line and Perpendicular Line. The different pass criteria are described in chapter 2 and selection of criterion in section 4.11.4 “Nav Config” on page 145.

Cross-Track Error Limit

The cross-track error limit determines the allowed cross-track error, and thus also when the XTE Limit Exceeded alarm shall be raised. The parameter is described in section 4.11.4 “Nav Config” on page 145.

Distance or Time for Waypoint Approach Alarm

The distance to or estimated time before arrival at the next waypoint where an Approaching Waypoint alarm is raised can be configured, as described in section 4.11.4 “Nav Config” on page 145.

UTC or Local Time Frame

It can be selected whether displayed time shall refer to UTC or a to user defined local time frame with constant offset from UTC. Refer to section 4.11.2 “Time Config” on page 142.

Range, Speed and Depth Units

The units used for displaying range, speed and depth values can be configured. Configuration of units is described in section 4.11.7 “Units Config” on page 158.

Route Leg Default RAIM Accuracy Level

The default RAIM accuracy level set when specifying accuracy level for a leg. Configuration of the parameter is described in section 4.11.4 “Nav Config” on page 145.

Position or Next Waypoint in Status Bar

Status bar information at the top left corner of the display can be selected between current position (if available), or the name of the waypoint that the system currently is navigating towards. Refer to section 4.11.4 “Nav Config” on page 145.

4.4 Man Over Board

The MOB (Man Over Board) key can be used to simultaneously mark a position and starting to navigate towards it, for quick response to emergency situations.

To activate the MOB function, press and hold the ***MOB*** key for at least 5 seconds.

Once activated, a MOB waypoint is created and the R4 Combined AIS & Navigation System will start navigate towards that waypoint. The active route is suspended until the MOB functionality is deactivated. The R4 Display will show a scalable Plot view, plotting the position of both the MOB waypoint and the ship, as well as displaying the bearing and distance to the MOB waypoint and the ship’s current speed and course over ground. See illustration below.

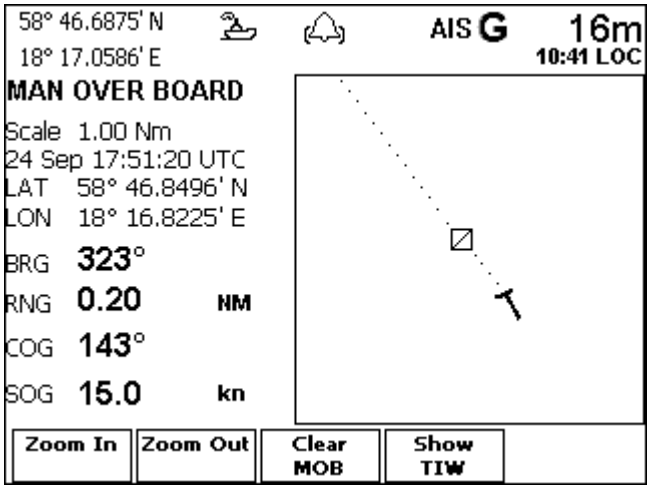


Figure 53 – Man Over Board

Clear MOB and resume navigation on active route

1. Press function key **Clear MOB**.
2. Answer Yes to the confirmation dialog and press ***Enter***.

Show Time In Water (TIW)

1. Press function key **Show TIW**. Press function key **Show Time Act.** to return to showing the time MOB was activated.

The system can store up to 20 MOB waypoints at the same time. If more MOB waypoints are created, the oldest will be removed. If the information in a MOB waypoint is to be stored for long term reference, it is therefore recommended to copy it to another medium or store it in a normal, non-MOB waypoint (which is easily achieved using the **Create Wp From** function key in the *Waypoint List* view, described in section 4.9.5).

MOB waypoints are named “MOB date time” and shown in the *Waypoint List* view.

4.5 Event Mark

The Mob key can, as well as being used for emergency situations as described above, also be used to quickly create a waypoint for easy marking of current position. To create a waypoint for the current position, press the Mob key momentarily. Hold it down no more than 1 second.

Pressing ***MOB*** momentarily brings up the following view.

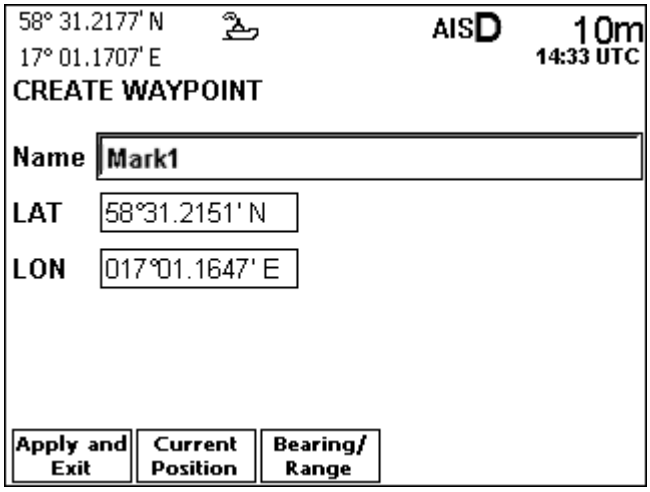


Figure 54 - Create MOB Waypoint

The Lat and Long values will be set up to position of the ship when the ***MOB*** key was pressed. The waypoint is also given a default name. To change its name, do the following:

1. Select the Name field using ∧. Press ***ENTER***.
2. Use the alphanumeric keypad to enter name text, and the ***Backspace*** function key to erase characters. Use function key **Capslock** to change between upper and lower case letters.
3. Press ***ENTER*** when done.

Press ***Apply and Exit*** to create the waypoint. Press ***ESC*** to abort creating the waypoint. The Create Waypoint view is described in detail on page 116.

4.6 Alarm Pop-Ups

There are two types of pop-up windows, alarms and alerts. Pop-up windows can appear any time during system operation to notify the user of an event or alarm condition. To acknowledge an alarm or an alert and close the pop-up window, press ***ENTER***. Active alarms are listed in the Alarm List view described on page 124. For explanation of different alarms, see Appendix, section 5.1 “Alarm Messages” on page 180.

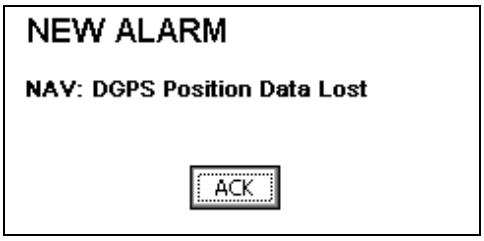


Figure 55 - Alarm pop-up window

It is possible to disable alarms that are invalid for the specific system configuration. If not disabled, such alarms will otherwise always be active. For example, if no depth sensor is connected to the system then the alarm Depth Data Lost should be disabled. This is described in section 4.11.6 on page 157.

4.7 Changing System Mode

The R4 Display has four system modes: Navigate, Plan Voyage, Alarms & Msgs and Config. The system modes corresponds to the kind of operation the user is performing. An overview of the different modes is present in section 3.3 “System Modes” on page 19. Each mode is also described in detail in the following sections of this chapter.

Accessing Navigate mode views from a different mode

1. Press ***MODE*** key.
2. Press function key ***NAVIGATE***.
3. To show the second page of main views, press ***PAGE***.
4. Press the function key associated with the desired view.

Accessing Plan Voyage mode views from a different mode

1. Press ***MODE*** key.
2. Press function key ***PLAN VOYAGE***.
3. Press the function key associated with the desired view.

Accessing Alarms & Msgs mode views from a different mode

1. Press ***MODE*** key.
2. Press function key ***ALARMS & MSGS***.
3. Press the function key associated with the desired view.

Accessing Config mode views from a different mode

1. Press ***MODE*** key.
2. Press function key ***CONFIG***.
3. To show the second page of main views, press ***PAGE***.
4. Press the function key associated with the desired view.

4.8 Navigate Mode

The *Navigate* mode contains a set of views related to typical ship navigation tasks during normal voyage operation. The mode is entered by pressing the ***Mode*** key followed by function key **NAVIGATE**. Press ***ESC*** a few times anywhere in the mode for access of top level function keys.

4.8.1 Navigate Mode Overview

The top level function keys of the *Navigate* mode are illustrated below. Press ***ESC*** a few times anywhere in the mode to bring them up.

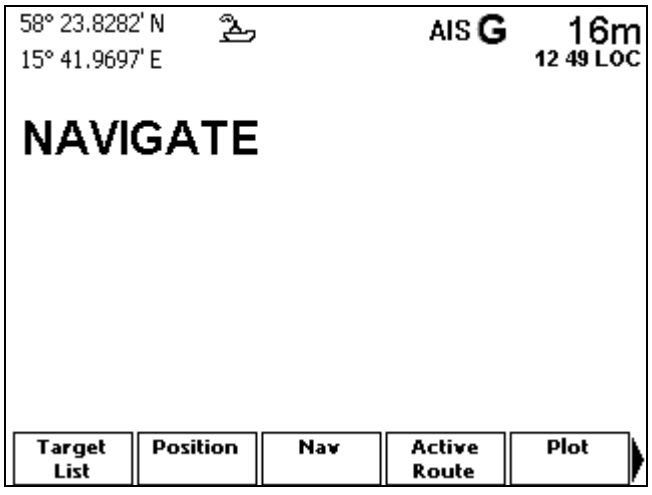


Figure 56 - Navigate, First Page

A second page of function keys becomes available by pressing the ***PAGE*** key as illustrated below.

Figure 57 - Navigate, Second Page

- *Target List* lists brief information about the closest targets.
- *Position* shows the last calculated position, speed and course over ground and has subviews for GPS and radio beacon status, satellite information and RAIM.
- *Nav* shows textual and graphical information on the next waypoint as well as current speed and course over ground, cross-track error and ETA.
- *Active Route* lists the remaining waypoints in the active route and enables functions for editing the route, setting ETA target and manually selecting which waypoint in the route to navigate towards.
- *Plot* shows a plot of the waypoints and legs of the active route and the cross-track error limit of current leg.
- *User Defined* gives access to up to five user configurable views, capable of displaying different types of navigation and sensor data.
- *Own Ship Data* shows the ships own data which is transmitted to other vessels.
- *Trip Logs* provides functions for calculation of travelled distances and average speeds.
- *Anchor Watch* provides a function for activation of an alarm when the deviation from a reference position exceeds a preset range.
- *Route List* provides a short-cut to the *Route List View* from which it is possible to activate a route or select a waypoint for navigation.

A graphical overview of the different views present in *Navigate* mode are shown in the next diagram.

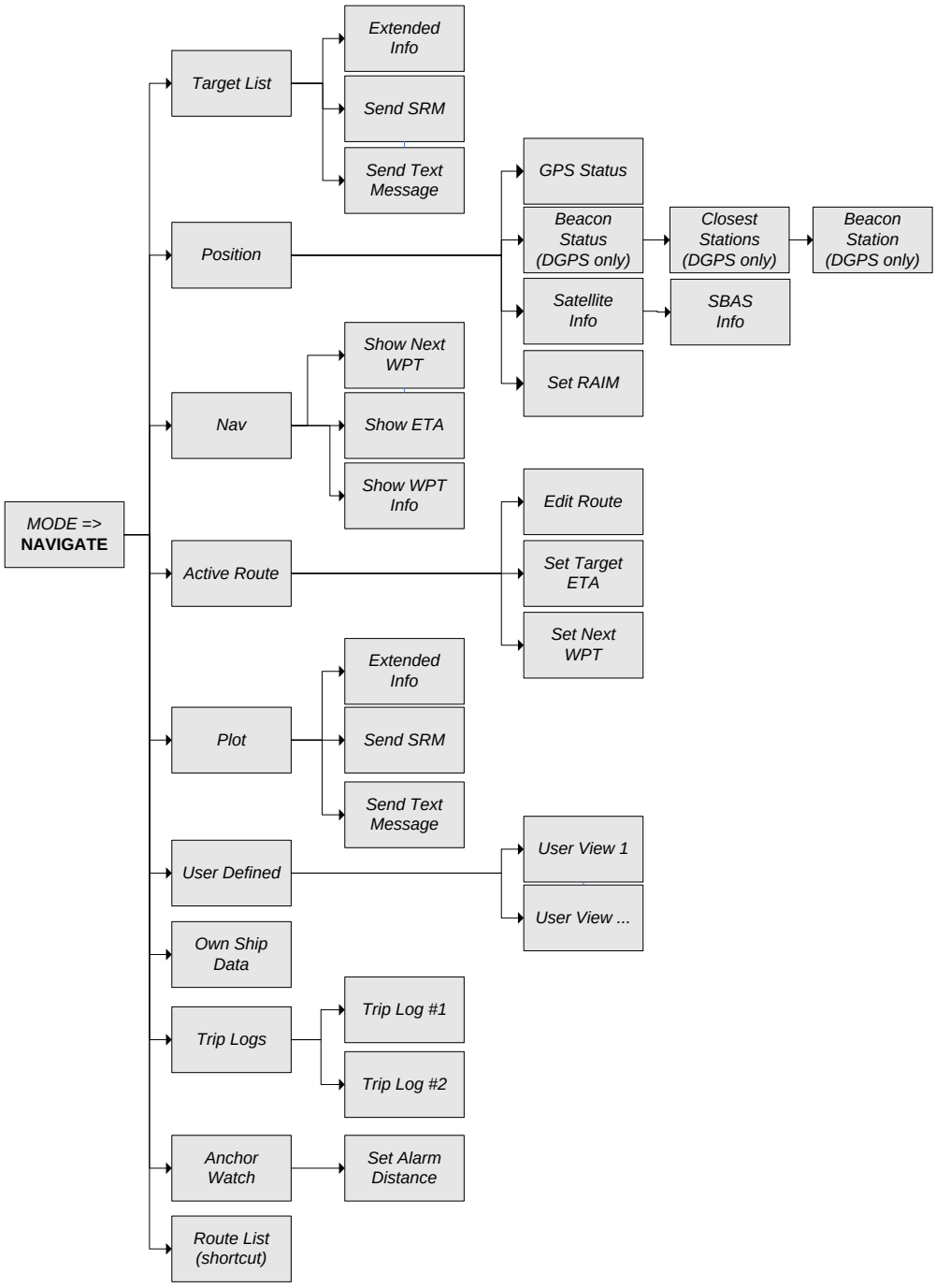


Figure 58 - Overview of the Different Views in the Navigate Mode

Note: The *Beacon Status* view and subviews is only present when using the R4 DGPS Navigation Sensor.

The views are further described below.

4.8.2 Target List

The *Target List* view displays a list of targets sorted by range from own ship (closest first). The list includes MMSI, ship's name, range (RNG) and bearing (BRG). The total number of ships in the list will be shown in the upper right corner of the list and the index of the currently selected ship will be shown on the right side. The maximum number of targets that can be shown in the list is controlled by the *Max. Targets in List* parameter, as set in the *AIS Display* view described on page 152.

By pressing the **Show Sector / Show All Targets** function key the list will show either the targets within a bearing interval, or all targets. Starting sector is in own ship heading direction if heading is available, or else in own ship COG direction. Each bearing sector covers 30°.

To get detailed information about a target, to send an SRM to a specific target or to send a text message to a specific target, enter subview *Extended Info*, *Send SRM* or *Send Text Message.*

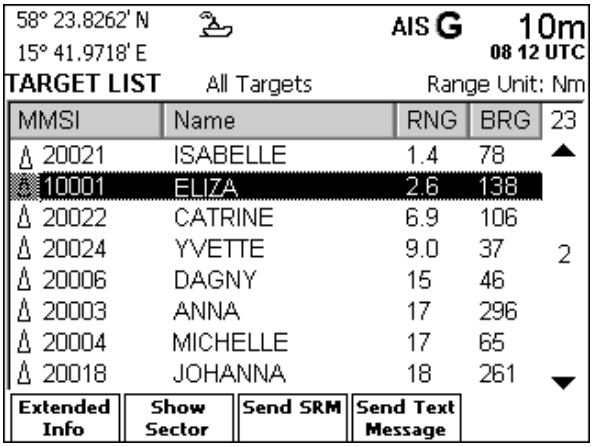


Figure 59 – Target List

Get extended information about a selected target

1. Select the target using ∧ ∨.
2. Press function key **Extended Info** or ***ENTER***.
3. The *Extended Info* view is shown, described on page 61.

Send an SRM to a selected target

1. Select the target using ∧ ∨.
2. Press function key Send SRM.
3. To send SRMs, refer to Send SRM on page 129.

Send a text message to a selected target

1. Select the target using ∧ ∨.
2. Press function key **Send Text Message**.
3. To send text messages, refer to Send Text Message on page 131.

Show only targets within a sector (when showing all targets)

1. Press function key **Show Sector**.

Show all targets (when showing only targets within sector)

1. Press function key **Show All.**

Changing displayed sectors (when showing only targets within sector)

1. Use the function keys -**15**° ← and +**15**° → to step through the sectors counterclockwise or clockwise. Starting sector is in own ship heading direction if heading is available, or else in own ship COG direction.

4.8.2.1 Extended Info

The *Extended Info* subview is used to show extended information for a specific target. The upper part of the view always show central information of the selected target including call sign, MMSI and bearing and range to target. The lower part of the view can be toggled showing three different sets of information. When first entered, the following view is shown.

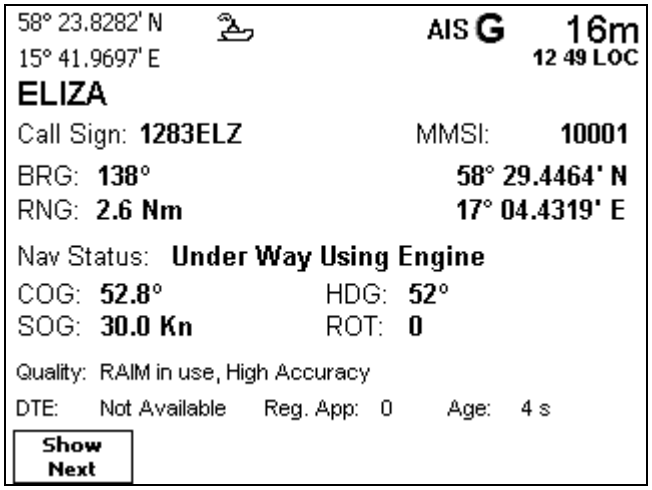


Figure 60 – Extended Info, page 1

Pressing function key **Show Next** once displays the following fields.

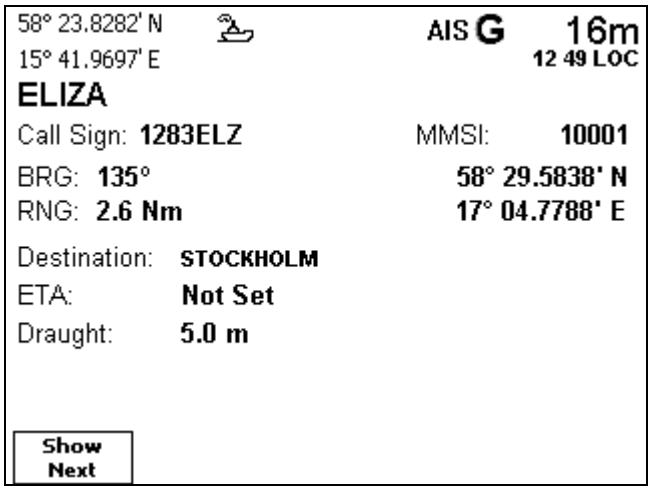


Figure 61 – Extended Info, page 2

Pressing function key **Show Next** again shows the following fields.

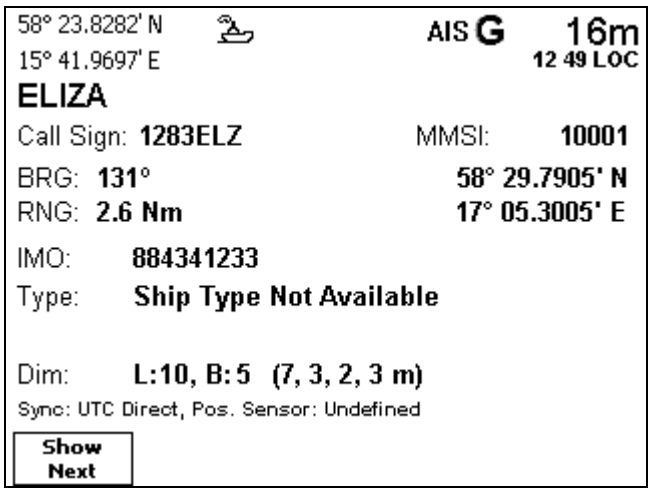


Figure 62 – Extended Info, page 3

If all messages from the specific target have not been received yet, it is possible to perform a manual interrogation for the missing information with function key **Query**. This function key will only be available until all static and voyage related data have been received from the target.

It is also possible to enable a manual request for number of persons on board from a specific target. In this case, a function key **Persons On Board** will be available and a datafield added on the second page of the *Extended Info* view. This function is enabled by the *Persons On Board Query* parameter in the *AIS Display* view as described on page 152.

For a Class B target the *Extended Info* subview will look somewhat different due to the smaller amount of data transmitted from Class B transponders. The following parameters will not be available:

- Nav Status
- Destination
- ETA

- Draught
- IMO number
- Persons on Board

A ‘display’ parameter will indicate whether the Class B transponder is capable to process and display AIS safety related messages (SRM:s). Only two *Extended Info* pages are required to display all data for a Class B target.

4.8.3 Position

The *Position* view shows the last calculated position, speed over ground (SOG) and course over ground (COG). The position shown is always the position of the R4 Navigation Sensor. The position is represented by latitude and longitude. Current time, in UTC or local time, is also displayed. The view can contain four subviews, *GPS Status, Beacon Status, Satellite Information* and *Set RAIM*. The *Beacon Status* view is only present if an R4 DGPS Navigation Sensor is used as the navigation sensor.

If the navigation system not is able to calculate new position information, the latest valid information is shown in conjunction with the time when it was calculated. The icon in the status bar will indicate that no new position information is available. See section 4.2 for further details on the icons.

Note: COG is based on track angle which requires that the ship is moving. Thus, COG data is not displayed when the SOG value is below 0.3 knots.

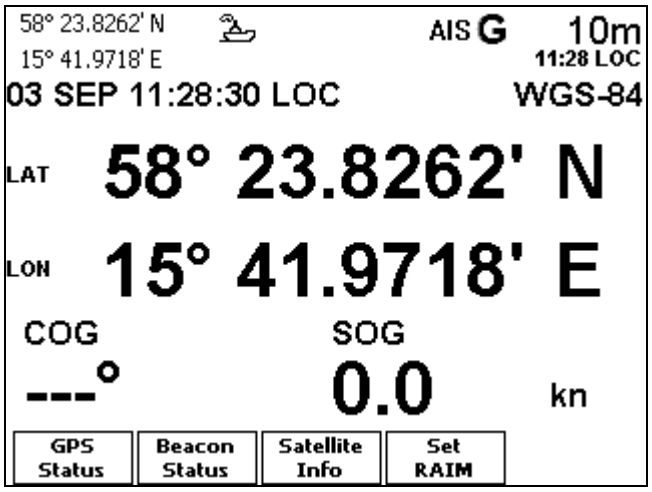


Figure 63 - Position view

View GPS Status

1. Press function key GPS Status.
2. See “GPS Status” on page 64.

View Beacon Status

1. Press function key Beacon Status.
2. See section “Beacon Status” on page 65.

Note: The Beacon Status view is only present when using a R4 DGPS Navigation Sensor.

View satellite information

1. Press function key Satellite Info.
2. See section “Satellite Info” on page 67.

Set RAIM accuracy

1. Press function key Set RAIM.
2. See section “Set RAIM” on page 69

4.8.3.1 GPS Status

The *GPS Status* view displays information related to the current navigation solution.

- Operating mode: *NO GPS* (no navigation solution), *GPS* (GPS only navigation solution) or DGPS (differentially corrected navigation solution).
- Number of GPS satellites from which signal is received and number of GPS satellites currently used in the navigation solution.
- DGPS warning, related to an active DGPS *Integrity Alert*. The warnings that can be displayed are:
  - *No Signal*. A correction source for GPS other than None has been selected in the GPS Configuration view and more than ten seconds have passed since new differential corrections were applied to the navigation solution.
  - *Station Unhealthy*. Correction source *Beacon* has been selected and the radio beacon station in use indicates an unhealthy status.
  - *Station Unmonitored*. Correction source *Beacon* has been selected and the radio beacon station in use indicates an unmonitored status.
  - *Poor signal*. Correction source *Beacon* has been selected and the word error rate of the received signal in use exceeds 10%.
- DGPS reference station ID. The reference identity of the currently applied differential corrections (if any).
- DGPS correction age. The time difference between navigation solution and reference time for the applied corrections (if any).
- DGPS correction source: *Beacon, SBAS, External* or None (-).
- Beacon receiver tuning mode: *Manual* or *Frequency Scan*. Only displayed when correction source is *Beacon*.
- RAIM accuracy limit.

- RAIM status: *Safe, Caution* or *Unsafe*.

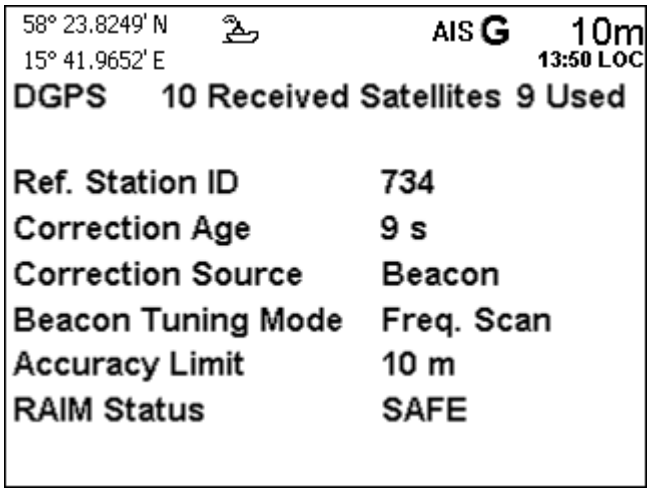


Figure 64 - GPS Status view

The RAIM status is also indicated by the LEDs on the front of the display unit. The green LED corresponds to the safe state, the yellow to caution state and the red to unsafe state.

4.8.3.2 Beacon Status

The *Beacon Status* view shows information related to the R4 DGPS Navigation Sensor's beacon reception. The view is only accessible if an R4 DGPS Navigation Sensor is used as navigation sensor. The header will include DGPS warning information if beacon is selected as correction source and a *DGPS Integrity Alert* is active. The header will display 'Not in Use' if a correction source another than beacon is selected. Use ∧ ∨ to scroll in the list with following information.

- Reference Station ID: The reference identity of received corrections from the tuned beacon station.
- Tuned frequency.
- Tuning mode. Current beacon receiver frequency selection mode: *Manual* or *Frequency Scan*. When tuning mode is manual, a function key **Auto Tuning** is available for simple switch over to automatic tuning mode (frequency scan).
- Signal quality as determined by current word error rate. The signal is regarded as poor when word error rate exceeds 10%.
- Health indication received from the tuned beacon station.
- Message throughput.
- Word error rate, percentage of bad data words in the last 25 words received.
- SNR, signal to noise ratio. All values above 15 are good SNRs for the beacon signal.
- Signal strength.
- Bit rate.

- Beacon receiver bit rate selection mode: *Manual* or *Auto*.
- Firmware version for the internal beacon receiver.

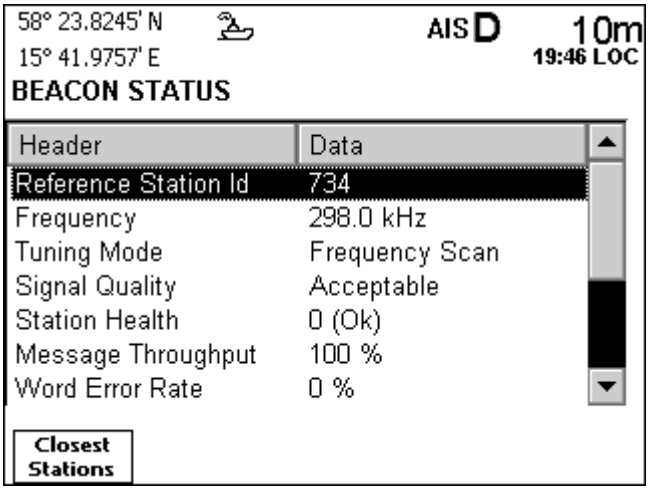


Figure 65 - Beacon Status view

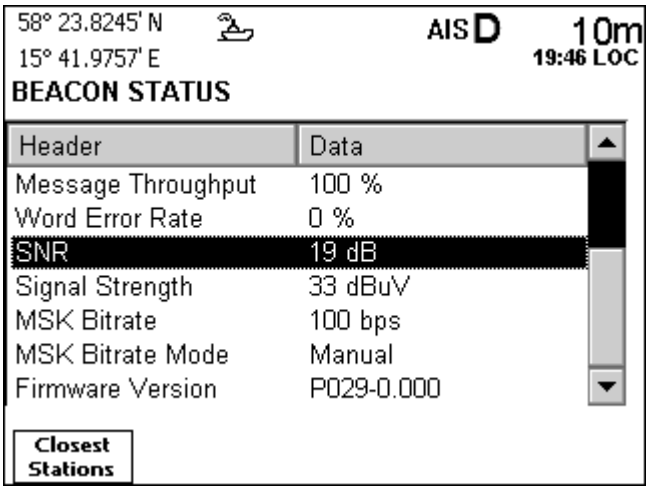


Figure 66 - Beacon Status view

To view a list of the closest beacon stations with information on each station, press the function key ***Closest Stations***.

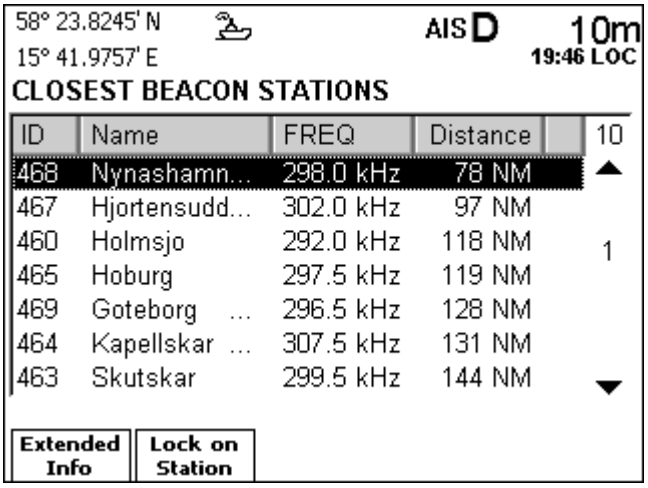


Figure 67 - Closest Beacon Stations view

In the Closest Beacon Stations view it is possible to view more information on each station by using ∧ ∨ to scroll in the list and then press function key ***Extended Info*** for the desired beacon station.

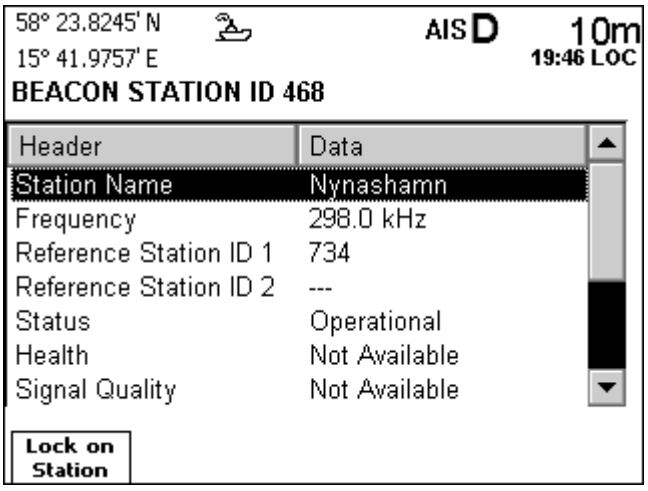


Figure 68 - Extended Info

To manually lock on a specific beacon station, scroll down to the desired station by using ∧ ∨ and press the function key ***Lock on Station***. A confirmation dialog appears, press ***ENTER*** to confirm.

4.8.3.3 Satellite Info

The *Satellite Information* view shows information relating to GPS satellites that the R4 Navigation Sensor is receiving or expecting to receive signals from. The view displays the ID, elevation and azimuth of each satellite, and current signal to noise ratio (SNR) of each satellite's signal. The elevation value represents the satellite's angular height above the horizon. The azimuth value represents the satellite's angular horizontal position, counted clockwise from north.

Use ∧ ∨ to scroll in the list

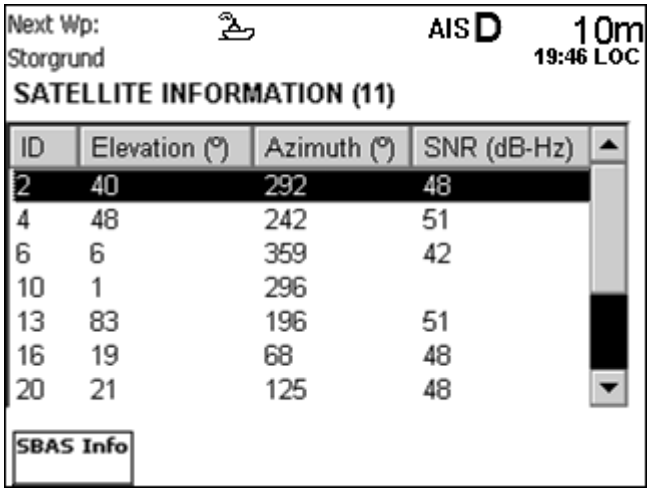


Figure 69 - Satellite Information view

4.8.3.4 SBAS Info

The *SBAS Information* view shows information relating to the one or two geostationary SBAS satellites that the R4 Navigation Sensor is receiving or expecting to receive signals from. The view is reached from the *Satellite Information* view by function key **SBAS Info**. Identity (PRN number) and longitude of the satellite as well as elevation and azimuth angle from the current position to the satellite and bit error rate of the received signal is provided by the view. Additionally, when using SBAS as correction source the reference id of applied corrections is displayed in the header of the view. The header will display 'Not in Use' if a correction source another than SBAS is selected.

