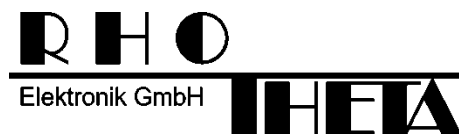


User Manual

RT-400 DF Scout



Edited by:

RHOTHETA Elektronik GmbH
Kemmelpark
Dr.-Ingeborg-Haeckel-Str. 2
82418 Murnau
Germany

Tel.: +49 8841 4879 - 0
Fax: +49 8841 4879 - 15

Internet: www.rhotheta.de
E-Mail: email@rhotheta.de

Copyright © RHOTHETA Elektronik GmbH
All rights reserved
- *Issue: 2020/08/14 [Rev 1.05]*
- *Document-ID: 12-9-1-0020-3-1-61*

Note

The manufacturer reserves the right to make modifications at any time and without previous information of the here described product.

Content

1	Overview.....	4
2	Installation.....	4
2.1	System Requirements	4
2.2	Installing the DF Scout Application	5
2.2.1	Licensing.....	6
2.2.2	WiFi Connection.....	7
2.2.3	MAP Data.....	7
2.3	Compass calibration	7
3	Map Pages.....	9
3.1	Basic Elements of the Bottom Line.....	10
3.2	Basic Elements and Functions of the Map Section	12
3.3	Map Page Bearing	14
3.4	Map Page Decode	16
3.5	Map Page Scan	20
3.6	Special Map Operations	22
3.6.1	Creating a semi-automatic target position on the map	22
3.6.2	Creating a manual target position on the map.....	25
3.6.3	Deleting an item on the map.....	26
4	Dialog Pages	27
4.1	Main Menu	27
4.2	Input dialogues	29
4.2.1	Numerical Input Dialog	29
4.2.2	Textual Input Dialog.....	30
4.2.3	Technical Input Field (Standard Version)	32
4.2.4	Technical Input Field in Map Page Scan	35
4.3	SAR Scan Settings	37
4.3.1	Configuring Stop Condition.....	39
4.4	Display Settings	40
4.5	System Settings.....	44
4.6	Service Settings.....	48
4.6.1	Export Configuration Dialog.....	51
4.6.2	Import Configuration Dialog	53
4.6.3	KML Logging and Export Log Files Dialogs	54
4.7	Error and Warning messages.....	58
5	Troubleshooting	61
6	Notes.....	63

1 Overview

This guide is part of the product RT-400 DF Scout and must be kept with the product throughout its lifetime.

The RT-400 DF Scout is designed to control and operate a RHOTHETA direction finder antenna unit through Wi-Fi connectivity.

It operates on tablet computers running ANDROID operating systems.

Operation, including access to geographical maps, is independent from internet connections.

The RT-400 DF Scout application is a map-based tool, helping to quickly find your way to the source of a transmission, for example, a search and rescue (SAR) beacon. The application is built around a large map screen, offering three major operating modes or map pages:

- Map Page Bearing for bearing transmission sources
- Map Page Scan for finding specific SAR transmissions
- Map Page Decode for decoding COSPAS-SARSAT transmissions of COSPAS-SARSAT compatible SAR beacons

The user might use the RT-400 DF Scout either to simply follow a “line of bearing”, or to collect several “lines of bearing”, defining a possible target position manually or semi-automatically, or to decode a possible target position from a COSPAS-SARSAT transmission.

2 Installation

2.1 System Requirements

Minimum Tablet Requirements	
Operating System:	<i>Android 5.1 or newer Recommended: Android 9 (GMS) or newer</i>
Processor:	<i>Qualcomm® Snapdragon 410 (MSM8916) (4 cores 1.2 GHz)</i>
Memory:	<i>2 GB RAM / 16 GB internal storage</i>
Interfaces:	<i>Micro SD-Slot (128 GB)</i>
Display:	<i>Minimum: 7” Recommended: 8” – 10.5”</i>
Important Features:	<ul style="list-style-type: none"> - Wi-Fi Module - Compass - GNSS Receiver (e.g. GPS)

2.2 Installing the DF Scout Application

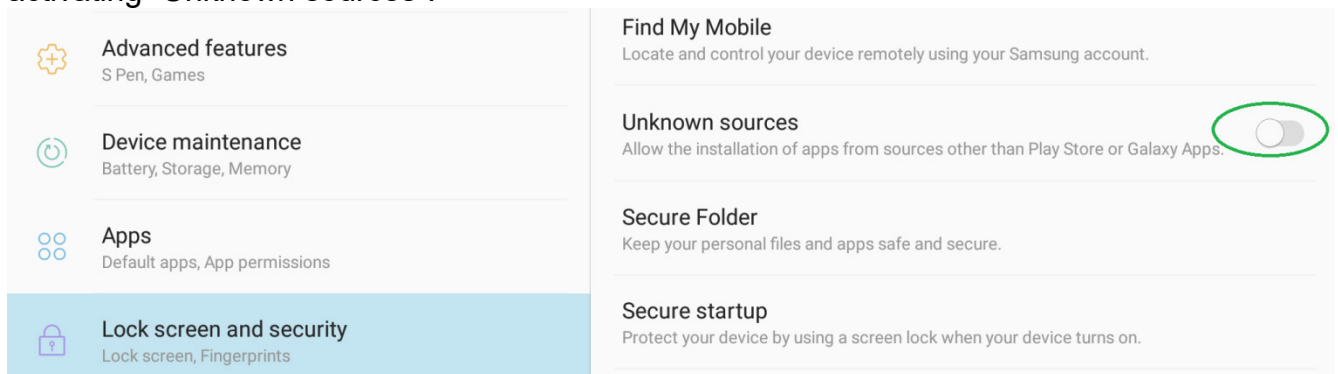
The .apk file shall be copied to the internal memory or to a SD card placed into the tablet. Double-tap the .apk file.

In standard Android installations, the installation of apps obtained from unknown sources is not enabled and must be unblocked manually. Tap on “settings” to open the relevant settings dialog:

For security, your phone is set to block installation of apps obtained from unknown sources.

CANCEL **SETTINGS**

In the settings dialog, the “Lock screen and security” menu allows to enable the installation by activating “Unknown sources”.



Confirm with “OK”, then confirm that the application shall be installed by tapping “INSTALL”. Once the installation is successful, the application can be opened by tapping “OPEN”.

Unknown sources

Installing from unknown sources may be harmful to your device and personal data. By tapping OK, you agree that you are solely responsible for any damage to your device or loss of data that may result from using these applications.

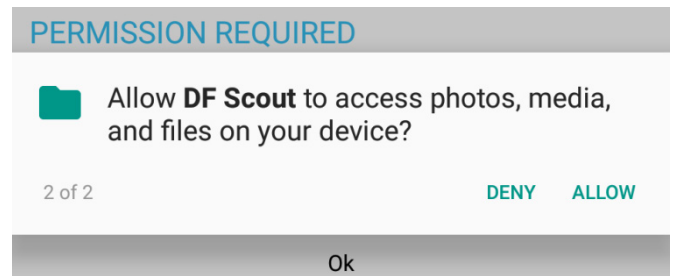
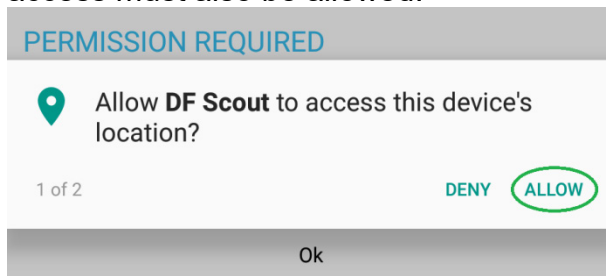
☒ Allow this installation only

CANCEL **OK**

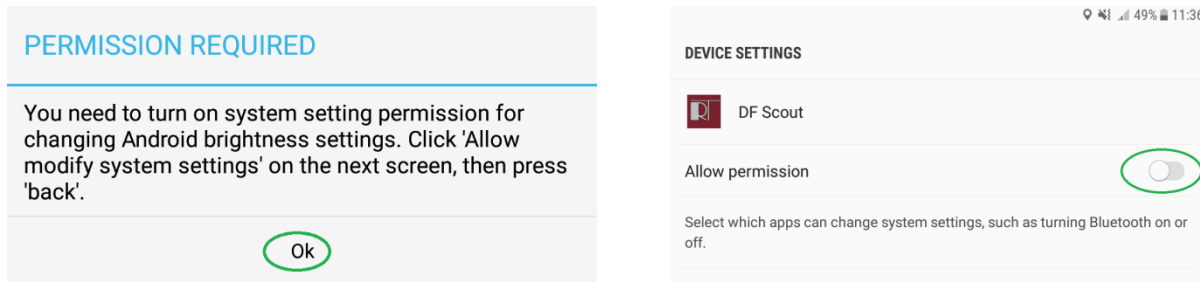
CANCEL **INSTALL**

DONE **OPEN**

To be able to use map functions, access to the device’s location must be allowed, and file access must also be allowed.



To allow automatic brightness settings by RT-400 DF Scout, the system’s permissions must be modified. Confirm this with “OK”, then allow permission to change system settings by tapping the slider symbol:



After that, use the “Back” button of your tablet to go back to the DF Scout application:

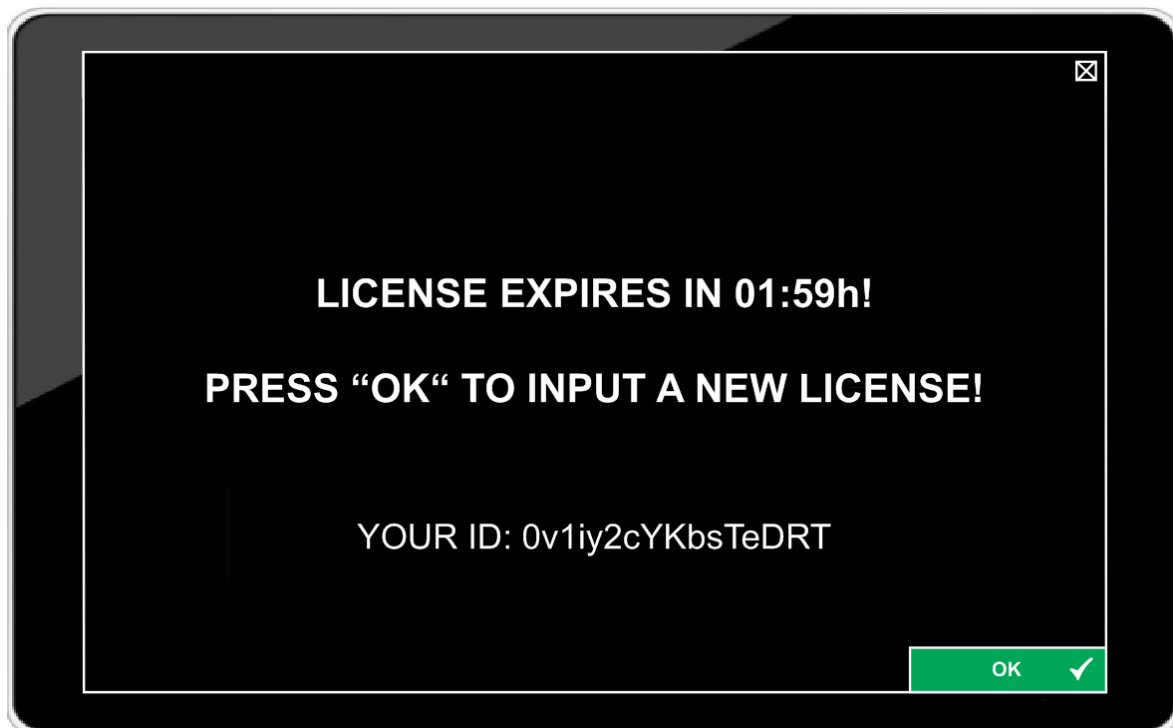


Next, the license code has to be entered.

Note: Depending on Android versions used and on manufacturer-specific adaptations, some of the dialogs shown might look slightly different on your tablet computer.

2.2.1 Licensing

Each copy of RT-400 DF Scout must be licensed to the tablet on which it has been installed. The licence is bound to the hardware used.



After sending the hardware ID to RHOTHETA, we will provide you with the required license key. Tap “OK” to continue with entering the license code:

The license key can be entered through the textual input dialog and, if numbers are included, through the numerical input dialogue.

If a part of the key has not been entered correctly, the procedure restarts, but with the same key.

Note: The key code is case sensitive.



If successfully entered and confirmed with “OK”, the application will start.

2.2.2 WiFi Connection

The WiFi connection must be established before using the application.

Please check the settings of the particular tablet in order to activate the WiFi.

It is recommended to use the “auto reconnect” function of the tablet, so that the system automatically reconnects to the wireless network after starting the tablet or loss of connection. Note that only one WiFi hotspot should be set to “auto reconnect” when using this function.

If the antenna unit is activated, the corresponding SSID: **RT-400 SN******* is available in the list of accessible networks. To establish the connection to the antenna unit use the password: **rhotheta123**.

2.2.3 MAP Data

Map Data used on Map Pages must be stored in an SD Card, with the map data being located in the folder “OSM_tiles”.

Map data in the required data format is provided by RHOTHETA.

New additional map files must only be copied into the existing “OSM_tiles” folder to be automatically found by the application.

While using the DF Scout application, map data from the SD Card is loaded into the internal app storage to reduce access time. This causes the storage consumption of the application to increase. It is possible to check the data in Android settings and to clear it if necessary.

2.3 Compass calibration

Before starting an operation, make sure the compass heading and orientation of the maps are correct. If this is not the case, the compass inside the tablet must be calibrated.

There are several ways to do so. One of them is to use the “Google Maps” app, which is preinstalled on an Android tablet. Alternatively, the calibration can be performed while working with the DF Scout app. To get acquainted with the flow of motion needed for the calibration, use Google Maps.

Start the “Google Maps” app and press the blue dot that identifies your own position. This opens a menu in which you have to select the option “Calibrate compass”. Then follow the instructions on the screen. If the calibration has been successful, a dialog with the message “Compass calibrated” will show. Afterwards, switch back to the “DF Scout” app.

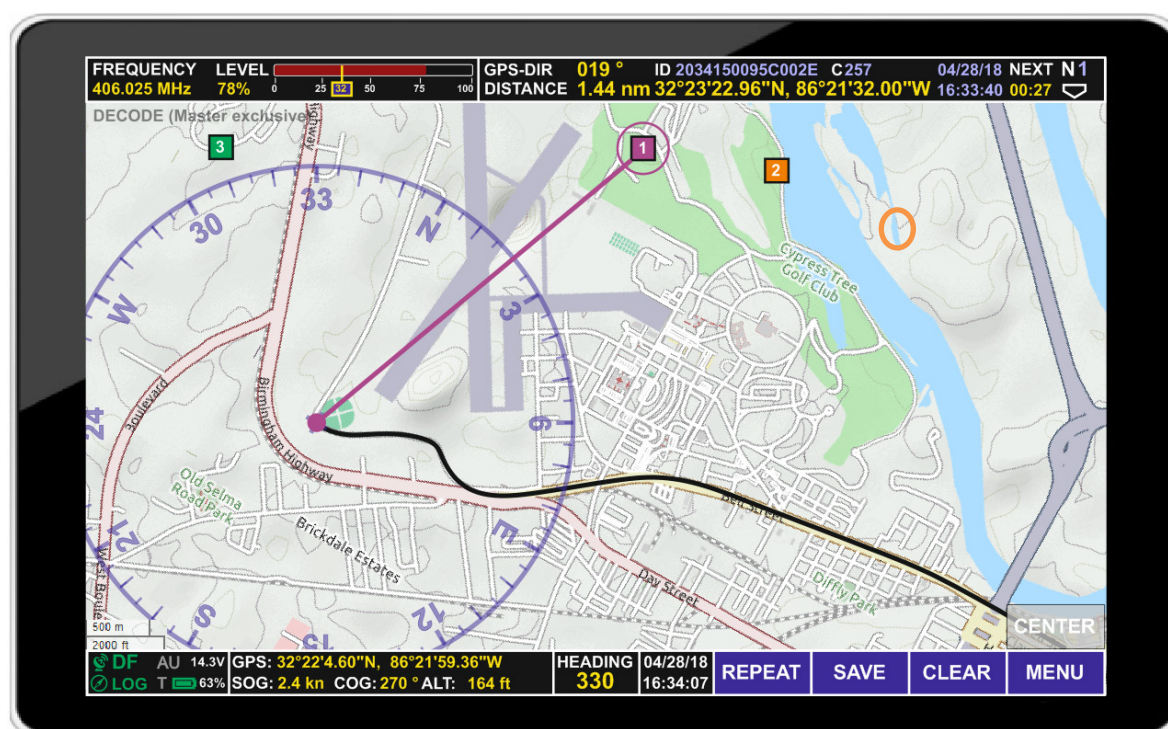
3 Map Pages

There are three main pages used during normal operation of the RT-400 DF Scout:

- Map Page Bearing
- Map Page Decode
- Map Page SAR Scan

They are selected through the Main Menu dialog page.

All those pages are divided into three main sections, as shown in the example (Map Page Decode):









- Top line, showing the most important information regarding the beacon to be received, with page-specific information. Refer to the specific map pages sub-chapters for more details.
- Bottom line, showing all necessary information regarding the user's position and DF technical status.
- Map Section, showing the user's position and GPS track, Lines of Bearing, and target positions on a map.

There are several symbols on each page indicating system status information or allowing basic system operation.