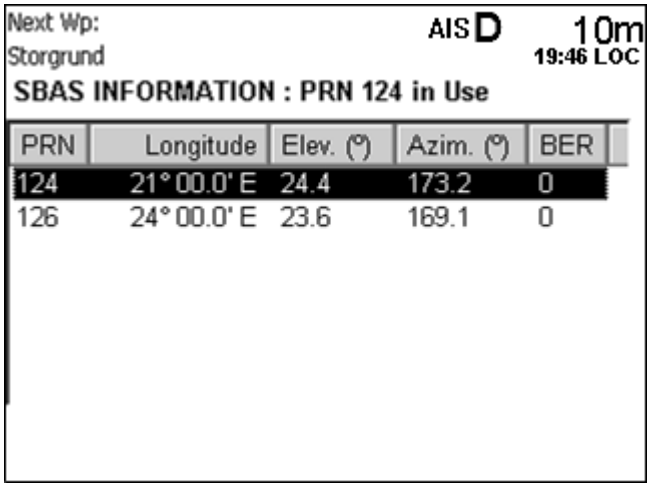


Figure 70 - SBAS Information view

4.8.3.5 Set RAIM

The *Set RAIM* view is used to modify the used RAIM accuracy level. The RAIM accuracy level is always set in meters. In the case the active route has RAIM accuracies specified for any of its legs, a RAIM accuracy level specified in this view will override the RAIM settings in the active route. If this is the case, you will be warned before any RAIM level is set.

When overriding active route RAIM accuracy levels, the RAIM accuracy level indication will appear underlined, as illustrated in the figure to the right: 

When overriding, accuracy levels specified in the active route does not affect the used RAIM accuracy level. To stop RAIM overriding, enter the *Set RAIM* view and press the **Cancel Override** function key that is present in this view when the override condition is active. The override RAIM condition is also automatically cancelled when reaching the end of the active route.

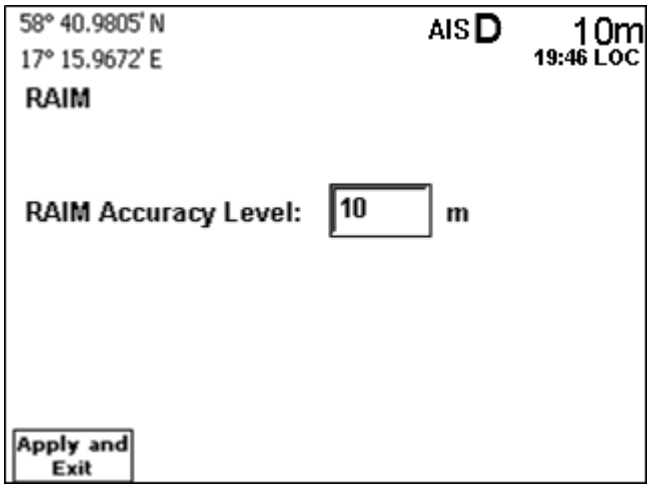


Figure 71 - RAIM Accuracy Level

Set RAIM accuracy level (in meters)

1. Press ***ENTER***.
2. Use the alphanumeric keypad to enter new the RAIM accuracy level in meters. Use the **Backspace** function key to erase digits. Press ***ENTER*** when done.
3. Press function key **Apply and Exit** to store the changes.
4. If the active route contains any set RAIM accuracy levels, a warning pop-up will be displayed.

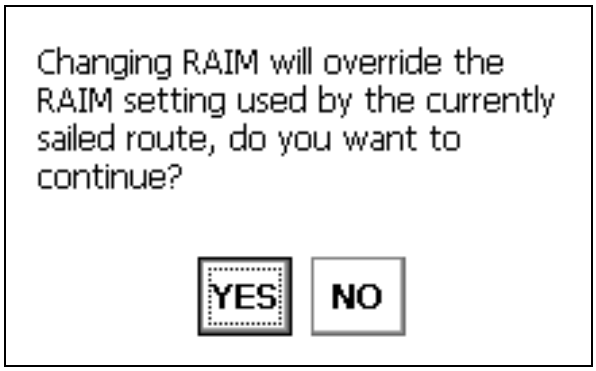


Figure 72 - Warning pop-up

5. Press ***ENTER*** to confirm that the set RAIM accuracy level should override the RAIM settings in the active route. Press > and ***ENTER*** to abort.

Cancel override condition

1. Press the function key **Cancel Override**.
2. Note that this function key only is present when the override condition is active.

4.8.4 Nav

The Nav view presents fundamental navigation data and aids the user in navigating towards a waypoint and following a route. It presents information such as the bearing and range to the next waypoint, the ship's current course over ground (COG) and speed over ground (SOG) and current cross-track error (if sailing on a route). The view is also an entry point to the three partially different subviews: Show Next Wp, Show ETA and Show Wp Info. Show Next Wp shows a close-up plot of the next waypoint. Show Wp Info shows the name of the active route, of the previous waypoint and of the current waypoint. Show ETA shows current Estimated Time of Arrival to the end point of the route as well as target ETA (if defined).

Note: COG is based on track angle which requires that the ship is moving. Thus, COG data is not displayed when the SOG value is below 0.3 knots.

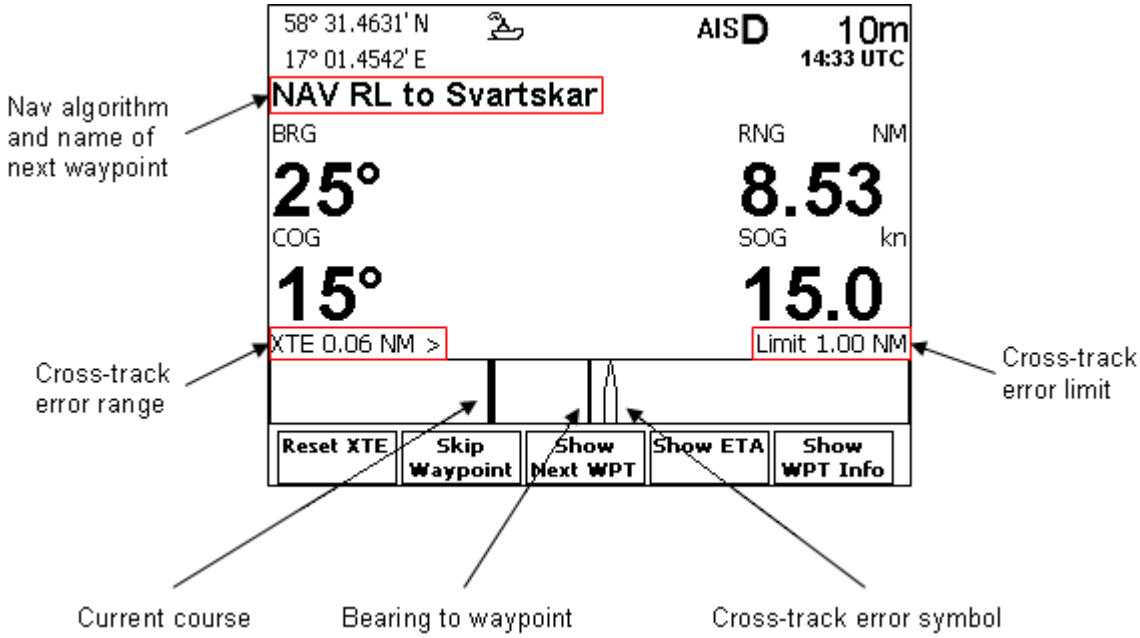


Figure 73 - Nav view

The rectangle in the lower part of the view visually represents current navigation information, as illustrated in the figure above. The difference between present course and the course to head to exactly navigate towards next waypoint is illustrated by the distance between the bold vertical bar and the center line. The bold vertical bar represents current course and the center line represents the bearing to the next waypoint. To steer towards the waypoint, make the bold vertical bar stand over the center line. The rectangle can represent a course deviation of ± 30 °.

If sailing on a route and having reached the first waypoint, the rectangle also presents current cross-track error, illustrated by the distance between the boat symbol and the center line. The cross-track error limit determines the scale of the rectangle; when the boat symbol is outside the rectangle the cross-track error limit has been exceeded and the XTE Limit Exceeded alarm will be raised (if enabled).

Reset cross-track error

1. Press function key ***Reset XTE***.

The cross-track error is set to zero by inserting an temporary waypoint at the current position in the active route. The temporary waypoint will not be saved if the active route is saved.

Skip next waypoint

1. Press function key ***Skip Waypoint***.

Show next waypoint plot

1. Press function key **Show Next WPT**.
2. The central region of the display shows a close-up of the remaining leg to the next waypoint oriented upwards. Initial bearing of next leg in the route and estimated time to go (TTG) to the next waypoint are also displayed. The plot is scaled so that the distance from the mid point lower edge of the plot area to the next waypoint equals current distance to the waypoint, unless this distance is less than 100 meters. As the waypoint is approached, it is possible to increase resolution by hiding the plot as described in the next step and then re-open it.

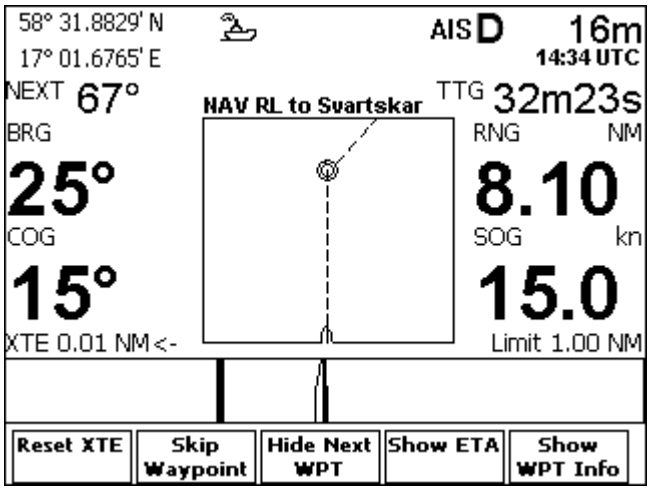


Figure 74 - Next waypoint plot

3. Hide the close-up by pressing function key **Hide Next WPT**.

Show estimated time of arrival (ETA)

1. Press function key Show ETA.
2. Estimated time of arrival to the final waypoint in the active route is displayed. If a target ETA has been set, it is displayed as well along with the speed necessary to reach the destination in time.

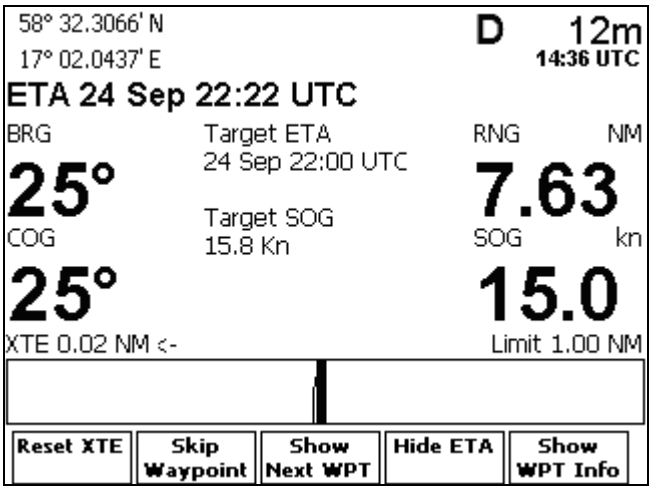


Figure 75 - Estimated time of arrival

3. Hide the display of ETA by pressing function key ***Hide ETA***.

Note: The calculation of ETA and TTG is dependent on the average SOG time parameter described in section 4.11.4 “Nav Config” on page 145.

Show waypoint information

1. Press function key ***Show WPT Info***.
2. The following view is displayed, including the name of the active route and the next and previous waypoint.

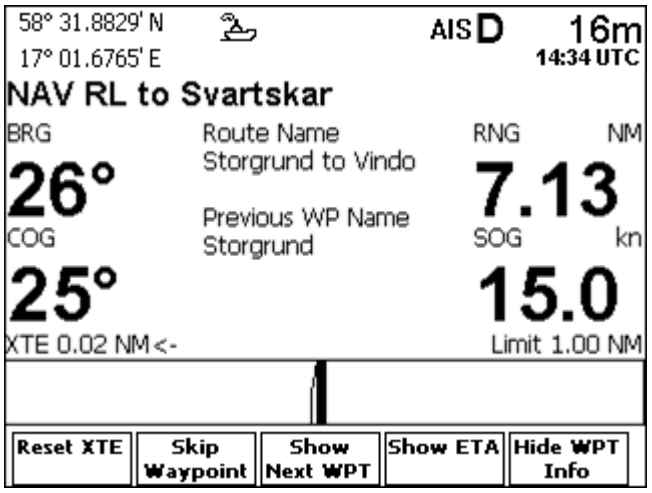


Figure 76 - Waypoint information

3. Hide the display of WPT Info by pressing function key ***Hide WPT Info.***

4.8.5 Active Route

The Active Route view shows information of the active route, including route name, route length, number of total and remaining waypoints, ETA and details of the remaining waypoints.

From this view it is possible to access the Edit Active Route, Set Target ETA and Set Next Wp subviews. The Edit Active Route subview can be used to modify legs and waypoints of the active route. The Set Target ETA view can be used to set a target for Estimated Time of Arrival. The Set Next Wp view can be used to change the waypoint in the active route that currently is being navigated towards. The latter is useful to quickly skip to a certain position in the active route or to unpass a previously passed waypoint.

The Active Route view is illustrated below. It displays the remaining waypoints in the route. For the first waypoint in the list, current bearing and remaining distance to it is displayed. For the other waypoints, initial distance and bearing to it calculated from the waypoint before it is displayed. For each remaining waypoint the navigation algorithm and RAIM setting used when sailing towards that waypoint is shown.

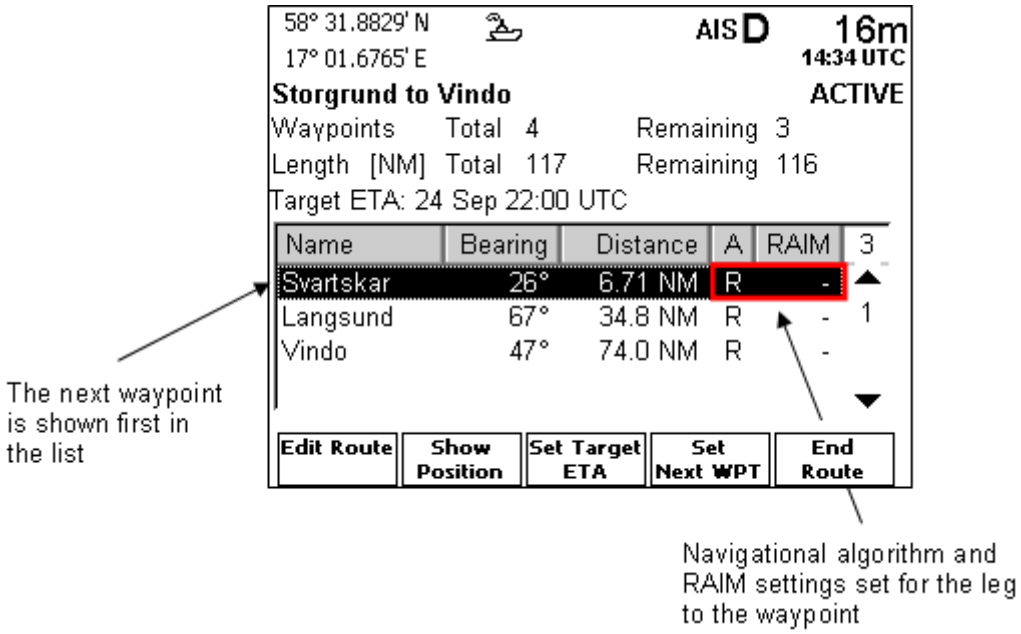


Figure 77 - Active Route view

Alternate information sets relating to the active route can be displayed using the function key initially labeled Show Position as follows.

Press function key ***Show Position***. Latitude and longitude of each waypoint is displayed.

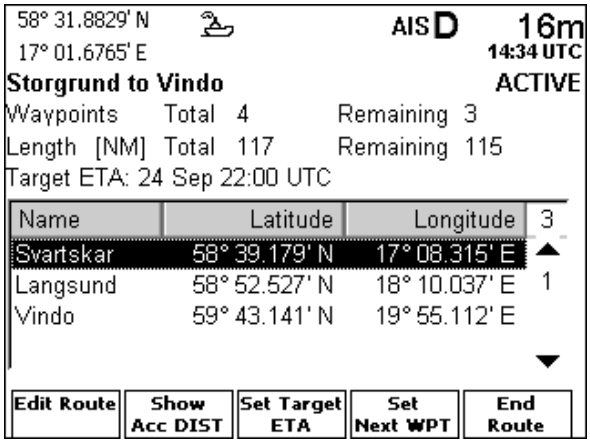


Figure 78 - Position

Press function key ***Show Acc Dist***. Accumulated distance along the route to each waypoint is displayed.

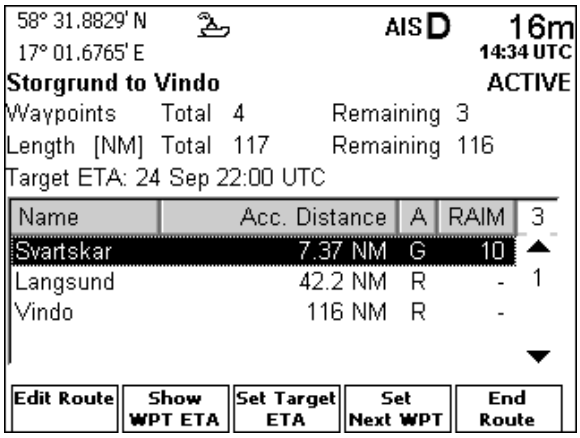


Figure 79 - Accumulated Distance

Press function key ***Show WPT ETA***. Estimated time of arrival to each waypoint in the route is displayed.

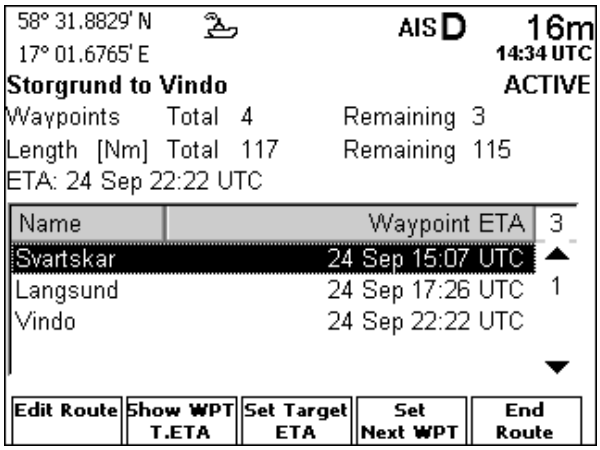


Figure 80 - Waypoint ETA

Press function key ***Show WPT T.ETA*** (available only if a target ETA has been set). Target arrival time at each waypoint corresponding to the target ETA for the complete route is displayed.

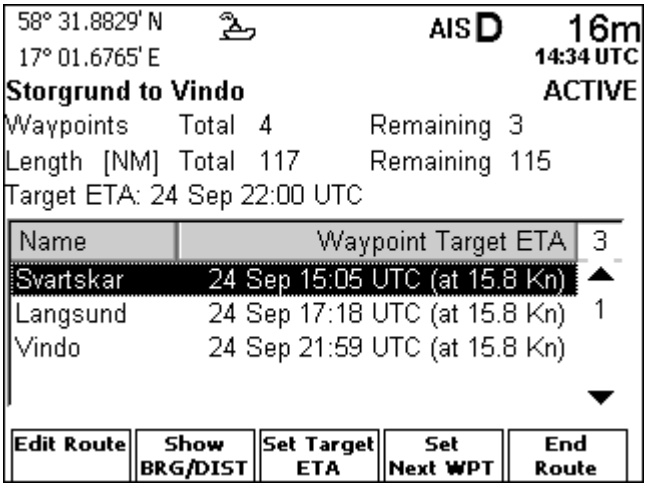


Figure 81 - Waypoint Target ETA

Press function key ***Show BRG/DIST***. The default initial view of bearing and range between waypoints is displayed once again.

Edit the active route

1. Press function key Edit Route. The Edit Active Route view is displayed, as described in section 4.8.5.1.

Set target ETA (Estimated Time of Arrival)

1. In the Active Route view press function key ***Set Target ETA***. The ETA view is shown, as illustrated below.

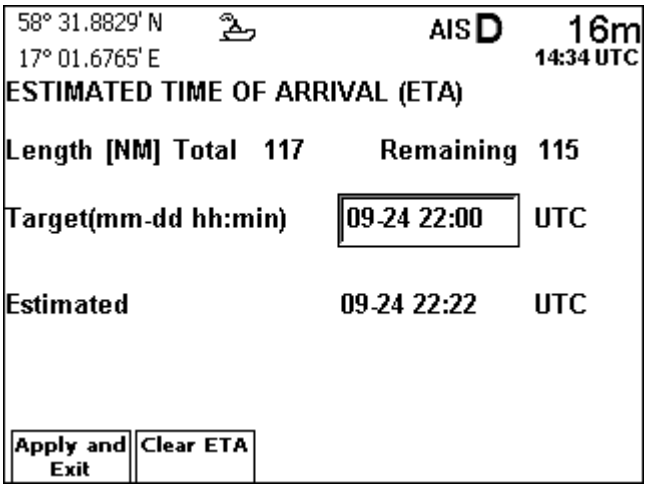


Figure 82 - ETA view

2. Press ***ENTER*** to start editing the target ETA corresponding to a goal for the arrival time at the final waypoint in the active route. The value is entered on the form MM-DD HH:MM (month, day, hour and minute). Use the alphanumeric keypad to enter digits. Use < > to select which digits to edit.
3. Press ***ENTER*** when done.
4. Press function key ***Apply and Exit***.

Note: If ETA integration between AIS and navigation is turned on (controlled by the setting Integrated ETA described in section 4.11.4), the ETA value set in this view is the same as edited in the Voyage view. The ETA is then, in addition to being used for navigation calculations, also used for transmission to remote ships.

Unset target ETA

1. Press function key **Set Target ETA**. The ETA view is shown, as illustrated above.
2. Press function key **Clear Target ETA**.

Change waypoint to navigate towards

1. In the Active Route view press function key **Set Next WPT**. The Set Next Waypoint view is shown, as illustrated below

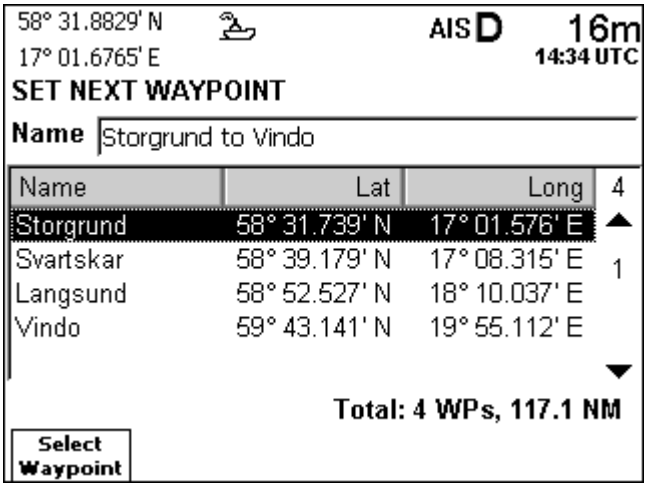


Figure 83 - Set Next Waypoint view

2. Highlight the waypoint that should be set as waypoint to navigate towards using ∧ ∨.
3. Press function key **Select Waypoint**.

Stop sailing current route

1. In the Active Route view press function key End Route. A pop-up request for confirmation will be displayed before the active route is terminated.

4.8.5.1 Edit Active Route

The Edit Active Route view is used to modify the active route. It displays all waypoints and legs in the active route, regardless if they are passed or not and including waypoints created when resetting cross-track error in the Nav view. It is possible to modify navigation algorithm and RAIM setting for each leg, as well as remove, modify and insert waypoints. Changes made to the active route leaves the original route unaffected. It is however possible to save the active route and thus update the original route to reflect changes made.

Note: Waypoints named “XTE Reset-..” have been inserted into the route when resetting the cross-track error. When saving changes, they will not be stored. The original route will not be affected by changes made to legs towards or between such waypoints, nor will such legs be created in the original route. These waypoints are not viewed as part of the planned route.

When entered, the view displays the legs of the route, as illustrated below.

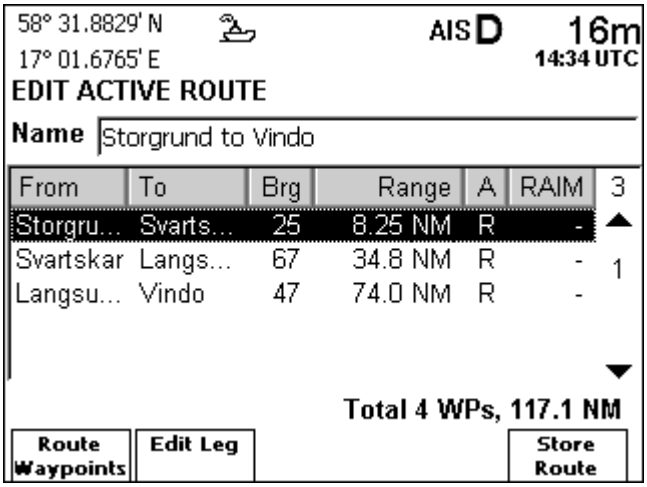


Figure 84 - Edit Active Route

Press function key **Route Waypoints** to display the waypoints of the active route and the associated function keys, as illustrated in the below figure.

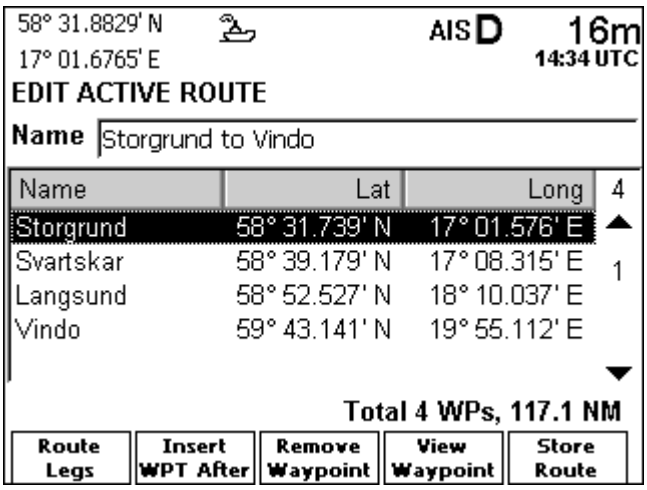


Figure 85 - Active Route Waypoints

Change navigation algorithm for a leg in the active route &

Change RAIM accuracy for a leg in the active route

1. Show route legs, by pressing function key ***Route Legs*** if necessary.
2. Select the leg to modify using ∧ ∨. Press ***ENTER*** or function key ***Edit Leg***.
3. The Edit Leg view is displayed. See below

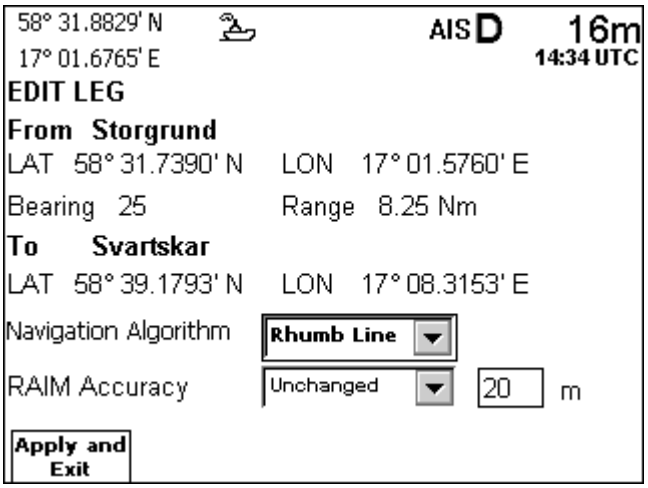


Figure 86 - Edit Leg view

4. To change the used navigation algorithm, select the Navigation Algorithm field using ∧ and press ***ENTER***. Use ∧ ∨ to highlight the desired algorithm, and press ***ENTER*** when done.
5. To change the RAIM accuracy level for the leg, select the ***RAIM Accuracy*** field using ∨ and press ***ENTER***. Select the desired RAIM setting using ∧ ∨. Select unchanged to set the leg to not affect the RAIM level at all. Select level to specify a RAIM accuracy level to switch to when navigating on the leg. Press ***ENTER***.
6. If level was selected above, then use > to bring focus to the right box that appeared when level was selected. Press ***ENTER*** and enter the RAIM accuracy level using the alphanumeric keypad. Use the ***Backspace*** function key to erase digits. Press ***ENTER*** when done.
7. Press the function key ***Apply and Exit*** to save changes made.

Insert waypoints into the active route

1. Show route waypoints, by pressing function key ***Route Waypoints*** if necessary.
2. Use ∧ ∨ to highlight the waypoint after which the new waypoint should be inserted.
3. Press the function key ***Insert Wps After***.

4. The Insert Waypoints view is displayed (described on page 107). Highlight the first desired waypoint to insert using ∧ ∨, possibly with the aid of the different sort and find functions present in the view.
5. Press function key ***Insert Waypoint***.
6. Repeat the procedure of highlighting and inserting waypoints until the desired waypoints are selected for insertion into the route.
7. Press function key ***Return***.

View or edit a waypoint

1. Highlight the waypoint to view or edit using ∧ ∨ and press ***ENTER*** or the ***View Waypoint*** function key.
2. The View Waypoint view is displayed, as described on page 113.
3. If desired, press function key ***Edit Waypoint*** to edit the waypoint.
4. The Edit Waypoint view is displayed, as described on page 113.

Remove waypoint from the active route

1. Highlight the waypoint using ∧ ∨.
2. Press function key ***Remove Waypoint***.

Update the original route with the changes made in the active route

1. Press function key ***Store Route***.

4.8.6 Plot

The Plot view displays a plot over the active route, indicating the ship's position, way-points, legs and cross-track error limit range for current leg. It also shows received AIS targets. It is possible to zoom in and out in the plot, as well as turning on plotting of the ship's sailed track. The waypoint currently being used for navigation is indicated by a double circle in the plot.

Note: COG is based on track angle which requires that the ship is moving. Thus, COG data is not displayed when the SOG value is below 0.3 knots.

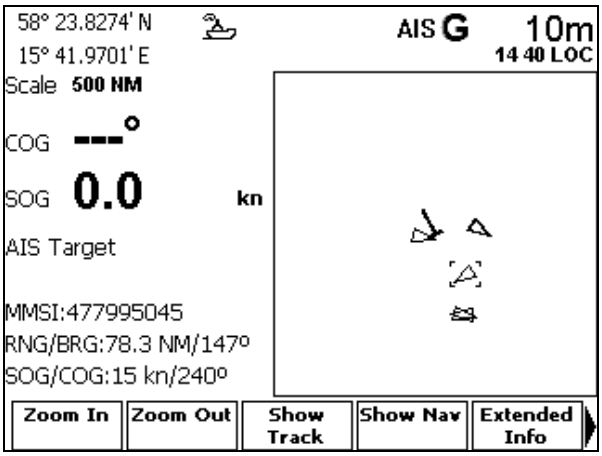


Figure 87 - The Plot view

Show more details in the plot

1. Press function key ***Zoom In***

Show less details in the plot

1. Press function key ***Zoom Out***.

Show / Hide Track

1. Press function key ***Show Track*** to turn on plotting of the ship's track, and function key ***Hide Track*** turn it off.

Skip next waypoint

1. Press function key ***Skip Waypoint***.

Select AIS targets in the plot

1. Use the arrow key pad to switch between AIS targets. The currently selected target is indicated by an open square symbol (see figure above).

4.8.7 User Defined

The User Defined Views view provides functionality for creation of up to five user defined views. The information shown in the fields of each view can be configured as described below. The different types of information that can be shown (if available) are listed in the table below.

Table 1 - User Defined Views

Name	Description
Empty	No information displayed in this field.
Alg, WPT	Current nav algorithm (GC or RL) and the name of the waypoint that the system currently is navigating to.
Algorithm	Current nav algorithm (GC or RL).
BRG	Bearing to next waypoint. Can be displayed in big (B), medium (M) or small (S) format.
COG	Course over ground. Can be displayed in big (B), medium (M) or small (S) format. COG data is not displayed when SOG is below 0.3 knots.
Dialog Title	Name of view: 'User Defined View #' where # is a number from 1 to 5 depending on the current view.
DPT	Depth information input through the serial interface. Can be displayed in big (B), medium (M) or small (S) format.
ETA	Estimated time of arrival to the end waypoint of the current active route.
ETA Target	A user input value for target time of arrival to the end waypoint of the current active route.
From WPT	Name of the previous waypoint in the current active route. Can be displayed in big (B), medium (M) or small (S) format.
HDG (m)	Magnetic heading information input through the serial interface. Can be displayed in big (B), medium (M) or small (S) format.
HDG (t)	True heading information input through the serial interface. Can be displayed in big (B), medium (M) or small (S) format.
HDOP	Horizontal dilution of precision.
Leg Plot	A plot oriented with the bearing of the current leg upwards.
Next BRG	Bearing of the next leg in the current active route. Can be displayed in big (B), medium (M) or small (S) format.
Next WPT	The name of the waypoint the system currently is navigating towards. Can be displayed in big (B), medium (M) or small (S) format (length).
Plot	A plot with zoom functionality oriented with north upwards. A big (B), small (S) and a wide (W) version is available.
Position	Current latitude and longitude. Can be displayed in big (B) and small (S) format.

Table 1 - User Defined Views (Continued)

Name	Description
RNG	Distance to the next waypoint in big (B) medium (M) and small (S) formats.
Route	The name of the current active route. Available in big (B), medium (M) and small (S) format.
Route Info	Number of remaining waypoints and remaining length of the current active route.
SOG	Current groundspeed in big (B), medium (M) and small (S) format.
Target SOG	Required groundspeed in order to reach the final waypoint of the current active route at the set target ETA. Available in big (B) and medium (M) sized formats.
Time Local	Date and time in local time frame with the currently set offset from UTC.
Time UTC	Date and time in UTC time frame.
TTG	Remaining time to next waypoint at current (filtered) groundspeed. Available in big (B) medium (M) and small (S) sized formats.
WCV	Waypoint closure velocity—current velocity component towards next waypoint. Big (B), medium (M) and small (S) format.
XTE Bar	Graphic display of cross track error and difference between current COG and bearing to next waypoint. Available in big (B) and small (S) size formats.

Depending on the position on the screen, only a subset of the user defined options may be available depending on the available remaining screen space.

A *User Defined Views* view with three user views is illustrated below

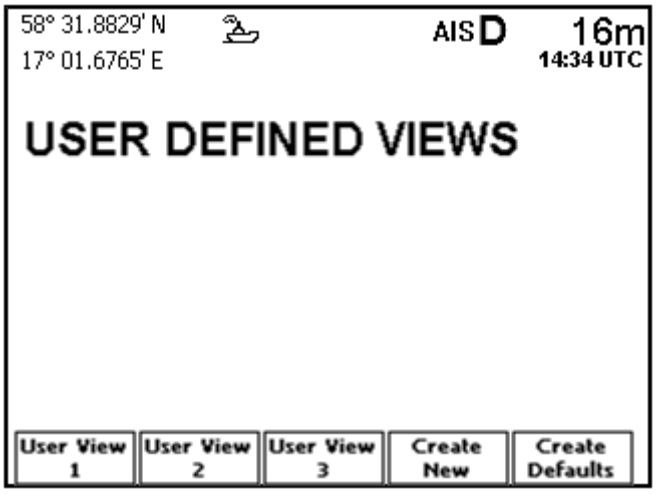


Figure 88 - User Defined view

Create a new user defined view

1. In the User Defined Views view, press function key ***Create New***. The following view is displayed:

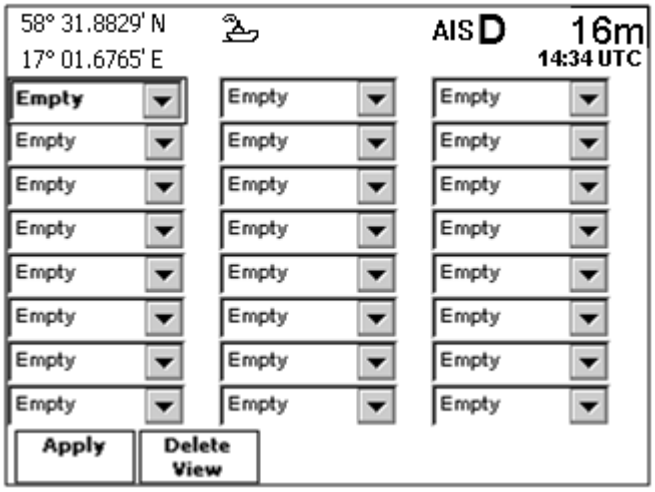


Figure 89 - Create user defined view

2. Go to a desired position on the view to insert data using < > and ∧ ∨.
3. Press ***ENTER*** and scroll down the list of available options to select the parameter that is to be displayed. Press ***ENTER*** again.
4. Repeat steps 2 and 3 above as many times as necessary. As an example, after a while it may look like this:

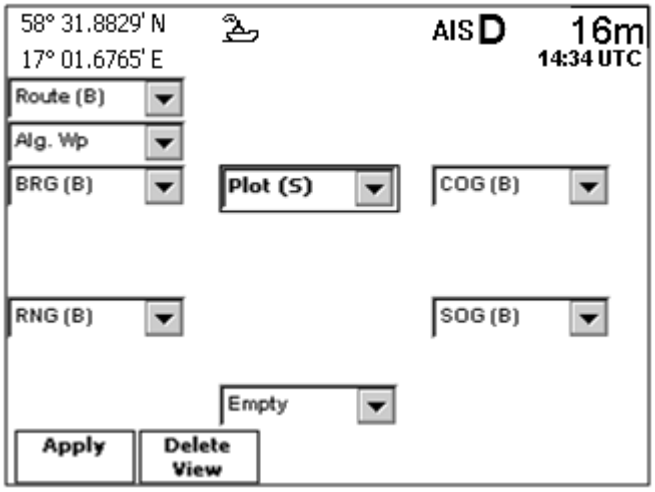


Figure 90 - Create user defined view (example)

5. Press function key ***Apply*** to view the result. In this example it may look like this:

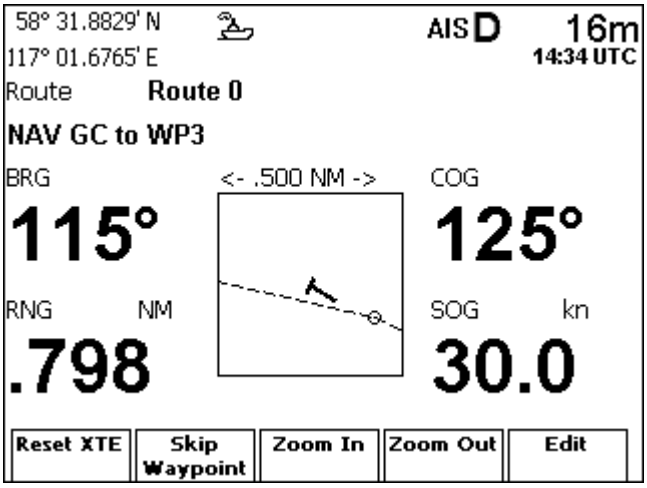


Figure 91 - User Defined view (example)

6. If necessary, press function key ***Edit*** and repeat the procedure from paragraph 2 to 5 above to include any changes. When satisfied press ***Esc*** to return to the User Defined Views view.

In addition to **Edit**, User defined views will always include the function keys **Reset XTE** and **Skip Waypoint**. These have the same functionality as in the *Nav* view described in section 4.8.4 on page 70. Additional function keys may be added depending on the selected items to display (e.g zoom keys for plots).

View or edit a user defined view

1. In the User Defined Views view, press function key ***User View #*** where # is a number 1 to 5 depending on the view.
2. If required, press function key ***Edit***.
3. Edit the contents of the view. Press function key ***Apply*** when satisfied.

In addition to ***Edit***, User defined views will always include the function keys ***Reset XTE*** and ***Skip Waypoint***. These have the same functionality as in the Nav view described in section 4.8.4 on page 70. Additional function keys may be added depending on the selected items to display (e.g. zoom keys for plots).

Create default user defined views

1. In the User Defined Views view, press function key ***Create Defaults***.
2. Creation of default views will remove any existing user defined views so use with caution. A warning will be displayed with request for confirmation. Press ***ENTER*** to confirm.

Delete a user defined view

1. In the User Defined View to be deleted, press function key ***Edit***.
2. Press function key ***Delete View***. A warning will be displayed.
3. Press ***ENTER*** to confirm and delete the view.

4.8.8 Own Ship Data

The *Own Ship Data* view shows your ships own data, which is transmitted to other vessels. The upper part of the view always displays the most central information being MMSI, call sign and position. The lower part of the view consists of three different pages which can be toggled by pressing the function key **Show Next** one or more times. See illustrations below.

Figure 92 – Own Ship Static Data

Figure 93 – Own Ship Static Data, page 2

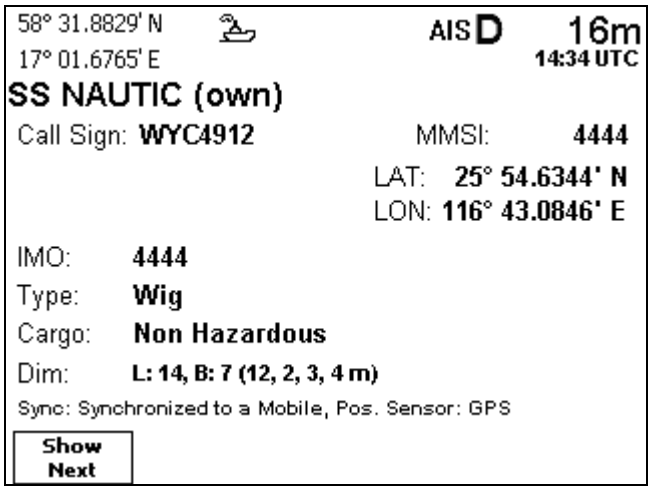


Figure 94 – Own Ship Static Data, page 3

4.8.9 Trip Logs

The Trip Logs view shows a status summary of the three trip logs in the system. Two individual trip logs (#1 and #2) are available as well as a 'total' trip log.

The trip logs accumulate travelled distance during the on time of the navigation system. Trip logs #1 and #2 are individually resettable and will also provide accumulated time moving and average speed since last reset.

To access the Trip Logs view, go to the top level in Navigate mode. Press Page if necessary to bring up the second page of function keys and press Trip Logs. The Trip Logs view displays accumulated distance and average speeds as illustrated below.

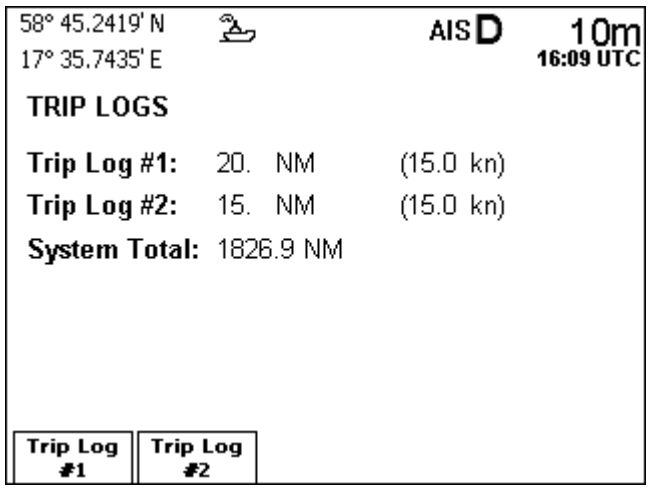


Figure 95 - Trip Logs view

View trip log details

1. Press function key ***Trip Log #1*** or ***Trip Log #2*** to access the corresponding Trip Log view. This view is further described below.

4.8.9.1 Trip Log Details

The details of the two user resettable trip logs are displayed in the Trip Log #1 and Trip Log #2 views as illustrated below.

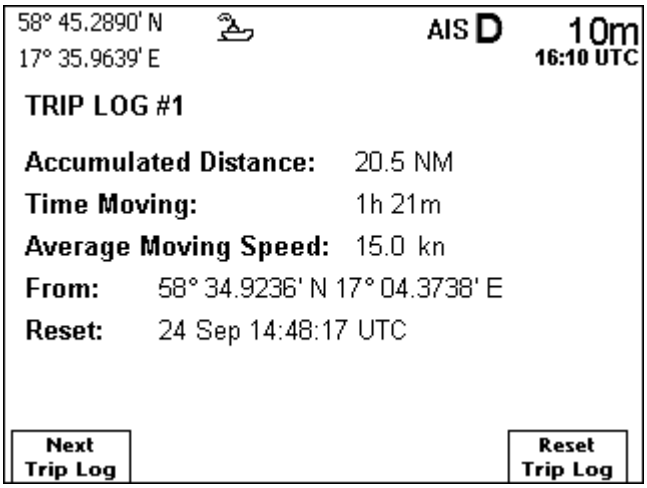


Figure 96 - Trip Log #1

Accumulated distance since last reset, average speed during the time the system has been in motion as well as position and time of last reset is displayed.

Reset trip log

1. Press function key ***Reset Trip Log***. A warning will be displayed with request for confirmation.
2. Press ***ENTER*** to confirm and reset the trip log.

If a valid GPS position is available, it will be captured and used as the starting position for the trip log. If no valid position is available, position will be captured the next time a valid position is available.

Note: Position displacement that occur when the display is switched off will not be included in the accumulated trip distance. Position displacement that occur when the display is switched on but no valid GPS position is available will be included in the trip distance when a valid position is received, provided that a valid position has been available at least some time after the display was switched on.

Toggle between trip log #1 and #2

1. Press function key ***Next Trip Log***.

4.8.10 Anchor Watch

The Anchor Watch view provides functionality for activation of an alarm when the displacement from a reference position exceeds a certain limit.

Note: In order for an external or audible anchor watch alarm to be generated, the anchor watch alarm must be enabled as described in section 4.11.6 on page 157 of this manual.

To access the Anchor Watch view, go to the top level in Navigate mode. Press ***PAGE*** if necessary to bring up the second page of function keys and press ***Anchor Watch***. The Anchor Watch view will be displayed.

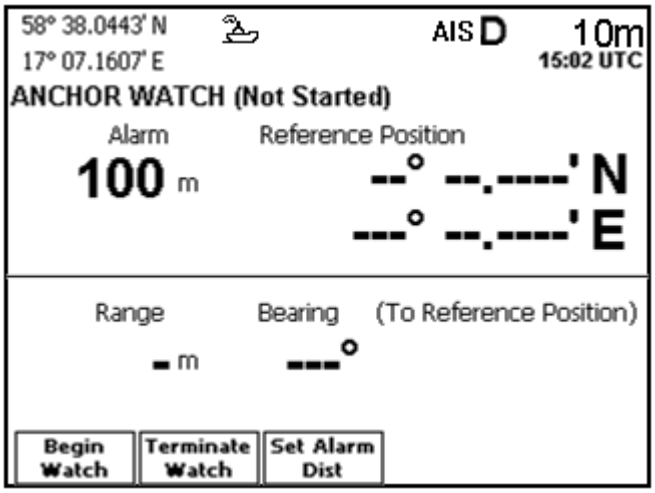


Figure 97 - Anchor Watch view

Setting the Anchor Watch alarm distance

1. Press function key ***Set Alarm Dist***. The following view is displayed.

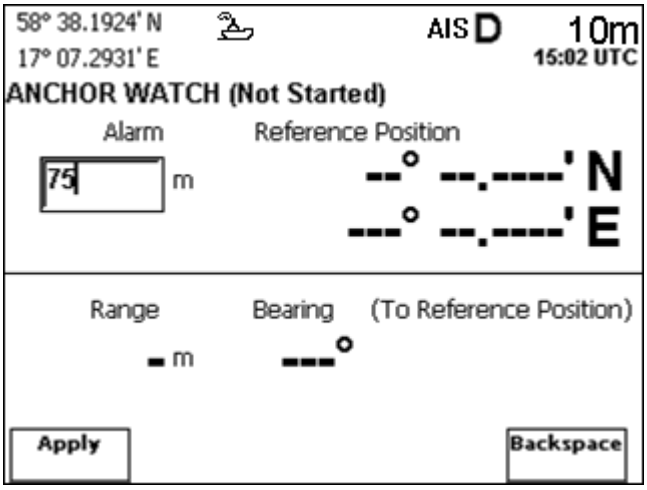


Figure 98 - Anchor Watch alarm distance

2. Press ***ESC*** and edit the Alarm value with the aid of function key ***Backspace***, <> and the numerical keys.
3. When finished press function key ***Apply***.

Note: The acceptable alarm distance must be within 1 to 1500 meters. The unit used for definition of the anchor watch alarm limit as well as for display of the current range to the reference position is configurable, as described in section 4.11.7 “Units Config” on page 158 of this manual.

Activating Anchor Watch

1. Press function key ***Begin Watch***. The current position at the time will be captured as a reference position. The distance to the reference position will be calculated and compared to the alarm limit on a regular basis. The bearing and range from current position to reference position is displayed as illustrated below.

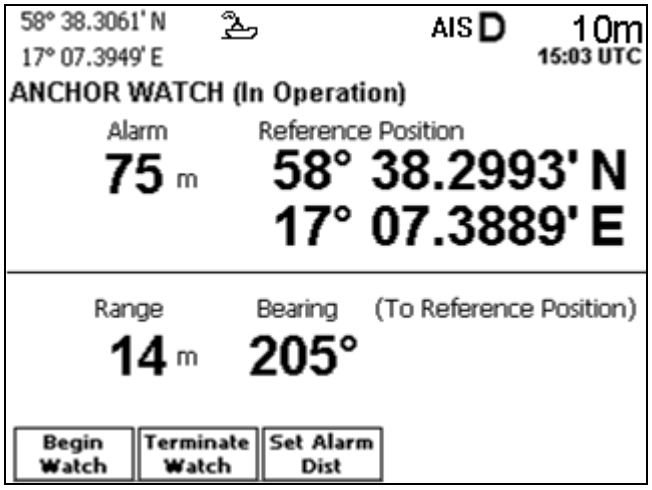


Figure 99 - Anchor Watch activated

If the calculated range exceeds the alarm distance, the anchor watch alarm will be activated. This is shown in the Anchor Watch view by an inverted color scheme of the range parameter. Further actions caused by the activation is pending on the current setting of the alarm configuration parameter as described in section 4.11.6 on page 157 of this manual.

Note: If the range subsequently falls below the alarm limit the anchor watch alarm condition will be deactivated. It will re-activate any time the range exceeds the alarm limit again.

Terminating Anchor Watch

1. Press function key ***Terminate Watch***. A warning will be displayed with request for a confirmation.
2. Press ***ENTER*** to terminate the Anchor Watch.

4.8.11 Route List

The ***Route List*** function key at the top level in Navigate mode provides a short-cut to the Route List view in Plan Voyage mode. It is further described in section 4.9.3 “Route List” on page 94 of this manual.

4.9 Plan Voyage Mode

The Plan Voyage mode contains views for voyage planning, viewing and creating way-points and routes, and starting to sail a route. To get to the Plan Voyage views, press ***MODE*** followed by function key ***PLAN VOYAGE***. Press ***ESC*** one or a few times anywhere in the mode for access of top level function keys.

4.9.1 Plan Voyage Mode Overview

The top level function keys of the mode are illustrated below.

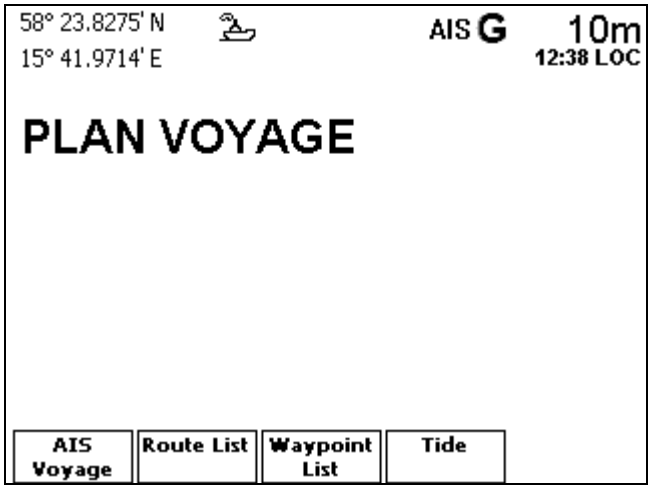


Figure 100 - Plan Voyage Mode

- *AIS Voyage* is used to view and set information about the current voyage
- *Route List* is used to view, create, modify and delete routes, as well as sail directly to a location and sail an existing route.
- *Waypoint List* is used to view, create, modify and delete waypoints.
- *Tide* is used to view, create and modify tidal data.

Below is a graphical overview of the different views present in Plan Voyage mode.

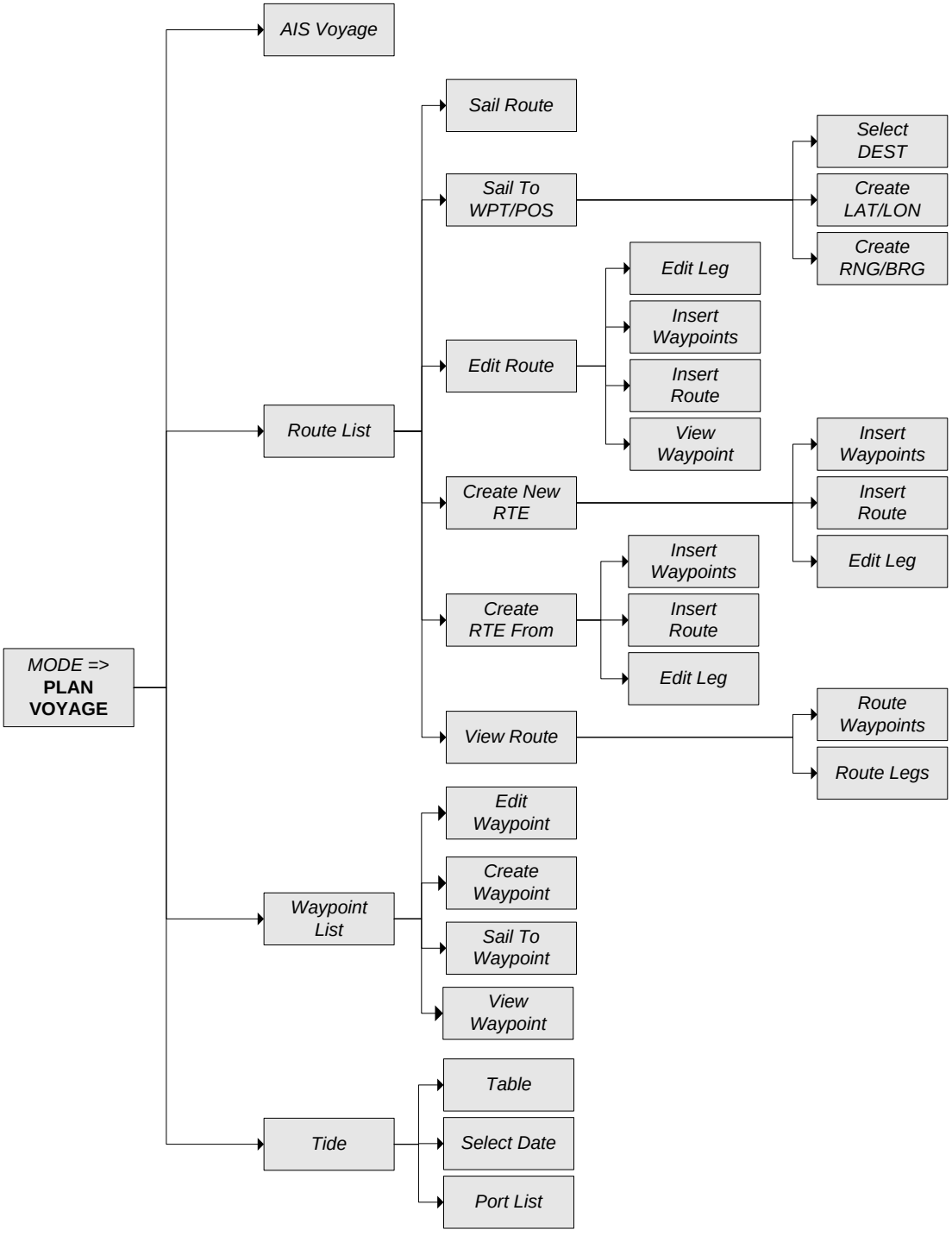


Figure 101 - Plan Voyage Mode Overview

The views are further described below.

4.9.2 AIS Voyage

The *AIS Voyage Settings* view is used to view and edit voyage related data such as navigational status, estimated time of arrival (ETA), draught, number of people aboard, destination and cargo. These settings are used when transmitting information about the current voyage to remote ships. The *Cargo* parameter is only present when ship type is one of Wig, High-Speed Craft, Passenger Ship, Cargo Ship, Tanker or Ship Type Other. The ship type is set in the *Ship Static Configuration* view described on page 148.

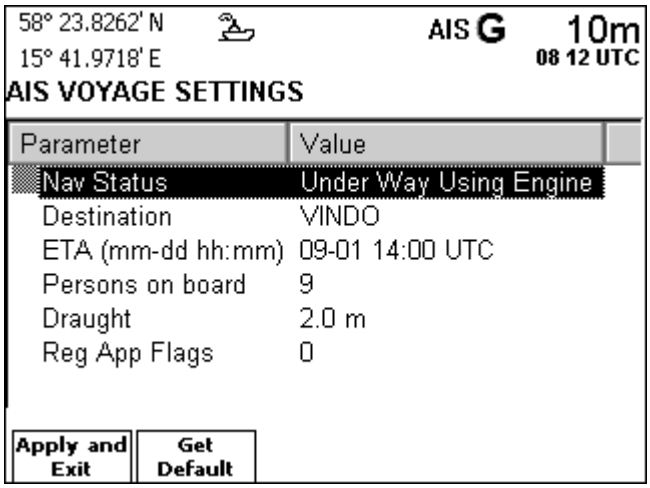


Figure 102 – AIS Voyage Settings

Change settings

1. Select parameter to change using ∧ ∨ and press ***ENTER***.
2. Enter the desired value using the alphanumeric keypad or if it is a drop down list, select a value using ∧ ∨. Use function key **Backspace** to erase data where applicable. Press ***ENTER*** when done.
3. Repeat step 2 and 3 for each setting to change.
4. Press function key **Apply and Exit** when done.

Reg. app. flag is intended for use in regional applications only and should be set to zero (0) in other applications. Definitions of values 1 to 15 shall be provided by a competent regional authority if used.

A special function called “1 W mode” is made available when ship type is defined as a tanker (in the *Ship Static Configuration* view described on page 50) and navigational status is “Moored”. This mode is automatically disabled whenever any of these conditions no longer applies and also at speeds exceeding 3 knots. While enabled, ‘1W mode’ operation can be manually controlled by a setting in the *AIS Voyage Settings* view and also by a function key in the *Navigational Status* view. A ‘1 W’ icon is displayed in the Status Bar while this mode is active. For further information about the “1 W mode” see International Safety Guide for Oil Tankers & Terminals (ISGOTT).

4.9.3 Route List

All stored routes are edited and controlled in the Route List view and its subviews. This excludes the active route, which is the route that currently is being sailed and handled completely separate in the Active Route view, described on page 74.

The *Route List* view presents the routes currently stored in the system, and provides subviews to view and edit a route as well as create a new route. The *Route List* view also contains functionality to delete routes and find a route by name.

The view contains two pages of function keys as shown below.

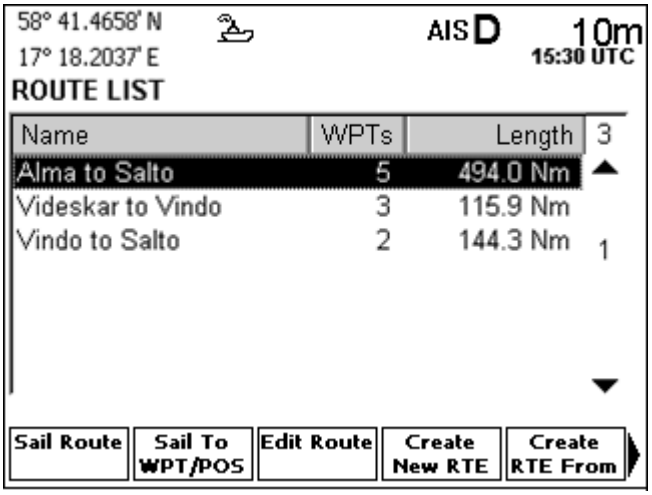


Figure 103 - Route List view

The second page of function keys is accessed by pressing the ***PAGE*** key.

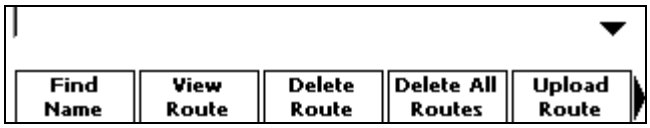


Figure 104 - Second page of function keys

The name, number of waypoints and length of each route is displayed in the view. The unit of length is user configurable, see section 4.11.7 “Units Config” on page 158.

Hint: Use < > to jump between pages of routes in the list.

Sail a route

1. Highlight the route to sail using ∧ ∨.
2. Press function key ***Sail Route***. This brings up the Sail Route view, described on page 96. Press function key ***Sail Forward*** or ***Sail Reverse*** to sail the route.

Sail directly to a specific location

1. Press function key ***Sail To WPT/POS***.
2. The Sail To view is displayed. See “Sail To” on page 97.

Edit a route

1. Highlight the route to edit using ∧ ∨.
2. Press function key ***Edit Route***.
3. The Edit Route view is displayed. See page 99.

Create a new route

1. Press function key ***Create New Rte***.
2. The Create Route view is displayed. See “Create Route” on page 103.

Create a new route from an existing route

1. Highlight the route to use as a base for the new route in the list using ∧ ∨.
2. Press the function key ***Create Rte From***.
3. The Create Route view is displayed. The new route is initially identical to the highlighted route, except that it has a default name. See “Create Route” on page 103.

Find a route by name

1. Press function key ***Find Name***.
2. Use the alphanumeric keypad to enter a (part of) a name. Use the ***Backspace*** function key to erase characters. Press ***ENTER*** when done.
3. The route with the closest matching name is highlighted in the list.

View a route

1. Highlight the route to view using ∧ ∨.
2. Press ***ENTER*** or function key ***View Route***.
3. The View Route view is displayed. See “View Route” on page 104.

Delete a route

1. Highlight the desired route using ∧ ∨.
2. Press function key ***Delete Route***.
3. If confident in deleting the route, use < > to select Yes to the confirmation message. Press ***ENTER***.

Delete all routes

1. Press function key ***Delete All Routes***.
2. If confident in deleting ALL routes, use < > to select Yes to the confirmation message. Press ***ENTER***.

Note: All routes will be permanently erased from the R4 Navigation System!

Upload route and associated waypoints from the R4 Navigation System to external system

1. Highlight the route to upload using ∧ ∨. Use the find function described above as aid in finding the correct route.
2. Press function key ***Upload Route***. The route and its waypoints will be transmitted to the external system.

Individual waypoints as well as the complete set of all waypoints can be uploaded from the Waypoint List view, as described on page 110. In order for a upload to occur, the output port connected to the external system must be configured with the appropriate NMEA messages enabled. See section 5.4.2 on page 187 in the Appendix chapter for more information on uploading waypoints and routes.

4.9.3.1 Sail Route

The Sail Route view shows details of a specific route, including name, length, legs and waypoints. It provides functionality for sailing the route in forward or reverse direction. Either the waypoints or the legs of the route are shown. Each waypoint is displayed together with its name and position, and for each leg the length and initial bearing of the leg is shown, as well as the algorithm used to calculate bearing in the leg. The navigation algorithm can be either G (Great Circle) or R (Rhumb Line). Any set RAIM accuracy level for the leg is also shown.

Note: The navigation algorithm used when sailing towards the first waypoint in a route or towards a single waypoint is determined by the Navigation Algorithm parameter set in the Nav Configuration view.

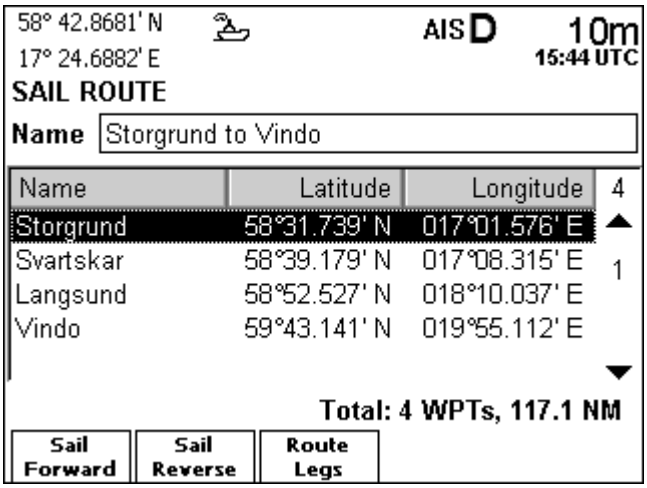


Figure 105 - Sail Route view

Hint: Use < > to jump between pages of waypoints in the list.

Sail the route

1. Press the function key ***Sail Forward*** to sail the route from the first waypoint to the last. Press the function key ***Sail Reverse*** to sail the route from last waypoint to the first.

Note: Valid position information is required to sail a route.

Show legs in route (when showing waypoints)

1. Press function key ***Route Legs***.

Show waypoints in route (when showing route legs)

1. Press function key ***Route Waypoints***.

4.9.3.2 Sail To

Pressing function key ***Sail To WPT/POS*** brings forth the Sail To view, which is used to sail from current position to a destination waypoint. Either an existing waypoint can be used, or a new destination waypoint created. The new waypoint can be created by either specifying latitude and longitude or by specifying a range and bearing from current position.

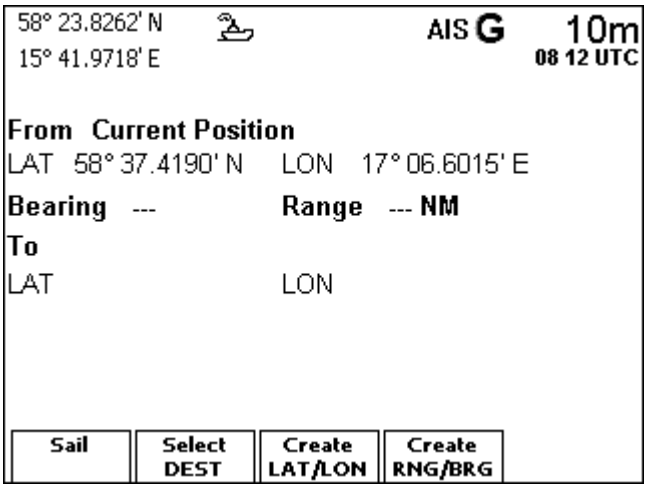


Figure 106 - Sail To view

Sail to an existing waypoint

1. Press function key **Select DEST**.
2. The Select Waypoint view is displayed. The view is described in section 4.9.4.1 “Select Waypoint” on page 105.

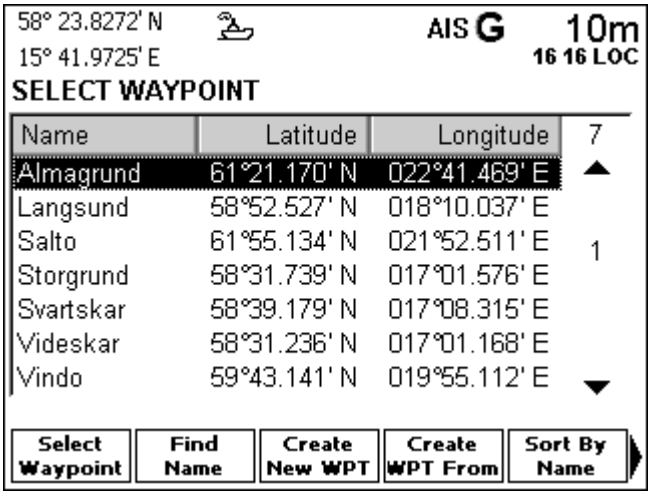


Figure 107 - Select Waypoint

3. Highlight the waypoint to sail to using ∧ ∨. Use the sort and find functions as aid in finding the correct waypoint.
4. Press function key ***Select Waypoint*** to select the highlighted waypoint as destination.
5. Press function key ***Sail*** to start sailing to the waypoint.

Sail to a new waypoint created by specifying latitude and longitude

1. Press function key ***Create Lat/Long***.
2. The Create Waypoint view is displayed.
3. Enter name and position as described in section 4.9.6.3 on page 116. Press function key ***Apply and Exit*** when done.
4. Press function key ***Sail*** to start sailing to the waypoint.

Sail to a new waypoint created by specifying range and bearing

1. Press function key ***Create Rng/Br***.
2. The following view is displayed.

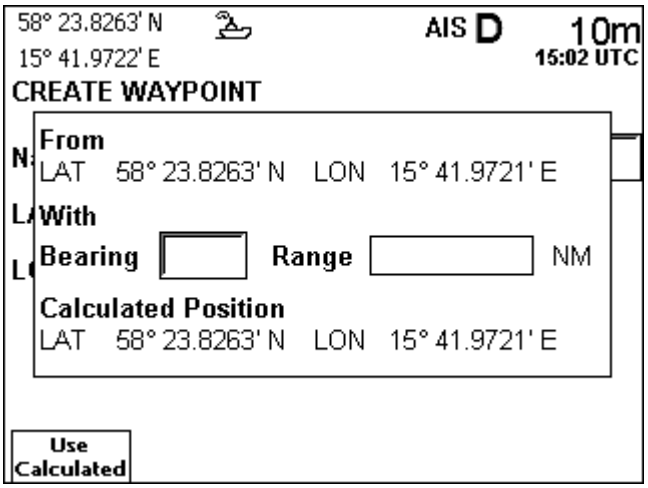


Figure 108 - Create Waypoint

3. Use < to select the Bearing field and press ***ENTER***.
4. Use the alphanumeric keypad to enter a bearing in degrees. Use the ***Backspace*** function key to erase digits. Press ***ENTER*** when done.
5. Use > to select the Range field and press ***ENTER***.
6. Use the alphanumeric keypad to enter a range. Use ***Backspace*** function key to erase digits. Press ***ENTER*** when done.
7. Press the function key ***Use Calculated*** to use the newly calculated position.
8. The Create Waypoint view is displayed. Set a suitable name and, if necessary, adjust the position values as described in section 4.9.6.2 “Edit Waypoint” on page 113.
9. Press function key ***Apply and Exit*** when done.
10. Press function key ***Sail*** to start sailing to the waypoint.