3.1 Basic Elements of the Bottom Line

 DF AU 14.3V	GPS: 32°22'4.6"N, 86°21'59.4"W	HEADING 330	04/28/18 16:34:07	REPEAT	SAVE	CLEAR	MENU
 LOG T  63%	SOG: 2.4 kn COG: 270 ° ALT: 164 ft						



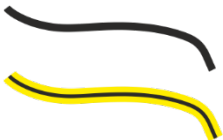
Basic Elements of the Bottom Line	
Symbol	Description
	The GPS symbol indicates whether GPS/GNSS data is available or not. When GPS data is not available, there should be a gray symbol.
	The COMPASS symbol indicates whether compass data is available (green) or not (gray).
DF DF	DIRECTION FINDER indicates whether data from the Antenna Unit is available (green) or not (red).
LOG LOG	LOGGING ON indicates whether logging is activated (green) or not (gray).
AU 14.3V	BATTERY VOLTAGE ANTENNA UNIT indicates the battery voltage of the Antenna Unit.
T  63%	BATTERY STATUS TABLET indicates the battery status of the tablet (full battery is indicated with battery symbol entirely green colored and 100%).
Tap and hold the fields above for a few seconds to open the "Service Settings: KML Logging Dialog" (Refer to Chapter "KML Logging and Export Log Files Dialogs" for details)	
GPS: 32°22'4.60"N, 86°21'59.36"W	GPS POSITION indicates the current Position (Latitude / Longitude) of the DF as calculated from GNSS (GPS) reception.
SOG: 2.4 kn	SPEED OVER GROUND indicates the current speed over ground of the DF, as calculated from GNSS (GPS) reception.
COG: 270 °	COURSE OVER GROUND indicates the Course Over Ground of the DF as calculated from GNSS (GPS) reception.
ALT: 164 ft	ALTITUDE indicates the Altitude of the DF as calculated from GNSS (GPS) reception.
Tap and hold the fields above for a few seconds to open the Display Settings Dialog, where the format of the indications can be changed.	
HEADING 330	HEADING indicates the Heading of the Tablet as calculated from the internal compass.
Tap and hold the HEADING field for a few seconds to open the System Settings Dialog, where the Heading Source may be changed.	
04/28/18 16:34:07	DATE AND TIME shows current date and time received from GPS, shown in US data format (Month/Day/Year).
REPEAT	Tapping the REPEAT BUTTON displays the last bearing with a gray-colored Line Of Bearing. Important: If there is an active bearing signal, tapping the REPEAT BUTTON has no effect! Furthermore, an incoming bearing will always have priority and immediately terminate the repeat view.

Basic Elements of the Bottom Line	
Symbol	Description
	If the SAVE BUTTON is tapped during an active bearing, the currently received bearing is shown permanently on the screen as DIRECTION OLD (dotted Line of bearing). This is also valid for the SAR Scan. There is no need to save a COSPAS-SARSAT position received, as this is done automatically in decode mode (Map Page Decode).
	<p>Tapping the CLEAR BUTTON opens a dialog to delete the currently selected item on the map. It can be confirmed by tapping "OK" or rejected by tapping the ESCAPE cross within the message.</p> <p>If nothing is selected, the CLEAR function clears the internal bearing value averaging memory. The averaging memory enhances bearing accuracy and delivers a useful bearing display even with weak receiving signals. The averaging procedure causes a drag error, which might influence the bearing value, if changing heading too quickly. In this case, the indicated bearing value will be lagging a bit to the actual bearing value.</p> <p>By tapping the CLEAR BUTTON after a distinct change of heading, the corrected bearing value will be displayed immediately.</p>
	Tapping the MENU BUTTON opens the Menu settings dialog.

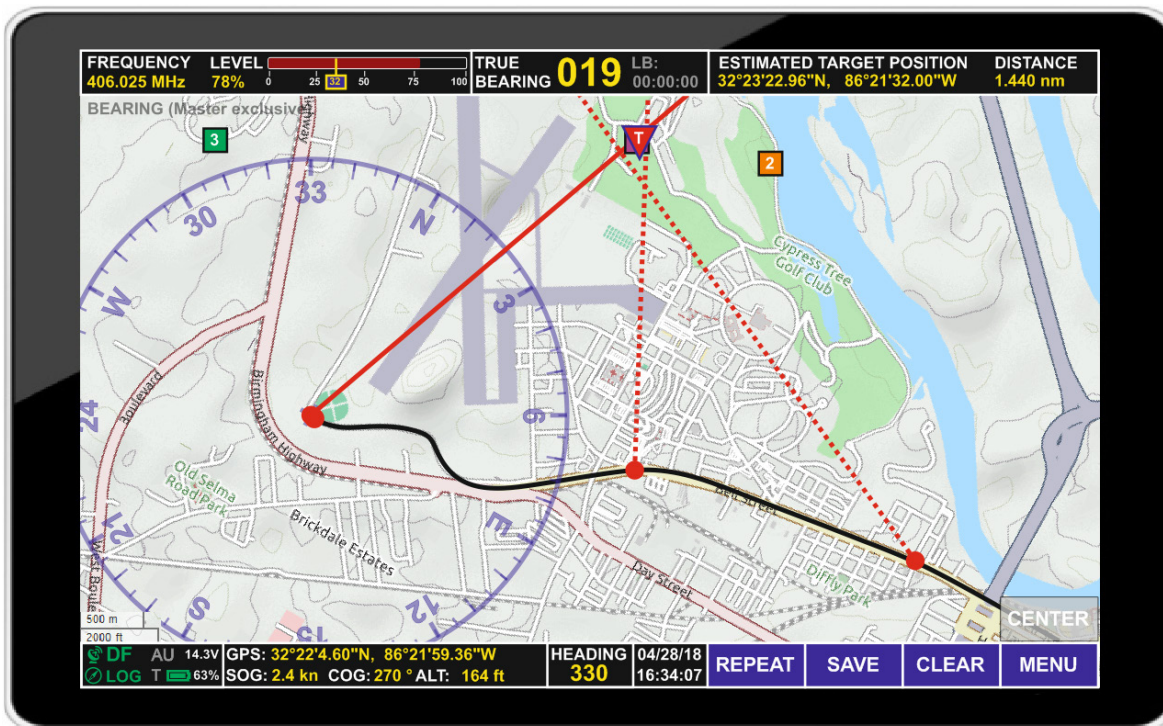
3.2 Basic Elements and Functions of the Map Section

Basic Elements and Functions of the Map Section	
Symbol	Description
	Tapping the CENTER BUTTON centers the bearing rose (azimuth dial) on the screen.
	<p>An ACTUAL Line Of Bearing indicates the direction from the actual position of the Antenna Unit to the last bearing. The Bearing Indication Hold Time defines how long this line will be visible on the screen if no other bearing arrives (See “Display Settings Dialog”). If a new bearing arrives, the old line will disappear.</p> <p>If the REPEAT button is tapped after the signal falls below the squelch level, the last bearing will be repeated, and the line will be shown in gray color.</p> <p>If the SAVE button is tapped while an ACTUAL Line of Bearing (including a repeated one) is being displayed, it will be stored as a DIRECTION OLD Line of Bearing.</p>
	<p>DIRECTION OLD Line of Bearing indicates Lines Of Bearings stored from an ACTUAL Line of Bearing using the SAVE Button. Both the user's position and Line Of Bearing saved at the time of reception are shown.</p> <p>Special functions and looks are available in scan mode (Map Page Scan):</p> <p>If a line of bearing is received during SCAN mode in a COSPAS-SARSAT frequency, it is stored automatically.</p> <p>Depending on the receive frequency, stored DIRECTION OLD Line Of Bearings receive different colors, and the frequency of reception is written alongside the line.</p> <p>If a DIRECTION OLD Line of Bearing is tapped, it will be highlighted and shown as a black line with yellow background for some seconds.</p> <p>If the Button CLEAR BUTTON is tapped in this state, the related dialog for deleting will be opened.</p> <p>Additional functions are available for Semi-Automatic Target Positions and described in the appropriate chapter.</p>
	The HEADING ARROW indicator is only used when the map view is configured to “North Up” and shows the current TRUE heading which is given by compass data and variation.
	The user's POSITION mark is in the center of the azimuth dial. Usually it is indicated as a filled red circle.

Basic Elements and Functions of the Map Section

Symbol	Description
	<p>The POSITION TARGET BEARING is an estimated target position, based on semi-automatic calculation using Lines of Bearing or on the user's estimation (see Special Map Operations).</p> <p>This symbol can be selected by tapping it on the screen. A selected symbol is highlighted with a black outline and black text on yellow background.</p> <p>If the Button CLEAR BUTTON is tapped in this state, the related dialog for deleting will be opened.</p> <p>Otherwise, the highlight disappears after a few seconds and the symbol keeps its original appearance.</p> <p>Double-tap on an estimated beacon position on the map to create a target position.</p>
	<p>POSITION TARGET GPS is a target position based on GPS data from a decoded COSPAS-SARSAT message. The number inside the symbol starts with "1" and is incremented with every new COSPAS-SARSAT beacon ID. That means the first COSPAS-SARSAT message generates a symbol with "1". The number relates to the full beacon ID. The color is automatically determined by the software. The actual position from the last decoding is always shown with a circle around the symbol.</p> <p>This symbol can be selected by tapping it on the screen. A selected symbol is highlighted with a black outline and black text on yellow background.</p> <p>If the Button CLEAR BUTTON is tapped in this state, the related dialog for deleting will be opened.</p> <p>Otherwise, the marking disappears after a few seconds and the symbol keeps its original appearance.</p>
	<p>A TRACK is the GPS track of the Antenna Unit.</p> <p>It can be selected by tapping it on the screen. A selected track is highlighted and shown as a black line with yellow background.</p> <p>If the Button CLEAR BUTTON is tapped in this state, the related dialog for deleting will be opened.</p> <p>Otherwise, the marking disappears after a few seconds and the track keeps its original appearance.</p>

3.3 Map Page Bearing



On the map display, the user's position is in the center of an azimuth dial (bearing rose), whose upper edge points toward the direction of the heading.

The currently measured bearing is shown as a solid red line with a red dot as the current position, while older bearing lines from other positions are shown as dotted lines. Refer to “Basic elements of the Map Section” for a detailed explanation of symbols.




To provide a graphical distinction between marked positions, decoded positions (see chapter “Map Page Decode”) are represented by a rectangle with an appropriate decode number, which corresponds to a certain beacon ID. An estimated beacon position in bearing mode is represented by a triangle with “T” inside (“Target”). Refer to chapter “Special Map Operations” for details.

Basic Elements of the Top Line, Map Page Bearing

Symbol	Description
FREQUENCY 406.025 MHz	The FREQUENCY field shows the current receiving frequency while in bearing mode. Tap and hold this area for a few seconds to open the technical input field.
SAR SCAN 406.025 MHz	SAR SCAN is displayed instead of “FREQUENCY”, if Map Page “Scan” is active.
LEVEL 78% 0 25 32 50 75 100	The LEVEL indicator shows the receive signal strength of the currently received signal as a bar graph and numeric value. The small figure below the bar graph is the currently set squelch level.

Tap and hold the fields above for a few seconds to open the Technical Input Field.
(Standard Version)

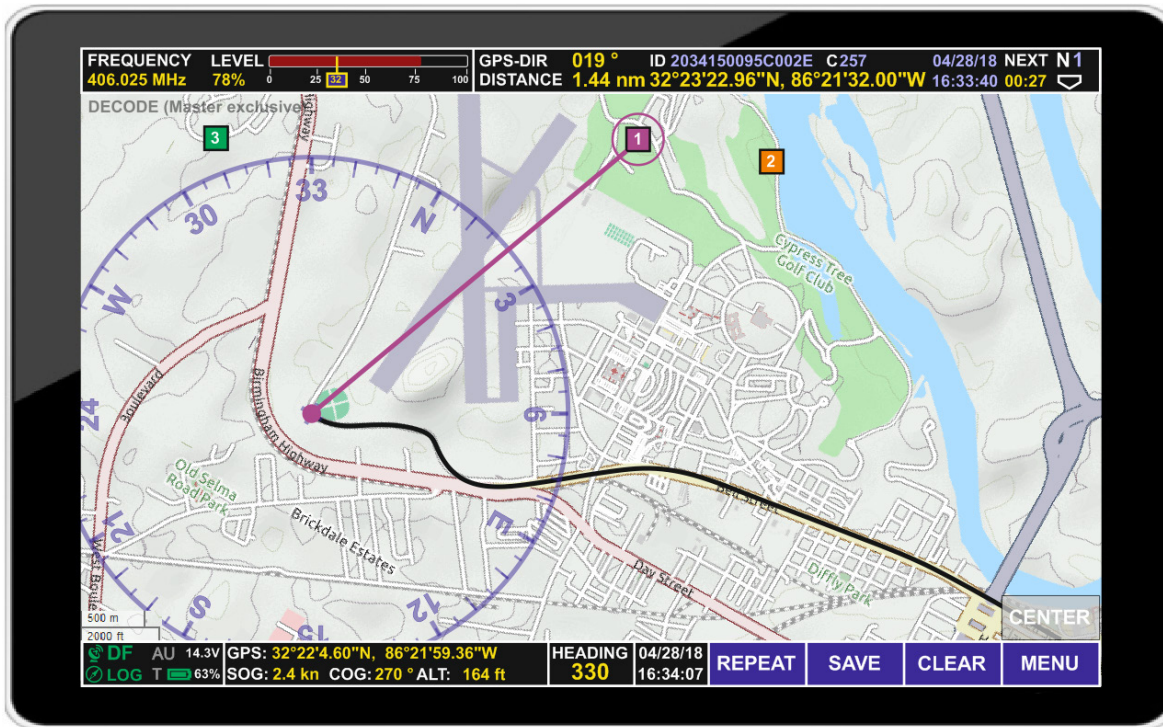
Basic Elements of the Top Line, Map Page Bearing

Symbol	Description
	TRUE BEARING is the indication of the current / last true bearing (bearing relative to north) and the elapsed time since that bearing was last measured.
Tap and hold the field above for a few seconds to open the System Settings dialog.	
	ESTIMATED TARGET POSITION is the estimated geographical position (Latitude / Longitude) of the target.
	Estimated DISTANCE to the target.
Tap and hold the fields above for a few seconds to open the Display Settings dialog.	

3.4 Map Page Decode


Map Page Decode allows to receive and decode COSPAS-SARSAT beacon data transmissions, and to visualize their content. As long as a beacon is using a location protocol and transmitting a valid position, the beacon is shown on the map. In the case that several beacons are being received, they will be serially numbered, starting with 1.

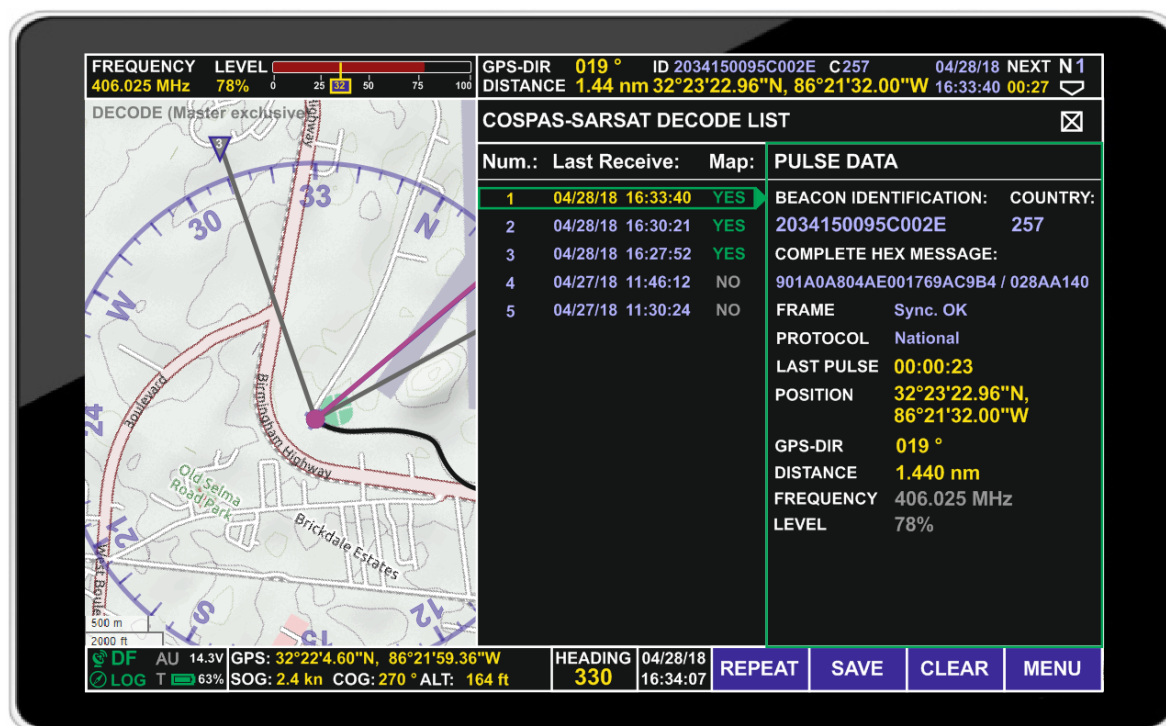
Bearing mode is disabled while in Map Page Decode, and only frequencies between 406.022 MHz and 406.076 MHz may be selected.



Basic Elements of the Top Line, Map Page Decode

Symbol	Description
FREQUENCY 406.025 MHz	The FREQUENCY field shows the current receiving frequency while in decode mode. Tap and hold this area for a few seconds to open the technical input field.
LEVEL 78%	The LEVEL indicator shows the receive signal strength of the currently received signal as a bar graph and numeric value. The small figure below the bar graph is the currently set squelch level.
Tap and hold the fields above for a few seconds to open the Technical Input Field (Standard Version).	
GPS-DIR 019°	GPS DIRECTION (relative to North) towards the target, calculated from the GPS position of the DF and the position encoded in the COSPAS-SARSAT-message. <i>Note: Due to the limited accuracy, final approach should not be based on GPS-DIR, but on bearing.</i>


Basic Elements of the Top Line, Map Page Decode	
Symbol	Description
DISTANCE 1.44 nm	GPS DISTANCE towards the target, calculated from the GPS positions of DF and target. <i>Note: Due to the limited accuracy, final approach should not be based on GPS-Distance, but on bearing. Distance unit is as configured in the Display Settings Dialog.</i>
ID 2034150095C002E	15-HEX ID of the beacon. The 15 hexadecimal characters that uniquely identify each 406 MHz beacon are called the beacon identification or "Beacon 15 Hex ID".
C257	COUNTRY Code of the beacon. This is the ITU Maritime Identification Digit (MID) country code.
32°23'22.96"N, 86°21'32.00"W	Encoded BEACON POSITION (Latitude / Longitude) in the format defined in the Display Settings Dialog. <i>Note: Availability and accuracy depends on the COSPAS-SARSAT message format used. Many COSPAS-SARSAT beacons do not use GNSS. Depending on the message data format, the position resolution is between 4 arc minutes and 4 arc seconds.</i>
04/28/18 16:33:40	MESSAGE DATE (in US format: Month/Day/Year) and time when the transmission was received.
NEXT 00:27	NEXT MESSAGE is the estimated remaining time until the next message should be received. Usually, this should occur around 10 seconds before the counter is down to 0. If no signal is received before 0 is reached, the receiving location might be disadvantageous. In that case, choosing a different location is recommended. <i>Note: The beacon signal repetition rate is randomized from 47.5 to 52.5 seconds. So, typically, the next transmission occurs at a counter position between 7 and 12 seconds.</i>
Tap and hold the field above for a few seconds to open the System Settings dialog.	
N1	DISPLAY MESSAGE shows the number of the currently displayed Message (correlates with the number of the position target on the map).
	The arrow symbol opens the COSPAS-SARSAT DECODE LIST.



It consists of a list of received COSPAS-SARSAT messages, of which one can be selected, and the data decoded from the selected message.

Elements of the Top Line COSPAS-SARSAT Decode List

Symbol	Description																		
<table><tr><th>Num.:</th><th>Last Receive:</th><th>Map:</th></tr><tr><td>1</td><td>04/28/18 16:33:40</td><td>YES</td></tr><tr><td>2</td><td>04/28/18 16:30:21</td><td>YES</td></tr><tr><td>3</td><td>04/28/18 16:27:52</td><td>YES</td></tr><tr><td>4</td><td>04/27/18 11:46:12</td><td>NO</td></tr><tr><td>5</td><td>04/27/18 11:30:24</td><td>NO</td></tr></table>	Num.:	Last Receive:	Map:	1	04/28/18 16:33:40	YES	2	04/28/18 16:30:21	YES	3	04/28/18 16:27:52	YES	4	04/27/18 11:46:12	NO	5	04/27/18 11:30:24	NO	<p>The List of received COSPAS-SARSAT messages contains all received and decoded COSPAS-SARSAT messages. The list contains the serial number of the message, time and date when the message has been received.</p> <p>If the beacon is shown as a target on the map, “Map” is set to “YES”, that means a target from encoded position data is visualized on the map.</p> <p>If the target has been removed from the map manually, or if no position data has been decoded, this value will be set to “NO”.</p> <p>A single list entry can be selected by tapping the corresponding line. If it has been removed from the map before, by tapping “SAVE” the corresponding target will be shown in the map again, and Map will be set to “YES”.</p> <p>To irrevocably delete the selected list entry, hit CLEAR and confirm with OK. A gap in the list will remain, e.g. if beacon number 3 is deleted in the example, beacons 2 and 4 will keep those numbers.</p> <p>A line of bearing on the map will always relate to the latest received beacon.</p>
Num.:	Last Receive:	Map:																	
1	04/28/18 16:33:40	YES																	
2	04/28/18 16:30:21	YES																	
3	04/28/18 16:27:52	YES																	
4	04/27/18 11:46:12	NO																	
5	04/27/18 11:30:24	NO																	
<table><tr><td>BEACON IDENTIFICATION: 2034150095C002E</td></tr></table>	BEACON IDENTIFICATION: 2034150095C002E	<p>BEACON IDENTIFICATION shows the 15-HEX ID of the beacon. The 15 hexadecimal characters that uniquely identify each 406 MHz beacon are called the beacon identification or “Beacon 15 Hex ID”.</p>																	
BEACON IDENTIFICATION: 2034150095C002E																			

Elements of the Top Line COSPAS-SARSAT Decode List	
Symbol	Description
COUNTRY: 257	COUNTRY Code of the beacon. This is the ITU Maritime Identification Digit (MID) country code.
COMPLETE HEX MESSAGE: 901A0A804AE001769AC9B4 / 028AA140	The COMPLETE MESSAGE (short / long message) modulated on the beacon signal is shown here in hexadecimal characters.
FRAME Sync. OK	DECODE STATUS of the data message. "Sync. OK" means the frame has been decoded without error. Only in this case, the displayed data is reliable.
PROTOCOL National	PROTOCOL TYPE shows the data protocol in which the COSPAS-SARSAT message has been coded.
LAST PULSE 00:00:23	Elapsed time since the LAST PULSE of that beacon has been received.
POSITION 32°23'22.96"N, 86°21'32.00"W	Encoded BEACON POSITION . <i>Note: Availability and accuracy depends on the COSPAS-SARSAT message format used. Many COSPAS-SARSAT beacons do not use GNSS. Depending on the message data format, the position resolution is between 4 arc minutes and 4 arc seconds.</i>
GPS-DIR 019 °	GPS DIRECTION (relative to North) towards the target, calculated from the GPS position of the DF and the position encoded in the COSPAS-SARSAT-message. <i>Note: Due to the limited accuracy, final approach should not be based on GPS-DIR, but on bearing.</i>
DISTANCE 1.440 nm	GPS DISTANCE towards the target, calculated from the GPS positions of DF and target. <i>Note: Due to the limited accuracy, final approach should not be based on GPS-Distance, but on bearing.</i>
FREQUENCY 406.025 MHz	The RECEIVE FREQUENCY on which the selected message has been received is shown here.
LEVEL 78%	Here, the RECEIVE LEVEL is shown at which the selected message has been received.
	ESCAPE closes the COSPAS-SARSAT DECODE LIST and switches back to Map Page Decode.

3.5 Map Page Scan

Scan Mode can be accessed through the MENU button on the Bottom Line.

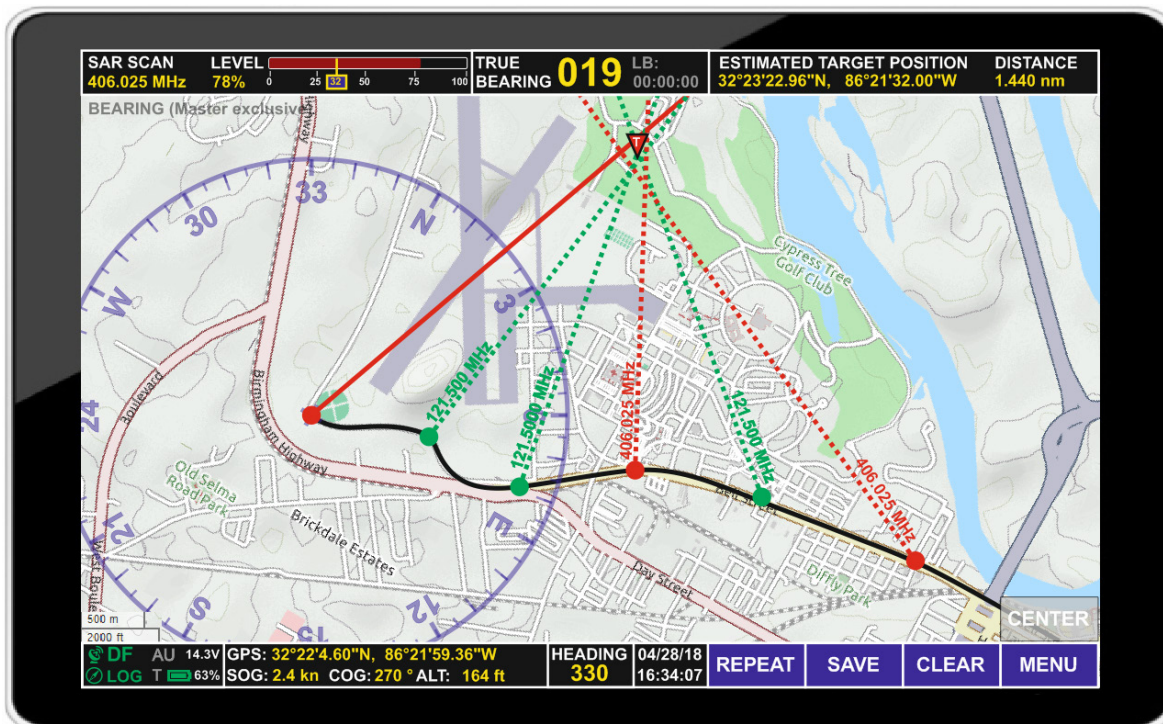
SAR Scan is an excellent tool to detect and find a COSPAS-SARSAT beacon, which transmits short but strong (5 W radiated power) data pulses on 406 MHz, but which also transmits a continuous signal, or a high duty cycle signal, on 121.5 MHz (around 100 mW radiated power or less).

A strong transmission has the advantage of a wide detection range of the beacon, while a continuous signal allows far better bearing performance compared to pulses.

The RT-400 / DF Scout SCAN Algorithm combines both advantages in one function.

If the SAR Scan is activated, the system will wait for a COSPAS-SARSAT pulse on 406 MHz. Compared to 121.5 MHz, the detection likelihood of a COSPAS-SARSAT pulse is higher due to the strong transmitter power of approximately 5 W. Once the pulse has been detected, the system calculates the direction to it. At the same time, the RT-400 systems “knows” that the next COSPAS-SARSAT pulse will arrive after approximately 50 seconds, and uses this time for scanning 121.5 MHz or 4 other adjustable frequencies. If the signal at 121.5 MHz has not been detected, the RT-400 automatically switches back to 406 MHz. On the other hand, if a 121.5 MHz transmission has been detected, the user gets the possibility to stay on 121.5 MHz in order to operate with the continuous signal, which allows the operator to achieve a better bearing performance and to find the target very fast.

The related map page only shows small visual differences compared to the Map Page Bearing. On the map, bearings are shown together with the frequency on which the bearing has been measured.



As with normal bearing mode, Lines of Bearing can be kept on the map by tapping “SAVE”, with exception of those originating from 406 MHz (COSPAS-SARSAT) transmissions, which






are saved automatically (Also refer to the chapter “Basic Elements and Functions of the Map Section”).

All Lines of Bearing (LOBs) belonging to the same frequency are displayed with the same color by default. In the map shown, the user has three LOBs on the map which all came from the COSPAS-SARSAT frequency 406.025 MHz every 50 seconds, while the LOBs of the 121.5 MHz (continuous) signal - received between COSPAS-SARSAT bursts and stored manually - are displayed with a different color.

Two different SAR scan modes are implemented:

- Scan of all COSPAS-SARSAT channels
- Scan of one specific COSPAS-SARSAT channel

Settings are accessible through the Main Menu / Setting Section. There, the frequencies to be scanned between two COSPAS-SARSAT bursts can be defined.

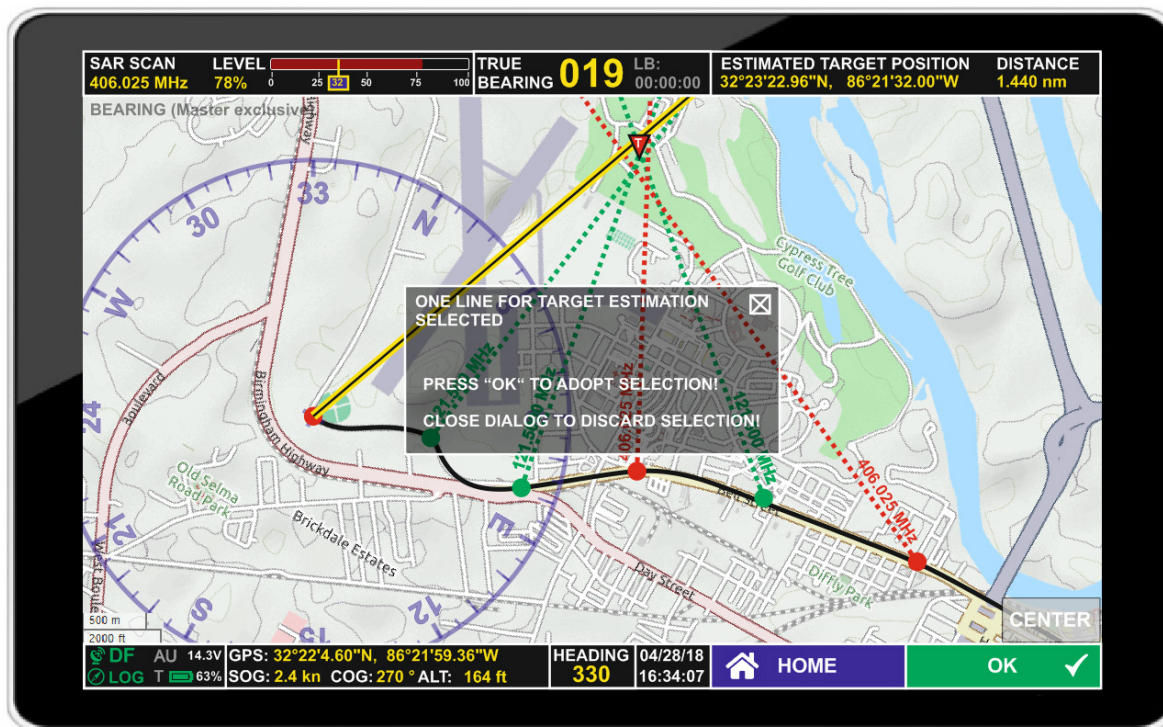
Basic Elements of the Top Line, Map Page Scan	
Symbol	Description
	<p>Instead of FREQUENCY, SAR SCAN is displayed, if Map Page “Scan” is active.</p> <p>Tap and hold this area for a few seconds to open a scan-specific variant of the technical input field.</p>
	<p>LEVEL shows the signal strength of the currently received signal as a bar graph and numeric value. The small figure below the bar graph is the currently set squelch level.</p>
<p>Tap and hold the fields above for a few seconds to open the Technical Input Field in Map Page scan.</p>	
	<p>TRUE BEARING indicates the current / last true bearing (bearing relative to north) and the elapsed time since that bearing was last measured.</p>
<p>Tap and hold the field above for a few seconds will open the System Settings dialog.</p>	
	<p>ESTIMATED TARGET POSITION is the estimated geographical position (Latitude / Longitude) of the target.</p>
	<p>Estimated DISTANCE to the target.</p>
<p>Tap and hold the fields above for a few seconds to open the Display Settings dialog.</p>	

3.6 Special Map Operations

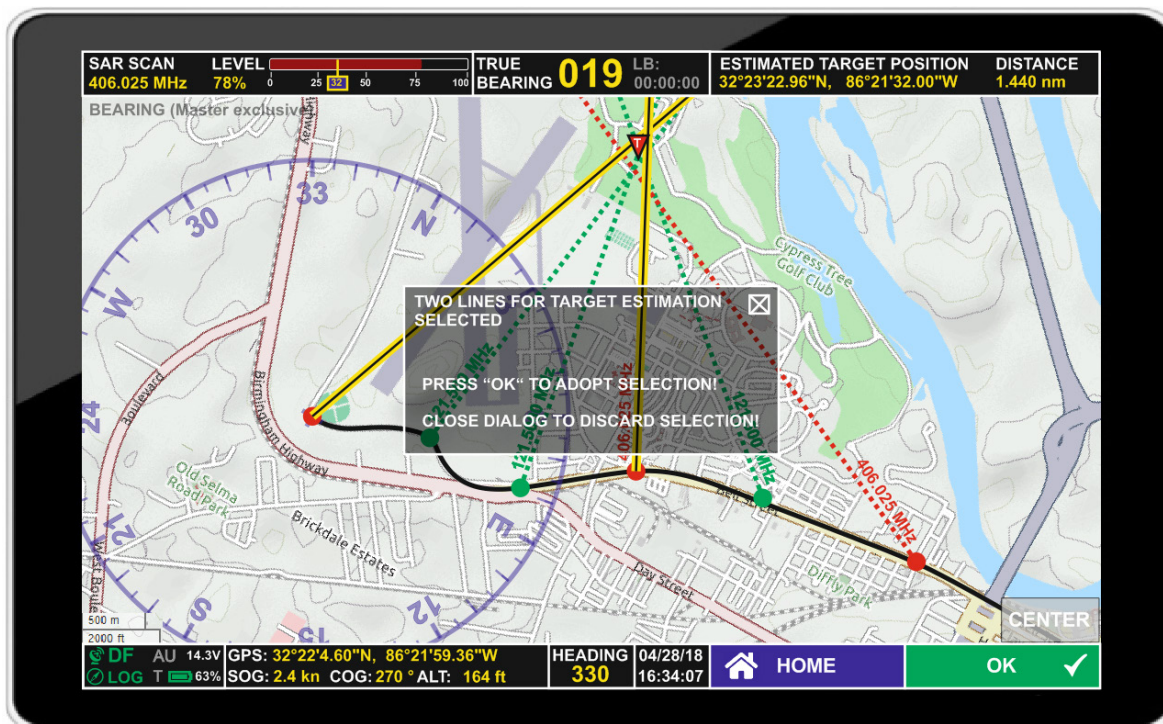
3.6.1 Creating a semi-automatic target position on the map

To use the automatic estimation of target positions by the RT-400 DF Scout, “Position estimation” must be set to “SEMI AUTO” in the Display Settings dialog, and three Lines of Bearings (LOB) must be crossing each other.

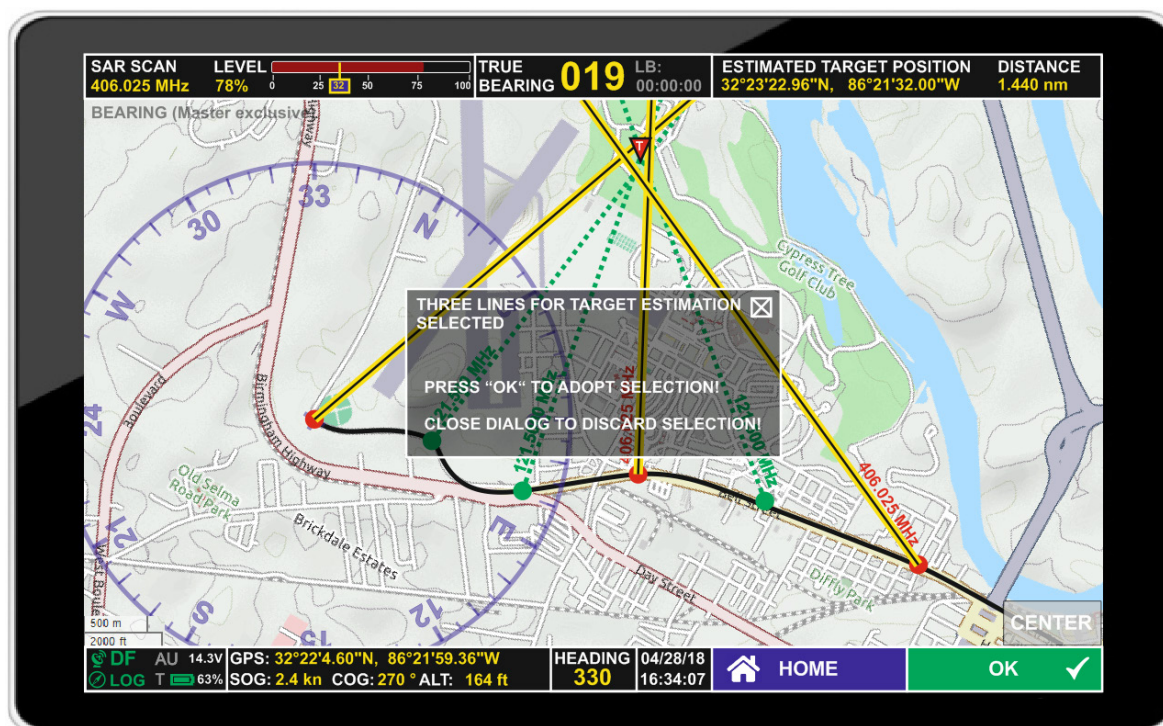
First, a Line of Bearing must be selected by double-tapping it. A dialog window will open and ask you if you want to adopt the selection by tapping “OK”.