4.9.3.3 Edit Route

The *Edit Route* view enables the user to modify a route. It is possible to insert waypoints as well as existing routes into the route being edited. It is also possible to remove and edit waypoints and change the navigation algorithm and RAIM setting for each leg in the route. The route name can also be modified.

A waypoint or route inserted first or last in the route, results in the creation of a new leg from or to that waypoint. Such a leg will initially gain the following default settings:

- Navigation Algorithm will be set to the default navigation algorithm specified in the “Nav Config” view, described on page 145. The factory default setting is rhumb line.
- The RAIM Accuracy setting will be set to unchanged, meaning that starting to sail the leg does not modify the RAIM accuracy level.

A waypoint or route that is inserted in between two existing waypoints is however seen as splitting the original leg in two. Both the leg to and from the inserted waypoint or route will in this case have the same settings as the original leg had.

Press function key ***Apply and Exit*** when done editing the route.

The Edit Route view contains two pages of function keys as shown below.

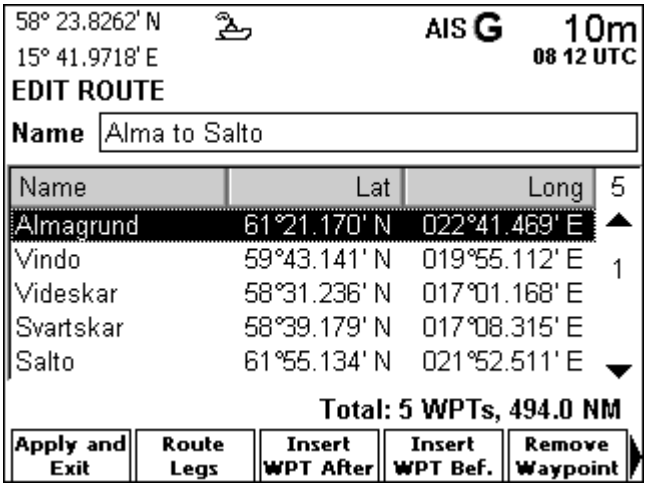


Figure 109 - Edit Route view

The second page of function keys is accessed by pressing the ***PAGE*** key.

Figure 110 - Second page of function keys

Hint: Use < > to jump between pages of waypoints in the list.

Note: When the route contains no waypoints, the function keys ***Insert Waypoints*** and ***Insert Route*** will be present instead of the ***Insert Wps After***, ***Insert Wps Bef***, ***Insert Route After*** and ***Insert Route Before*** function keys.

Change name of route

1. Select the Name field using ∧ ∨ and press ***ENTER***.
2. Use the alphanumeric keypad to enter name text, and the ***Backspace*** function key to erase characters. Use function key ***Capslock*** to change between upper and lower case letters.
3. Press ***ENTER*** when done.

Insert waypoints into the route

1. Use ∧ ∨ to highlight the position before or after the list position where waypoints should be inserted.
2. Press function key ***Insert Wps After*** or ***Insert Wps Bef***.
3. The Insert Waypoints view is displayed (described on page 107). Highlight the desired waypoint in the list using ∧ ∨, possibly with the aid of the different sorting and finding functions present in the view.
4. Press function key ***Insert Waypoint***. A small '1' will be appended in a box to the right of the waypoint in the list
5. If more waypoints are to be inserted immediately after the just inserted waypoint, highlight the next desired waypoint and press ***Insert Waypoint*** once again. A small '2' will be appended
6. Repeat the procedure of highlighting and inserting waypoints per above until all the desired waypoints have been selected for insertion at the specific position in the route.
7. Press function key ***Return*** in order to return to the Edit Route view.
8. Repeat the procedure from point 1 to point 7 above as many times as necessary to insert the desired waypoints into the route.

Change navigation algorithm for a leg in the route &

Change RAIM accuracy for a leg in the route

1. Show route legs, by pressing function key ***Route Legs***.
2. Select the leg to modify using ∧ ∨. Press ***ENTER*** or function key ***Edit Leg***.
3. The Edit Leg view is displayed. See below.

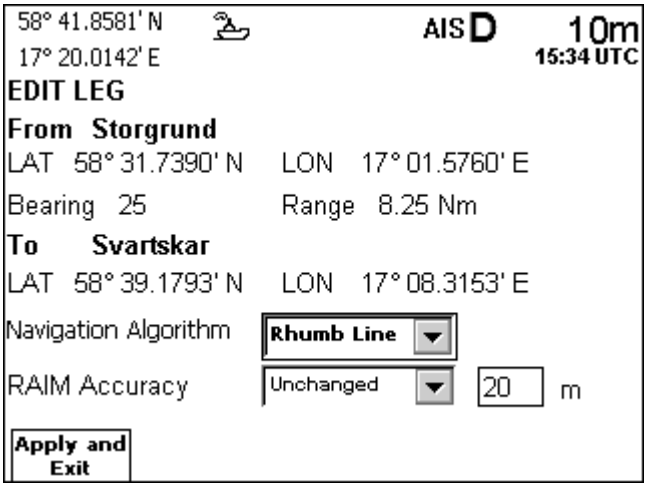


Figure 111 - Edit Leg view

4. To change the used navigation algorithm, select the Navigation Algorithm field using ∧ and press ***ENTER***. Use ∧ ∨ to highlight the desired algorithm, and press Enter when done.

5. To change the RAIM accuracy level for the leg, select the RAIM Accuracy field using ∨ and press ***ENTER***. Select the desired RAIM setting using ∧ ∨. Select unchanged to set the leg to not affect the RAIM level at all. Select level to specify a RAIM accuracy level to switch to when navigating on the leg. Press ***ENTER***.
6. If level was select above, then use > to bring focus to the right box that appeared when level was selected. Press ***ENTER*** and enter the RAIM accuracy level using the alphanumeric keypad. Use the ***Backspace*** function key to erase digits. Press ***ENTER*** when done.
7. Press function key ***Apply and Exit*** to save made changes.

Remove waypoint from the route

1. Highlight the waypoint using ∧ ∨.
2. Press function key ***Remove Waypoint***.

Replace waypoint in the route

1. Use ∧ ∨ to highlight the waypoint to replace.
2. Press the function key ***Replace Waypoint***.
3. The Select Waypoint view is displayed (described on page 105). Use ∧ ∨ to highlight the new waypoint to use, possibly with the aid of the different sorting and finding functions present in the view.
4. Press function key ***Select Waypoint***.

Note: The new waypoint will replace the old waypoint. All leg information will remain unchanged.

Insert existing route into the route being edited

1. Highlight the position before or after the position where the waypoints of the route should be inserted, using ∧ ∨.
2. Press function key ***Insert Rte After*** or ***Insert Rte Before***.
3. The Select Route view is displayed (described on page 109). Highlight the desired route in the list using ∧ ∨, possibly with the aid of the different sorting and finding functions present in the view.
4. Press function key ***Select Route***.

View or edit a waypoint

1. Highlight the waypoint to view or edit using ∧ ∨ and press ***ENTER*** or ***View Waypoint*** function key.
2. The View Waypoint view is displayed, as described on page 113.
3. If desired, press function key ***Edit Waypoint*** to edit the waypoint.
4. The Edit Waypoint view is displayed, as described on page 113.

Reverse the route

1. Press the ***Reverse Route*** function key.

4.9.3.4 Create Route

The Create Route view is used to create a new route. A default name is supplied, but should be changed to a descriptive name for the new route. The function keys present in the view are identical to those in the Edit Route view, described on page 99 and onwards.

Press function key ***Apply and Exit*** to create the route when done editing.

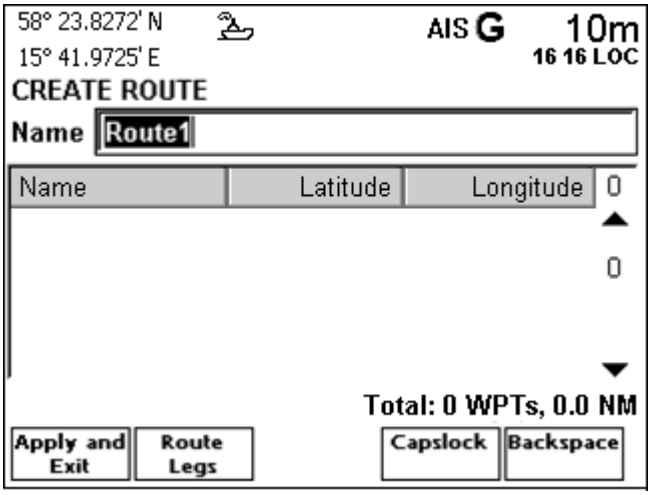


Figure 112 - Create Route view

Specify name of route

1. Select the Name field using ∧ ∨ and press ***ENTER***.
2. Use the alphanumeric keypad to enter name text, and the ***Backspace*** function key to erase characters. Use function key ***Capslock*** to change between upper and lower case letters.
3. Press ***ENTER*** when done.

Insert waypoints and edit leg information

1. Press ∨ to bring focus to the (initially empty) waypoint list. Use the function keys that appear to insert waypoints and edit leg information. The function keys are the same as for the Edit Route view, described on page 99 and onwards.

4.9.3.5 Create Route From

The Create Route view is displayed with information entered from the source route.

4.9.3.6 View Route

The *View Route* is similar to the *Sail Route* view described on page 96, as it shows the same details of the route. Either the waypoints or the legs of the route are shown. Each waypoint is displayed together with its name and position, and for each leg the length and initial bearing of the leg is shown, as well as the algorithm used to calculate course in the leg. The navigation algorithm can be either G (Great Circle) or R (Rhumb Line). Any set RAIM accuracy level for the leg is also shown.

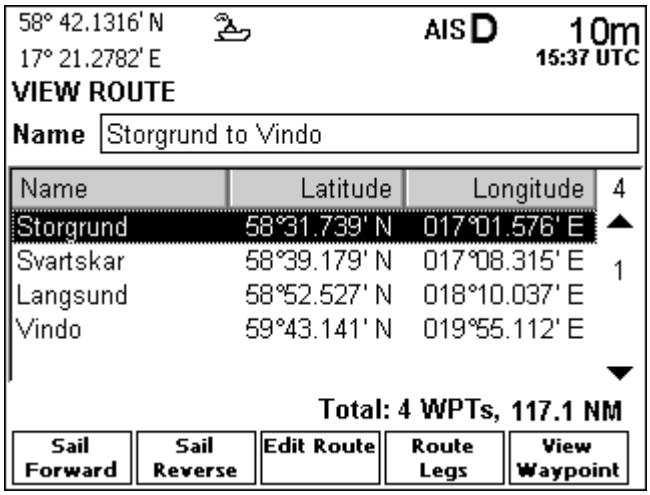


Figure 113 - View Route

Hint: Use < > to jump between pages of waypoints in the list.

Sail the route

1. Press the function key ***Sail Forward*** to sail the route from the first waypoint to the last. Press the function key ***Sail Reverse*** to sail the route from last waypoint to the first.

Note: Valid position information is required for starting to sail a route.

Edit the route

1. Press function key ***Edit Route***.
2. The Edit Route view is shown. See page 99.

Show legs in route (when showing waypoints)

1. Press function key ***Route Legs***.

Show waypoints in route (when showing route legs)

1. Press function key ***Route Waypoints***.

View waypoint details

1. Ensure that the list is showing waypoints. Press function key ***Route Waypoints*** if currently showing route legs.
2. Highlight the waypoint to view in the list using ∧ ∨ and press ***ENTER*** or function key ***View Waypoint***.
3. The View Waypoint view is displayed. See page 113.

View leg details

1. Ensure that the list is showing route legs. Press function key ***Route Legs*** if showing waypoints.
2. Highlight the leg to view in the list using ∧ ∨ and press ***ENTER*** or function key ***View Leg***.
3. The View Leg view is displayed, as illustrated below.

Figure 114 - View Leg

4.9.4 Route Related Views

This section describes views related to the subviews present in *Route List*.

4.9.4.1 Select Waypoint

The Select Waypoint view is used to select a specific waypoint, for example as a Sail To destination. It lists all existing waypoints, and it is possible to sort the list by different criteria and search for waypoints by name.

The view contains two pages of function keys, which can be toggled by pressing the ***PAGE*** key. The first page is shown below.

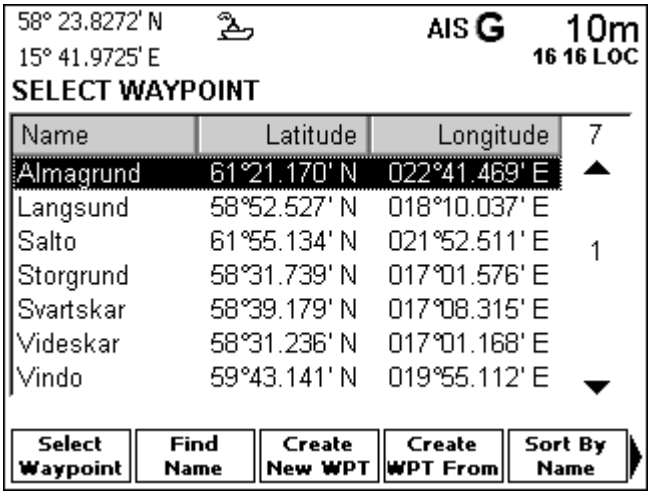


Figure 115 - Select Waypoint

The second page of function keys is shown below

Figure 116 - Second page of function keys

Hint: Use < > to jump between pages of waypoints in the list.

Select waypoint

1. Highlight the waypoint to select using ∧ ∨. Use the sort and find functions described below as aid in finding the correct waypoint.
2. Press function key ***Select Waypoint***.

View details of waypoint

1. Highlight the waypoint to view using ∧ ∨. Use the sort and find functions described below as aid in finding the correct waypoint.
2. Press ***ENTER***. The View Waypoint view, described on page 113, is shown.

Find waypoint by name

1. Press function key ***Find Name***.
2. Use the alphanumeric keypad to enter (part of) a name. Use ***Backspace*** to erase characters. Press ***ENTER*** when done.
3. The waypoint with the closest matching name is highlighted in the list.

Create a new waypoint

1. Press function key ***Create New WPT***.
2. The Create Waypoint view is displayed. See page 116.

Create a new waypoint from an already existing waypoint

1. Highlight the waypoint to use as base for the new waypoint using ∧ ∨. Use the sort and find functions described below as aid in finding the correct waypoint.
2. Press function key ***Create Wp From***.
3. The Create Waypoint view is displayed, with position values taken from the highlighted waypoint. See page 116.

Sort waypoints by name, distance or time last modified

1. Press function key **Sort By Name**, **Sort By Distance** or **Sort By Time** depending on desired sorting criteria.

4.9.4.2 Insert Waypoints

The Insert Waypoints view is used to select one or several specific waypoints for insertion into a route during creation or editing of routes. It is similar to the Select Waypoint view described in the previous section.

The view contains two pages of function keys, which can be toggled by pressing the ***PAGE*** key. The first page is shown below.

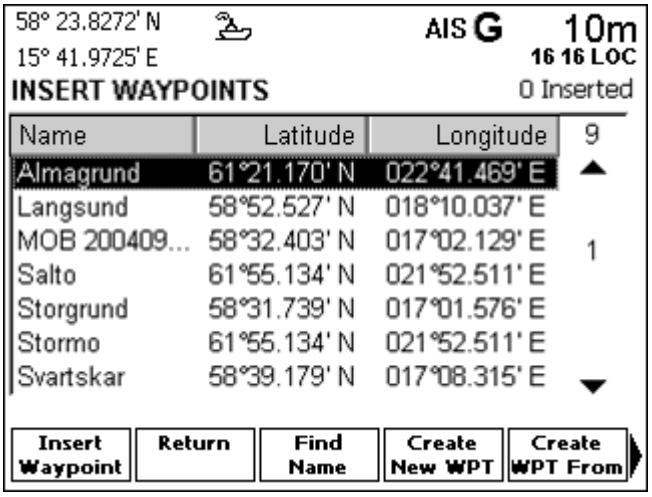


Figure 117 - Insert Waypoints

The second page of function keys is shown below.

Figure 118 - Second page of function keys

Hint: Use < > to jump between pages of waypoints in the list.

Insert waypoints

1. Highlight the first waypoint to insert using ∧ ∨. Use the available sort and find functions as aid in finding the correct waypoint.
2. Press function key ***Insert Waypoint*** to select the waypoint for insertion. A small '1' will be appended in a box to the right of the waypoint position.
3. Repeat the procedures of highlighting and inserting waypoints until all waypoints needed have been selected. Selected waypoints will be numbered in insertion order.

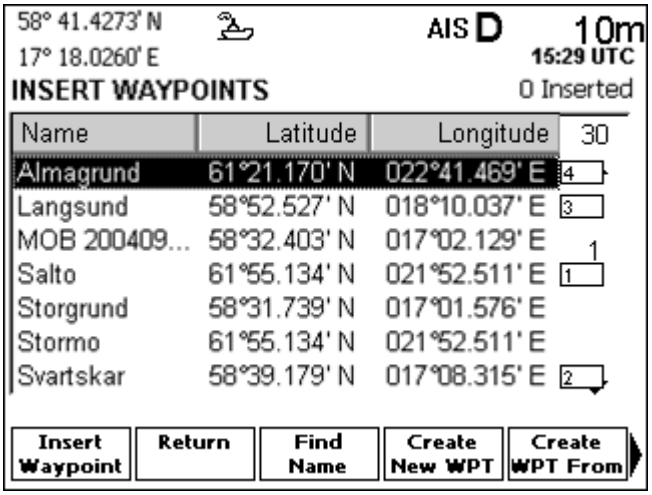


Figure 119 - Insert Waypoints

4. Press function key ***Return*** to insert the selected waypoints into the route.

Find, create, view and sort waypoints

These functions are identical to those described for the Select Waypoint view described in the previous chapter.

4.9.4.3 Select Route

The Select Route view is used to insert a route into a route under editing. It is accessed from the Create Route and Edit Route views.

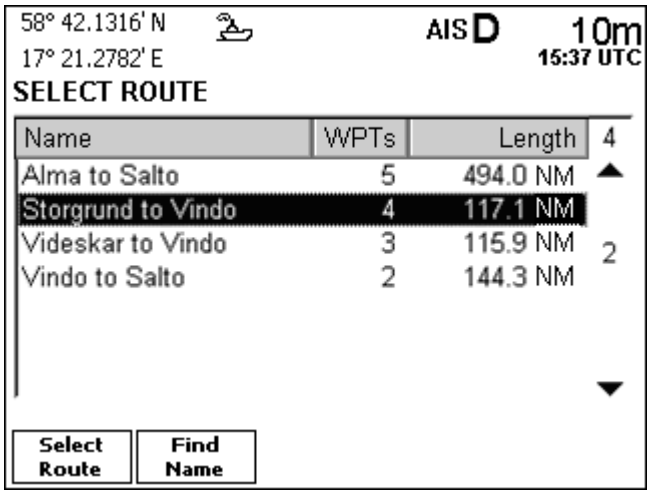


Figure 120 - Select Route view

The name, number of waypoints and length of each route is shown. Use < > to jump between pages in the list.

Insert highlighted route

1. Highlight the route to insert using ∧ ∨. Use find function described below as aid in finding the correct route.
2. Press function key ***Select Route***.

View a route

1. Highlight the route to view using ∧ ∨.
2. Press ***ENTER***. The View Route view is displayed. See section 4.9.3.6 “View Route” on page 104.
3. Press function key ***Select Route*** to insert the route being viewed.

Find a route by name

1. Press function key ***Find Name***.
2. Use the alphanumeric keypad to enter a (part of) a name. Use the ***Backspace*** function key to erase characters. Press ***ENTER*** when done.
3. The route with the closest matching name is highlighted in the list.

4.9.5 Waypoint List

The *Waypoint List* view and subviews provides functionality to view, create, modify and delete waypoints. The list of waypoints can be sorted by name, time last modified and distance, and the list can be search by specifying (part of) a waypoint name. Each waypoint is presented with its name and position.

Detailed information about each waypoint, including time of last modification, can be accessed in the *View Waypoint* subview. The *Edit Waypoint* and *Create Waypoint* subviews are used to edit and create waypoints, respectively.

The view contains three pages of function keys, which can be shown by pressing the ***PAGE*** key one or multiple times. The first page is shown below.

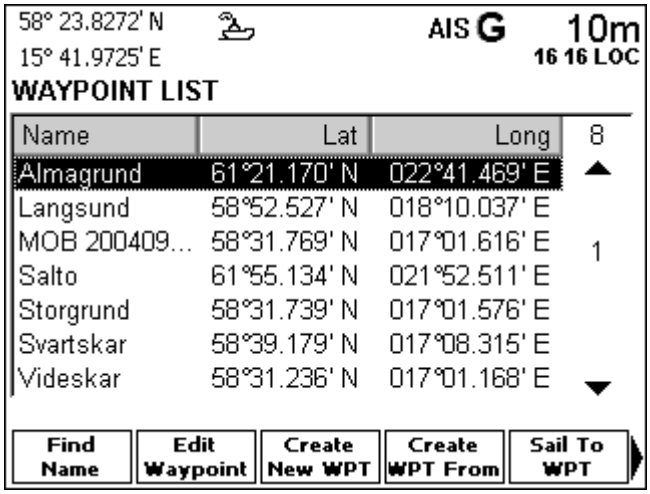


Figure 121 - Waypoint List

The second and third pages of function keys are shown below.

Figure 122 - Second page of function keys

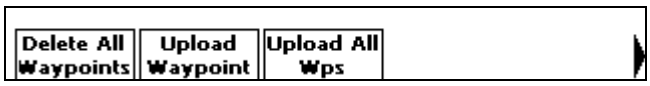


Figure 123 - Third page of function keys

Hint: Use < > to jump between pages of waypoints in the list.

Find waypoint by name

1. Press function key ***Find Name***.
2. Use the alphanumeric keypad to enter (part of) a name. Use ***Backspace*** to erase characters. Press ***ENTER*** when done.
3. The waypoint with the closest matching name is highlighted in the list.

Edit a waypoint

1. Select the waypoint to edit using ∧ ∨. Use the sort and find functions described below as aid in finding the correct waypoint.
2. Press function key ***Edit Waypoint***.
3. The Edit Waypoint view is displayed. See page 113.

Create a new waypoint

1. Press function key ***Create New WPT***.
2. The Create Waypoint view is displayed. See page 116.

Create a new waypoint from an already existing waypoint

1. Highlight the waypoint to use as base for the new waypoint in the list, using ∧ ∨. Use the sort and find functions described below as aid in finding the correct waypoint.
2. Press function key ***Create WPT From***.
3. The Create Waypoint view is displayed, with position values taken from the highlighted waypoint. See page 116.

Sail to a waypoint

1. Highlight the desired waypoint using ∧ ∨. Use the sort and find functions described below as aid in finding the correct waypoint.
2. Press function key ***Sail To WPT***.
3. Bearing and distance to the selected waypoint is displayed. Confirm by pressing function key ***Sail***.

Sort waypoints by name, distance or time last modified

1. Press function key ***Sort By Name***, ***Sort By Distance*** or ***Sort By Time*** depending on desired sorting criteria.

View waypoint

1. Select the waypoint to edit using ∧ ∨. Use the sort and find functions described below as aid in finding the correct waypoint.
2. Press ***ENTER*** or function key ***View Waypoint***.
3. The View Waypoint view is displayed. See page 113.

Delete a waypoint

1. Select the waypoint to edit using ∧ ∨. Use the sort and find functions described below as aid in finding the correct waypoint.
2. Press function key ***Delete Waypoint***.
3. Use < > to select ***Yes*** to the confirmation message and press ***ENTER***, if you are confident in deleting the waypoint.

Delete all waypoints

1. Press function key ***Delete All Waypoints***.
2. If confident in deleting ALL waypoints and routes, use < > to select ***Yes*** to the confirmation message. Press ***ENTER***.

Note: All waypoints and routes will be permanently erased from the R4 Navigation System !

Upload a waypoint from the R4 Navigation System to external system

1. Highlight the waypoint to upload using ∧ ∨. Use the sort and find functions described above as aid in finding the correct waypoint.
2. Press function key ***Upload Waypoint***. The waypoint will be transmitted to the external system

Upload all waypoints from the R4 Navigation System to external system

1. Press function key ***Upload All Wps***. All waypoints will be transmitted to the external system.

In order for a waypoint transfer to occur, the output port connected to the external system must be configured with the NMEA WPL message enabled. See section 5.4.2 on page 187, in the Appendix chapter for more information on uploading waypoints and routes.

4.9.6 Waypoint Related Views

This section describes views used for viewing, editing and creating waypoints. Most of these views can be accessed from the Waypoint List view, but also from other views.

4.9.6.1 View Waypoint

The view presents the full latitude and longitude values of a waypoint, its name as well as the time when the waypoint was last created or modified.

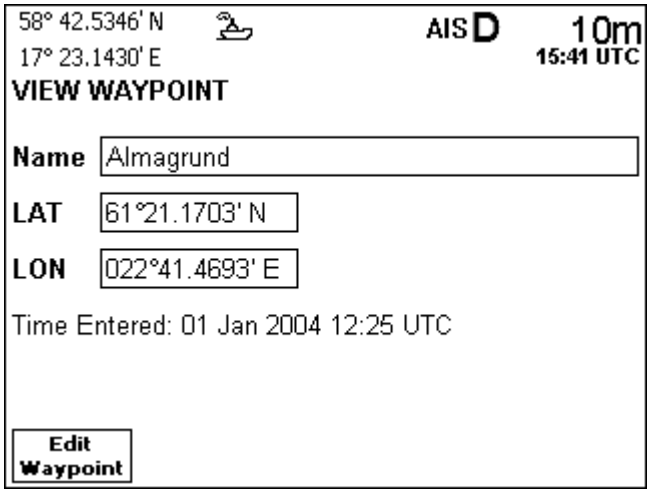


Figure 124 - View Waypoint

4.9.6.2 Edit Waypoint

The Edit Waypoint view is used to modify an existing waypoint. Both name and position can be changed. The position can be modified by:

- Manually specifying latitude and longitude.
- Taking latitude and longitude from current position.
- Specifying a bearing and a range to move the waypoint by.

If the edited waypoint is part of one or more existing routes, a warning dialog will be shown when entering the view (and also when saving changes), as illustrated below.

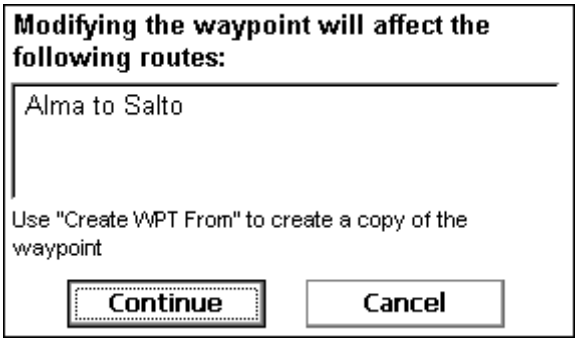


Figure 125 - Warning dialog

Press the function key ***Continue*** to edit the waypoint. Note that any changes made will affect all the routes that the waypoint is a part of. To leave the other routes unmodified, press ***Cancel*** and create and use a new waypoint instead. Tip: Use the ***Create WPT From*** function key present in the Waypoint List and Select Waypoint views.

The Edit Waypoint view is illustrated below.

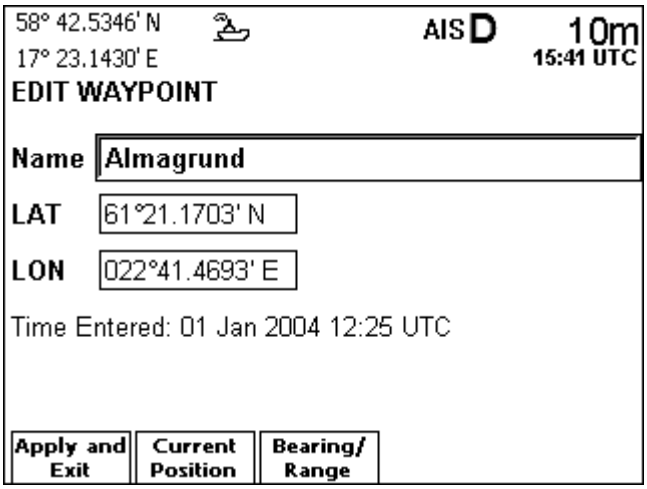


Figure 126 - Edit Waypoint view

The function key ***Apply and Exit*** is used to store changes made to the waypoint.

Change name of waypoint

1. Select the Name field using ∧. Press ***ENTER***.
2. Use the alphanumeric keypad to enter name text, and the ***Backspace*** function key to erase characters. Use function key ***Capslock*** to change between upper and lower case letters.
3. Press ***ENTER*** when done.

Modify latitude or longitude of waypoint

1. Select the LAT or LON field using ∧ ∨. Press ***ENTER***.
2. Use < > to select the digit to modify, and enter the new digit using the alphanumeric keypad.
3. Press ***ENTER*** when done.

Take waypoint position from current position

1. Press function key ***Current Position***.

Move waypoint by bearing and range

1. Press function key ***Bearing/Range***.
2. The following view is shown.

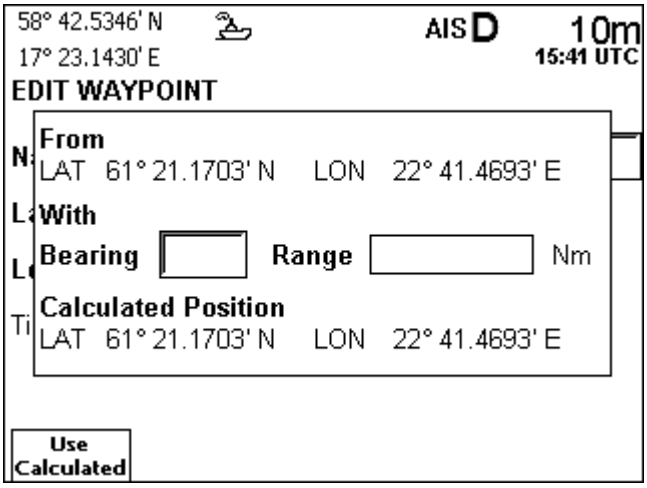


Figure 127 - Move waypoint by baring/range

3. Use < to select the Bearing field. Press ***ENTER***.
4. Use the alphanumeric keypad to enter the bearing in degrees. Use ***Backspace*** to erase digits. Press ***ENTER*** when done.
5. Use > to select the Range field. Press ***ENTER***.
6. Use the alphanumeric keypad to enter a range. Use ***Backspace*** to erase digits. Press ***ENTER*** when done.
7. Press the function key ***Use Calculated*** to use the newly calculated position.

4.9.6.3 Create Waypoint

The Create Waypoint view is used to create a new waypoint. The functions present in this view are the same as for the Edit Waypoint view. Refer to section 4.9.6.2 “Edit Waypoint” on page 113 for details.

This view can either be accessed by pressing the ***Create New WPT*** or ***Create WPT From*** function keys in the Waypoint List or Select Waypoint views. If accessed by pressing the ***Create New WPT*** function key, the position of the created waypoint is by default set to the current position. If accessed by pressing the ***Create WPT From*** function key, the position is set to the position of currently highlighted waypoint in the waypoint list.

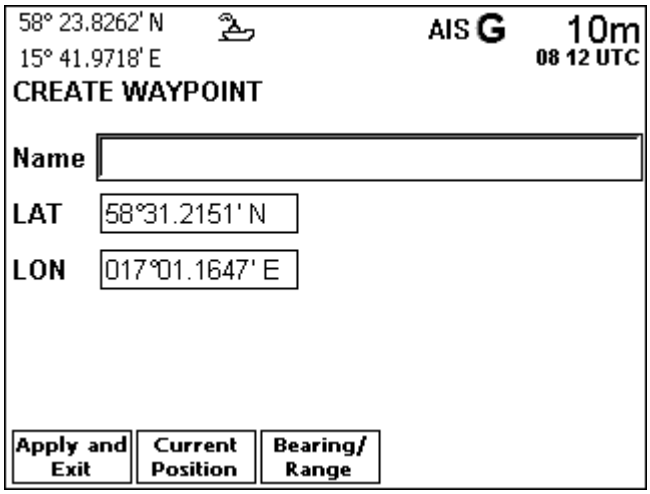


Figure 128 - Create Waypoint

Press function key ***Apply and Exit*** to complete creating the waypoint.

4.9.7 Tidal

The R4 Combined AIS & Navigation Display, sw version 5.1.2 and onwards, can be used for calculation of tidal predictions based on user input of data from the Admiralty Tide Tables published by the U.K Hydrographic Office.

The user is required to input data for the specific port and select the point in time for which the prediction is to be calculated.

The tidal prediction features in the R4 Combined AIS & Navigation Display are centered around three views; the Port List, Tide Plot and Tide Table views, available in the Plan Voyage mode.

Note that meteorological effects (e.g wind and barometric pressure) as well as other factors not accounted for in the generalized tidal models may cause significant deviation between actual and predicted tide.

4.9.7.1 Calculation Method and Source Data

The tidal predictions are calculated by the so called 'simplified harmonic method'. Harmonic constants and other parameters required are included in publications below. Note that the algorithms applied are specifically adapted for this data. Tidal parameters obtained from other sources shall not be used with the R4 Navigation Display tidal calculations.

Predictions calculated according to this method will not be fully consistent with the tabulated high/low and hourly predictions from the Admiralty tide tables. This is due to the fact that the tabulated values are based on a more extensive data set compared to the limited number of parameters used by the simplified harmonic method

The source data is split between volumes with different geographical coverage as follows:

U.K Hydrographic Office ADMIRALTY TIDE TABLES (ATT)

Volume 1 (NP 201):	United Kingdom and Ireland (including European channel ports)
Volume 2 (NP 202):	Europe (excluding United Kingdom and Ireland), Mediterranean Sea and Atlantic Ocean
Volume 3 (NP 203):	Indian Ocean and South China Sea
Volume 4 (NP 204):	Pacific Ocean

Optionally, for European ports, ATT Volume 1 and European part of Volume 2 can be substituted by:

TIDAL HARMONIC CONSTANTS, EUROPEAN WATERS (NP 160).