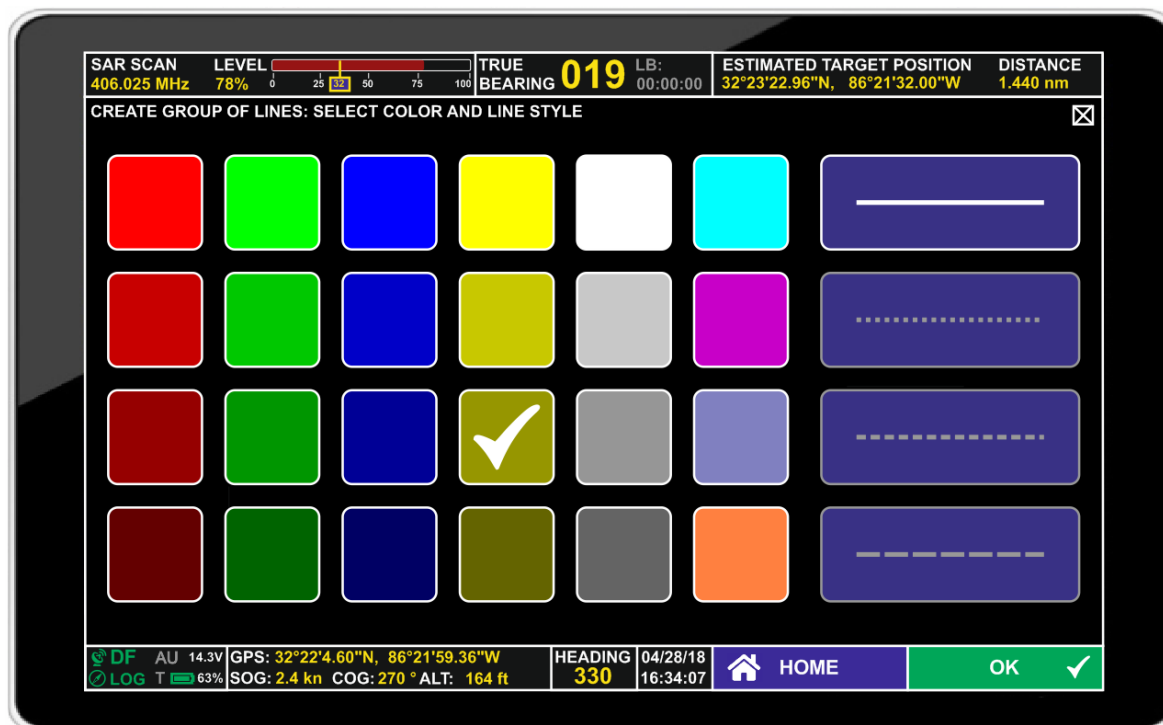
Repeat this with a second line:



Repeat this with a third line:

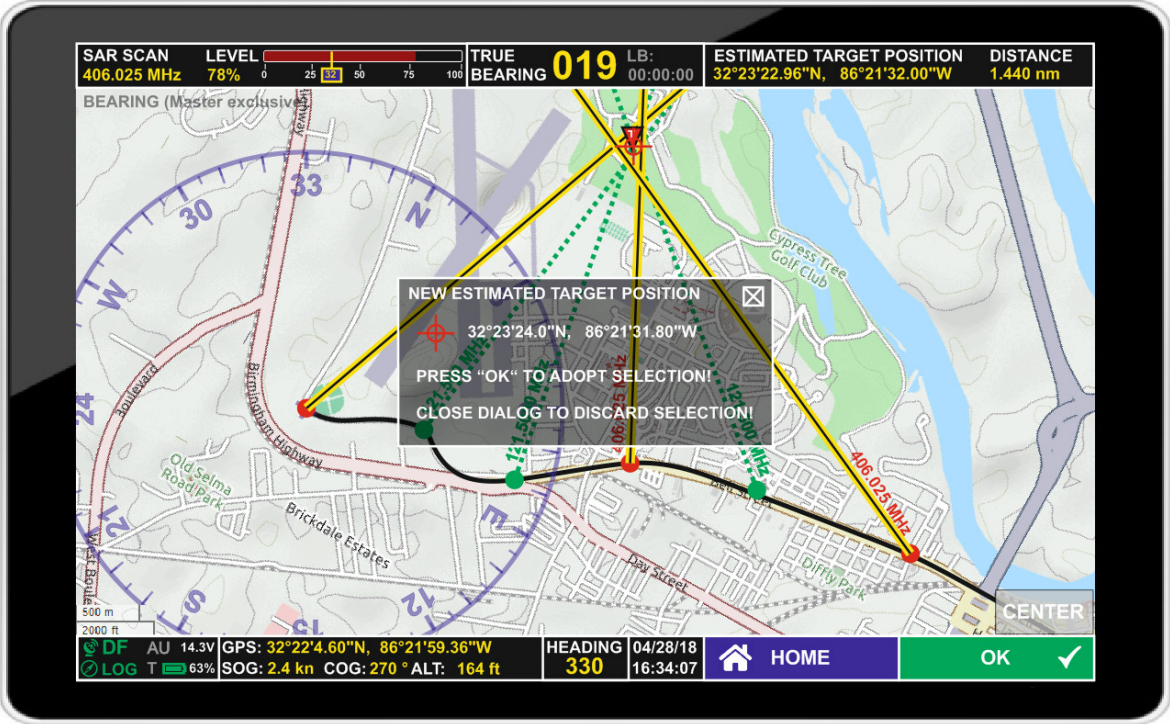


Colors and line style of the group of lines then can be defined in the Create Group of Lines dialog:



Mark a color field and a line style field and confirm with "OK".

Afterwards, the estimate will be calculated and displayed on the map:

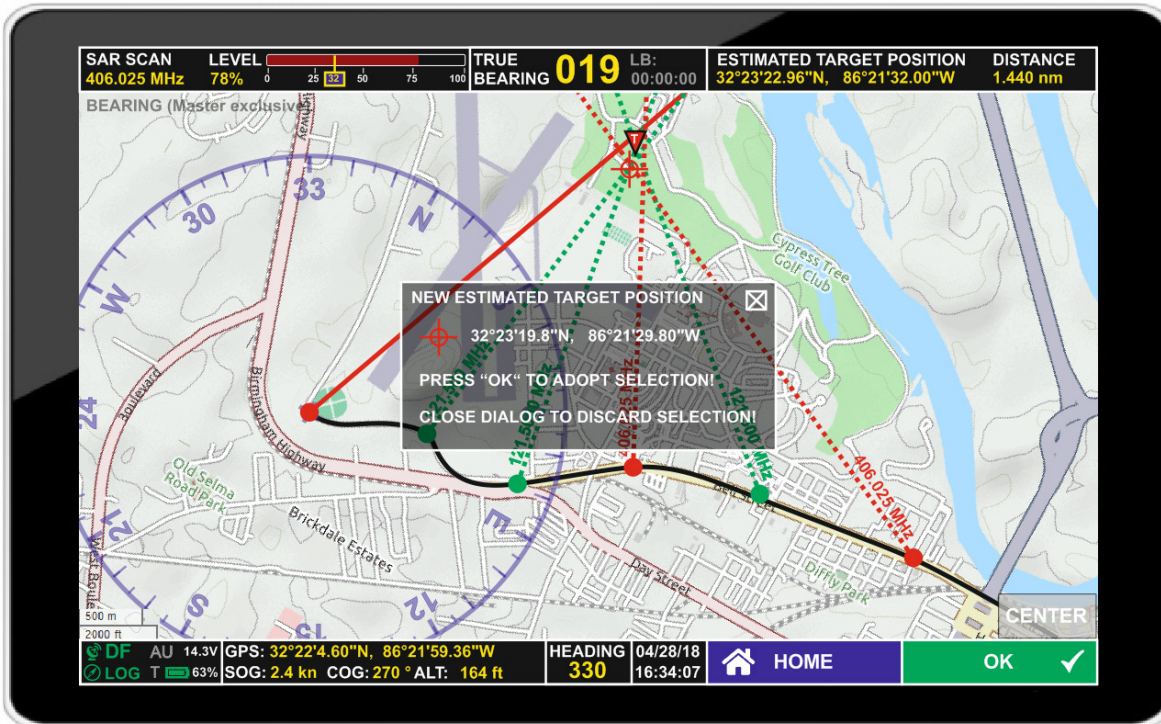


3.6.2 Creating a manual target position on the map

To use this function, “Position estimation” must be set to “MANUAL” in the Display Settings dialog.

On either Map Page Scan or Map Page Bearing, after having received several Lines Of Bearing (LOB) from different user's positions, it might be useful to manually mark an estimated target position close to where the LOBs are crossing.

Double-tap on the estimated position on the map for selecting this position. A dialog window will open requesting to confirm the selected position by tapping on the “OK” button.

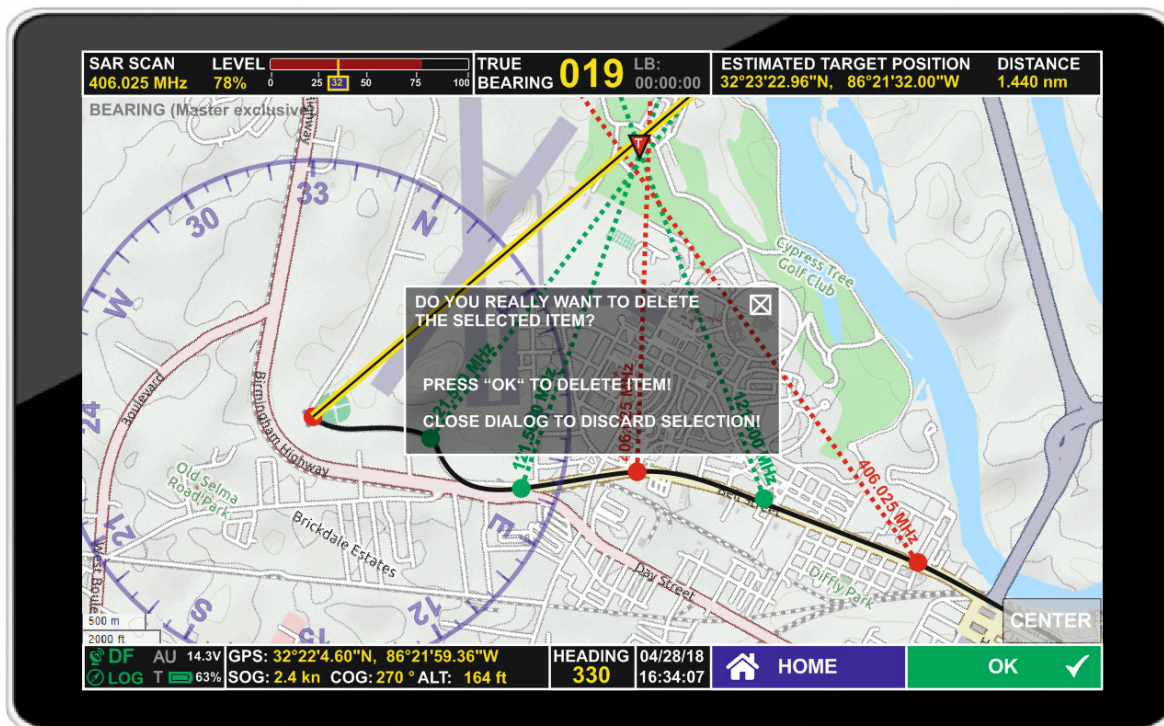


3.6.3 Deleting an item on the map

To delete items on the map, such as Lines of Bearing, position tracks, or target estimates, select the item by tapping and holding it.

Then tap “CLEAR” on the bottom line of the display.

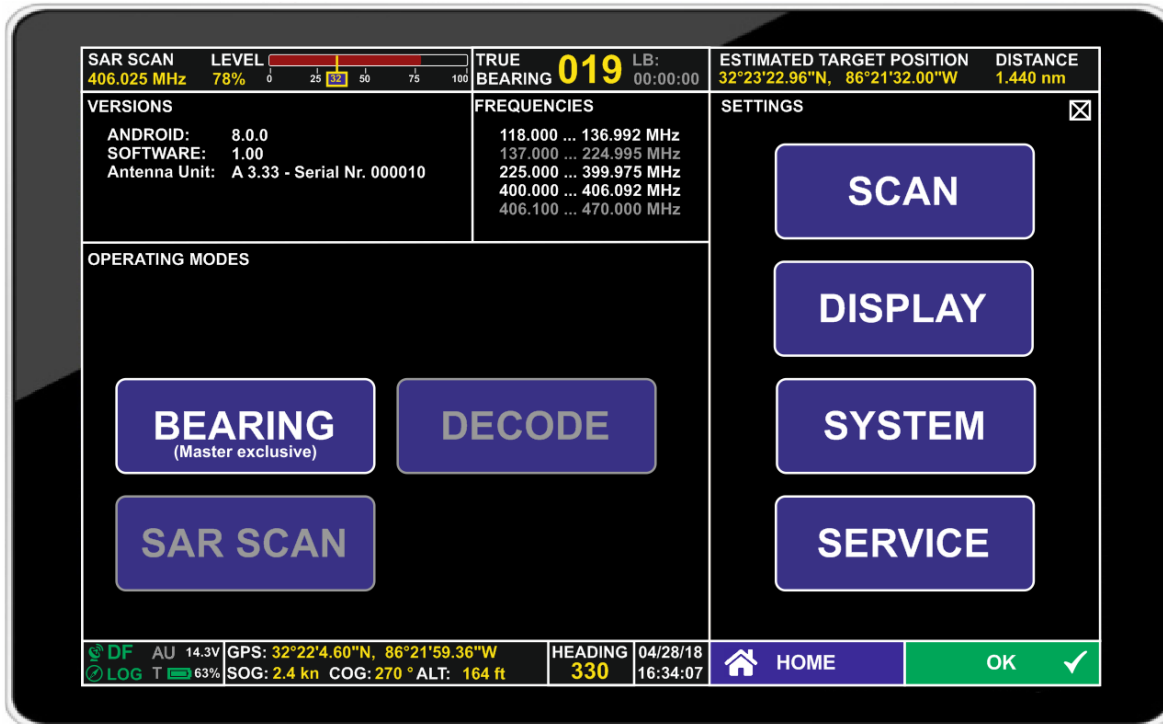
A dialog will open asking to either confirm the deletion by tapping “OK” on the bottom of the display, or to cancel this action by tapping the “X” or “HOME”.



4 Dialog Pages










4.1 Main Menu

The Main Menu can be accessed using the MENU button. It allows modifying system settings and selecting operating modes (Map Pages).



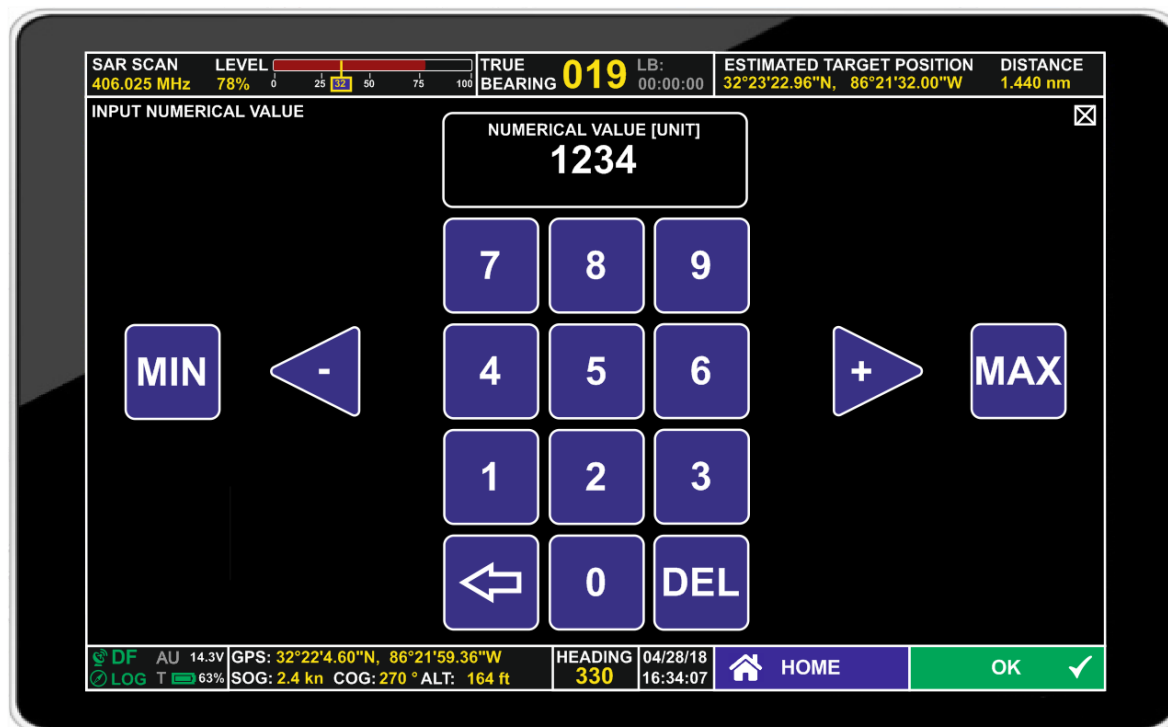
Basic Elements of the Main Menu

Symbol	Description
VERSIONS ANDROID: 8.0.0 SOFTWARE: 1.00 Antenna Unit: A 3.33 - Serial Nr. 000010	In the VERSIONS field, the revisions of the used ANDROID operating system and the RT-400 DF Scout are shown. Additionally, the revision of the antenna unit and its serial number are also shown.
FREQUENCIES 118.000 ... 136.992 MHz 137.000 ... 224.995 MHz 225.000 ... 399.975 MHz 400.000 ... 406.092 MHz 406.100 ... 470.000 MHz	Possible frequency options (beyond standard frequencies) are shown in the FREQUENCIES table. Options purchased for the system are shown in white color. Others are grayed out. If the list becomes long enough, a scroll bar will appear to allow scrolling through the list.
BEARING (Master exclusive)	BEARING activates the Map Page Bearing. The mode currently active is highlighted with white letters and information about master/slave mode settings. If a mode is currently not active, its letters show grayed out.



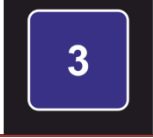


Basic Elements of the Main Menu	
Symbol	Description
	DECODE activates the Map Page Decode. The mode currently active is highlighted with white letters and information about master/slave mode settings. If a mode is currently not active, its letters show grayed out.
	SAR SCAN activates the Map Page Scan. The mode currently active is highlighted with white letters and information about master/slave mode settings. If a mode is currently not active, its letters show grayed out.
	SCAN opens the SAR SCAN SETTINGS page.
	DISPLAY opens the DISPLAY SETTINGS page.
	SYSTEM opens the SYSTEM SETTINGS page.
	SERVICE opens the SERVICE SETTINGS page.
	"OK" is used to confirm the changes and switches back to the map page out of which the Main Menu has been opened.
	HOME closes the dialog without adopting the changes and opens the map page from which the Main Menu has been opened.
	ESCAPE closes the dialog without adopting the changes and opens the map page from which the dialog has been opened.

4.2 Input dialogues






4.2.1 Numerical Input Dialog



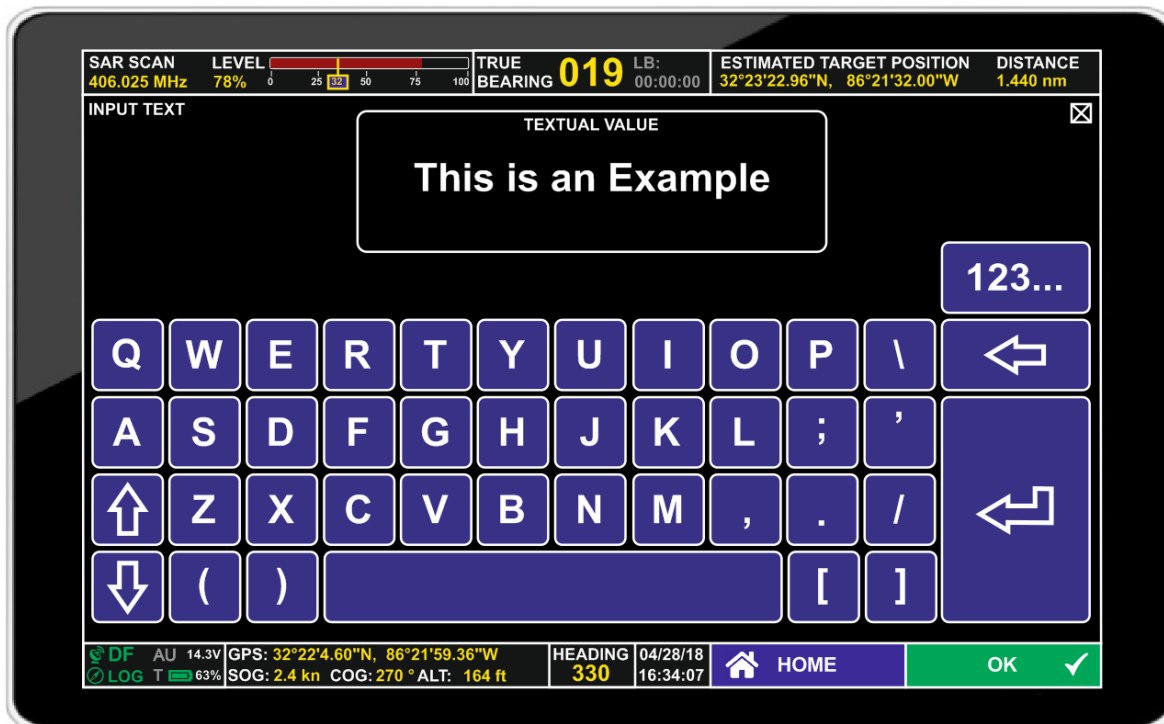
Basic Elements of the Numerical Input Dialog









Symbol	Description
	The DECREASE button decreases the value in the NUMERICAL VALUE [UNIT] window by one. Keeping the button tapped starts auto-repeat, i.e. the value is decreased continuously.
	The INCREASE button increases the value in the NUMERICAL VALUE [UNIT] window by one. Keeping the button tapped starts auto-repeat, i.e. the value is increased continuously.
	Tapping a NUMBER button sets the selected number into the next digit of the NUMERICAL VALUE [UNIT], if it is a permitted value. There is no auto-repeat function available for this button.
	The MINIMUM button sets the value in the NUMERICAL VALUE [UNIT] field to the lowest permissible value.
	The MAXIMUM button sets the value in the NUMERICAL VALUE [UNIT] field to the highest permissible value.

Basic Elements of the Numerical Input Dialog

Symbol	Description
	The BACKSPACE button deletes the last digit on the NUMERICAL VALUE [UNIT] field.
	The DELETE button deletes the whole value on the NUMERICAL VALUE [UNIT] field.
	OK is used to confirm the entered values and switches back to the page from which the Numerical Input Dialog has been opened.
	HOME Closes the dialog without adopting the values and switches back to the map page.
	ESCAPE closes the Numerical Input Dialog without adopting the values and switches back to the page from which the Numerical Input Dialog has been opened.

4.2.2 Textual Input Dialog



Basic Elements of the Textual Input Dialog	
Symbol	Description
	Tap the SWITCH TO NUMERICAL hotkey to open the Numerical Input Dialog in order to enter numerical values.
	Tap any character, sign or the space key for entering text.
	The SHIFT key switches to uppercase letters.
	The UNSHIFT key switches to lowercase letters.
	The BACKSPACE key deletes the last entered character.
	OK is used to confirm the entered values and switches back to the page from which the Textual Input Dialog has been opened.
	HOME closes the dialog without adopting the values and switches back to the map page.
	ESCAPE closes the Textual Input Dialog without adopting the values and switches back to the page from which the Textual Input Dialog has been opened.

4.2.3 Technical Input Field (Standard Version)

The standard version of the technical input field can be opened from all pages EXCEPT the Map Page Scan.

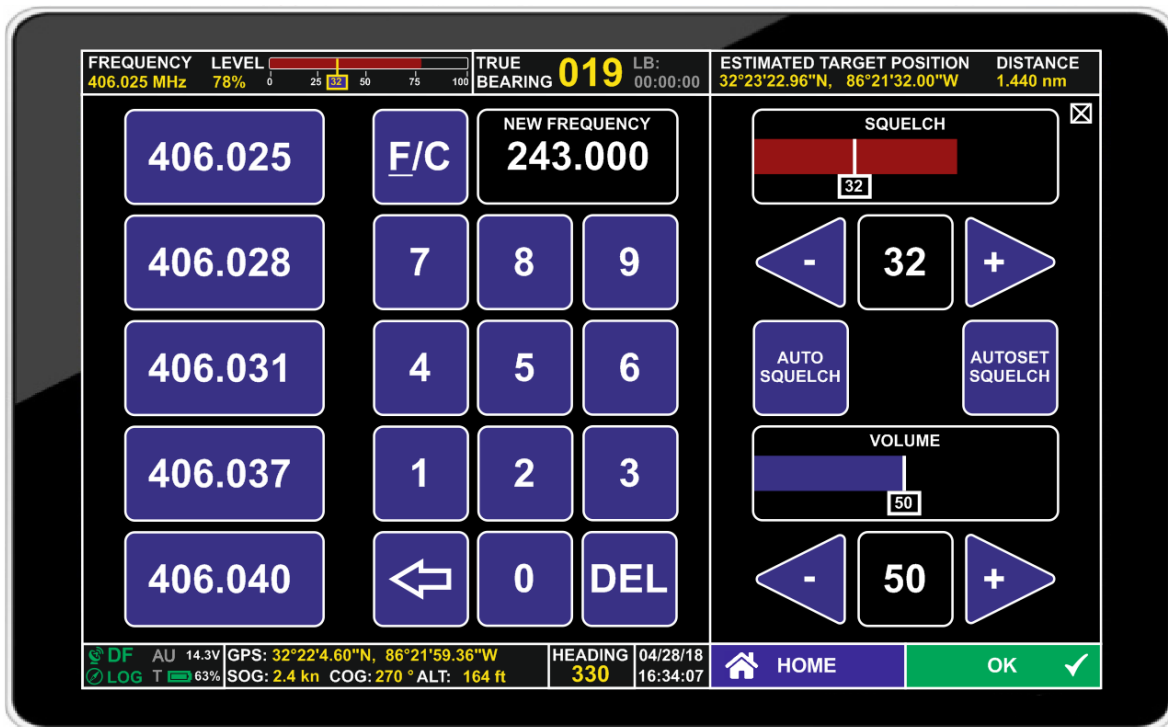
Tapping the “FREQUENCY” or “LEVEL” field in the Top Line for a few seconds will open a sub-page where frequencies, volume level, and squelch level can be set. This is called the technical input field.

In the absence of user interaction, this sub-page will close after a few seconds.

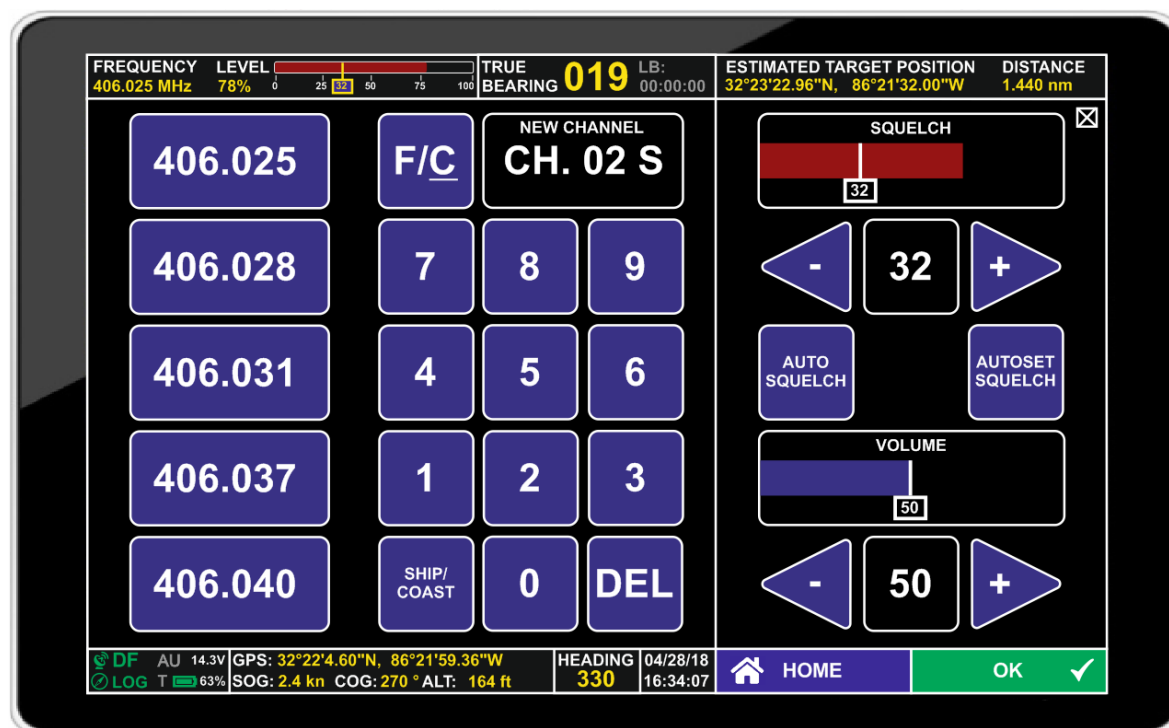
The top line and the information part of the bottom line remain unchanged.

The central number pad can be used to enter either a receive frequency or a marine band channel.





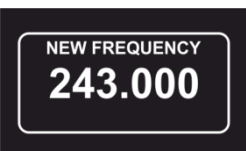

Frequency view:



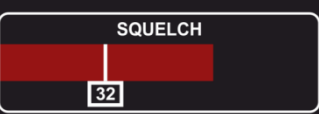



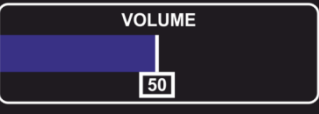






Channel view:



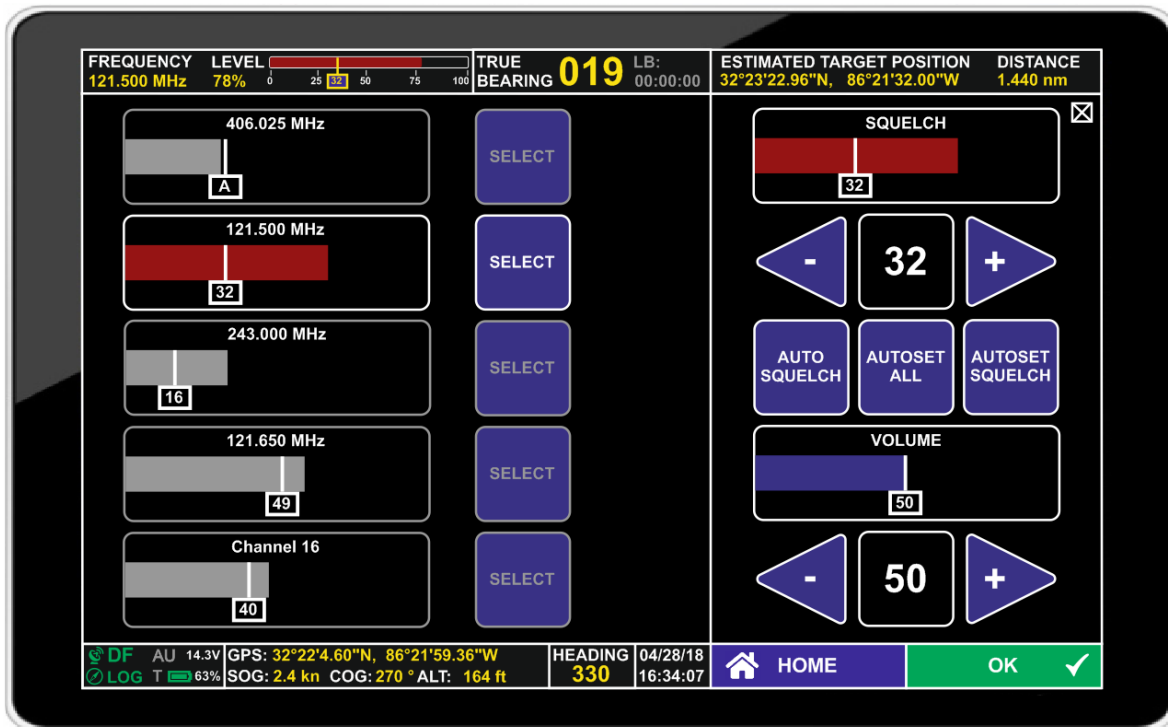
Basic Elements of the Technical Input Field

Symbol	Description
	COSPAS-SARSAT frequencies commonly assigned by the COSPAS-SARSAT program to certified beacons can be chosen directly from the COSPAS-SARSAT FREQUENCY hotkeys on the left side of the technical input field.
 	F/C switches between the channel and frequency views. In the frequency view, a frequency can be entered directly, which includes an auto-completion function. Either completion is achieved directly in the VHF Air Band, or by rounding to the next valid frequency after confirming the chosen frequency.
	Channel mode allows entering marine band channels directly, which are, in addition, divided between “Ship” and “Coast” in case of duplex channels. Use the button SHIP/COAST to switch between those choices.
	If “frequency” has been selected through the F/C hotkey, the frequency entered on the number pad is shown in the NEW FREQUENCY field.
	If “channel” has been selected through the F/C hotkey, the channel entered on the number pad is shown in the NEW CHANNEL field.



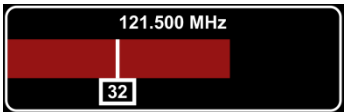
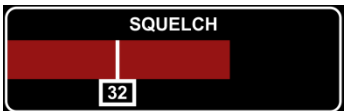

Basic Elements of the Technical Input Field	
Symbol	Description
	The BACKSPACE key is used to delete the last digit. This button is not available in channel view.
	DEL deletes all values already entered.
	The SQUELCH bar graph indicates the current signal level as a red-colored bar graph, with the current squelch setting being indicated in the small field below.
	To manually set the SQUELCH LEVEL, the arrow keys can be used.
	If a COSPAS-SARSAT frequency is selected, automatic optimization of the squelch level, also known as AUTO SQUELCH , can be activated. On other frequencies, the text is grayed out.
	Using AUTOSET SQUELCH will set the squelch level above the signal level by the defined S/N ratio chosen in system settings (S/N RATIO AUTOSQL [%] setting).
	The currently set audio VOLUME level is shown as a bar graph with indication of the volume level.
	To set the volume, the arrow keys can be used.
	OK confirms the changes and switches back to the map page from which the technical input field has been opened.
	HOME closes the dialog without adopting the values and opens the map page from which the technical input field has been opened.
	ESCAPE closes the dialog without adopting the values and opens the map page from which the technical input field has been opened.




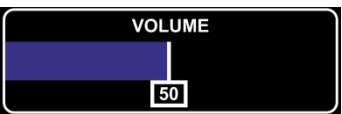




4.2.4 Technical Input Field in Map Page Scan

In scan mode, the technical input field is optimized to set parameters for the scan mode.