4.9.7.2 Input of Tidal Parameters

Tidal data for a new port is entered as follows:

1. Enter Plan Voyage mode by pressing the ***MODE*** key followed by function key ***Plan Voyage***.
2. Press the function key ***Tide***. The Tide Plot view is shown.
3. Press function key ***Select Location*** to enter the Port List view.
4. Press function key ***Add Port***
5. Input data for the tidal parameters from the relevant volume of ATT, part III. Press function key ***Apply and Exit*** when done in order to store the data in the port list.

The following data can be input for each port:

ID	Port No. from ATT part III.
Name	Place name from ATT part III.
Zone	UTC offset time zone (UTC time – Local Time) in hours and minutes from ATT part III. This information is important since ATT data is referenced to a local time in port with this offset from UTC. Enter this data as defined in ATT regardless of adjustments for other local time offsets (e.g daylight savings time). See further notes on treatment of time offset in sections below.
Position	Latitude & longitude of port. This is optional information that is not required for calculation of tide. If entered, the current distance to the actual port will be shown in the list of tidal stations. Position is not listed in ATT part III.
ML (Z0)	This is mean level in meters from ATT part III. For most stations this is a fixed value. Tables of seasonal corrections and fortnightly variations as required for some stations can be entered as described below.
ML Seasonal	Seasonal corrections to the mean level value as defined for some ports. If so, this parameter shall be set to 'Use Table' which will provide a new function key Edit Table. Use this key to access an editable list of values for each month and input the corrections listed in ATT part III.
ML Fortnightly	Fortnightly variations in mean level as defined for some ports. If so, this parameter shall be set to 'Use Table' which will provide a new function key Edit Table. Use this key to access an editable list of parameters to be entered from a supplementary table in ATT. When used, a lock icon will be displayed next to the ML(Z0) parameter in the list and the ML(Z0) value will be replaced by a 'W'. This indicates that the actual value used will be deduced from the fortnightly parameters.
M2(G)	Harmonic constant from ATT part III.
M2(H.m)	Harmonic constant from ATT part III. Fixed value used for most ports.
M2 Seasonal	Seasonal depending values of M2(H.m) as defined for some ports. If so, this parameter shall be set to 'Use Table' which will provide a new function key Edit Table. Use this key to access an editable list of values for each month and input values listed in ATT part III. When used, a lock icon will be displayed next to the M2(H.m) parameter in the list and the M2(H.m) value will be replaced by a 'v'. This indicates that the actual value used will be deduced from the seasonal table.
S2(G)	Harmonic constant from ATT part III.
S2(H.m)	Harmonic constant meters from ATT part III. Fixed value used for most ports.

S2 Seasonal	Seasonal depending values of S2(H.m) as defined for some ports. Function is equivalent to M2 as described above.
K1(G)	Harmonic constant from ATT part III.
K1(H.m)	Harmonic constant from ATT part III.
O1(G)	Harmonic constant from ATT part III.
O1(H.m)	Harmonic constant from ATT part III.
f4	Shallow water correction from ATT part III.
F4	Shallow water correction from ATT part III.
f6	Shallow water correction from ATT part III.
F6	Shallow water correction from ATT part III.

4.9.7.3 Tidal Predictions

Once port data has been entered, tidal predictions can be generated as follows:

1. Enter Plan Voyage mode by pressing the ***MODE*** key followed by function key ***Plan Voyage***.
2. Press the function key ***Tide***. The Tide Plot view is shown.
3. Press function key ***Select Location*** to enter the Port List view.
4. Use the arrow key pad to step through the list and select the port for which a prediction is to be generated. Press function key ***Use Port*** or ***ENTER*** in order to select it.
5. The Tide Plot view is shown with a graphical prediction for the current day or a previously selected date. In order to calculate predictions for another day use function key ***Select Date*** to access an almanac or use the arrow key pad to toggle up/down one day for each step.
6. By toggling the arrow key pad left/right a cursor will be moved along the plot. Time and height values for the cursor are displayed to the right of the plot area. It is also possible to step the cursor between local high and low points using function keys ***Set Prev H/L*** and ***Set Next H/L***.
7. While data for the current day is shown, a small diamond cursor will indicate the actual time. Value of current tide will also be displayed as 'Tide Now'
8. The function key ***Table*** will replace the graphical view with a table of local low and high points of the actual day. The maximum high and minimum low values for the actual day are displayed with bold characters. Up to eight values can be displayed in a table view. If there are more data points for a particular day, two views will be available that can be selected by the left/right arrow key pad. This is indicated by labels 1/2 or 2/2 together with a small arrow in the right bottom part of the view.

Typical examples of Tide Plot and Tide Table views are shown in the figures below:

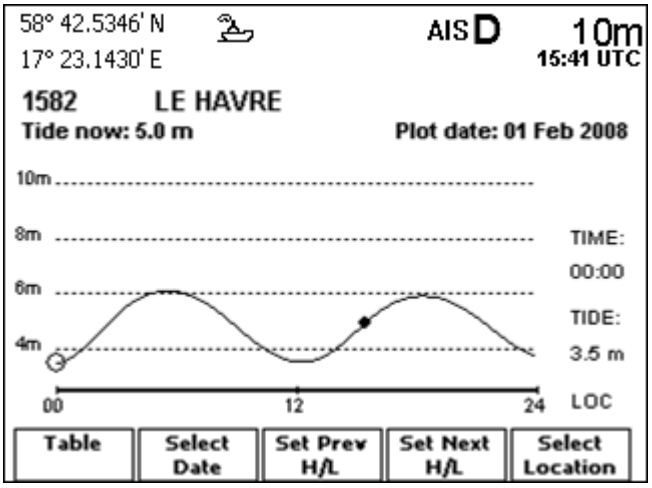


Figure 129 – Tide Plot view

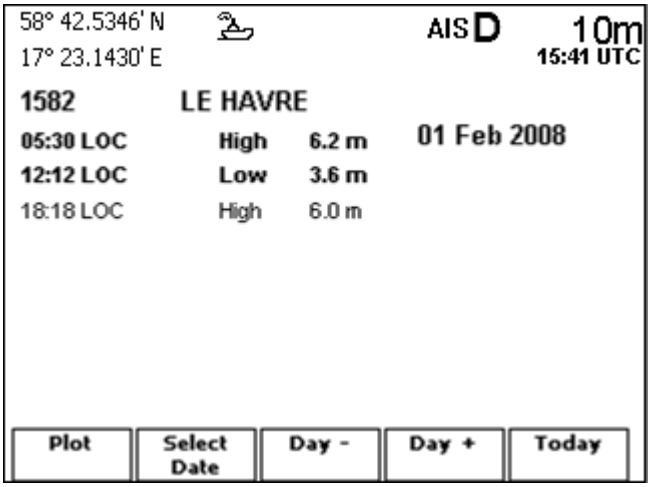


Figure 130 – Tide Table view

4.9.7.4 Units of Predicted Tide

Predicted tide can be displayed in meters, feet or fathom units as defined by the 'Depth Unit' configuration parameter. This parameter is accessed from the Units Configuration view in Configuration mode described in section 4.11.7.

4.9.7.5 Treatment of Local Time Frames

For each port, a ‘Zone’ parameter shall be entered as defined in ATT part III. This parameter defines the relationship of data published in ATT with respect to UTC.

When a tide prediction is generated, a graph will be displayed for 00 to 24 hours of a selected date. This time will be in UTC or with any user selectable local time offset as defined in the Time Configuration view. If UTC is used, times will be denoted ‘UTC’. If a local time frame is used, times will be denoted ‘LOC’. This is in analogy with how all times generally are treated by the display.

Thus, it is important to realize that a tide displayed in ‘LOC’ time not necessary is the local time in port defined by the ‘Zone’ parameter. If this is desired, the user must manually define a local time in the Time Configuration view that corresponds to the ‘Zone’ value for the actual port.

To make things more complicated, the ‘Zone’ parameter in ATT part III is defined as (UTC time – Local Time) and thus being negative when moving eastwards from Greenwich. On the other hand, the local time offset in the Time Configuration view is to be added to UTC and thus positive when moving eastwards. Thus, a negative ‘Zone’ value is equivalent to a positive offset of time configuration and vice versa.

Thus, in general: always enter ‘Zone’ for the port as indicated in ATT part III and select local time offset in Time Configuration view to obtain the desired local time frame for which the prediction is to be obtained.

Examples of ‘Zone’ setting and corresponding local time configuration are shown in the following two figures.

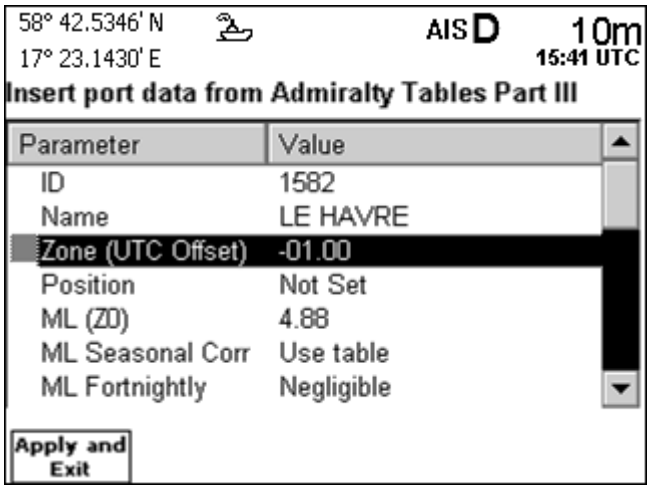


Figure 131 – Insert port data

Figure 132 – Local time settings

4.10 Alarms & Msgs Mode

The Alarms & Msgs mode is used to view the status of the R4 Navigation System. It contains views and functions for viewing current and past alarms, clearing the alarm log and reading DGPS messages. This mode also provides functionality for definition of time related scheduled alerts.

To reach Alarms & Msgs mode, press ***MODE*** followed by function key ***ALARMS & MSGS***. Press ***ESC*** one or a few times anywhere in the mode for access of top level function keys

4.10.1 Alarms & Msgs Mode Overview

The top level functions keys of the mode are illustrated below. Press ***ESC*** one or a few times anywhere in the mode to bring them up.

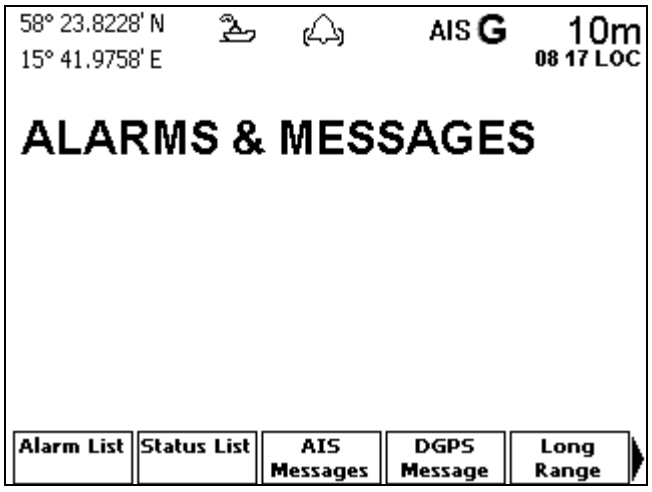


Figure 133 - Alarms & Messages view

- *Alarm List* indicates which alarms that are active in the system. It also contains logs for viewing past and present alarms.
- *Status List* provide current status of indications and the latest events.
- *AIS Messages* supports sending/receiving safety related messages (SRMs) and text messages.
- *DGPS Message* lists all received DGPS messages, and supports reading and deleting them. The view is only present when using a R4 DGPS Navigation Sensor.
- *Long Range* lists received long range (LR) interrogations and transmitted replies. It also supports manual replies to unacknowledged interrogations.
- *Scheduled Alerts* provides access to functions for definition and inspection of time related alerts.

Below is a graphical overview of the different views present in Alarms & Msgs mode.

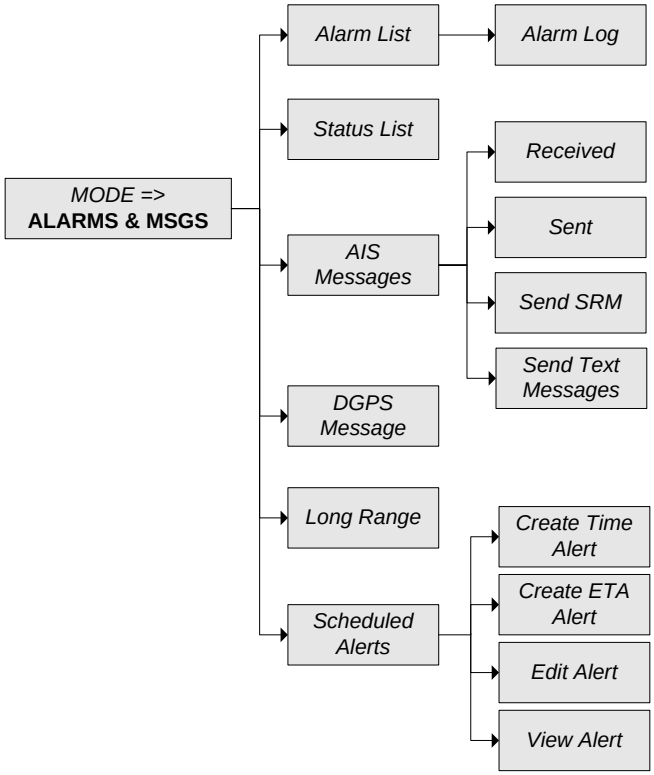


Figure 134 - Graphical overview

The views are further described below. The DGPS Message view is only present when using a R4 DGPS Navigation Sensor.

4.10.2 Alarm List

The Alarm List view lists current status of all alarms. Active alarms are presented in the top of the list and are marked with an exclamation mark (!). The view contains the Alarm Log subview which shows the log of all alarms that has been activated in the system. It is also possible to show only active alarms, both active and inactive alarms or disabled alarms by toggling the function keys **Show/Hide Inactive** and **Disabled/Enabled Alarms**. All alarms are described in section 5.1 “Alarm Messages” on page 180 in the Appendix. The Alarm List view is illustrated below.

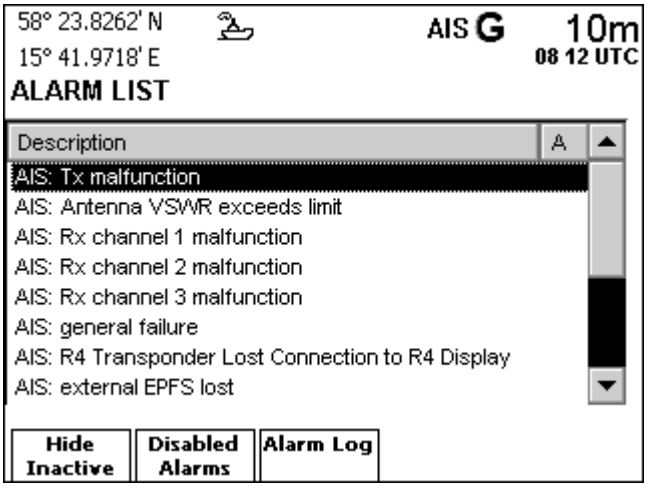


Figure 135 - Alarm List view

View the log of all alarms

1. Press function key ***Alarm Log***.
2. The following view is displayed. The view contains an entry for each time an alarm has been active, and shows the time of activation and deactivation (if the alarm has been deactivated).

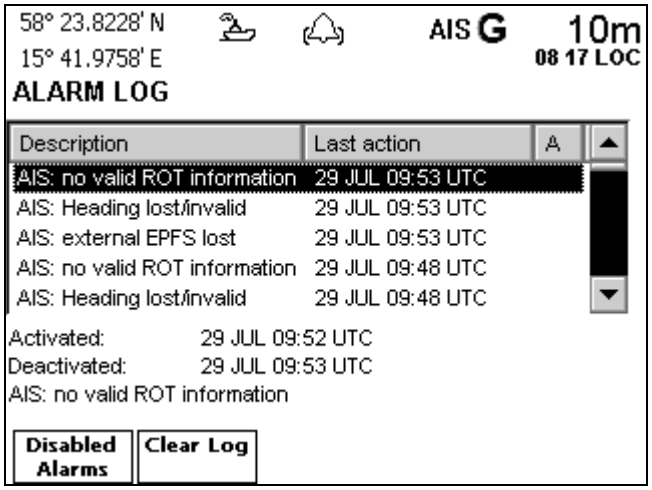


Figure 136 - Alarm Log

3. Press function key ESC to return to the main view.

Clear the alarm log

1. Press function key ***Alarm Log***. The above view is displayed.
2. Press function key ***Clear Log***. The alarm history will be erased.

4.10.3 Status List

The *Status List* view lists current status of indications and the latest events. The different status indications are listed in section 5.2 in the Appendix.

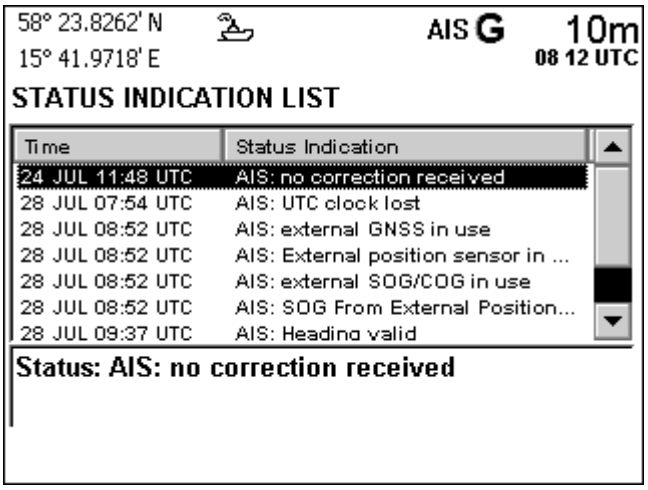


Figure 137 – Status Indication List

4.10.4 AIS Messages

The system supports transmission of safety related messages (SRMs) as well as text messages for undefined purposes over the AIS data link. Messages can be broadcast to all targets within range or addressed to a particular AIS target. Maximum length of each message is 156 characters for an addressed SRM and 161 characters for a broadcast SRM. For text messages, the maximum lengths are 151 and 156 characters respectively. An AIS Message Icon will be displayed in the status bar whenever a new SRM or text message has been received.

Note that Class B transponders are allowed to, but not required to, process SRMs and broadcast text messages. Thus it can not be expected that a message sent to a Class B target will be received. Addressed text messages are not processed by Class B transponders.

When sending an addressed message, a warning will be displayed if no acknowledge is received from the addressee. For text messages, it may be configured whether a warning also shall be provided if the message not has been interpreted by the receiving equipment. Refer to “AIS Display” on page 152.

The *AIS Messages* view contains the subviews *Received Messages, Sent Messages, Send SRM* and *Send Text Message.*

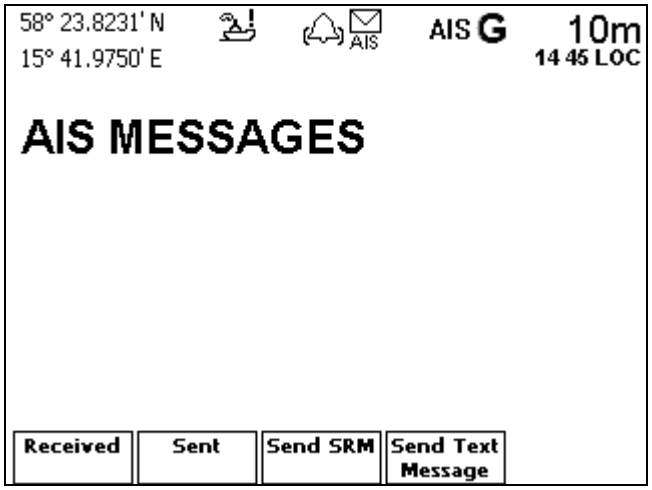


Figure 138 – AIS Messages

4.10.4.1 Received Messages

The *Received Messages* view allows the user to read, delete, reply or forward a received SRM or text message.

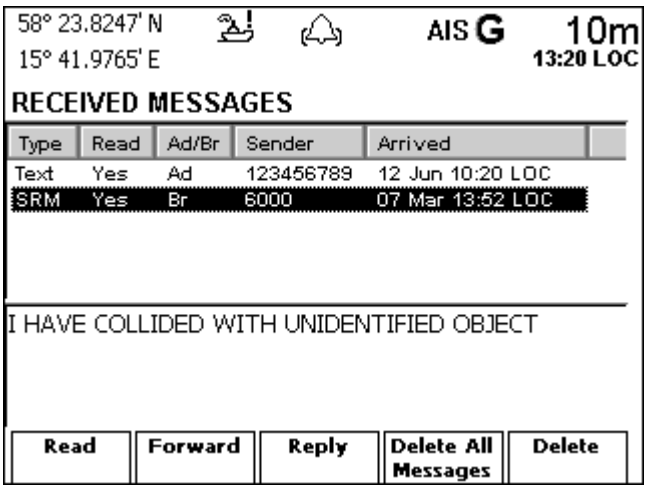


Figure 139 – Received Messages

Read a received SRM or text message

1. Select message from the list using ∧ ∨.
2. If necessary press function key **Read** to see the entire message.

Reply to a received SRM or text message

1. Select message from the list using ∧ ∨.
2. Press function key **Reply**.
3. Continue as described under “Send SRM” on page 129 or “Send Text Message” on page 131.

Forward a received SRM or text message

1. Select message from the list with ∧ ∨.
2. Press function key **Forward**.
3. Continue as described under “Send SRM” on page 129 or “Send Text Message” on page 131.

Delete a received SRM or text message

1. Select message from the list using ∧ ∨.
2. Press function key **Delete**

Delete all received SRMs and text messages

1. Press function key **Delete All Messages**
2. Acknowledge the displayed request for confirmation.

4.10.4.2 Sent Messages

Sent SRMs and text messages are stored and can be retrieved in the *Sent Messages* view. A sent message can also be used as source for a new message by selecting the desired message followed by the function key **Forward**. The selected sent messages text field is then copied into the new messages text field.

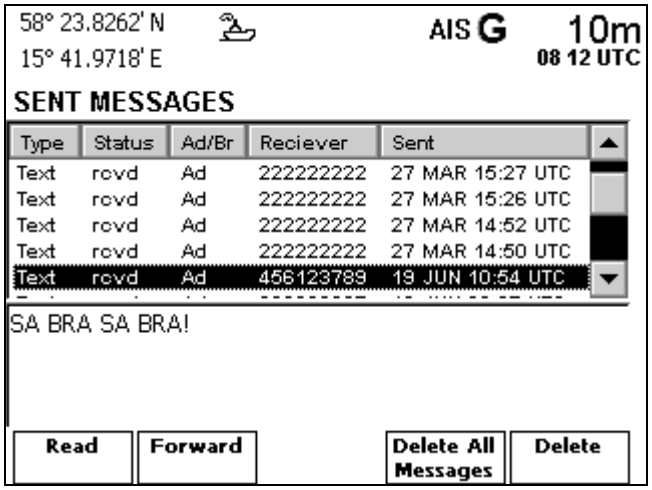


Figure 140 – Sent Messages

Send an SRM or text message based on a previously sent message

1. Select message from the list using ∧ ∨.
2. Press function key **Forward**.
3. Continue as described under “Send SRM” on page 129 or “Send Text Message” on page 131.

Delete a sent SRM or text message

1. Select message from the list using ∧ ∨.
2. Press function key **Delete**.

Delete all sent SRMs and text messages

1. Press function key **Delete All Messages**
2. Acknowledge the displayed request for confirmation.

4.10.4.3 Send SRM

The *Send SRM* view allows the user to create and send an addressed or broadcast SRM. The message text can be taken from a predefined list or entered manually. A manually entered text can be stored in the list of predefined SRM texts as a user predefined SRM.

A user predefined SRM can also be removed from the list. The factory predefined messages cannot be removed.

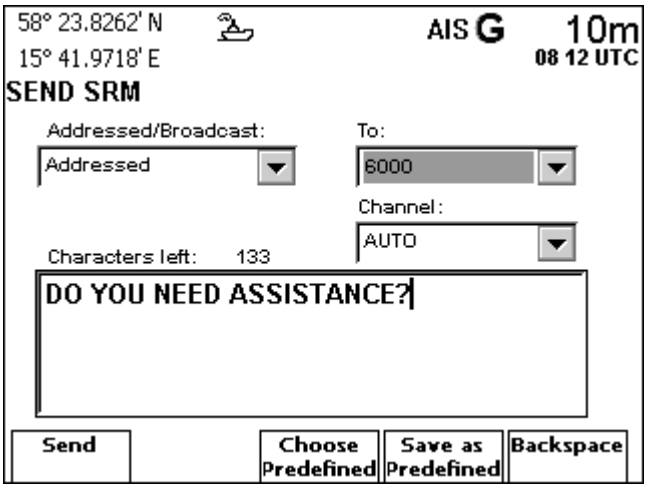


Figure 141 – Send SRM

Send a SRM with manually entered text

1. Enter message text using the alphanumeric keypad and press ***ENTER***. Use the **Backspace** function key to erase characters.
2. Select the **Addressed/Broadcast** field and press ***ENTER***.
3. Use ∧ ∨ to choose **Addressed** if you want to send the SRM to a specific target, and **Broadcast** if you want to send the SRM to all targets. Press ***ENTER*** when done.
4. If **Addressed** is selected: Press **>** to select the **To:** field and then press ***ENTER***. Type in the target address and press ***ENTER*** again. If you are sending a SRM from the *Target List* or *Plot* view, the target address is already filled in.
5. Select the **Channel** field and press ***ENTER***.
6. Select between **AUTO**, **A**, **B** or **A+B** with ∧ ∨ and press ***ENTER***.
7. Send the SRM by pressing function key **Send**.

Save as predefined SRM

1. Enter message text and select addressed/broadcast and channel, as described in the previous section.
2. Press the function key **Save as Predefined**.

Send a predefined SRM

1. Press function key **Choose Predefined**. The below view is shown.

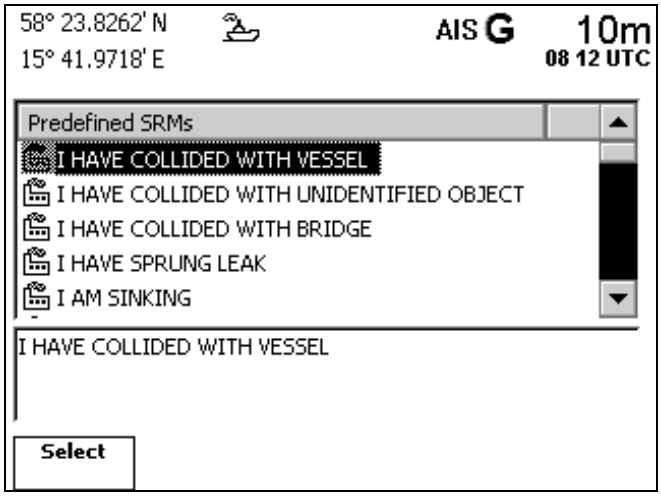


Figure 142 – Predefined Messages

2. Choose SRM text with ∧ ∨.
3. Press the function key **Select** or ***ENTER***.
4. The message field is now entered and the mesage can be sent as described for SRM with manually entered text above.

Delete a user predefined SRM

1. Press function key **Choose Predefined**.
2. Choose the user predefined SRM using ∧ ∨.
3. Press the function key **Delete**.

4.10.4.4 Send Text Message

The *Send Text Message* view allows the user to create and send an addressed or broadcast text message.

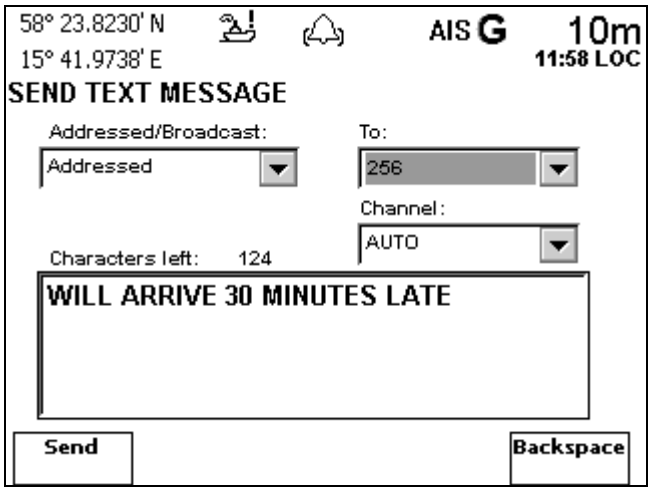


Figure 143 – Send Text Message

Send a text message with manually entered text

1. Enter message text using the alphanumeric keypad and press ***ENTER***. Use the **Backspace** function key to erase characters.
2. Select the **Addressed/Broadcast** field and press ***ENTER***.
3. Use ∧ ∨ to choose **Addressed** if you want to send the message to a specific target, and **Broadcast** if you want to send to all targets. Press ***ENTER*** when done.
4. If **Addressed** is selected: Press **>** to select the **To:** field and then press ***ENTER***. Type in the target address and press ***ENTER*** again. If you are sending a message from the *Target List* or *Plot* view, the target address is already filled in.
5. Select the **Channel** field and press ***ENTER***.
6. Select between **AUTO**, **A**, **B** or **A+B** with ∧ ∨ and press ***ENTER***.
7. Send the message by pressing function key **Send**.

4.10.5 DGPS Message

The DGPS Message view allows the user to read and delete received DGPS messages.

Note: The view is only present when using a R4 DGPS Navigation Sensor

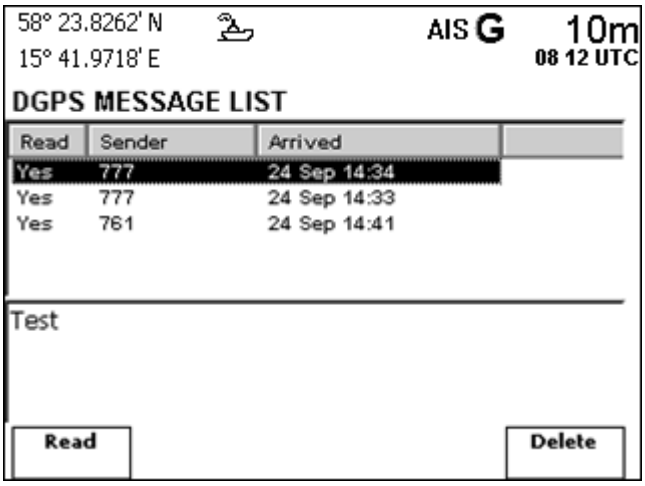


Figure 144 - DGPS Message view

Read a received DGPS Message

1. Highlight the message to read using ∧ ∨.
2. The message body is displayed in the lower region of the view. If necessary, press function key ***Read*** to see the entire message.

Delete a received DGPS Message

1. Highlight the message to delete using ∧ ∨.
2. Press function key ***Delete***.

4.10.6 Long Range Messages

Received long range (LR) interrogations and transmitted replies are displayed in the *Long Range* view. The user can delete LRs and manually send replies to LRs that have not been acknowledged. Below is a list of definitions for information that can be requested via long range.

A = Ship's name, call sign, and IMO number

B = Date and time of message composition

C = Position

E = Course over ground (COG)

F = Speed over ground (SOG)

I = Destination and Estimated Time of Arrival (ETA)

O = Draught

P = Ship/Cargo

U = Ship's length, breadth, type

W = Persons on board

Note that the reply mode for the R4 can be set up to automatically acknowledge, or to let the user manually acknowledge any LR interrogation. To change the LR reply mode, refer to the description of the *Long Range Configuration* view on page 154.

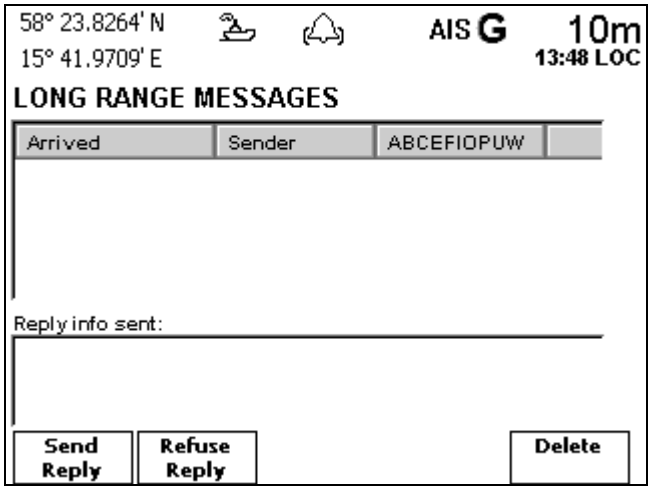


Figure 145 – Long Range Messages

Reply to a LR interrogation (only when current LR reply mode is set to manual)

1. Select LR message using ∧ ∨.
2. Press function key **Send Reply**.

Refuse to reply to a LR interrogation (only when current LR reply mode is set to manual)

1. Select LR message using ∧ ∨.
2. Press function key **Refuse Reply**.

Delete a LR interrogation/message

1. Select LR message using ∧ ∨.
2. Press function key **Delete**.

4.10.7 Scheduled Alerts

The Scheduled Alerts view allows the user to create and inspect alerts scheduled to activate alarms at certain points in time.

There are two types of alerts that may be scheduled. Time Alerts are activated at a specific time and may be reactivated at a certain time interval. ETA Alerts will be activated at a certain time prior to ETA of the current active route.

When a scheduled alert is activated, it is treated like any other type of alarm in the system. Thus, the user may decide if scheduled alerts should be disabled, provide warning messages on the display and/or generate external alarms. This is determined by settings in the Alarm Configuration view as described on page 157 of this manual.

The Scheduled Alerts view is illustrated below.

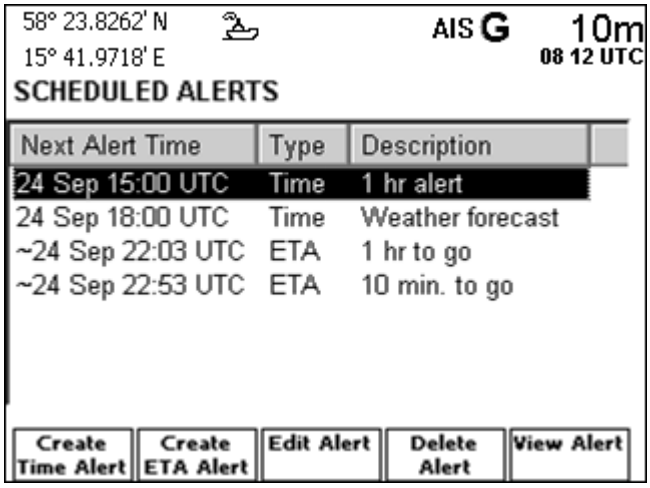


Figure 146 - Scheduled Alerts view

A list of the currently defined alerts is displayed together with the next (estimated) activation time for each alert.