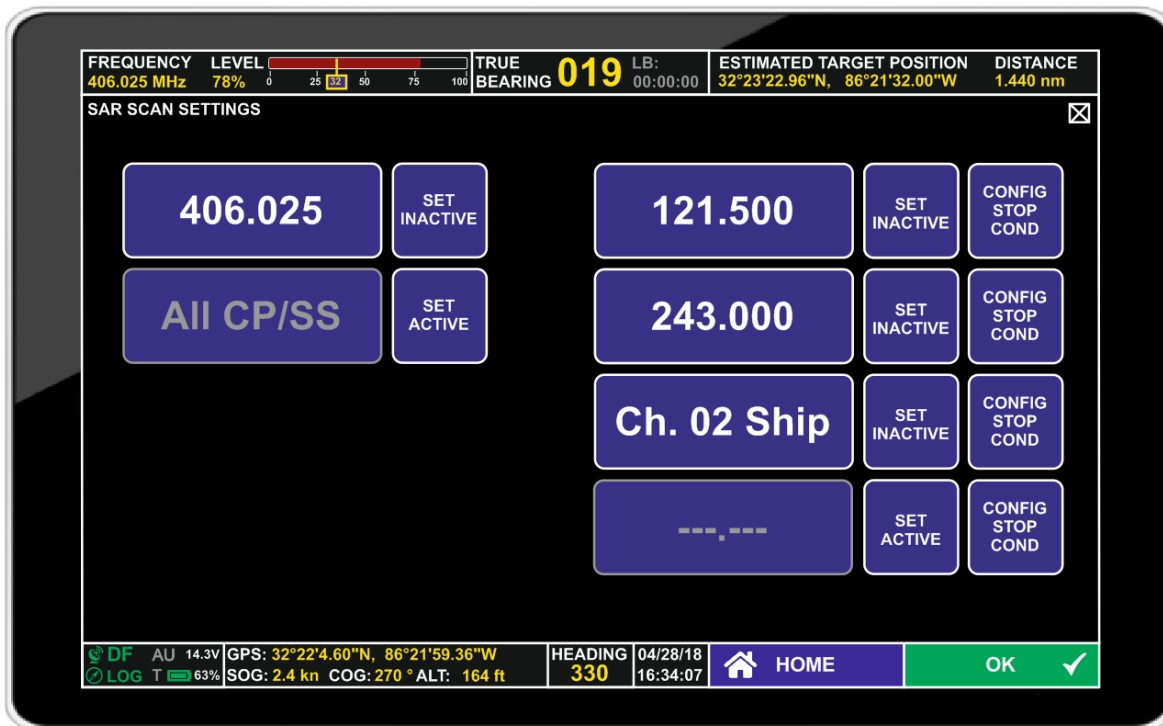


Basic Elements of the Technical Input Field in Map Page Scan






Symbol	Description
	For any frequency selected for scan, the last measured signal level is shown together with the currently chosen squelch settings. If the frequency is not selected for changing their squelch settings, the field is gray.
	By tapping SELECT , the frequency assigned to the SELECT button can be chosen for modifying its squelch settings. If the frequency is selected, the button will be highlighted in white color.
	The bar graph for the selected frequency is highlighted in red color.
	The SQUELCH field on the right side indicates the current signal level on the selected frequency as a red-colored bar graph, with the current squelch setting being indicated in the small field below.
	To manually set the SQUELCH LEVEL on the selected frequency, the arrow keys can be used.







Basic Elements of the Technical Input Field in Map Page Scan	
Symbol	Description
	If a COSPAS-SARSAT frequency is selected, automatic optimization of the squelch level, also known as auto squelch, can be activated using the AUTO SQUELCH hotkey. On other frequencies, text and shape are gray and the hotkey is not usable.
	Using AUTOSET SQUELCH will set the squelch level above the signal level by the defined S/N ratio chosen in system settings (S/N RATIO AUTOSQL [%] setting) on the selected frequency.
	Using AUTOSET ALL will set the squelch level above the signal level by the defined S/N ratio chosen in system settings (S/N RATIO AUTOSQL [%] setting) on all frequencies.
	The currently set audio VOLUME level is shown as a bar graph with indication of the volume level. The setting is valid on all frequencies.
	To set the volume, the arrow keys can be used.
	OK is used to confirm the entered values and switches back to the map page out of which the technical input field has been opened.
	HOME Closes the dialog without adopting the values and opens the map page from which the technical input field has been opened.
	ESCAPE closes the dialog without adopting the values and opens the map page from which the technical input field has been opened.

4.3 SAR Scan Settings

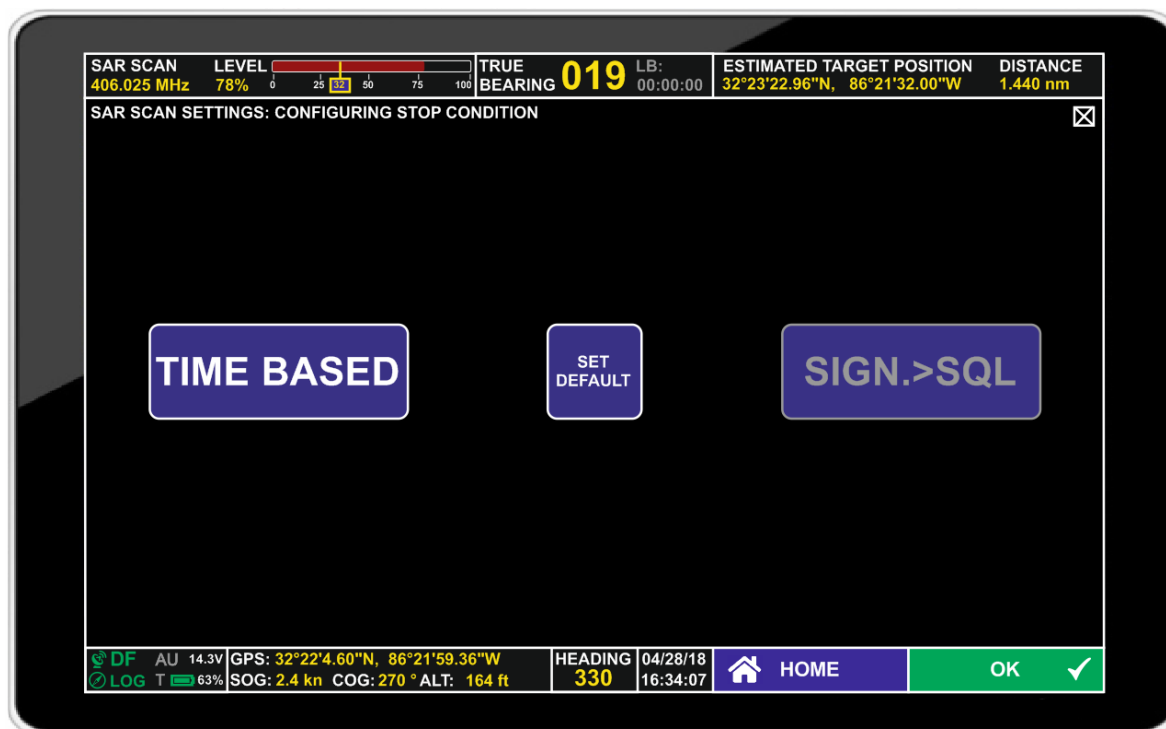


Basic Elements of the SAR Scan Settings Dialog







Symbol	Description
	If a frequency is set as being active for scanning, it can be deactivated by tapping the SET INACTIVE button.
	If a frequency is set as being inactive for scanning, it can be activated by tapping the SET ACTIVE button.
	CONFIG STOP CONDITIONS is used to define under which conditions a frequency shall be considered as being in use. The “CONFIGURING STOP CONDITION” window opens.
	If the COSPAS-SARSAT FREQUENCY hotkey for a specific frequency is set active, only the COSPAS-SARSAT frequency shown is scanned. If not selected, it is grayed out. If selected, letters are white. Tapping the field opens the Technical Input Field (standard version) for selecting the wanted frequency.
	If ALL COSPAS-SARSAT is selected, all COSPAS-SARSAT channels are scanned. If not selected, shape and text are gray. If selected, they are white.

Basic Elements of the SAR Scan Settings Dialog	
Symbol	Description
	Scanning on 121.500 MHz and 243.000 MHz can be activated by tapping the appropriate hotkey. If not selected, shape and text are gray. If selected, they are white.
 	<p>The lower two frequency hotkeys on the right side of the SAR Scan Settings page are used for user-defined frequencies. If not selected, they are grayed out. If selected, letters are white.</p> <p>By tapping the hotkey, the Technical Input Field (standard version) is opened. Either frequencies or marine band channels can be entered, and the chosen frequency/channel can be set inactive by tapping the “set inactive” button.</p> <p>---,--- means that no frequency has been selected.</p>
	OK is used to confirm the entered values and switches back to the map page out of which the technical input field has been opened.
	HOME Closes the dialog without adopting the values and opens the map page from which the technical input field has been opened.
	ESCAPE closes the dialog without adopting the values and opens the map page from which the technical input field has been opened.

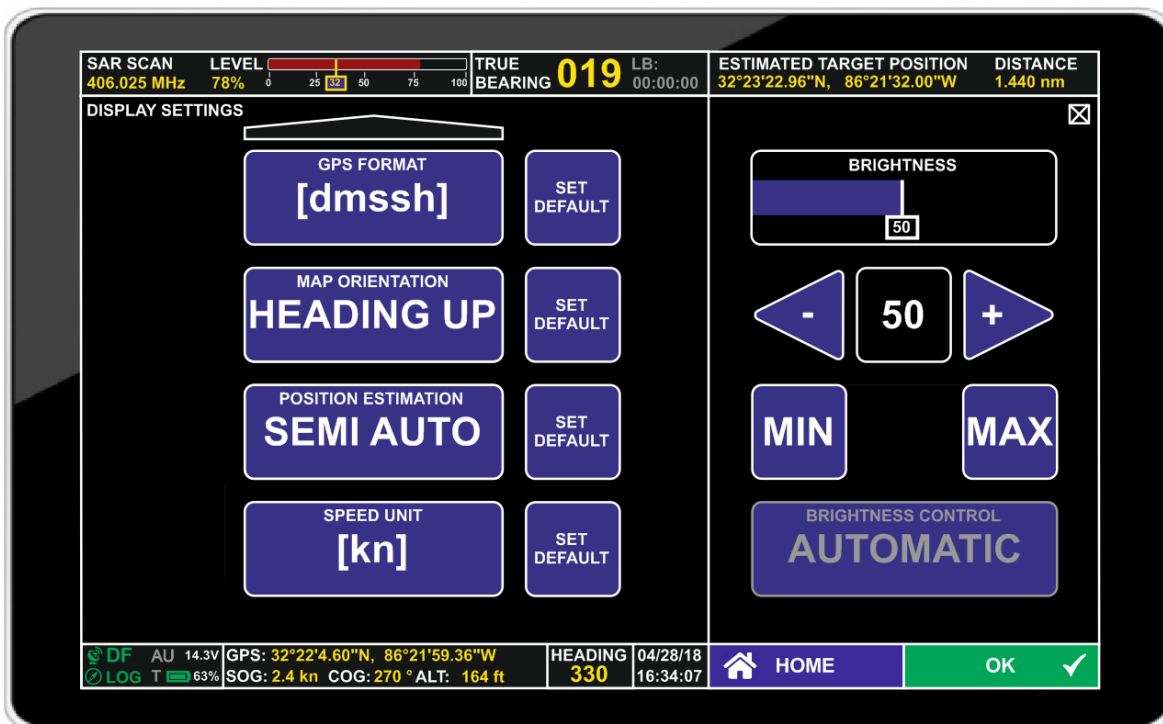
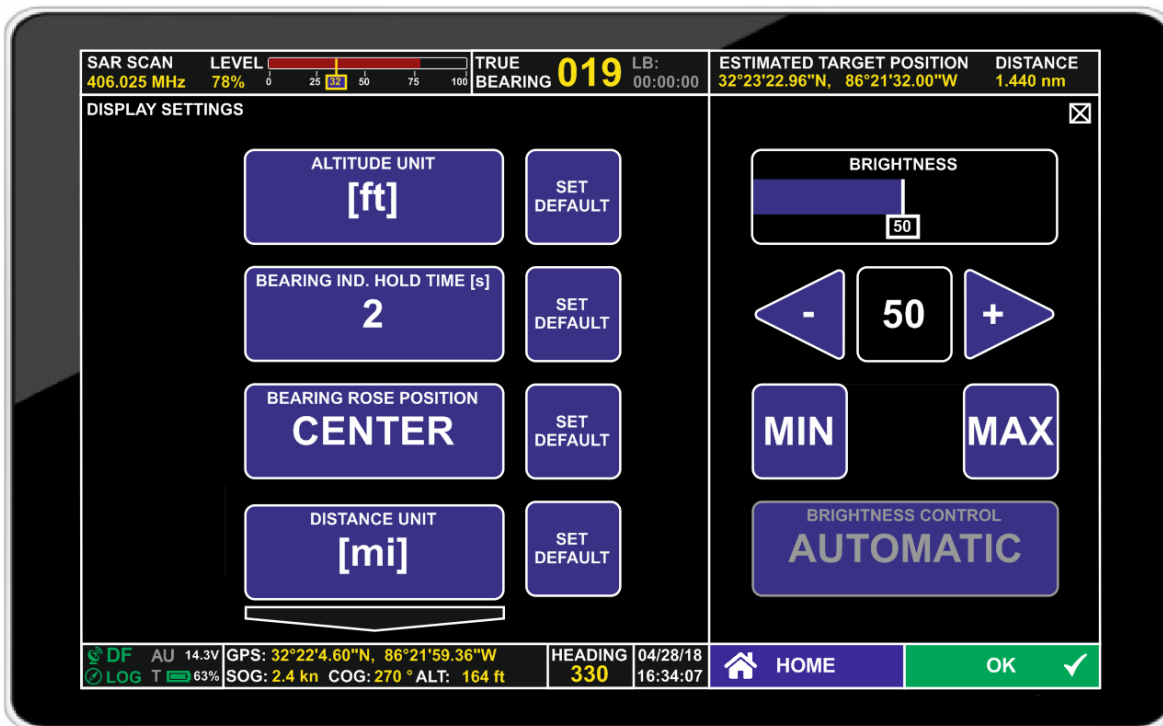
4.3.1 Configuring Stop Condition










Basic Elements of the Configure Stop Condition dialogue


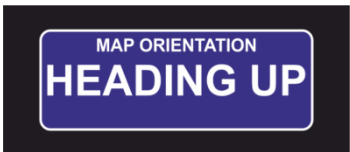


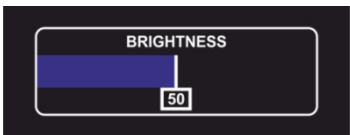
Symbol	Description
	Activates the time-based stop condition for SAR Scan.
	Activates the signal level based stop condition for SAR Scan.
	Sets the default, which is the time-based stop condition.
	OK is used to confirm the entered values and switches back to the page out of which the Configure Stop Conditions dialogue has been opened.
	HOME Closes the dialog without adopting the values and opens the map page from which the Configure Stop Conditions dialogue has been opened.
	ESCAPE closes the dialog without adopting the values and opens the map page from which the Configure Stop Conditions dialogue has been opened.







4.4 Display Settings



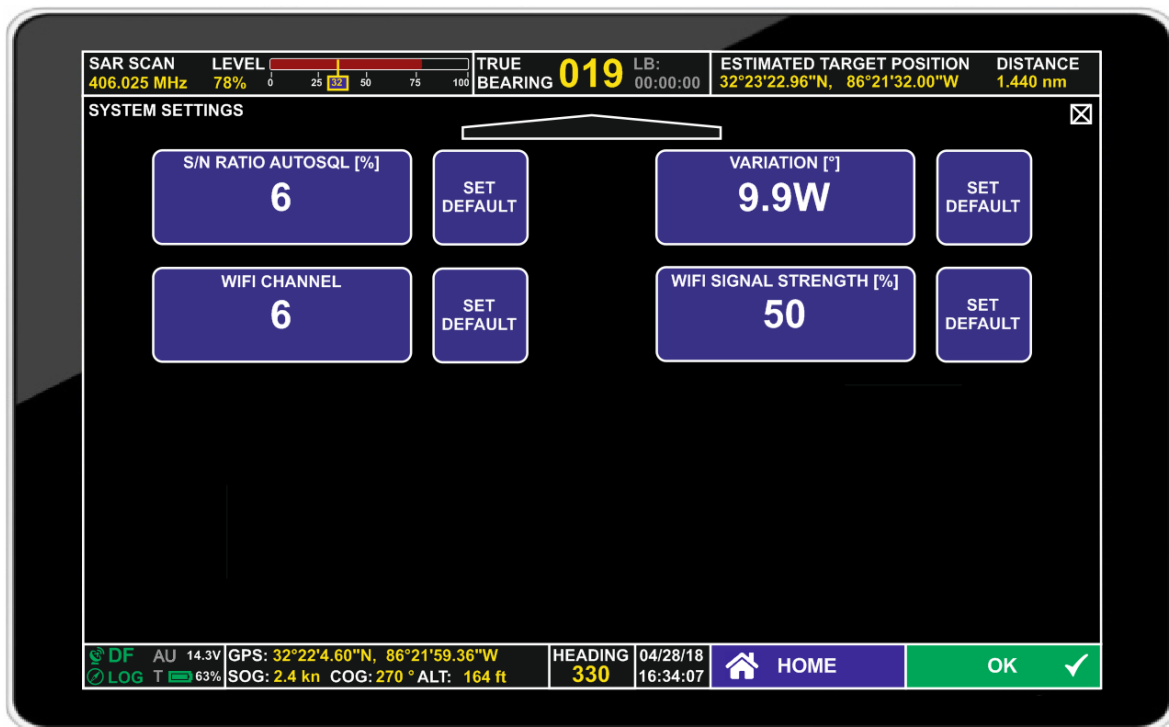
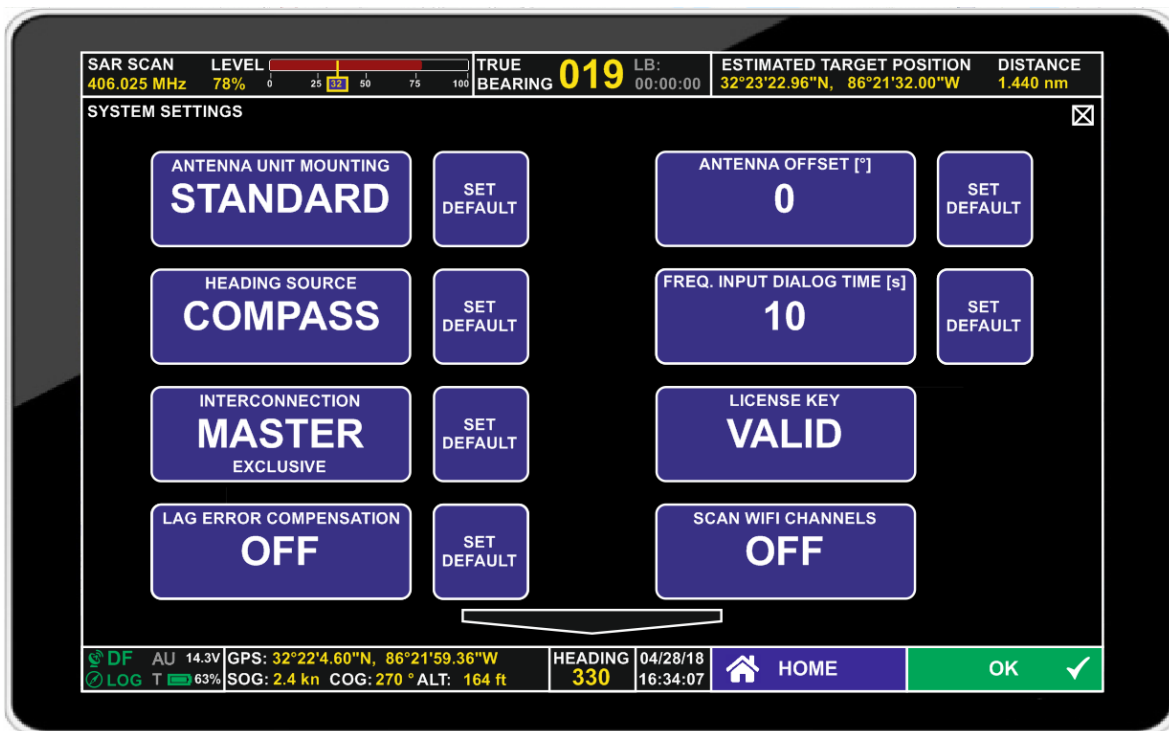
Basic Elements of the Display Settings Dialog	
Symbol	Description
	SCROLL DOWN arrow is used to scroll down through the 3 display settings pages.
	SCROLL UP arrow is used to scroll up through the 3 display settings pages.
	SET DEFAULT allows resetting the default value of each display setting.
	ALTITUDE UNIT defines which altitude format is used. [m] for meters and [ft] for feet can be selected, with [ft] being the default.
	BEARING INDICATION HOLD TIME can be set to values from 0 to 60 seconds. This sets how long a bearing is displayed after transmission has ended. Default is 2 seconds. The Numerical Input Dialog opens to enter the desired value.
	The BEARING ROSE POSITION's (Azimuth dial position) default position can be set either centered or off-center. After tapping that button, use the arrows to move the rose around the map, or tap the CENTER button to place it in the center of the display. If it is placed Off-Center, the position (in pixel units) is displayed instead of "CENTER". Default is in the center of the display.
	The DISTANCE UNIT button toggles the possible formats for distance indications between Kilometers [km], statute miles [mi] and nautical miles [nm]. Nautical Miles are the default.