Create Time Alert

1. Press function key ***Create Time Alert***.
2. The Create Time Alert view is displayed. See section 4.10.8.1.

Create ETA Alert

1. Press function key ***Create ETA Alert***.
2. The Create ETA Alert view is displayed. See section 4.10.8.2.

Edit Scheduled Alert

1. Highlight the alert to edit using ∧ ∨.
2. Press function key ***Edit Alert***.
3. The Edit Time Alert or Edit ETA Alert view is displayed. See section 4.10.8.4.

Delete Scheduled Alert

1. Highlight the alert to delete using ∧ ∨.
2. Press function key ***Delete Alert***.
3. A warning with request for confirmation is displayed. Press ***ENTER*** to delete the alert.

View Scheduled Alert

1. Highlight the alert to view using ∧ ∨.
2. Press ***ENTER*** or function key ***View Alert***.
3. The View Time Alert or View ETA Alert view is displayed. See section 4.10.8.6.

4.10.8 Scheduled Alert Related Views

This section describes views used for creating, editing and viewing scheduled alerts. These views are accessed from the Scheduled Alerts view.

4.10.8.1 Create Time Alert

The Create Time Alert view is used to create alerts that will be activated at specific times and repeated at certain time intervals. The view is illustrated below.

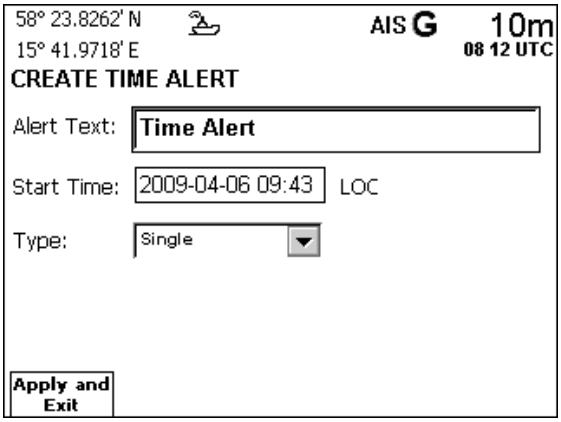


Figure 147 - Create Time Alert

The function key ***Apply and Exit*** is used to store the alert settings when done.

Define alert text

1. Select the Alert Text field using ∧ ∨, press ***ENTER***.
2. Use the alphanumeric keypad to enter text, and the ***Backspace*** function key to erase characters. Use function key ***Capslock*** to change between upper and lower case letters. The text will be displayed when the alert is activated.
3. Press ***ENTER***.

Define first activation time

1. Select the Start Time field using ∧ ∨, press ***ENTER***.
2. Use the alphanumeric keypad to enter date and time when the alert is to be activated for the first time.
3. Press ***ENTER***.

Note: Time is entered in UTC or local time depending on the current time configuration of the system. Internally however, the alert start time will be converted to UTC. Thus, the alarm will be activated at the same UTC time regardless if the local time offset has been changed.

Define alert type and repetition interval

1. Select the Type field using ∧ ∨, press ***ENTER***.
2. Select between Single (alert will be activated once) or Recurring (alert will be reactivated at a certain interval) using ∧ ∨, press ***ENTER***.
3. If Recurring was selected, new fields for input of the repetition interval will be displayed. Select the Hours field (if required) using ∧ ∨, press ***ENTER*** and enter the repetition interval in hours with the alphanumeric keypad.
4. Press ***ENTER***.
5. Press > and enter a value in the Minutes field if required.

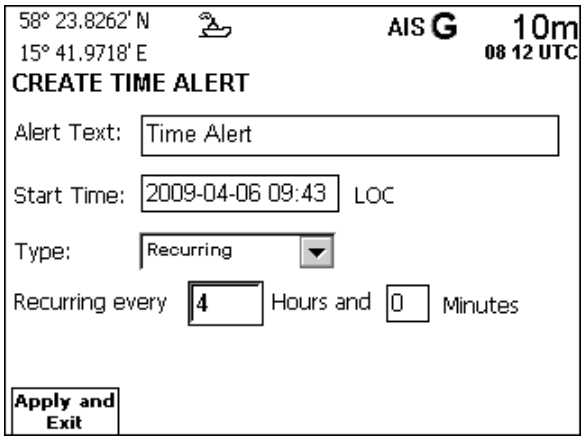


Figure 148 - Create Time Alert

4.10.8.2 Create ETA Alert

The Create ETA Alert view is used to create alerts that will be activated at a specific time prior to ETA of the active route. The view is illustrated below.

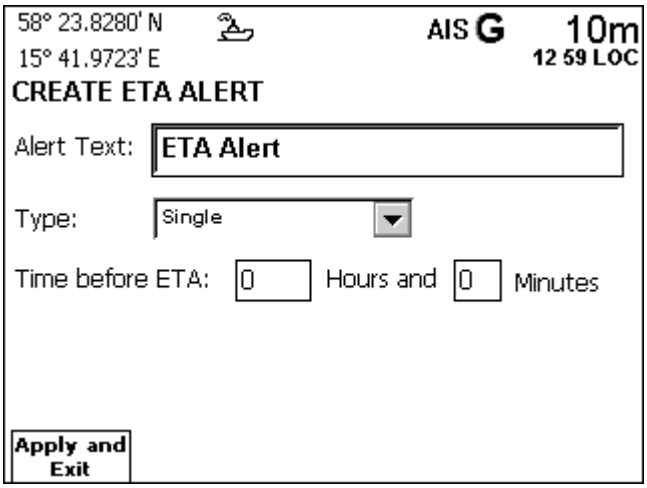


Figure 149 - Create ETA Alert

The function key ***Apply and Exit*** is used to store the alert settings when done.

Define alert text

1. Select the Alert Text field using ∧ ∨, press ***ENTER***.
2. Use the alphanumeric keypad to enter text, and the ***Backspace*** function key to erase characters. Use function key ***Capslock*** to change between upper and lower case letters. The text will be displayed in the warning dialog on the display when the alert is activated.
3. Press ***ENTER***.

Define alert type

1. Select the Type field using ∧ ∨, press ***ENTER***.
2. Select between Single (alert will be activated in the current or next active route only) or Every Route using ∧ ∨, press ***ENTER***.

Define activation time before ETA

1. Select the Hours field using ∧ ∨, press ***ENTER***.
2. Enter the appropriate value through the alphanumeric keypad. Press ***ENTER***.
3. Press > and enter a value in the Minutes field if required.

Note: ETA alerts will be activated once in every route only. Thus, the alert will not reactivate if the time before ETA criterion will be fulfilled duplicate times due to variations in speed.

4.10.8.3 Edit Time Alert

The Edit Time Alert view is used to change settings for a specific time alert. The view is identical to the Create Time Alert view described above, with the edited alert settings entered.

4.10.8.4 Edit ETA Alert

The Edit ETA Alert view is used to change settings for a specific ETA alert. The view is identical to the Create ETA Alert view described above, with the edited alert settings entered.

4.10.8.5 View Time Alert

The View Time Alert view is used to view the settings for a specific time alert. The view is identical to the Edit Time Alert view described above, except that contents not can be edited and with the function key ***Apply and Exit*** replaced by ***Edit***. Press the ***Edit*** function key to access the Edit Time Alert view if necessary.

4.10.8.6 View ETA Alert

The View ETA Alert view is used to view settings for a specific ETA alert. The view is identical to the Edit ETA Alert view described above, except that contents not can be edited and with the function key ***Apply and Exit*** replaced by ***Edit***. Press the ***Edit*** function key to access the Edit ETA Alert view if necessary.

4.11 Config Mode

The Config mode is used to configure the R4 Navigation System. To get to the Config views, press Mode followed by function key ***CONFIG***. Press ***ESC*** one or a few times anywhere in the mode for access of top level function keys.

4.11.1 Config Mode Overview

Use the ***PAGE*** key to toggle between the pages of top level function keys.

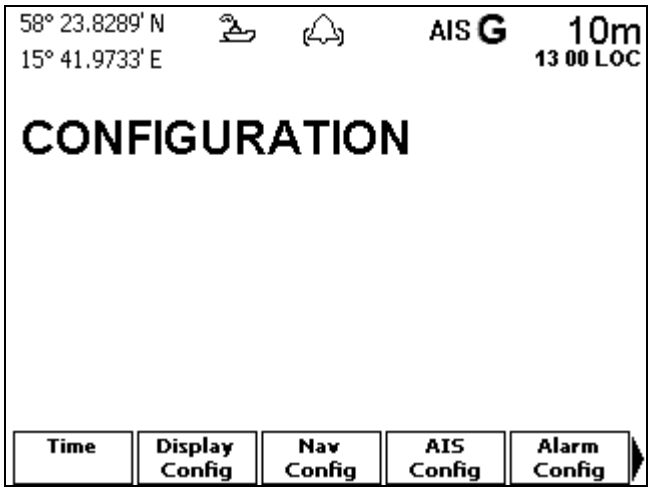


Figure 150 - Configuration, First Page

Figure 151 - Configuration, Second Page

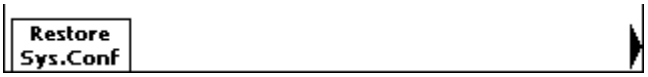


Figure 152 - Configuration, Third Page

The main views of Config mode are introduced below:

- *Time* allows the user to define a local time offset from UTC and choose if displayed time values shall be in local or UTC time frames.
- *Display Config* allows the user to configure settings for the R4 Display, both visual and sound settings.
- *Nav Config* allows the user to configure navigation parameters.
- *AIS Config* allows the user to configure AIS parameters
- *Alarm Config* allows the user to configure which alarms that should be used and if they should trigger the external alarm signal.
- *Units Config* allows the user to configure the used units.
- *GPS/DGPS Config* allows the user to configure GPS, DGPS, Beacon and SBAS settings.
- *Redund Config* allows the user to configure the system to interact with another R4 nav system in order to synchronize database and settings between the units.
- *I/O Config* allows the user to configure input and output sentences and port communication rates.
- *System Info* allows the user to view current system information including software and hardware versions as well as memory usage.
- *Restore Sys.Conf* allows the user to restore all parameters in display, transponder and/or navigation sensor to factory default.

Below is a graphical overview of the different views present in the mode.

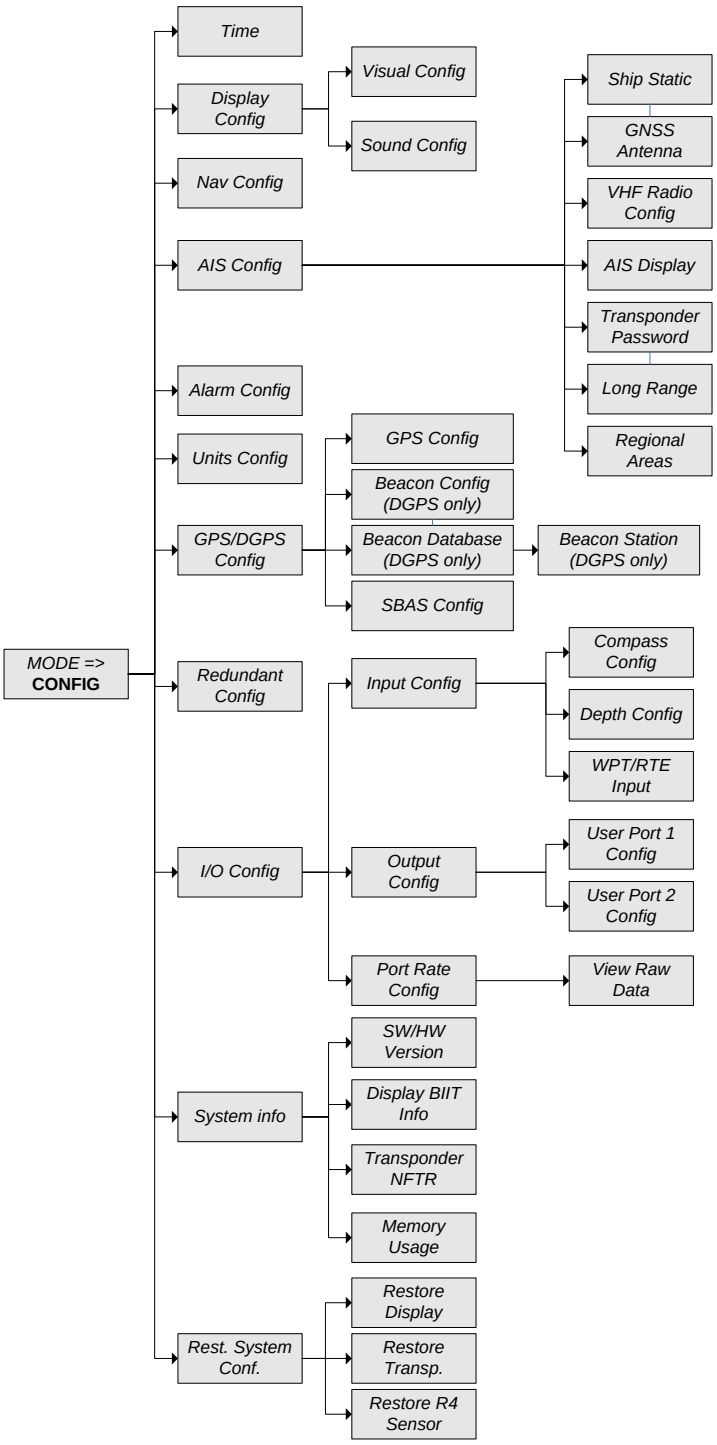


Figure 153 - Graphical overview

Note: The Beacon Config and Beacon Database view with subviews are only present when using the R4 DGPS Navigation Sensor.

The views are further described below.

4.11.2 Time Config

The Time Configuration view is used to define a local time offset from UTC and to select whether displayed time values shall be in local or UTC time frames. The Time Configuration view is illustrated below.

Figure 154 - Time Configuration view

Change local time offset

1. Edit the +/- field if required by selecting it using < > and press ***ENTER***. Use ∧ ∨ to set the desired sign and press ***ENTER*** again.
2. Edit the hours field if required by selecting it using < > and press ***ENTER***. Use the numeric keyboard together with function key ***Backspace*** to enter the desired value. Press ***ENTER*** when done.
3. Repeat the procedure to edit the minutes field if required.

Select time frame for display

1. Press function key ***Use UTC*** to display all times in UTC. Press function key ***Use Local*** to display all times with the current local offset from UTC. This will be indicated by 'LOC' displayed after the time values instead of 'UTC'.

Note: To output the time settings in the local time zone offset fields in ZDA messages on the serial interface, the parameter *Output in ZDA* needs to be enabled in Nav Config dialog (for more information about the parameter and this function, see section 4.11.4).

4.11.3 Display Config

The Display Configuration view contains two subviews, the Visual Configuration and Sound Configuration views. The former is used to configure display illumination settings and the latter the sounds played at different events.

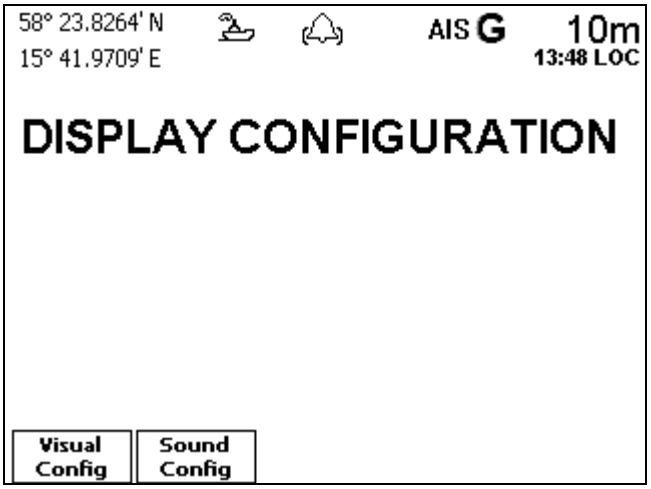


Figure 155 - Display Configuration view

4.11.3.1 Visual Config

The Visual Configuration view allows the user to adjust display back light, contrast, LED intensity and button illumination. Two separate settings are provided, for day and for night operation.

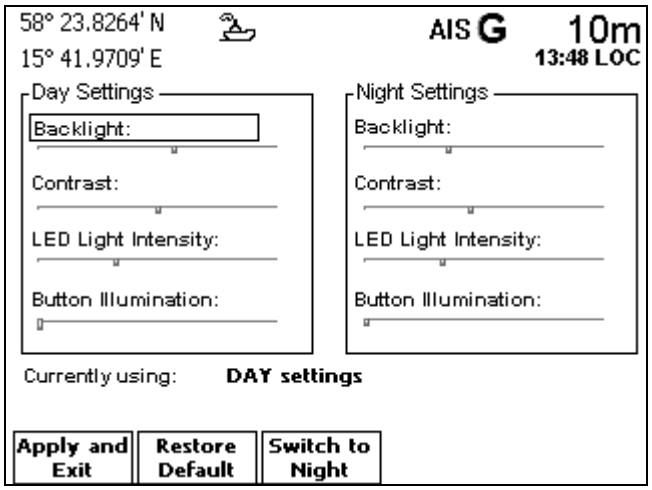


Figure 156 - Visual Configuration view

Change display setting

1. Select Day Settings or Night Settings with < >.
2. Select the setting you want to change using ∧ ∨ and press ***ENTER***.
3. Modify the setting with < > and press ***ENTER***. Repeat step 1 to 3 if necessary.
4. Press function key ***Apply and Exit***.

Note: As described in section 3.17 “Visual Settings” on page 46, it is also possible to change visual settings by pressing the ***DISPLAY*** key.

Restore to factory default setting

1. Press function key ***Restore Default***.
2. A warning with request for confirmation is displayed. Press ***ENTER*** to restore to factory default setting.

Switch between day mode and night mode

1. Press function key ***Switch to Night*** (only visible when in day mode) or ***Switch to Day*** (only visible when in night mode).

4.11.3.2 Sound Config

The Sound Configuration view allows the user to associate an event with a specific sound. The settings can be restored to their default values.

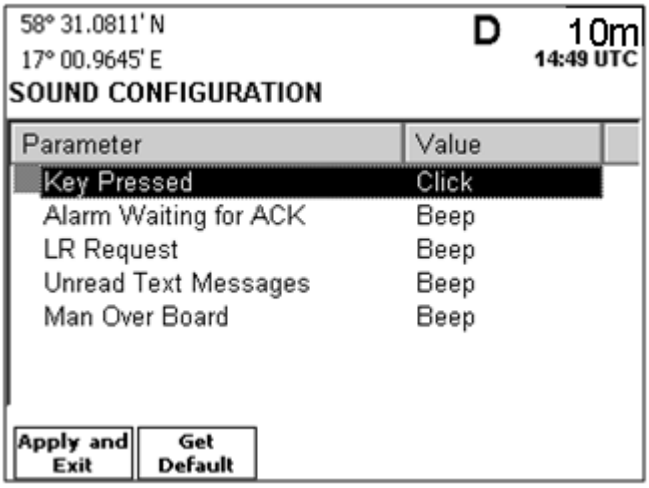


Figure 157 - Sound Configuration view

Change settings

1. Select the setting you want to change using ∧ ∨ and press ***ENTER***.
2. Select the desired value in the drop-down list using ∧ ∨, and press ***ENTER***.
3. Press function key ***Apply and Exit***.

Restore a parameter to factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key ***Get Default***.
3. Press function key ***Apply and Exit*** to save the changes.

4.11.4 Nav Config

The Navigation Configuration view is used to configure navigation parameters including navigation algorithm, waypoint pass criterion, range unit, waypoint change distance (for "distance" waypoint pass criterion), cross-track error alarm limit and waypoint approach alarm distance or time. The parameters are described below.

WPT Pass Criterion

The Waypoint Pass Criterion parameter specifies the method used to determine when a waypoint is considered passed. The parameter can be set to one of Manual, Distance, Bisector Line or Perpendicular Line. The different waypoint pass criteria are described in chapter 2.

WPT Pass Distance

The Waypoint Pass Distance parameter specifies the distance to the waypoint where it is considered passed when using the Distance waypoint pass criteria.

Start Sail From

It is possible to select whether an initial 'from' waypoint shall be inserted when starting an active route.

When this function is activated, the current position will be grabbed and stored in the active route as an initial 'from' waypoint with identifier 't1'. This waypoint will not be added to the waypoint database (functionality in line with XTE reset waypoints).

If 't1' subsequently is manually selected as the next waypoint in the route, function will be identical as the prior implementation when navigating towards first waypoint (no XTE computed and current position output as 'from' waypoint with identifier 't0' in active route RTE message).

It is now possible to insert a waypoint at current position using the 'reset XTE' function also while navigating towards the first waypoint in a route.

Default RAIM

This field sets the default RAIM accuracy level to appear when specifying a RAIM accuracy level for a leg in a route. See chapter 2 on page 13 for more information.

Navigation Algorithm

The Navigation Algorithm parameter specifies the default navigation algorithm for newly created legs. The algorithm can either be set to Rhumb Line or Great Circle. The difference between these algorithms are described in chapter 2. This parameter also determines the navigation algorithm used when sailing towards the first waypoint in a route or towards a single waypoint.

XTE Limit

The Cross-Track Limit parameter specifies the cross-track error limit used when navigating. If the cross-track error becomes larger than the set XTE Limit, the XTE Limit Exceeded alarm is raised and remains active until the cross-track error becomes less than the set XTE Limit, or navigation along the active route stops.

Approach Distance

The Approach Distance parameter specifies the distance from next waypoint where the Waypoint Approaching (Distance) alarm is raised.

Approach Time

The Approach Time parameter specifies the estimated time (in minutes) before arrival to the next waypoint when the Waypoint Approaching (Time) alarm is raised.

RTE Nav Algorithm

The RTE Navigation Algorithm specifies the navigation algorithm that is set for routes received from external systems, for example from ECDIS systems. See section 5.4.1 “Download Waypoints and Routes” on page 186 in the Appendix chapter for more information.

RTE/Rnn WP Limit

With R4 Combined Display software 5.1.2 and onwards, it is now possible to configure the maximum number of remaining waypoints in the active route that shall be transmitted in the Rnn or RTE message. Previously, only the four next waypoints were transmitted per default. This value can now be configured between 4 and 13 with the RTE/Rnn WP Limit parameter. The default value is 4.

Average ETA SOG

The Average ETA SOG parameter defines the time period over which average speed is calculated when estimating time of arrival (ETA) to the end of the active route and Time To Go (TTG) to the next waypoint.

Integrated ETA

If this parameter is set to On, the ETA value used for Navigation is the same as the ETA used in AIS transmissions. This means that the ETA set in *Set Target ETA* view described in section 4.8.5 is the same as edited in the *AIS Voyage* view described in section 4.9.2. The ETA is then, in addition to being used for navigation calculations, also used for transmission to remote ships.

Status Information

The Status Information parameter defines whether current position (when available) from the R4 navigation sensor or the name of the next waypoint is to be displayed in the status bar at the upper left corner of the display.

-Local Time Zone Offset- Output in ZDA

The Output in ZDA parameter defines if the local time zone offset set in the Time Config dialog (see section 4.11.2) should be output in ZDA messages. When the parameter is set to *Disabled* the local time zone offset fields in ZDA messages will be null fields. When set to *Enabled* the local time zone offset fields in ZDA messages will be defined by the settings in Time Config dialog. If UTC time is used the fields will be zeros in ZDA messages.

The Navigation Configuration view is illustrated below.

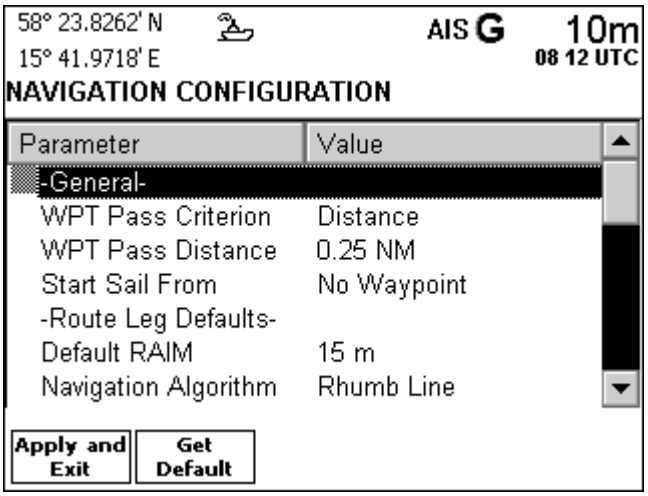


Figure 158 - Navigation Configuration view

Change a parameter

1. Select the parameter to edit using ∧ ∨ and press ***ENTER***.
2. If the parameter is selected using a drop-down box, use ∧ ∨ to select the desired option in the drop-down box. If the parameter is a numeric value, use the alphanumeric keypad to enter the desired value. Use the ***Backspace*** function key to erase digits.
3. Press ***ENTER*** when done.
4. Press function key ***Apply and Exit*** to save the changes.

Restore factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key ***Get Default***.
3. Press ***Apply and Exit*** to save the changes.

4.11.5 AIS Config

The *AIS Configuration* view contains subviews for configuration of AIS parameters. The view contains two pages of function keys, as illustrated below. To show the second page, press the ***PAGE*** key.

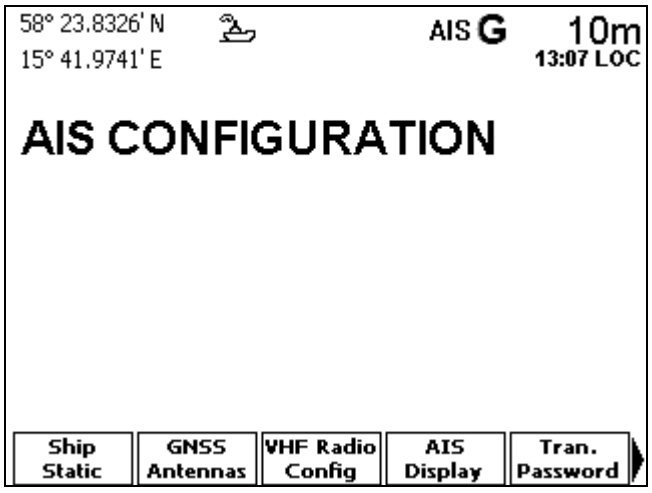


Figure 159 – AIS Configuration view, page one

Figure 160 – AIS Configuration view, page two

4.11.5.1 Ship Static

The *Ship Static Configuration* view is used to configure the static information for the current ship, including MMSI, IMO number, ship name, callsign, height over keel and ship type.

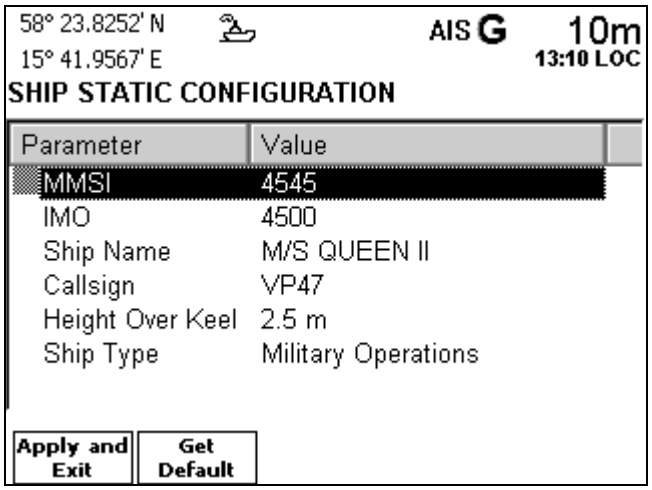


Figure 161 – Ship Static Configuration

Change setting

1. Select the parameter to edit using ∧ ∨ and press ***ENTER*.**
2. If the parameter is selected using a drop-down box, use ∧ ∨ to select the desired option in the drop-down box. If the parameter is a numeric or text value, use the alphanumeric keypad to enter the desired value. Use the **Backspace** function key to erase entered values.
3. Press ***ENTER*** when the correct parameter value has been entered.
4. Press function key **Apply and Exit.**
5. Enter the user password using the alphanumeric keypad. Use **Capslock** to change between upper- and lowercase letters. Press ***ENTER*** when done.

Restore a parameter to factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key **Get Default.**
3. Press function key **Apply and Exit** to save the changes.
4. Enter the user password using the alphanumeric keypad. Use **Capslock** to change between upper- and lowercase letters. Press ***ENTER*** when done.

4.11.5.2 GNSS Antennas

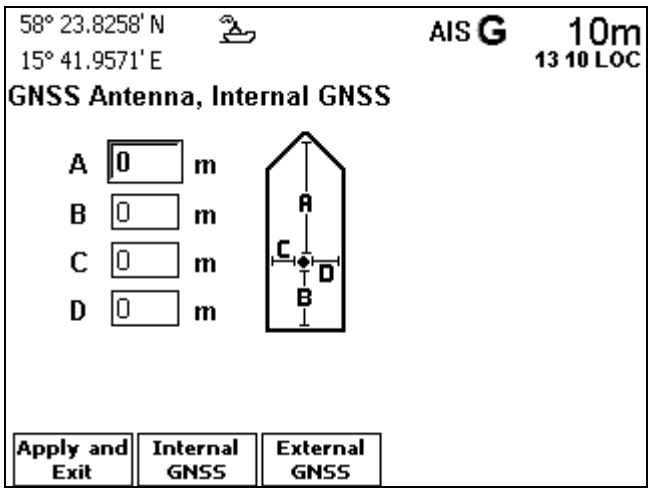


Figure 162 – GNSS Antennas Configuration

Change GNSS position

1. Select the GNSS to change position for, by pressing either the function key **Internal GNSS** or **External GNSS**.
2. Select the field to edit using ∧ ∨ and press ***ENTER*.**
3. Use the alphanumeric keypad to enter the desired value. Use the **Backspace** function key to erase digits.
4. Press ***ENTER*** when the correct value has been entered.
5. Repeat step 2 - 4 to change more fields. Press function key **Apply and Exit** when done.
6. Enter the user password using the alphanumeric keypad. Use **Capslock** to change between upper- and lowercase letters. Press ***ENTER*** when done.

Note:

Dimension	Distance (m)
A	0-511; 511 = 511 m or greater
B	0-511; 511 = 511 m or greater
C	0-63; 63 = 63 m or greater
D	0-63; 63 = 63 m or greater

The dimension A should be in the direction of the transmitted heading information (bow). Reference point of reported position not available, but dimensions of ship are available:

A = C = 0 and B ≠ 0 and D ≠ 0.

Neither reference point of reported position nor dimensions of ship available:

A = B = C = D = 0 (= default)

4.11.5.3 VHF Radio Config

The *VHF Radio Configuration* view allows an administrator to configure the systems radio parameters.

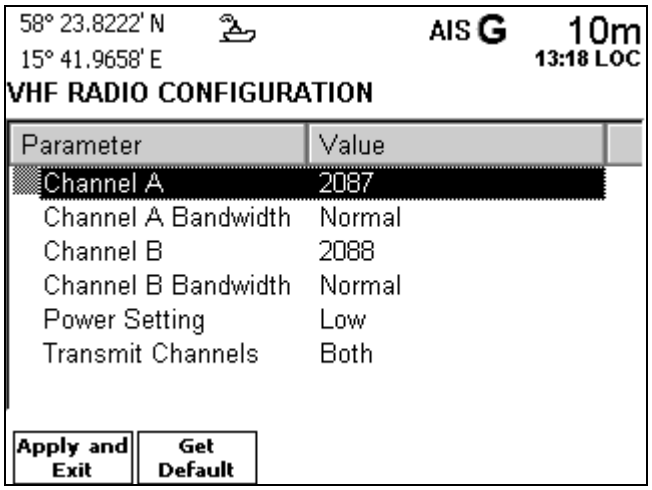


Figure 163 – VHF Radio Configuration

Change setting

1. Select the parameter to edit using ∧ ∨ and press ***ENTER*.**
2. If the parameter is selected using a drop-down box, use ∧ ∨ to select the desired option in the drop-down box. If the parameter is a numeric value, use the alphanumeric keypad to enter the desired value. Use the **Backspace** function key to erase entered digits.

3. Press ***ENTER*** when the correct parameter value has been entered.
4. Press function key **Apply and Exit.**
5. Enter the administrator password using the alphanumeric keypad. Use **Capslock** to change between upper- and lowercase letters. Press ***ENTER*** when done.

Restore a parameter to factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key **Get Default.**
3. Press function key **Apply and Exit** to save the changes.
4. Enter the administrator password using the alphanumeric keypad. Use **Capslock** to change between upper- and lowercase letters. Press ***ENTER*** when done.

Restore all parameters to factory default

1. Press function key **Restore Defaults.**
2. Press function key **Apply and Exit** to save the changes.
3. Enter the administrator password using the alphanumeric keypad. Use **Capslock** to change between upper- and lowercase letters. Press ***ENTER*** when done.

4.11.5.4 AIS Display

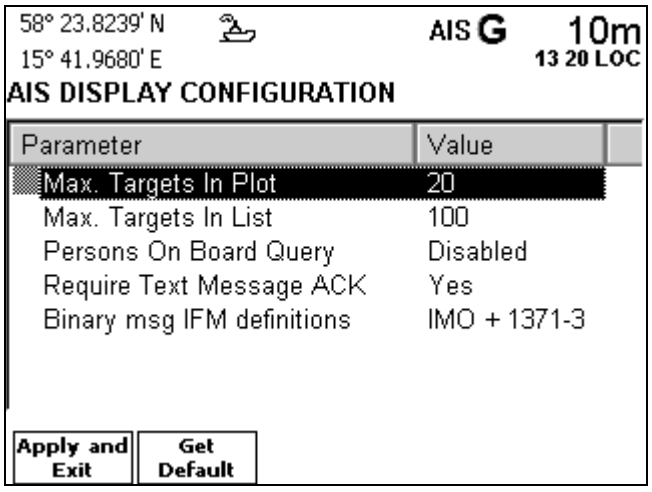


Figure 164 – AIS Display Configuration

The *Max Targets In Plot* and *Max Targets In List* parameters define the maximum number of targets displayed in the *Plot* and *Target List* views respectively.

The *Persons On Board Query* parameter enables or disables functionality for manual interrogation of number of persons on board from the *Extended Information* view.

The *Require Text Message Ack* parameter is related to transmission of adressed text messages. If this parameter is set to “Yes”, a warning will be displayed if the

message was not received and interpreted by the addressee. If set to “No”, no warning will be displayed regardless of whether it was interpreted by the receiving equipment or not.

Change setting

1. Select the parameter to edit using ∧ ∨ and press *ENTER***.**
2. Use the alphanumeric keypad to enter the desired value. Use the **Backspace** function key to erase entered digits. Press *ENTER* when done.
3. Press function key **Apply and Exit.**

Restore a setting to factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key **Get Default.**
3. Press function key **Apply and Exit** to save the changes.