Basic Elements of the Display Settings Dialog







Symbol	Description
	<p>The GPS FORMAT button allows GPS positions to be shown in different formats.</p> <p>[hd.d] shows decimal-point separated degree values with heading (North/South, East/West) as decimal prefix. Example: 47.68425, 11.19827. Minus sign would denote South / West.</p> <p>[hdm.m] shows degrees and minutes with decimal-point separated minutes with heading (North/South, East/West) as prefix. Example: N47 41.055 E11 11.896</p> <p>[hdmss] shows degrees, minutes and seconds, with seconds being decimal-point separated and with heading (North/South, East/West) as prefix. Example: N47°41'3.3", E11°11'53.8"</p> <p>[dmssh] shows degrees, minutes and seconds, with seconds being decimal-point separated and with heading (North/South, East/West) as suffix. Example: 47°41'3.3"N, 11°11'53.8"E</p> <p>Default is [dmssh].</p>
	<p>MAP ORIENTATION toggles how the map shall be oriented on the display. The map either can be oriented Heading up, so it is always showing in direction of the heading, or it can be oriented North up. Heading up is the default.</p>
	<p>POSITION ESTIMATION can be set to be either semi-automatic or Manual. Manual is the default.</p>
	<p>SPEED UNIT can be set either to [kn] (knots), [mph] or [km/h]. Default is [kn].</p>
	<p>The BRIGHTNESS bar-graph shows the currently set display brightness. Additionally, the numerical value is shown. If brightness control is in automatic mode, "A" is displayed instead of the value.</p>









Basic Elements of the Display Settings Dialog	
Symbol	Description
	The brightness value can be set manually using the arrow keys. Hold the arrows for a continuous variation of the value. Tap the arrow for single steps. If automatic mode has been chosen, tapping on the “+” or “-” arrow will switch back to manual control.
	MIN and MAX allow setting the brightness to either the minimum (0%) or maximum (100%) directly. If automatic mode has been chosen, tapping on the “MIN” or “MAX” button will switch back to manual mode and apply the minimum or maximum brightness immediately.
	If the “ BRIGHTNESS CONTROL AUTOMATIC ” button is tapped, the brightness of the display is set automatically depending on the ambient light conditions measured by the tablet’s light sensor.
	OK closes the dialog by adopting the values and switches back to the page from which the Display Settings page has been opened.
	HOME closes the dialog without adopting the values and switches back to the map page.
	ESCAPE closes the dialog without adopting the values and switches back to the map page.

4.5 System Settings

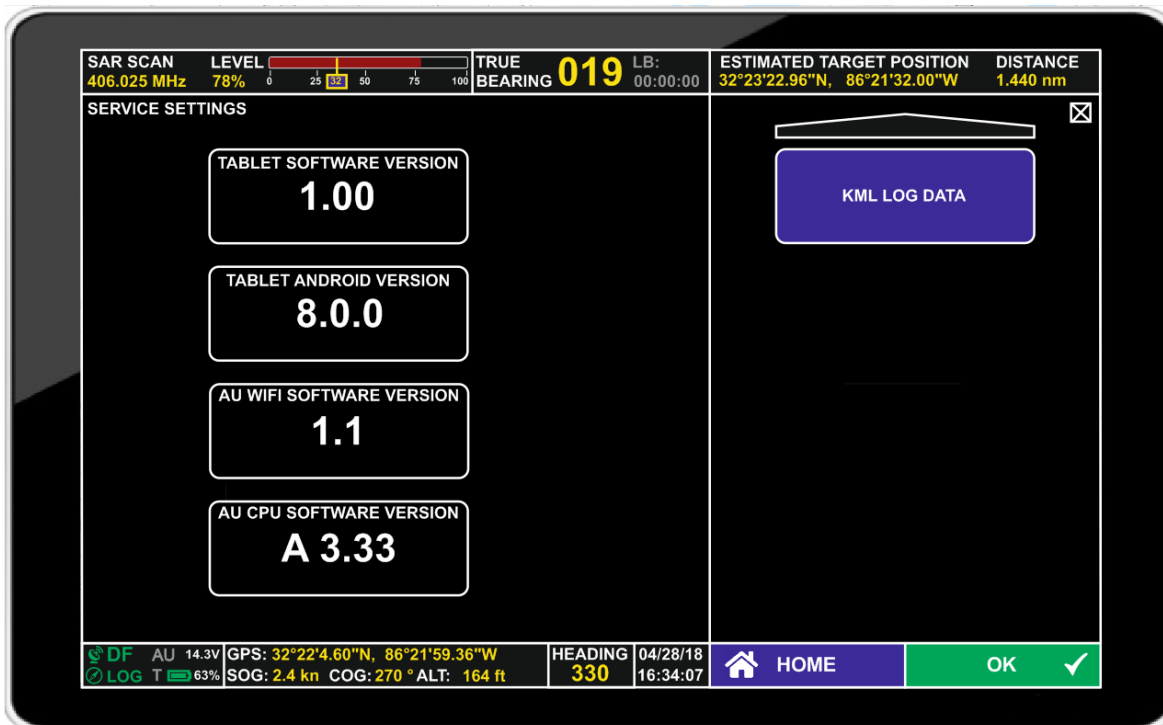
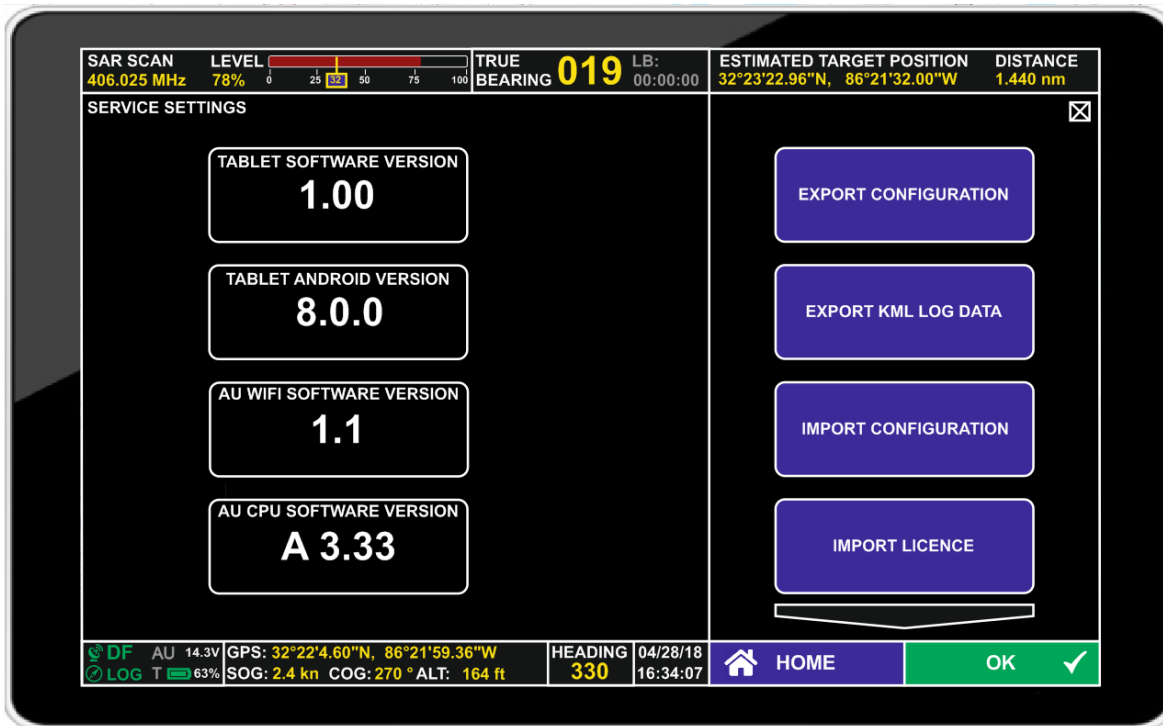





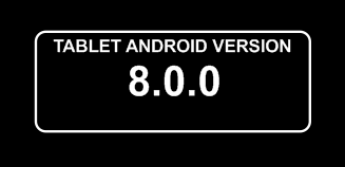


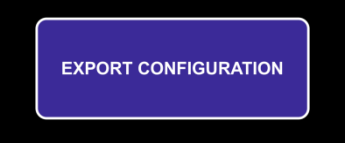



Basic Elements of the System Settings Dialog	
Symbol	Description
	SCROLL DOWN arrow is used to scroll down through the two system settings pages.
	SCROLL UP arrow is used to scroll up through the two system settings pages.
	SET DEFAULT allows resetting the default value of each system setting.
	ANTENNA UNIT MOUNTING allows toggling the mounting orientation of the antenna unit. STANDARD is the default mounting position, while “upside down” would allow mounting the antenna upside down without affecting the bearing output (which is recalculated to account for the reversal).
	ANTENNA OFFSET [°] opens the Numerical Input Dialog. There, an antenna offset to compensate an installation offset of the antenna may be entered. Allowed data range is 0 to 359 (i.e. “-10°” has to be entered as “350”), default is 0°.
	<p>The HEADING SOURCE hotkey allows choosing which source to use for calculating the heading of the system. This can either be Antenna, Compass or GPS.</p> <p>The default value is “COMPASS”, using the built-in compass device of the tablet computer. This might be unsuitable in the presence of large metallic objects (e.g. in a car) or magnets. Use GPS in such cases.</p> <p>If GPS is selected, the internal GPS receiver of the tablet is used. The heading can only be calculated if the tablet is being constantly moved in forward direction. During stand-still, the GPS device will not calculate a correct heading but random values due to position measurement fluctuations.</p> <p>If moving backwards or sideward, the map orientation and the wind rose can be wrong by up to 180°. Relative bearing stays correct.</p> <p>Note: Use “COMPASS” as heading source when having a mission by feet in the open air. Use “GPS” as heading source when having a mission with a vehicle.</p>
	FREQUENCY INPUT DIALOG TIME [s] opens the Numerical Input Dialog. There, a value in seconds can be entered which is the timeout for the frequency input dialogue (Technical Input Field) if no data is entered there. Default is 10 seconds.





Basic Elements of the System Settings Dialog	
Symbol	Description
  	<p>The INTERCONNECTION hotkey allows choosing between different system setups in regards to multi-user environments.</p> <p>MASTER EXCLUSIVE:</p> <ul style="list-style-type: none"> GPS data of this tablet is sent to the Antenna Unit. The Antenna Unit itself acts as a data server and provides this GPS information to any other connected tablet. Other tablets which are connected to the same Antenna Unit are not allowed to change settings of the Antenna Unit. On every map page, the status is indicated by the addition of “(Master exclusive)”, e.g. BEARING (Master exclusive). <p>MASTER GPS ONLY:</p> <ul style="list-style-type: none"> Same as MASTER EXCLUSIVE, but other connected tablets are also allowed to change settings of the Antenna unit. On every map page, the status is indicated by the addition of “(Master GPS)”, e.g. BEARING (Master GPS). <p>SLAVE:</p> <ul style="list-style-type: none"> Gets GPS data from the Antenna Unit. Tablet is not allowed to change settings of the Antenna Unit if Master is “Master Exclusive”. On every map page, the “SLAVE” status is indicated by the addition of “(Slave)”, e.g. BEARING (Slave). <p>There may only be one “MASTER” and “SLAVE” in a network.</p>
 	<p>The LICENSE KEY hotkey opens the Textual Input Dialog to allow entering the license key. If the application already has a valid license, the button shows the text “VALID”, and the Textual Input Dialog can't be opened. If there is no valid license but only a preliminary one, the text shows “EXPIRING”.</p>
	<p>LAG ERROR COMPENSATION toggles the compensation of the Phase Summator RAM ON/OFF, where, with an external compass connected, the bearing value determination is done by a special, improved compensating procedure. For a compass of minor quality, (e.g. heavy and quick variations) it may be necessary to switch off the lag error compensation.</p>

Basic Elements of the System Settings Dialog	
Symbol	Description
	The SCAN WIFI CHANNELS hotkey opens the WIFI Scan Dialog which allows scanning the workload on available WIFI channels. Results are shown graphically with the X-axis being the channel / frequency axis, and the Y-axis indicating the power level of the received WIFI networks. It is useful to select a channel where no or not many other networks are available (see WIFI channel hotkey and be mindful about channels allowed to be used in your area).
	The S/N RATIO AUTOSQL [%] hotkey opens the Numerical Input Dialog to allow entering the required S/N (in %) to be used as set criteria for the auto squelch. Squelch level is set above the current noise level by this value if auto squelch has been selected.
	The VARIATION [°] hotkey opens the Textual Input Dialog. There, the variation value for calculating TRUE heading and TRUE bearing can be set, in the case that there is no variation value available from the GPS. <i>Note: The value largely depends on your location and is time variant.</i>
	The WIFI CHANNEL hotkey opens the Numerical Input Dialog to allow entering the desired WIFI channel on which the communication between Tablet and Antenna Unit shall take place. Available channels are 1 to 13 (2.4 GHz band). No other bands are available. Default value is set to channel 6. Make sure to only use channels allowed in your country of operation. For example, in the U.S.A., only channels 1 to 11 are permitted.
	The WIFI SIGNAL STRENGTH [%] hotkey opens the Numerical Input Dialog to set the relative WIFI power. SET DEFAULT will set a reasonable value for typical applications (backpack, car roof). If higher operational ranges are desired, increase the value. MIN value is 0, MAX value is 100.
	OK is used to confirm the entered values and switches back to the page from which the System Settings page has been opened.
	HOME Closes the dialog without adopting the values and switches back to the map page.
	ESCAPE Closes the dialog without adopting the values and switches back to the map page.

4.6 Service Settings

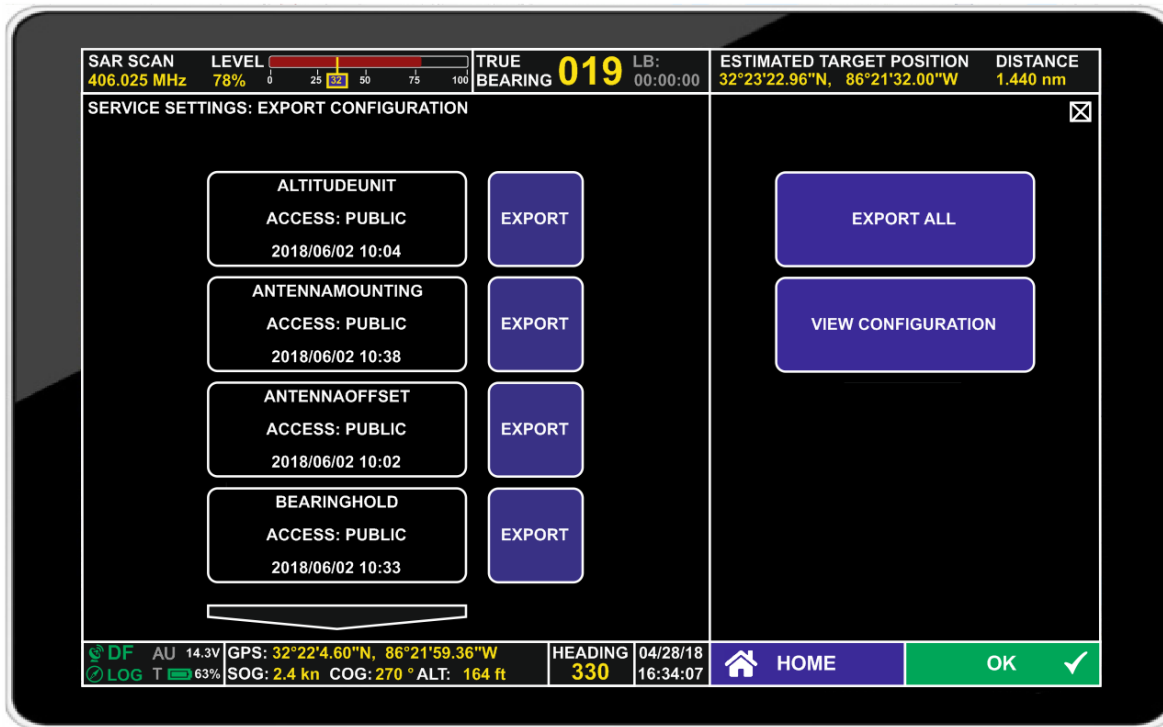


Basic Elements of the Service Settings Dialog	
Symbol	Description
	SCROLL DOWN arrow is used to scroll down through the two system settings pages.
	SCROLL UP arrow is used to scroll up through the two system settings pages.
	TABLET SOFTWARE VERSION shows the version of the RT-400 DF Scout software running on the tablet.
	TABLET ANDROID VERSION shows the version of the Android Operating System running on the tablet used.
	AU WIFI SOFTWARE VERSION shows the software version of the WIFI module in the Antenna Unit.
	AU CPU SOFTWARE VERSION shows the software version of the CPU in the Antenna Unit.
	The EXPORT CONFIGURATION hotkey opens the Export Configuration Dialog.
	The EXPORT KML LOG DATA hotkey opens the Service Settings: Export Log Files dialog. Refer to chapter “KML Logging and Export Log Files Dialogs” for details.
	The IMPORT CONFIGURATION hotkey opens the Import Configuration Dialog.
	A license key can be copied into the SD-card under Android/data/com.rhotheta.rt400/files/License/license.txt. By using the IMPORT LICENSE hotkey, the key is imported, and the license is set to valid. (See system settings dialog).