4.11.5.5 Tran. Password

WARNING! It is strongly recommended that passwords are never changed.

The *Transponder Password* view allows the operator to change the user and administrator transponder password. The user password is used to confirm changes made to the installation of the R4 Transponder, while the administrator password is used to confirm extra sensitive changes such as a complete system restore and changing VHF radio parameters. The administrator password can also be used to set a new user password.

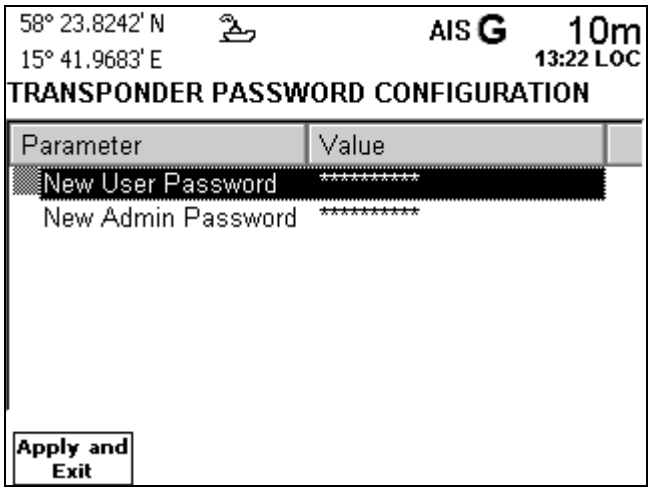


Figure 165 – Transponder Password Configuration

Change a transponder password

1. Select the password to edit using ∧ ∨.
2. Press ***ENTER*** and type the new password (4-8 characters) using the alphanumeric keypad. Use function key **Capslock** to change between upper- and lowercase letters. Use function key **Backspace** to erase characters.
3. Press ***ENTER*** when done.

4. Enter the password again to confirm it. Press ***ENTER*** when done.
5. Press function key **Apply and Exit** to store the new password.
6. If having only changed the user password, a dialog will appear. Answer *Yes* to confirm the new password using the administrator password. Answer *No* to confirm it using the user password.
7. Enter the existing password of the required type to confirm the change of password. Press ***ENTER*** when done.

Note: Store the new password in a safe place. Do not forget it!

4.11.5.6 Long Range

The *Long Range Configuration* view allows the user to configure long range interrogation parameters.

Manual Reply

The parameter specifies if manual or automatic long range reply should be used. When *on*, each response to received long range interrogations need to be manually confirmed or conformed by an external application. When set to *off*, replies are automatically sent for allowed interrogations.

Interrogations

Each interrogation parameter specifies if responses should be sent to interrogation requests of that type. No response will be sent to interrogation types which are *Disallowed,* regardless if manual reply mode is turned *off* or *on*.

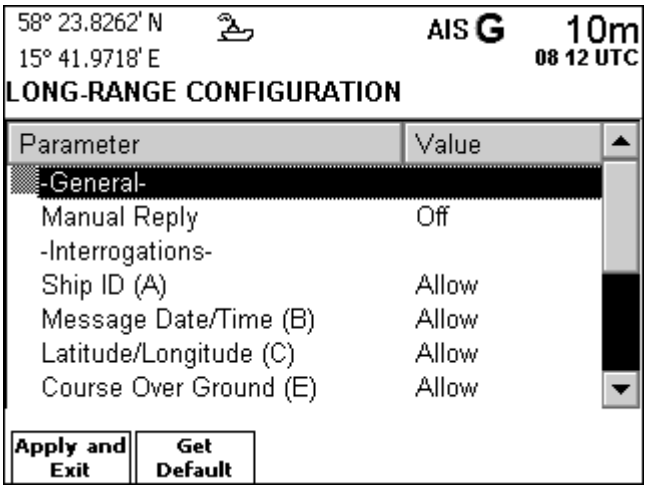


Figure 166 – Long Range Configuration

Change setting

1. Use ∧ ∨ to select the parameter to modify and press ***ENTER*.**
2. Select the desired value in the drop-down list using ∧ ∨**,** and press ***ENTER*.**
3. Press function key **Apply and Exit** to save the changes.

Restore a parameter to factory default

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key **Get Default.**
3. Press function key **Apply and Exit** to save the changes.

4.11.5.7 Regional Areas

The *Regional Areas* view allows the user to list, add and edit regional areas definitions.

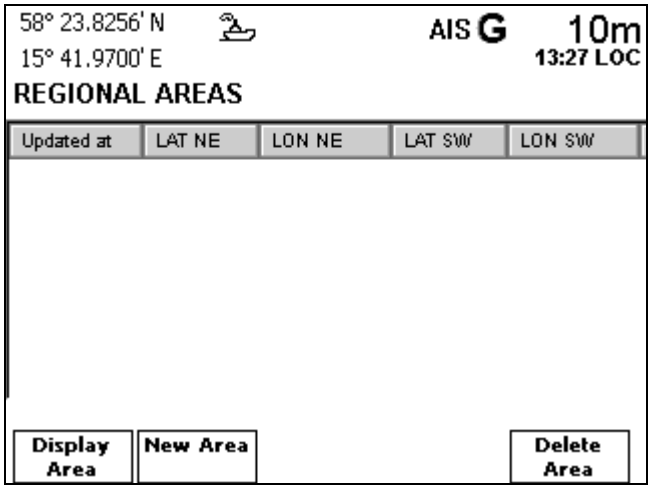


Figure 167 – Regional Areas

Create a new Regional Area

1. Press function key **New Area**. The below view is shown.

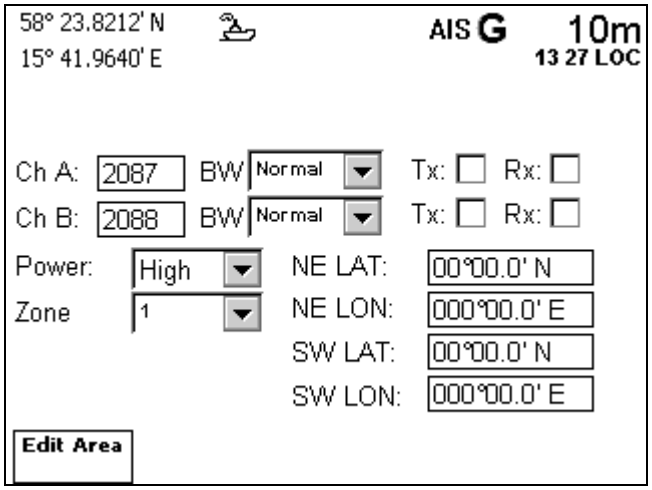


Figure 168 – Create New Regional Area

2. Press function key **Edit Area** to enter information for the new area.
3. Use ∧ ∨ **< >** to select the parameter to be entered and press ***ENTER***.

4. Enter the value using the keypad, or if it is a drop down list, select a value using ∧ ∨ and press ***ENTER***. To check the Tx and Rx check boxes, press ***ENTER*** when having the correct check box selected.
5. Repeat steps 3 and 4 for each parameter to enter.
6. Press function key **Apply** when done.
7. Press **OK** to confirm the entry of the area.
8. Press ***ESC*** to return to the *Regional Areas* view.

Edit a Regional Area

1. Select the Regional Area to edit using ∧ ∨.
2. Press function key **Display Area**.
3. Press function key **Edit Area**. The below view is shown.

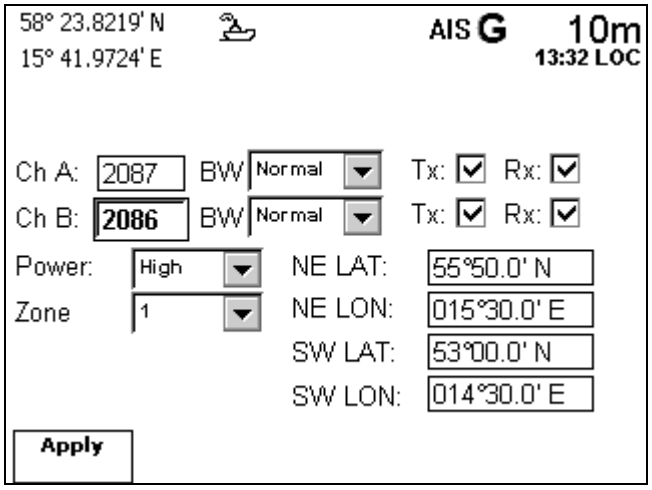


Figure 169 – Edit Regional Area

4. Use ∧ ∨ **< >** to select the parameter to be edited and press ***ENTER***.
5. Enter the new value using the keypad, or if it is a drop down list, select a value using ∧ ∨ and press ***ENTER***. To check the Tx and Rx check boxes, press ***ENTER*** when having the correct check box selected.
6. Repeat steps 4 and 5 for each parameter to edit.
7. Press function key **Apply** when done.
8. Press **OK** to confirm the entry of the area.
9. Press ***ESC*** to return to the *Regional Areas* view.

4.11.6 Alarm Config

The Alarm Configuration view is used to configure the action the system should perform when a specific alarm is raised. The possible settings for each alarm are:

- *Disabled*. The alarm will not be indicated when active.
- *Popup*. An alarm pop-up will be displayed when the alarm becomes active. See section 3.2.3 “Alarm Pop-Ups” on page 18.
- *External*. The Alarm Output signal will be activated when the alarm is active, typically triggering a visual alarm indicator and/or alarm bell. This setting will also generate alarm messages on the serial interface provided that the NMEA ALR message has been enabled on the specific port. For an AIS alarm, the AIS Alarm Relay will be activated.
- *Popup & External*. The alarm will result in both an alarm pop-up dialog and the Nav Alarm Output/NMEA ALR message or AIS Alarm Relay being activated.

It is possible to disable alarms that are of no interest for the operator by setting them to Disabled.

In this view it is also possible to enable and disable the use of an external alarm acknowledge momentary switch for acknowledging alarms. This is controlled by the *Allow External Ack* parameter. An external acknowledge input signal will acknowledge all active alarms (both navigation and AIS).

With R4 Combined AIS & Navigation Display software 5.1.2 and onwards, it is now possible to configure whether the external alarm discrete output will be reset as soon as all active alarms (of alarm types configured as ‘external’) have been acknowledged or will remain set as long as any (‘external’) active alarm condition is present. This is determined by the ‘Ack Disables Ext ALR’ parameter in the Alarm Configuration view in Configuration mode as illustrated below. The default setting of ‘Ack Disables Ext ALR’ is ‘Yes’. This corresponds to the behavior of the discrete alarm output in previous versions of the R4 Combined AIS & Navigation system before this setting was available.

Specific external navigation alarms may be acknowledged through the serial interface using the NMEA ‘ACK’ sentence.

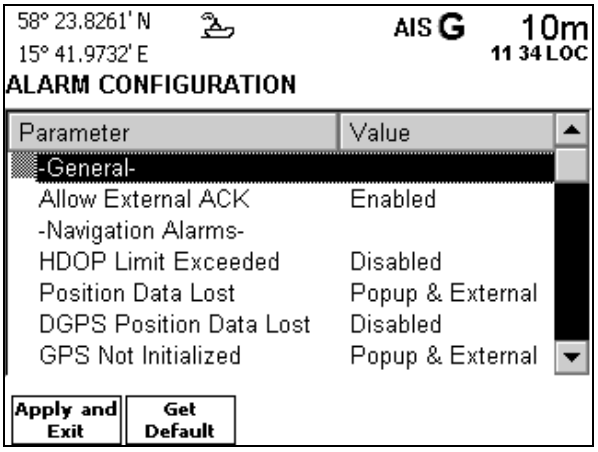


Figure 170 - Alarm Configuration

Change setting

1. Use ∧ ∨ to select the parameter to modify and press ***ENTER***.
2. Select the desired value in the drop-down list using ∧ ∨, and press ***ENTER***.
3. Press function key ***Apply and Exit*** to save the changes.

Restore factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key ***Get Default***.
3. Press function key ***Apply and Exit*** to save the changes.

4.11.7 Units Config

The Units Configuration view is used to configure used units of measurements in the system. The configurable types of units are described below.

Note: RAIM accuracy level is always input and displayed in meters regardless of selected units.

Range Unit

The unit used when displaying range values. Can be set to one of Nautical Mile, Kilometers and Statute Mile. The R4 Combined AIS & Navigation Display Software 5.1.2 and onwards has an improved range resolution. A range value (in NM, Km or Statute miles) not exceeding 1.0 in the given unit will now be displayed without the leading zero. Range resolution at short range is thus increased to three decimals.

Speed Unit

The unit used when displaying speed values. Can be set to one of Knots, kilometers per hour (km/h) and miles per hour (mph).

Depth Unit

The unit used for displaying depth. Can be set to one of meters, feet or fathoms.

Anchor Range Unit

The unit used to specify and display the alarm limit and current range to reference position in the Anchor Watch views. Can be set to one of meters or feet.

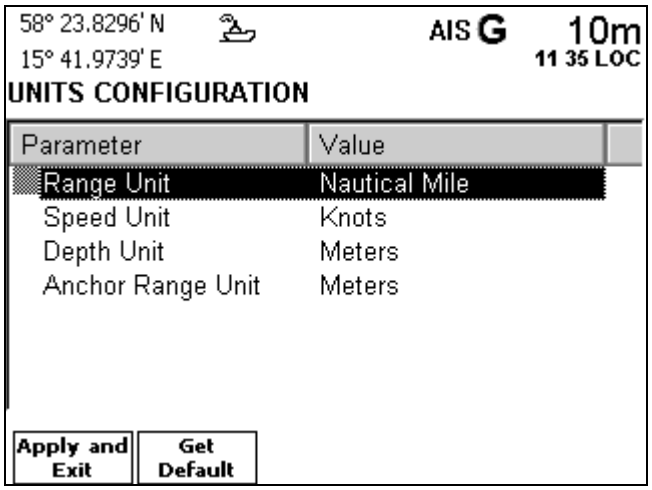


Figure 171 - Units Configuration view

Change setting

1. Use ∧ ∨ to select the parameter to modify and press ***ENTER***.
2. Select the desired value in the drop-down list using ∧ ∨, and press ***ENTER***.
3. Press function key ***Apply and Exit*** to save the changes.

Restore factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key ***Get Default***.
3. Press function key ***Apply and Exit*** to save the changes.

4.11.8 GPS/DGPS Config

The view contains the GPS Configuration and SBAS Configuration subviews. When an R4 DGPS Navigation Sensor is used, the view will also include the Beacon Configuration and Beacon Database subviews. The views are used to configure GPS, SBAS and Beacon settings of the R4 Navigation Sensor.

4.11.8.1 GPS Config

The GPS Configuration view allows the user to configure current GPS settings of the R4 Navigation Sensor. The following fields can be changed.

Elevation Mask

This parameter sets the elevation cutoff mask angle, in degrees, for the GPS. Any satellites below this mask angle will be ignored, even if available. The value should be between 0 and 60 degrees, and the default value is 5 degrees.

Correction Age

This field sets the maximum allowed age (in seconds) for correction data. The R4 Navigation Sensor is able to use old correction data for extended periods of time. The default setting is 120 seconds. The lowest allowed value is 10 seconds and the

highest 900 seconds. When increasing the allowed correction age, ensure that the new setting meets your requirements as accuracy will degrade with increasing correction age.

Correction Source

This parameter sets the source for differential corrections. Valid settings are:

- Beacon. In this setting the system will use signals from IALA radio beacon stations as source for differential corrections. This setting is only available when using an R4 DGPS Navigation Sensor (the DGPS configuration).
- SBAS. This setting makes the system use SBAS satellite signals as source for differential corrections.
- User Port 1. This setting will command the system to apply external differential corrections received in RTCM SC-104 format on the User 1 port. The User 1 port will not be available for output of serial data from the system if this setting is selected.
- None. This setting makes the system operate in autonomous mode, not using any differential corrections.

SOG Smoothing Parameter

The SOG Smoothing parameter allows you to adjust the level of responsiveness of the speed over ground (SOG) measurement, as displayed by the R4 Display and provided in the $GPVTG and $GPRMC sentences. The default value is zero, and increasing the value will increase the level of SOG smoothing.

The setting of this parameter depends upon the expected dynamics of the vessel. If a ship is highly dynamic, this value should be set to a lower value since the filtering window needs be shorter in time, resulting in a more responsive measurement. However, if a vessel is very large and has much more resistance to change in its motion, this value can be increased to reduce measurement noise. The following formula provides some guidance on how to set this value. **If unsure on which value to set, it's best to be conservative and leave this parameter at the default setting of 0.0 seconds.**

SOG smoothing = 10 / maximum acceleration (in m/s^2).

COG Smoothing Parameter

The COG Smoothing parameter allows you to adjust the level of responsiveness of the course over ground (COG) measurement, as displayed by the R4 Display and provided in the $GPVTG and $GPRMC sentences. The default value is zero, and increasing the value will increase the level of COG smoothing.

As with the SOG smoothing parameter, the setting of this parameter depends upon the expected dynamics of the vessel. If a ship is highly dynamic, this value should be set to a lower value since the filtering window needs be shorter in time, resulting in a more responsive measurement. However, if a vessel is very large and has much more resistance to change in its motion, this value can be increased to reduce

measurement noise. The following formula provides some guidance on how to set this value initially. It is however recommended that you test how the revised value works in practice. **If unsure on which value to set, it's best to be conservative and leave this parameter at the default setting of 0.0 seconds.**

COG smoothing = 10 / maximum rate of change in course (in °/s).

Note: The ship needs to be moving to calculate a valid COG value. Do not use COG values output while the ship is at rest as a basis for adjusting this parameter.

The GPS Configuration view is illustrated below.

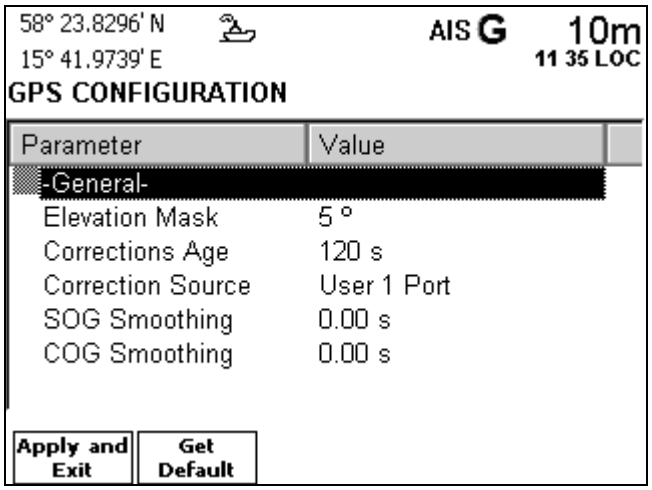


Figure 172 - GPS Configuration view

Change setting

1. Select the parameter to edit using ∧ ∨ and press ***ENTER***.
2. If the parameter is selected using a drop-down box, use ∧ ∨ to select the desired option in the drop-down box. If the parameter is a numeric value, use the alphanumeric keypad to enter the desired value. Use the ***Backspace*** function key to erase digits.
3. Press ***ENTER*** when the correct parameter value has been entered.
4. Press function key ***Apply and Exit***.

Restore factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key ***Get Default***.
3. Press function key ***Apply and Exit*** to save the changes.

4.11.8.2 Beacon Config

The Beacon Configuration view is used to configure beacon receiver parameters of the R4 DGPS Navigation Sensor. This includes setting the frequency and bit rate mode, as well as the radio beacon frequency and bit rate if manual mode is used.

Note: The Beacon Configuration view is only present when using a R4 DGPS Navigation Sensor.

Tuning Mode

The Tuning Mode parameter sets the frequency selection mode of the R4 DGPS Navigation Sensor internal radio beacon receiver. The mode can be Frequency Scan, Manual or Database (Auto). The Database mode is only available when then the Beacon Database is enabled. In Frequency Scan mode, the beacon receiver will search available frequencies and tune to the strongest beacon signal. In this mode, the R4 Navigation Sensor continuously performs background search to discover higher quality DGPS signals. While performing background searches, the R4 Navigation Sensor continues to receive differential corrections from the current radio beacon station.

In Manual tuning mode, the R4 DGPS Navigation Sensor tunes to the specified beacon frequency for receiving DGPS signals.

In Database mode, the receiver will search for the closest station based on its current location and distance to the internal list of station locations. The frequency and bit rate specified in the station database will be used and therefore these parameters are locked when the ***Tuning Mode*** parameter is set to *Database (Auto)*.

Frequency

The Frequency parameter is used to set the frequency to use for receiving DGPS signals, when the frequency mode parameter is set to manual. Valid frequencies are between 283.5 and 325 KHz, at 0.5 kHz intervals. This parameter is locked when ***Tuning Mode*** is set to *Frequency Scan* or *Database (Auto)*.

Bit Rate Mode

The Bit Rate Mode parameter sets the bit rate mode, to either Automatic or Manual. In Automatic mode the R4 DGPS Navigation Sensor will automatically select the correct bit rate to use for demodulating the radio beacon signal. In Manual mode, the R4 DGPS Navigation Sensor will use the specified bit rate.

This parameter is locked to *Auto* when ***Tuning Mode*** is set to *Database (Auto)* since the bit rate specified in the database will be automatically used.

Bit Rate

The Bit Rate parameter is used to set the bit rate used for demodulation of the DGPS signal, when using the manual bit rate mode. The bit rate can be set to one of 50, 100 and 200 bps. This parameter is locked when ***Bit Rate Mode*** is set to *Auto*.

Beacon Database

The Beacon Database parameter is used to enable or disable the Beacon Database. When the parameter is set to off, the Beacon Database view will not be available. See section 4.11.8.3 for more information about the Beacon Database.

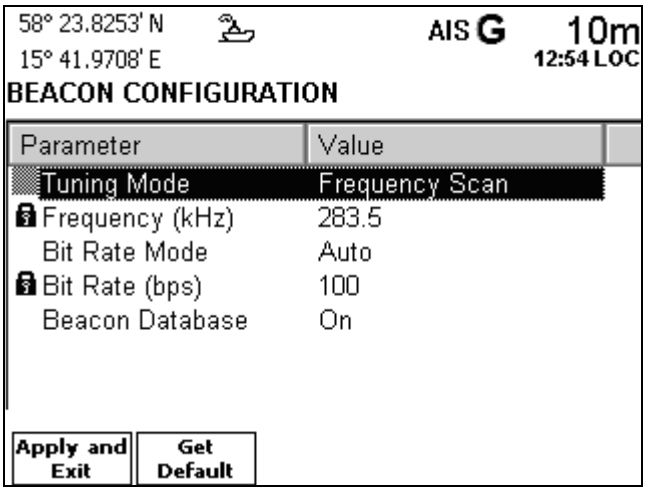


Figure 173 - Beacon Configuration view

Change Tuning Mode, Bit Rate Mode or Bit Rate

1. Select the parameter to edit using ∧ ∨ and press ***ENTER***.
2. Use ∧ ∨ to select the desired mode in the drop-down box and press ***ENTER***.
3. Press function key ***Apply and Exit***.

Change Frequency

1. Select the parameter using ∧ ∨ and press ***ENTER***.
2. Use the alphanumeric keyboard enter the desired value. Use the ***Backspace*** function key to erase digits. Press ***ENTER*** when done.
3. Press function key ***Apply and Exit***.

Restore factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key ***Get Default***.
3. Press function key ***Apply and Exit*** to save the changes.

4.11.8.3 Beacon Database

The Beacon Database view is used for inspection of the internal radio beacon station database.

Note: The Beacon Database view is only present when using an R4 DGPS Navigation Sensor and when the parameter *Beacon Database* is set to on, see section 4.11.8.2 “

Beacon Config" for more details.

The beacon station list can be sorted by station id number, station name or by the calculated distance to the station with function keys **Sort By Id**, **Sort By Name** and **Sort By Distance** respectively.

Available information about a particular station in the list can be viewed by highlighting it (using ∧ ∨) and pressing function key **Extended Info**. The Beacon Station view is displayed as described in section 4.8.3.2 Beacon Status on page 65 of this manual.

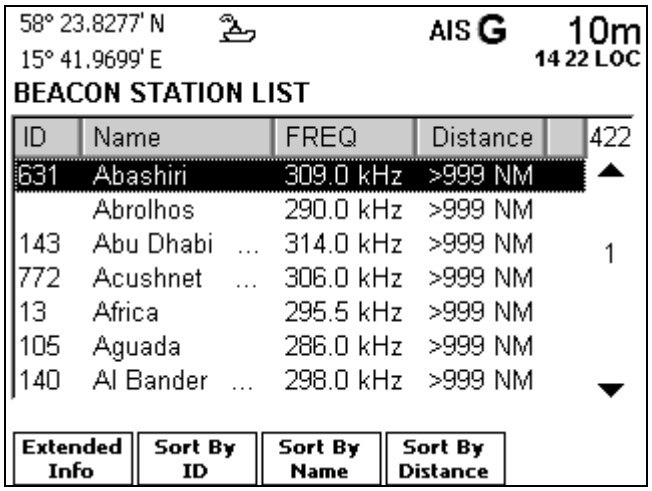


Figure 174 - Beacon Station List

4.11.8.4 SBAS Config

The SBAS Configuration view is used for control of SBAS satellite tracking for the two dedicated SBAS channels of the R4 Navigation sensor.

With the PRN Search Mode parameter, search mode can be set to either Automatic or Manual.

In Manual search mode, the R4 Navigation sensor will try to acquire signals from satellites with id (PRN) numbers input by the parameters PRN 1 and PRN 2 in the view. If only one particular satellite is to be tracked, input same number for both parameters.

In Automatic search mode, the R4 Navigation Sensor will try to identify and track SBAS signals without user control of satellite selection.

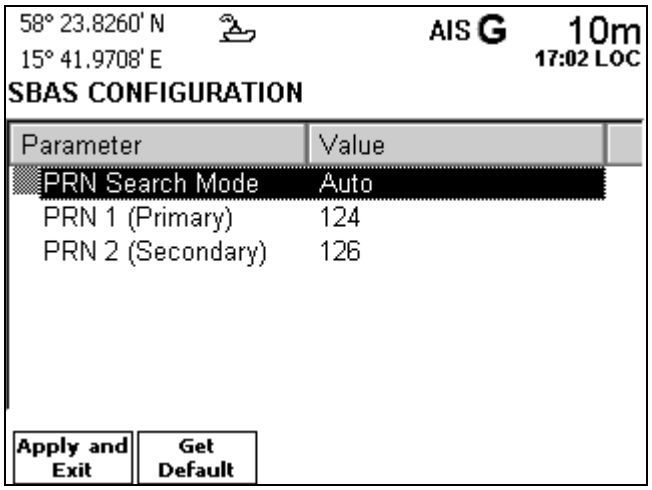


Figure 175 - SBAS Configuration view

4.11.9 Redund Config

The Redundant System Configuration view is to be used in a redundant or dual system configuration.

The Redundant System Configuration view is illustrated below.

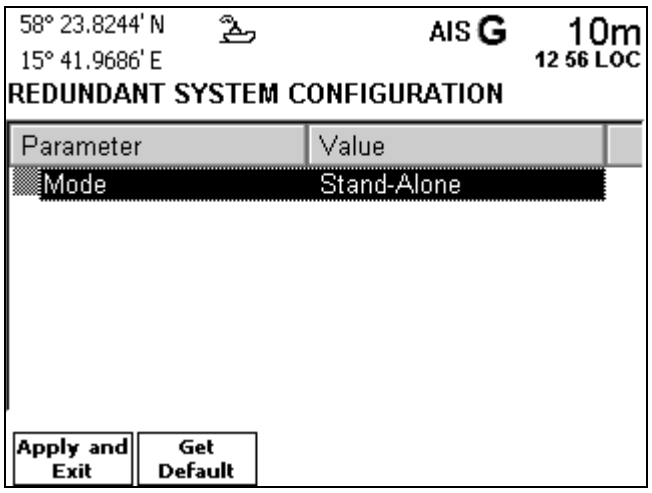


Figure 176 - Redundant System Configuration view

The Mode parameter can be set to Stand-Alone (default), Redundant Master, Redundant Slave, Dual Display Master or Dual Display Slave. When redundant or dual configuration not is to be used, the parameter shall be set to Stand-Alone. In a redundant or dual configuration, one unit shall be set to Master and the other unit to Slave. Press function key ***Apply and Exit*** to save the changes.

4.11.9.1 Redundant Mode

The *Redundant System Configuration* view is used in a redundant system configuration where two interconnected R4 navigation or combined AIS/navigation systems automatically synchronize their internal databases and some settings.

The systems to be synchronized are to be interconnected by their 'AUX' ports (or by the 'AUX' port of the combined system and the User 3 port of an R4 Navigation system). These ports are thus not available for other purposes in this configuration.

During synchronized operation, any changes to a synchronized item performed by the user at one system will also be incorporated in the other system. This applies regardless if the change is made through a manual input or by the serial interface.

It is the responsibility of the user not to input conflicting information to the two systems, such as different waypoints with identical names. The general rule is that the last change will override any previous inputs in such a case.

The following items are synchronized:

- Waypoints.
- Routes.
- Active Route.
- XTE reset function.
- MOB function.
- RAIM setting.
- Target ETA.
- Waypoint pass criterion (Nav Config).
- Waypoint pass distance (Nav Config).
- Default RAIM value (Nav Config).
- Nav Algorithm (Nav Config).
- XTE limit (Nav Config).
- Approach distance (Nav Config).
- Default nav algorithm for received routes (Nav Config).
- Averaging time for SOG used in ETA and TTG calculations (Nav Config).

When the Mode parameter is set to anything but Stand-Alone, communication with an external unit is to be expected. Current status of redundant operation is indicated by icons in the status bar at the top of the display as follows:

R Redundant operation active.

R Redundant operation active. Synchronizing from external unit.

Redundant configuration has been enabled but no communication is established.

When initial contact is established between two units their internal contents are compared. If they are different, a warning will be displayed as illustrated below.

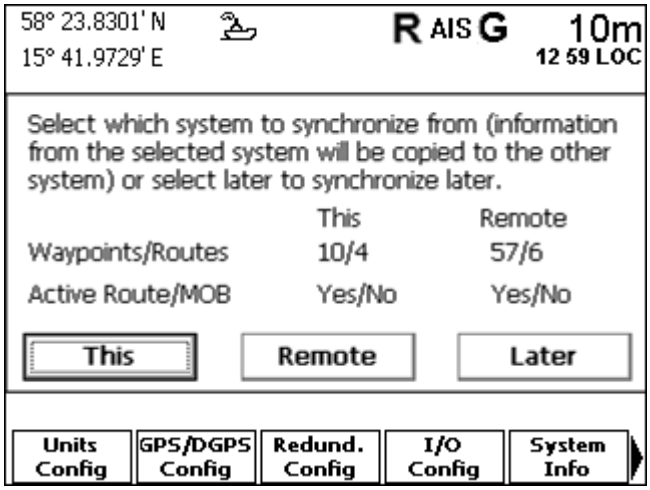


Figure 177 - Synchronization dialog

Select which unit to perform initial synchronization to or use the Later option to perform any desired changes before synchronization begins. In the latter case, function keys ***Synch This*** and ***Synch Remote*** will be available in the Redundant System Configuration view.

Figure 178 - Function keys

Note 1: At the initial synchronization, all contents in both systems will be set equal to the contents of the system that synchronization is made from. Unique contents of the other (receiving) system will be erased.

Note 2: During the initial synchronization process, the receiving unit (as indicated by the R icon) will have a large numbers of its functions temporarily disabled. For instance, any active route or active MOB function will be terminated and any

attempts to modify the route/waypoint database (either by manual inputs or by the serial interface) will be rejected.

Once initial synchronization is performed, changes to synchronized items will be applied to both systems automatically without the need for special actions by the operator.

4.11.10 I/O Config

The I/O Configuration view contains three subviews, used to configure the used input sentences, transmitted output sentences and port speed settings. The subviews are Input Config, Output Config and the Port Rate Config. The Port Rate Config view also contains functionality for viewing the data received on the ports (suitable for troubleshooting).

4.11.10.1 Input Config

The Port Input Configuration view contains subviews for specification of sentences that shall be interpreted and used for navigation. It is possible to define sentences to use for sensor data (heading and depth) and for receiving waypoint and route information. For each type of data, the used sentences can be limited in the following ways:

Input Port

This parameter makes it possible to only use sentences received on a particular port for the type of data.

Input Sentence

This parameter makes it possible to only use a specific NMEA sentence for the type of data.

Input Talker ID

This parameter makes it possible to only use sentences from a specific talker (having a specific NMEA talker ID) for the type of data.

The Port Input Configuration view is illustrated below.

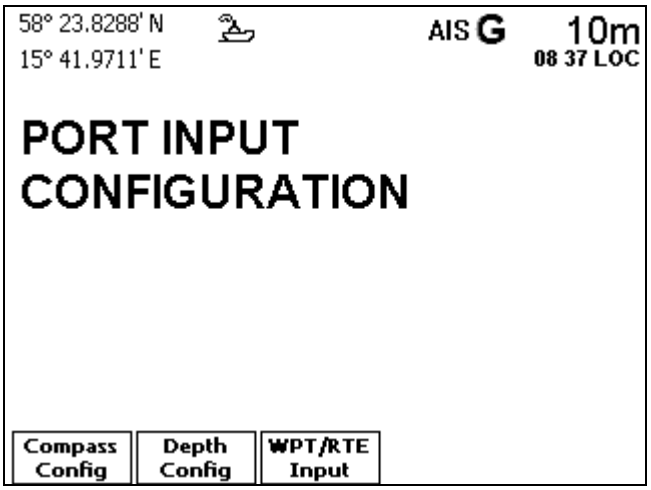


Figure 179 - Port Input Configuration

4.11.10.2 Compass Config

The Compass Configuration view allows the user to limit the heading sentences used for navigation by specifying Input Port, Input Sentence and Input Talker ID as described above.

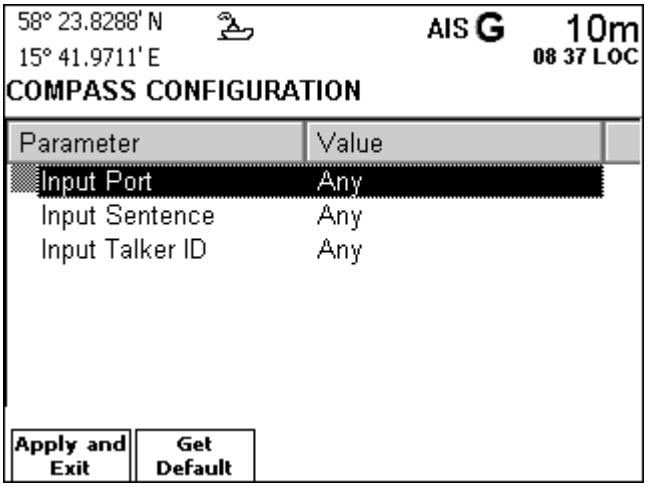


Figure 180 - Compass Configuration

Configure heading (compass) sentences

1. Select the parameter to modify using ∧ ∨ and press ***ENTER***.
2. Use ∧ ∨ to select the desired option in the drop-down box. Press ***ENTER*** when done.
3. Press function key ***Apply and Exit***.

Restore factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key ***Get Default***.
3. Press function key ***Apply and Exit*** to save the changes.

4.11.10.3 Depth Config

The Depth Configuration view allows the user to limit the depth sentences used for navigation by specifying Input Port, Input Sentence and Input Talker ID as described above. In addition, the following parameters can be configured to specify an offset to add to the received depth data.

Use NMEA Offset

If yes, any depth offset information available in the DPT sentence is added to the depth value taken from this sentence.

Use Manual Offset

If yes, the manually specified offset is added to the reported depth (regardless from which sentence it is taken).

Manual Offset

Specifies the size of the manual offset.

Manual Offset Sign

Specifies the sign of the manual offset. If positive the manual offset is added to the reported depth. If negative the manual offset is subtracted from the reported depth.

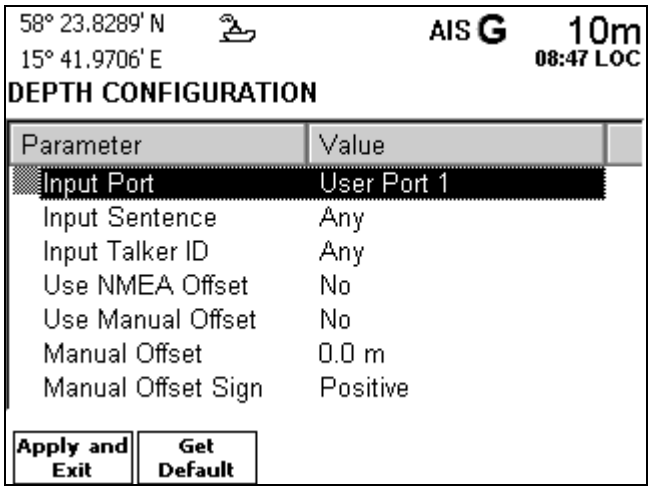


Figure 181 - Depth Configuration

Configure depth sentences

1. Select the parameter to modify using ∧ ∨ and press ***ENTER***.
2. Use ∧ ∨ to select the desired option in a drop-down box. Use the alphanumeric keypad to enter a number, and the ***Backspace*** function key to erase digits.
3. Press ***ENTER*** when done.
4. Press function key ***Apply and Exit***.

Restore factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key ***Get Default***.
3. Press function key ***Apply and Exit*** to save the changes.

4.11.10.4 WPT/RTE Input

The Waypoint/Route Input Configuration view allows the user to limit the waypoint and route input sentences used by the R4 Display by specifying Input Port and Input Talker ID, as described on page 168. The Route Sentence can also be specified. If set to RNN (which is only provided for NMEA backward compliance) only active routes can be input to the system. See section 5.4 in Appendix for more details.

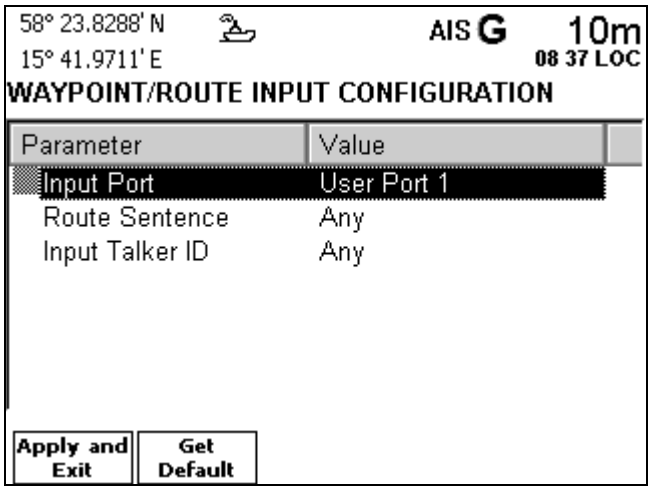


Figure 182 - Waypoint/Route Input Configuration

Configure used waypoint and route sentences

1. Select the parameter to modify using ∧ ∨ and press ***ENTER***.
2. Use ∧ ∨ to select the desired option in the drop-down box. Press ***ENTER*** when done.
3. Press function key ***Apply and Exit***.

Restore factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key ***Get Default***.
3. Press function key ***Apply and Exit*** to save the changes.

4.11.10.5 Output Config

The Port Output Configuration view is used to configure which sentences are output on the User Ports of the R4 Combined AIS & Navigation System, and how often they are sent. In the Output Configuration subview for each user port, current load on the port is displayed. This gives an indication on how much of the port's baud rate that is used up by the enabled sentences. Only turn on the sentences that you intend to use.

If no response is received from the R4 Navigation Sensor, the R4 Navigation Sensor dependant sentences will be locked.

For a list of output sentences available on the different serial ports, refer to the R4 Combined AIS & Navigation System installation manual (P/N 7000 109-153).

The Port Output Configuration view is illustrated below.

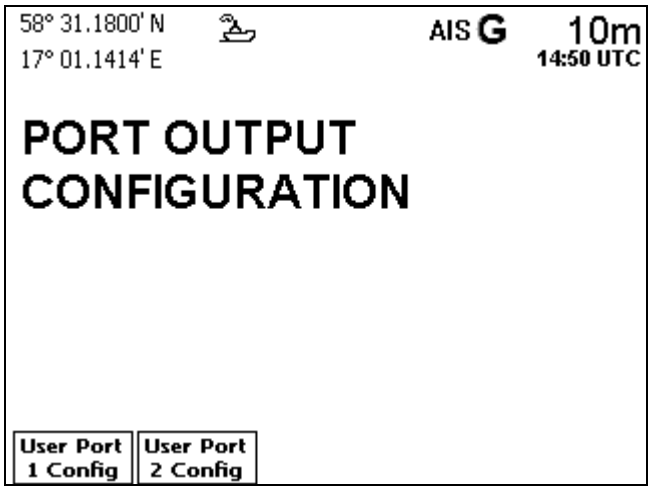


Figure 183 - Port Output Configuration

Note: If User Port 1 is selected as correction source, see section 4.11.8.1, this port will not be available in *Port Output Configuration* view.

Modify sentences sent on a specific port

1. Press the function key corresponding to the port to modify output sentences for. The following view is displayed.

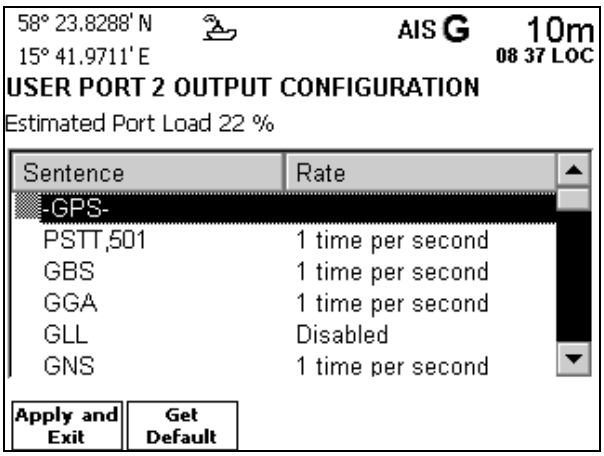


Figure 184 - Port Output Configuration

2. Highlight the sentence to modify output for using ∧ ∨.
3. To set the output interval, press ***ENTER*** and use ∧ ∨ to select the desired frequency to output the sentence at, or select ***Disabled*** to disable output of the selected sentence. Press ***ENTER*** when done.

Restore factory default setting

1. Use ∧ ∨ to select the parameter to return to the factory default setting.
2. Press function key ***Get Default***.
3. Press function key ***Apply and Exit*** to save the changes.

4.11.10.6 RTCM output on User 2 Port

It is possible to output correction data from the internal DGPS beacon receiver in RTCM format on the user 2 port. This function is available only if the R4 Combined AIS & Navigation Display is used together with an R4 DGPS Navigation Sensor with routing software version 1.07 or higher.

To determine current system type and current version of routing software proceed as described in section 4.11.12.

If this function is available, an 'RTCM' option will be added to the list of output messages in the User 2 Port Output Configuration view as illustrated below.

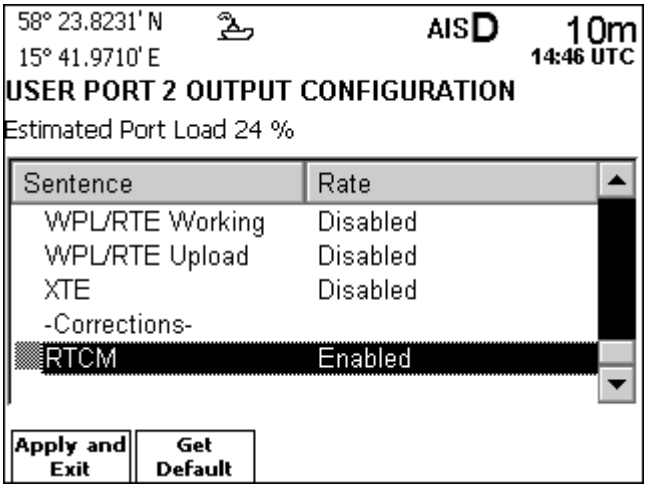


Figure 185 - User Port 2 Output Configuration

It is possible to interleave RTCM output data with the ordinary NMEA style text messages on the User 2 port. However, this may be a problem for receiving equipment and thus it is recommended that all other User 2 Port output messages shall be set to 'Disabled' when this feature is used.

The baud rate for RTCM output data is controlled by the 'User Port 2' rate parameter in the *Port Rate Configuration* view (see below). Selectable rates are 4800, 9600 and 19200.

4.11.11 Port Rate Config

The Port Rate Configuration view allows the user to configure the communication rate used for the serial ports in the R4 Combined AIS & Navigation System, and the output rate of the *Speed Log Output* binary port. The view also makes it possible to view the data that is received on the different serial ports.

The rate for the *Speed Log Output* binary port can be set to one of *Disabled, 100, 200, 300* or *400* pulses per nautical mile (P/Nm). The default setting is that Speed Log output is disabled. The output pulse period has a resolution of 50 ms providing a resolution of 0.5 knots up to 10-20 knots depending on pulse rate with a working range up to 30 knots.

The communication rate for a port is locked if no response is received from the unit (R4 Transponder or R4 Navigation Sensor) the port is located on. The Display port on the transponder and the Transponder port and Sensor port on the display is however always locked since the baudrate on these ports should not be changed.

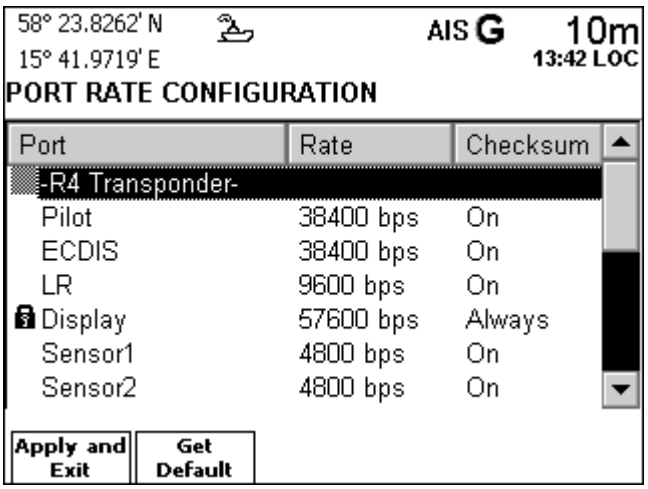


Figure 186 - Port Rate Configuration

Change communication rate

1. Select port to change communication rate (baud rate) for using ∧ ∨ and press ***ENTER***.
2. Use ∧ ∨ to select the desired communication rate in the drop-down box and press ***ENTER***.
3. Press function key ***Apply and Exit***.

Change Speed Log output rate

1. Select the Speed Log Output parameter using ∧ ∨. Press ***ENTER***.
2. Use ∧ ∨ to select the desired speed log output frequency in the drop-down list. Press ***ENTER*** when done.
3. Press function key ***Apply and Exit*** when done.

Restore factory default setting

1. Use ∧ ∨ to select the port to return to the factory default setting.
2. Press function key ***Get Default***.
3. Press function key ***Apply and Exit*** to save the changes.

View received data

1. Select serial port to view received data on using ∧ ∨. It is not possible to view received data on User Port 2, as it only supports output data.

2. Press function key ***View Raw Data***. The following view is displayed.

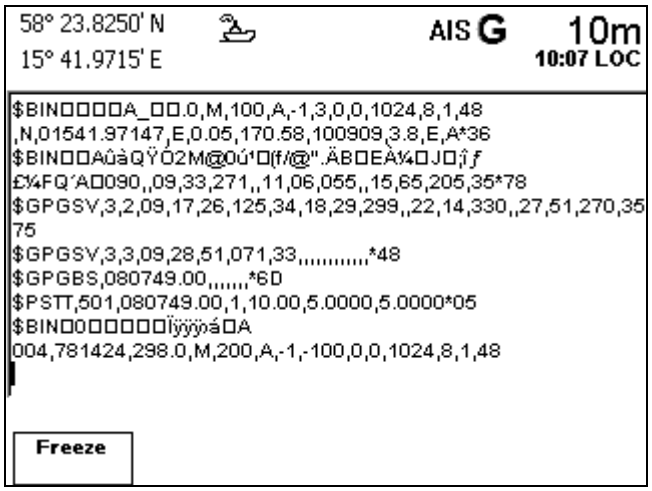


Figure 187 - View Raw Data view

3. Use function key ***Freeze*** to stop the update of raw data on the screen. Use ***Resume*** function key to view more data.
4. Press ***ESC*** when done.

4.11.12 System Info

The System Information view provides subviews for general system information. It contains subviews for: viewing software and hardware versions, displaying the results of the R4 Display's last performed built-in integrity tests and for viewing the current memory usage of the R4 Display. System Info view is accessed by pressing ***MODE→PAGE→System Info.*** The below view will be displayed:

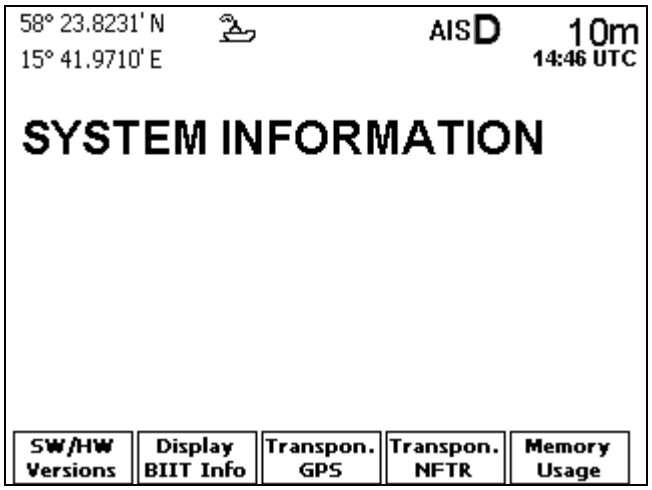


Figure 188 – System Information view

View software and hardware versions

1. Press the function key ***SW/HW Versions***.
2. The below view is displayed.

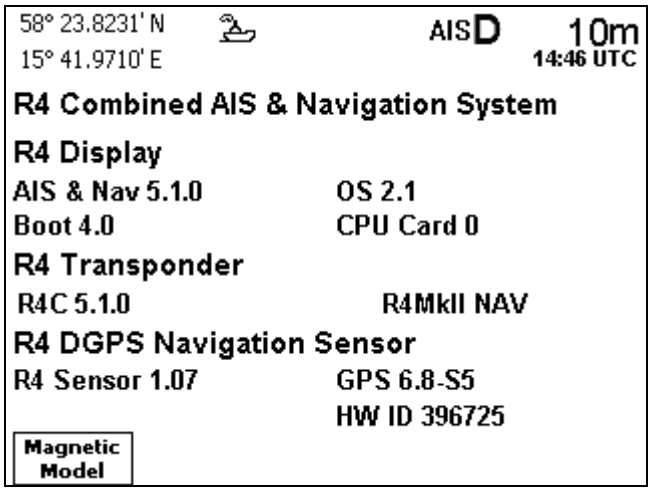


Figure 189 - Software/Hardware Versions

The view shows the software versions of the different components present in the R4 Display, R4 Transponder and R4 Navigation Sensor. It also shows hardware revisions for display and transponder and GPS module serial number. It is also possible to see if a GPS or DGPS Sensor is used.

View the result of the R4 Display's last performed built-in integrity tests

1. Press function key ***Display BIIT Info***.
2. A view displaying the built in test result is shown, as illustrated below.

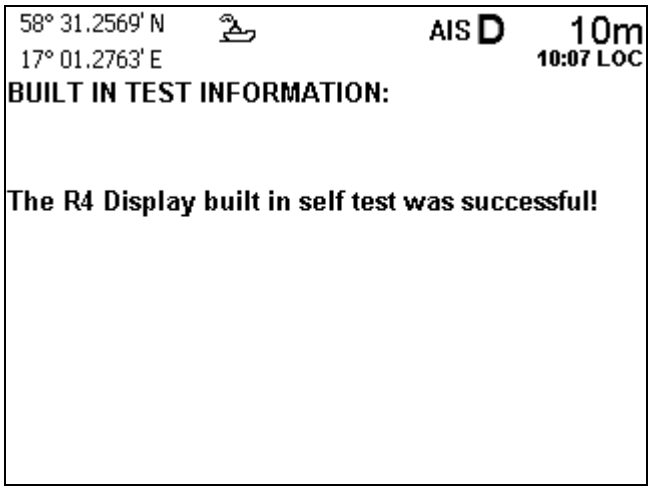
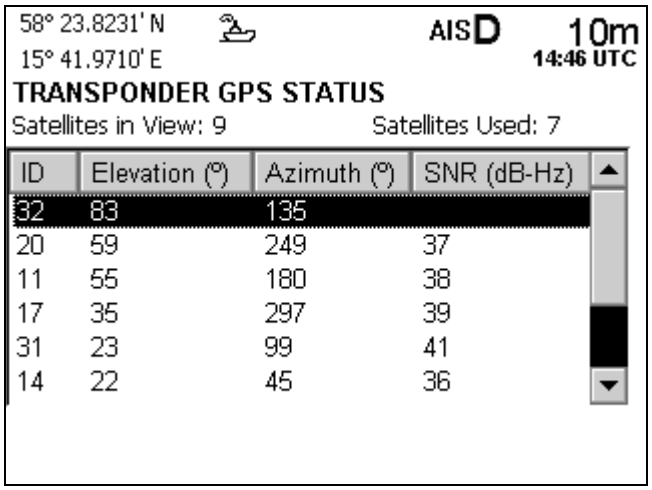


Figure 190 - Built in Test Information

View R4 Transponder's internal GPS Status

1. Press function key **Transpon. GPS**.
2. The *Transponder GPS Status* view is shown, as illustrated below.



The view displays the transponder's **internal GPS** status. At the top of the view the number of received satellites and the number of satellites actually used in the solution are shown. Elevation, Azimuth and signal to noise ratio for each received satellite are shown in the list.

View current memory usage of the R4 Display

1. Press function key ***Memory Usage***.
2. The Memory Usage view is shown, as illustrated below.

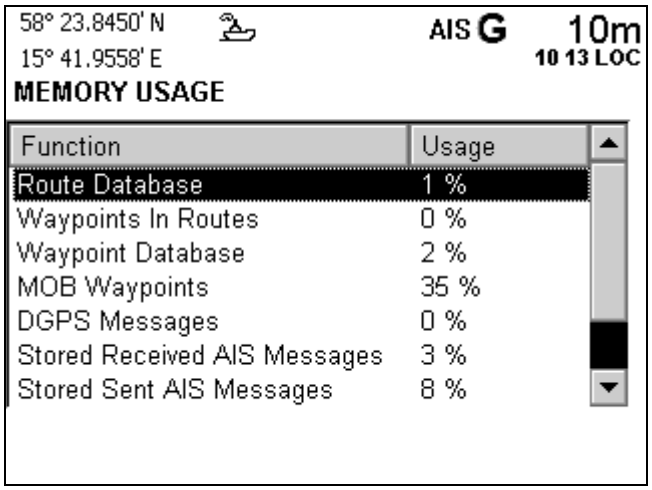


Figure 191 - Memory Usage

The memory usage is measured for:

- *Route Database* percentage of number of routes used.
- *Waypoints in Routes* percentage of route storage used.
- *Waypoint Database* percentage of waypoint storage used.
- *MoB Waypoints* percentage of MOB waypoint storage used.
- *DGPS Message* percentage of DGPS message storage used.

4.11.13 Restore Sys. Conf.

The *Restore System Configuration* view allows the user to restore the default settings for either the R4 Display, the R4 Transponder or the R4 Navigation Sensor.

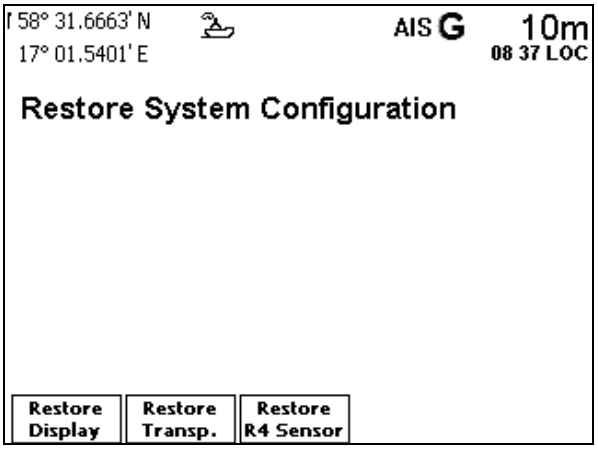


Figure 192 – Restore System Configuration

Restore display configuration

1. Press function key **Restore Display.**
2. Answer **Yes** to the confirmation message if confident in restoring all configuration parameters of the R4 Display.

Restore transponder configuration

1. Press function key **Restore Transp**.
2. Use the alphanumeric keypad to enter the administrator password. Use function key **Capslock** to change between upper and lowercase letters. Press ***ENTER*** when done.

Restore sensor configuration

1. Press function key **Restore R4 Sensor**.
2. Answer **Yes** to the confirmation message if confident in restoring all AIS configuration parameters of the R4 Navigation Sensor.
3. The display needs to be rebooted after the sensor restore. This is done automatically after 15 s but may be done manually when the reboot message is displayed.

5 APPENDIX

5.1 Alarm Messages

The alarm messages that can occur in a R4 Combined AIS & Navigation System are listed below.

Table 2 - AIS Alarm Messages

ID	Message	**Abbrevation** (in *Alarm Config*)
001	AIS: Tx malfunction	
002	AIS: Antenna VSWR exceeds limit	Antenna VSWR
003	AIS: Rx channel 1 malfunction	Rx 1 Malfunction
004	AIS: Rx channel 2 malfunction	Rx 2 Malfunction
005	AIS: Rx channel 70 malfunction	Rx 70 Malfunction
006	AIS: General failure	
008	AIS: R4 Transponder Lost Connection to R4 Display	Transp. Lost Display
025	AIS: External EPFS lost	No external EPFS
026	AIS: No sensor position in use	No Sensor Position
029	AIS: No valid SOG information	No Valid SOG Info.
030	AIS: No valid COG information	No Valid COG Info.
032	AIS: Heading lost/invalid	
035	AIS: No valid ROT information	No Valid ROT Info.
165	AIS: R4 Display Lost Connection to R4 Transponder	Display Lost Transp.

Table 3 - Navigation Alarm Messages

ID	Message
151	NAV: HDOP Limit Exceeded
152	NAV: Position Data Lost
153	NAV: DGPS Position Data Lost
154	NAV: GPS Not Initialized
155	NAV: GPS Connection Lost
156	NAV: XTE Limit Exceeded
157	NAV: Approaching Waypoint (Distance)
170	NAV: Approaching Waypoint (Time)
159	NAV: Serial Waypoint Download Failed
160	NAV: Serial Route Download Failed
161	NAV: Heading Data Lost
162	NAV: Depth Data Lost
163	NAV: RAIM Status - Caution
164	NAV: RAIM Status - Unsafe
166	NAV: Redundant System Connection Lost
167	NAV: Anchor Alarm Distance Exceeded
168	NAV: Scheduled Alert
169	NAV: DGPS Integrity Alert

5.1.1 AIS Alarms Description

AIS: Tx Malfunction

A Tx Malfunction alarm is generated if there is a malfunction in the radio transmitter hardware or if the antenna VSWR exceeds an allowed ratio. If the radio transmitter returns to normal operation or if VSWR returns to a value below the allowed threshold, the alarm is cleared.

AIS: Antenna VSWR Exceeds limit

The VSWR (Voltage Standing Wave Ratio) of the antenna is checked for every transmission and if it exceeds a given ratio then a VSWR alarm is generated. If the VSWR goes below the allowed threshold, the alarm is cleared.

AIS: Rx Malfunctions

The radio receivers are continuously monitored and if any part of the receivers hardware should malfunction, a Rx Malfunction alarm is generated for that receiver. If the radio receiver returns to normal operation, the alarm is cleared.

AIS: General Failure

This alarm is generated if the R4 AIS Transponder fails to initiate the radio or internal GPS. If this alarm occurs, contact your retailer.

AIS: R4 Transponder Lost Connection to R4 Display

This alarm is active if the communication between the R4 AIS Transponder and the R4 Display does not work. The alarm indicates that the Transponder does not receive any data from the Display.

AIS: R4 Display Lost Connection to R4 Transponder

This alarm is active if the communication between the R4 AIS Transponder and the R4 Display does not work. The alarm indicates that the Display does not receive any data from the Transponder.

AIS: External EPFS Lost

This alarm is generated if the position from the external Electronic Position Fixing System is invalid (i.e. no external GNSS). Due to the fallback arrangement for the positioning sensor this alarm can be inactive up to 30 seconds (during which the internal GNSS is used) before the alarm is activated.

AIS: No Sensor Position In Use

This alarm is active if the R4 AIS Transponder does not have a valid position (latitude/longitude) from any sensor.

AIS: No Valid SOG Information/No Valid COG Information

These alarms are active if the R4 AIS Transponder does not have a valid SOG (Speed Over Ground) or a valid COG (Course Over Ground) from any sensor. The SOG and COG is based on the speed log (if external GNSS is used and a valid heading is available) or the GNSS currently in use.

AIS: Heading Lost/Invalid

This alarm is generated if either the heading information is lost/invalid (from external sensors) or if the heading is undefined.

AIS: No Valid ROT Information

This alarm is active if ROT (Rate Of Turn) is undefined or if no valid ROT information is available from external sensor or internal calculations.

5.1.2 Navigation Alarms Description

NAV: HDOP Limit Exceeded

This alarm is active when the HDOP (horizontal dilution of precision) exceeds 4.0.

NAV: Position Data Lost

This alarm is active when no valid position information is available from the R4 Navigation Sensor.

NAV: DGPS Position Data Lost

This alarm is active when a differentially corrected position is not available.

NAV: GPS Not Initialized

The alarm is active when the display is not able to configure or receive the current configuration from the R4 Navigation Sensor.

NAV: GPS Connection Lost

This alarm is active if the communication between the GPS and the display unit does not work.

NAV: XTE Limit Exceeded

This alarm is active if the current cross-track error is greater than the configured cross-track error limit.

NAV: Approaching Waypoint (Distance)

This alarm is active when the distance to next waypoint is shorter than the approach distance configured in the Nav Config view, described on page 145.

NAV: Approaching Waypoint (Time)

This alarm is active when the estimated time to go to next waypoint is shorter than the waypoint approach time configured in the Nav Config view, described on page 145.

NAV: Serial Waypoint Download Failed

This alarm is raised if serial download of waypoint information has failed.

NAV: Serial Route Download Failed

This alarm is raised if serial download of route information has failed.

NAV: Heading Data Lost

This alarm is active when no valid heading data is received.

NAV: Depth Data Lost

This alarm is active when no valid depth data is received.

NAV: RAIM Status - Caution

This alarm is active when the RAIM status is caution.

NAV: RAIM Status - Unsafe

This alarm is active when the RAIM status is unsafe.

NAV: Redundant System Connection Lost

No connection to an external R4 nav system in redundant system configuration.

NAV: Anchor Alarm Distance Exceeded

This alarm is active when the anchor watch function is in operation and the range limit has been exceeded.

NAV: Scheduled Alert

This alarm is active when a scheduled time or ETA alert has been activated.

NAV: DGPS Integrity Alert

This alarm is active when any of the following conditions apply:

- No DGPS Signal: A correction source for GPS other than None has been selected in the GPS Configuration view and more than ten seconds have passed since a new set of differential corrections were applied to the navigation solution.
- Station Unhealthy: Beacon has been selected as correction source for GPS and the radio beacon station in use indicates an unhealthy status.
- Station Unmonitored: Beacon has been selected as correction source for GPS and the radio beacon station in use indicates an unmonitored status.
- Poor Signal: Beacon has been selected as correction source for GPS and word error rate of the received signal in use exceeds 10%.

5.2 Indication Messages

The indication messages, with identity and type information, are listed below:

ID	Type	Message text
007	Status	UTC clock lost
021	Status	External DGNSS in use
022	Status	External GNSS in use
023	Status	Internal DGNSS in use (beacon)
024	Status	Internal DGNSS in use (msg 17)
025	Status	Internal GNSS in use
027	Status	External SOG/COG in use
028	Status	Internal SOG/COG in use
031	Status	Heading valid
033	Status	Rate of Turn Indicator in use
034	Status	Other ROT source in use
036	Event	Channel management parameters changed
053	Status	SOG from external position source
054	Status	SOG from log sensor
055	Status	UTC clock OK
056	Event	Channel management zone memory changed
061	Status	Enter semaphore mode
061	Event	Leave semaphore mode
063	Event	NVM Checksum errors
064	Event	RATDMA overflow
066	Status	Tanker Low VHF Power Mode

5.3 Long Range Definitions

A = Ship's name, call sign, and IMO number

B = Date and time of message composition

C = Position

E = Course over ground (COG)

F = Speed over ground (SOG)

I = Destination and Estimated Time of Arrival (ETA)

O = Draught

P = Ship/Cargo

U = Ship's length, breadth, type

W = Persons on board

5.4 Transfer Waypoint and Routes

The R4 Combined AIS & Navigation System supports both download and upload of waypoints and routes from/to ECDIS and other external systems. The system also supports continuous output of the current active route. Waypoints and routes are transferred using the WPL and RTE sentences. The WPL and RTE sentences are interpreted according to the IEC 61162-1 (2000) standard. The Rnn sentence is supported but for NMEA backward compliance only. It can only be used to output and receive active routes.

5.4.1 Download Waypoints and Routes

Waypoints and complete routes can be received on user port 1 by using the WPL and RTE sentences. Active route can also be received using the Rnn sentence. Which sentences that should be interpreted can be configured in the WPT/RTE Input view, described on page 171.

Received routes are assigned the navigation algorithm specified by the parameter RTE Nav Algorithm, described in section 4.11.4 "Nav Config" on page 145. The R4 Navigation System can store a maximum of 2000 waypoints and 100 routes.

5.4.1.1 Waypoint and Complete Route Downloads

Received waypoints and complete routes will be stored in the R4 Display, and will automatically replace any existing waypoints/routes with the same name.

5.4.1.2 Working Route Downloads

A working route indicated by the Message mode field being set to 'w' in the RTE sentence that is received by the R4 Navigation System will automatically become the new active route of the system, and replace any existing active route.

Routes received using the Rnn sentence will also automatically become the new active route. The ‘nn’ part of the Rnn sentence is interpreted in the same way as the Route identifier field of the RTE sentence, i.e. as route name.

The first received waypoint of a working route will become the first ‘from’ waypoint and the second waypoint received will become the first ‘to’ waypoint of the active route. This is in accordance with the interpretation of the RTE sentence for working routes as defined in IEC standard 61162-1.

5.4.2 Upload Waypoints and Complete Routes

Uploaded waypoints and routes will be output using the WPL and RTE sentences, on the serial port where the sentence WPL/RTE Upload is enabled. See section “Output Config” on page 172 for details on enabling output sentences.

To upload a waypoint, go to the Waypoint List view described on page 110 and use the Upload Waypoint function key to transmit information about the highlighted waypoint on the configured serial port(s). It is also possible to upload the complete set of waypoints with a function key labelled Upload All Wps. To upload a complete route, go to the Route List view described on page 94 and use the Upload Route function key to transmit information about the highlighted route and all associated waypoints.

5.4.3 Output Working Route and Remaining Waypoints

The system supports output of the current active route (the working route) and the remaining waypoints of the route. The active route can be transmitted both using WPL/RTE and WPL/RNN sentences. Usage of WPL/RTE is recommended.

When navigating towards the first waypoint of the route, the ship’s current position is output as the origin waypoint. This waypoint is named “t0” when using WPL/RTE and “0000” when using WPL/RNN.

When transmitting active route data using WPL/RNN, the waypoints in the active route are given a number corresponding to their position in the route, starting from “0001”. The “NN” field in RNN is always “00”.

The number of remaining waypoints of the active route that are outputted is determined by the RTE/Rnn WP Limit parameter described in section 4.11.4.

Enabling output sentences is described in section 4.11.10.5 “Output Config” on page 172.

6 GLOSSARY

AIS	Automatic Identification System
ARPA	Automatic Radar Plotting Aid
BRG	Bearing
COG	Course Over Ground
DGNSS	Differential Global Navigational Satellite System
DSC	Digital Selective Calling
ECDIS	Electronic Chart Display and Information System
EGNOS	European Geostationary Navigation Overlay Service
EPFS	Electronic Position Fixing System
ETA	Estimated Time of Arrival
GNSS	Global Navigational Satellite System
GPS	Global Positioning System
HDG	Heading
HDOP	Horizontal Dilution Of Precision
IALA	International Association of Lighthouse Authorities
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
ITU	International Telecommunications Union
LR	Long Range
MKD	Minimum Keyboard and Display
MSAS	MTSAT Satellite Augmentation System (Japan)
NMEA	National Marine Electronics Association
MMSI	Maritime Mobile Service Identity
NVM	Non-Volatile Memory
RAIM	Receiver Autonomous Integrity Monitoring
RNG	Range
RATDMA	Random Access Time Division Multiple Access
ROT	Rate Of Turn
Rx	Receive
SAR	Search And Rescue
SBAS	Satellite Based Augmentation System
SNR	Signal to Noise Ratio

SOG	Speed Over Ground
SRM	Safety Related Message
TDMA	Time Division Multiple Access
Tx	Transmit
UTC	Universal Time Coordinated
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio.
WAAS	Wide Area Augmentation System (United States)