Basic Elements of the Service Settings Dialog	
Symbol	Description
	The KML LOG DATA Hotkey opens the KML Logging Dialog . Refer to chapter “KML Logging and Export Log Files Dialogs” for details.
	OK is used to confirm the entered values and switches back to the page from which the Service Settings Dialog has been opened.
	HOME Closes the dialog and switches back to the map page.
	ESCAPE closes the Service Settings Dialog and switches back to the main menu.







4.6.1 Export Configuration Dialog

The Export Configuration Dialog allows exporting each single configurable item of the software by itself or to export the complete configuration at once to a mass storage device.

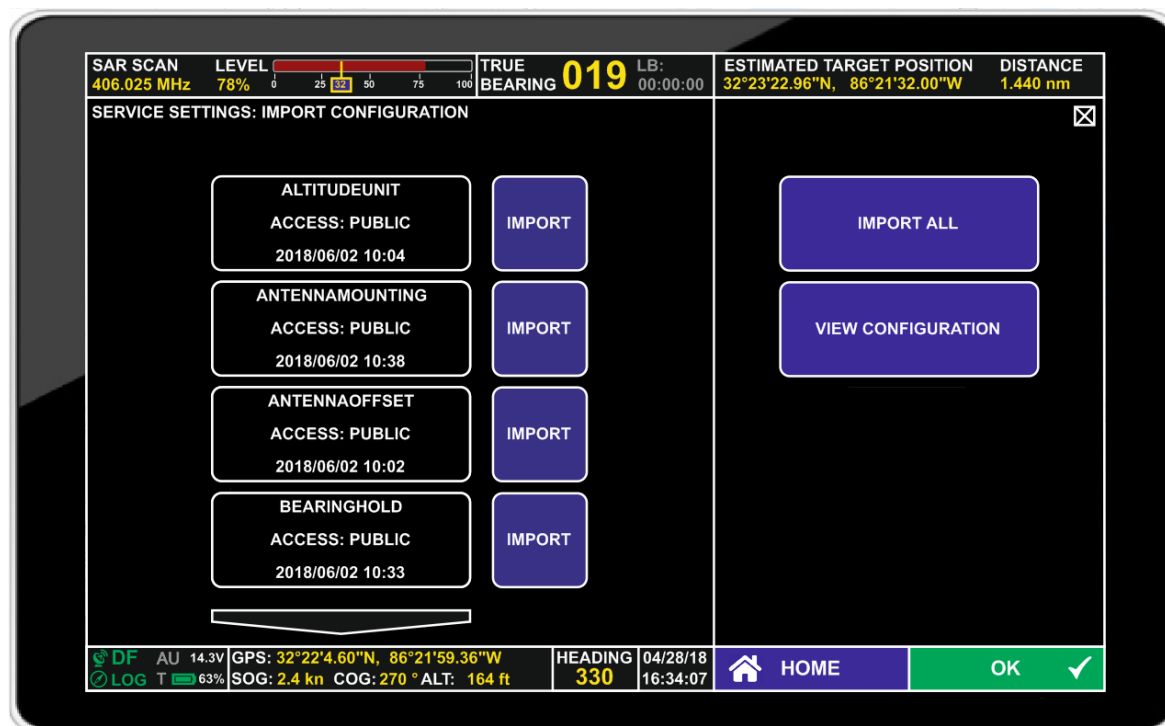










Files are stored in the mass storage device (e.g. SD-Card) under Android/data/com.rhotheta.rt400/files/Configurations. Each configuration item is stored in a separate file.

Basic Elements of the Export Configuration Dialog	
Symbol	Description
	SCROLL DOWN arrow is used to scroll down through the pages.
	SCROLL UP arrow is used to scroll up through the pages.
	EXPORT is used to export one specific configuration item via configuration files.
	EXPORT ALL allows exporting all configuration parameters at once.

Basic Elements of the Export Configuration Dialog	
Symbol	Description
	VIEW CONFIGURATION allows viewing the complete configuration in configuration files in the form of a simple text listing.
	OK closes the dialog and switches back to the Service Settings dialog.
	HOME Closes the dialog and switches back to the map page.
	ESCAPE closes the dialog and switches back to the Service Settings dialog.
	After choosing EXPORT of one specific configuration item, this text, shown below the “VIEW CONFIGURATION” hotkey, confirms that the export has been successful and shows the path to and the name of the specific configuration file.
	After choosing EXPORT ALL, this text, shown below the “VIEW CONFIGURATION” hotkey, confirms that the export has been successful and shows the path to the configuration files.

4.6.2 Import Configuration Dialog

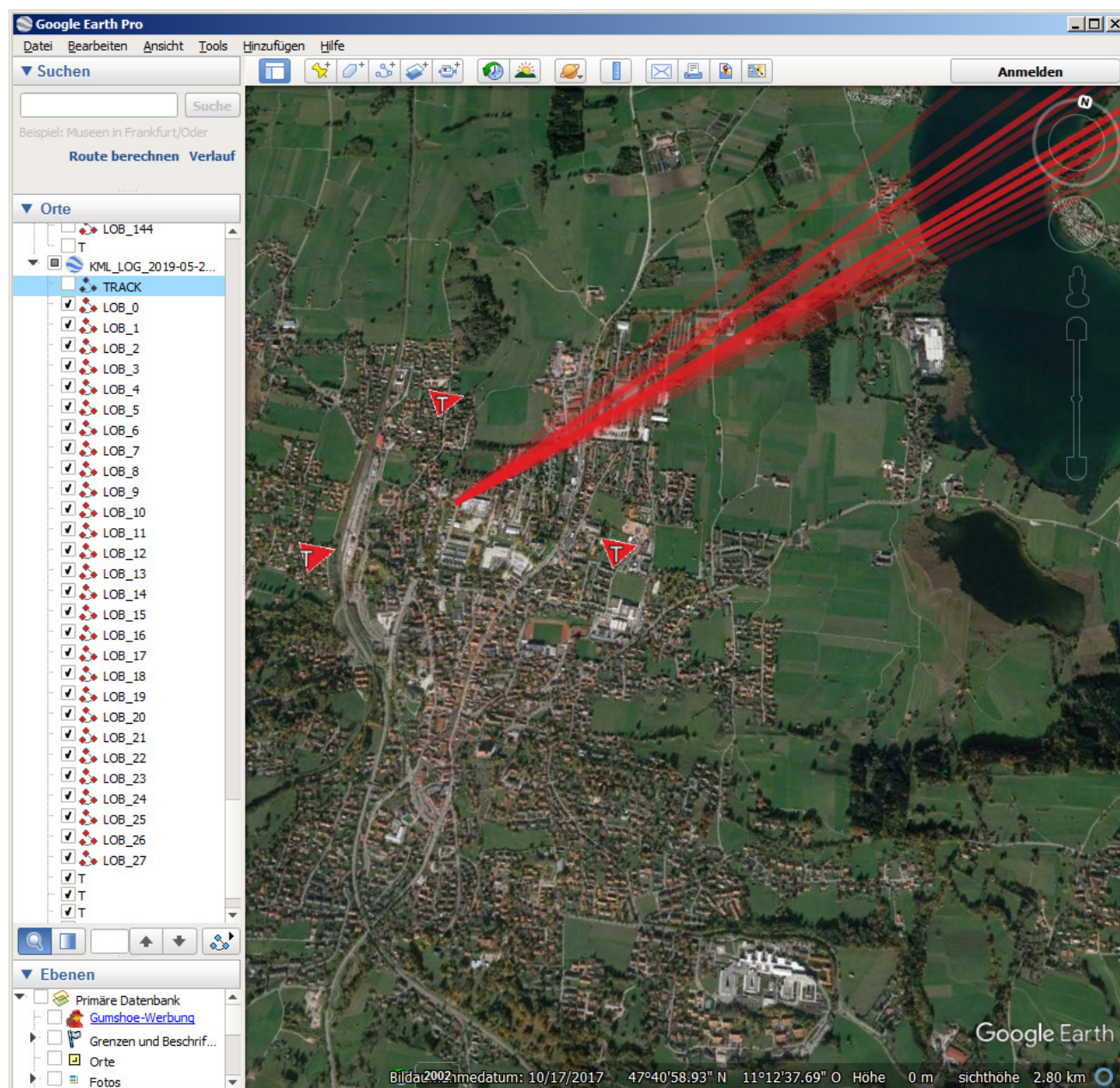


Basic Elements of the Import Configuration Dialog	
Symbol	Description
	SCROLL DOWN arrow is used to scroll down through the pages.
	SCROLL UP arrow is used to scroll up through the pages.
	IMPORT is used to import one specific configuration item via configuration files.
	IMPORT ALL allows importing all available configuration parameters from files at once.
	VIEW CONFIGURATION allows viewing the complete configuration in configuration files in the form of a simple text listing.
	OK closes the dialog and switches back to the Service Settings dialog.
	HOME closes the dialog and switches back to the map page.
	ESCAPE closes the dialog and switches back to the Service Settings dialog.

4.6.3 KML Logging and Export Log Files Dialogs

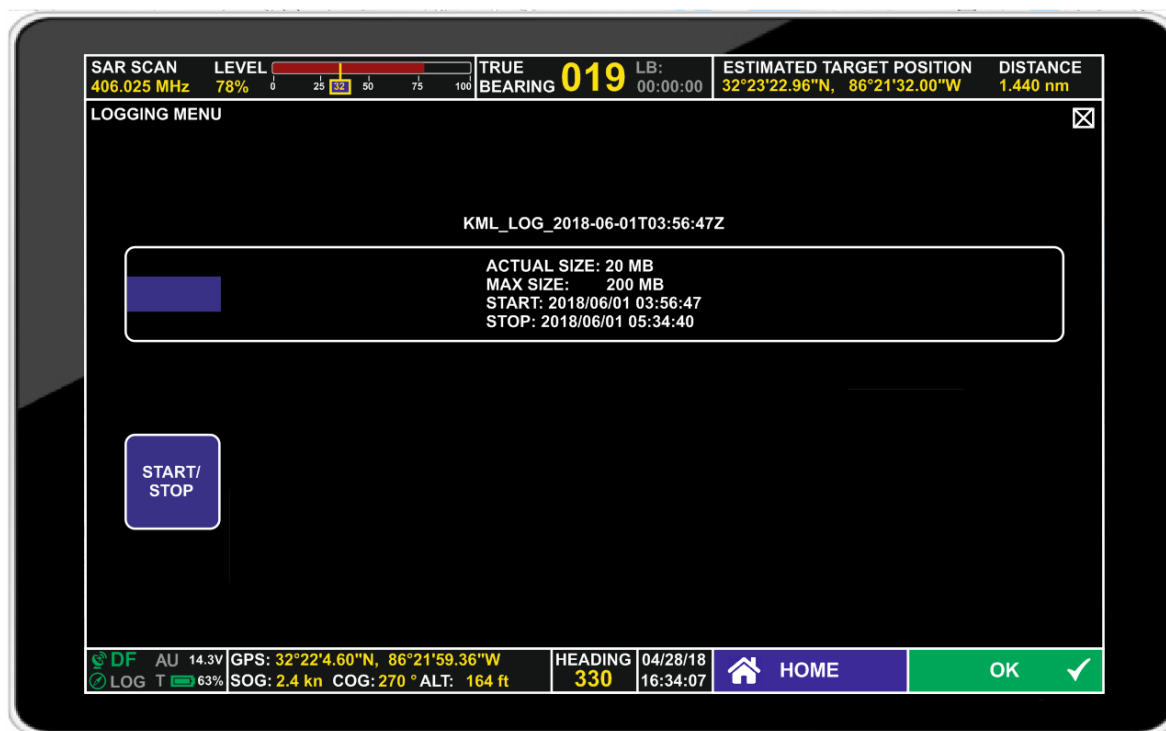
KML files allow to export the user's track, received Lines Of Bearing, estimated beacon positions and received beacon positions of COSPAS-SARSAT beacons. They can be loaded into GOOGLE EARTH or into KDE MARBLE and shown on their maps (only OPEN STREETMAP on Marble).

Within Google Earth, Lines Of Bearing (LOBs) are shown as red-colored lines, where the line's intensity increases with the number of overlapping LOBs. Estimated beacon positions are marked with a "T" inside a red triangle. Received COSPAS-SARSAT beacon positions are marked with the number known from the map pages:



Two dialogs are available to handle the creation and export of KML log data:

- KML Logging dialog
- Export Log Files dialog







The KML Logging Dialog is opened either by tapping and holding the lower left field of the bottom line on a map page, or through the SERVICE SETTINGS dialog, where “KML Log Data” can be found.

Once a logging process has been started, operational data is logged either until the user opens the KML Log Data window again and hits “Start/Stop”, or until the maximum file size of 200 MB has been reached. From that point on, the Log File no longer increases in size, instead, it follows the “FIFO” (First In, First Out) principle: old data is removed from the file as new data is saved.

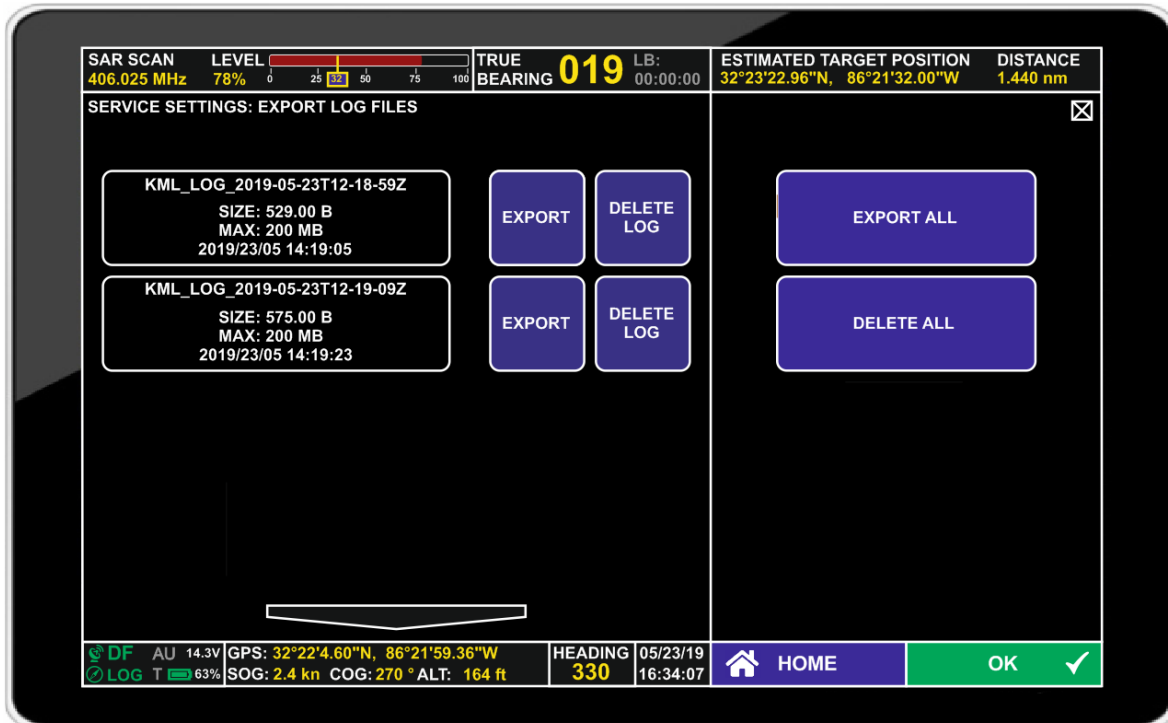
Basic Elements of the Service Settings: KML Logging Dialog

Symbol	Description
KML_LOG_2018-06-01T03:56:47Z	Each log is named using a unique UTC timestamp in the file name: KML_LOG_2018-06-01T03-56-47Z means the log started on 01 st of June 2018, at 03:56:47 UTC.
ACTUAL SIZE: 20 MB MAX SIZE: 200 MB START: 2018/06/01 03:56:47 STOP: 2018/06/01 05:34:40	For saved logs, the actual size, the size limit, the start date of the log, and the stop date of the log (both in actual system time) are shown.
ACTUAL SIZE: 20 MB MAX SIZE: 200 MB START: 2018/06/01 03:56:47 RUNNING - 2018/06/01 03:56:47	While logging is in progress, the data content is being changed. The actual and maximum sizes are shown, as well as the start date. Instead of the stop date, RUNNING will indicate that logging is in progress, with the current date and time shown.



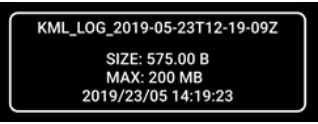



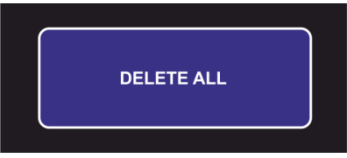





Basic Elements of the Service Settings: KML Logging Dialog

Symbol	Description
	With START/STOP , logging can be either started or stopped. After each stop and new start, a new log is created. While running, the shape and text of the button are highlighted in yellow color.
	If an action which must be confirmed, such as deleting a log, has been chosen, the OK button is used to confirm the action. Otherwise, "OK" closes the dialog and switches back to the Service Settings Dialog.
	HOME closes the dialog and switches back to the map page.
	ESCAPE closes the dialog and switches back to the Service Settings Dialog.

The **SERVICE SETTINGS: EXPORT LOG FILES** Dialog is accessible through the SERVICE SETTINGS dialog's KML LOG DATA hotkey. It shows available logs and allows exporting or cancelling/deleting them:

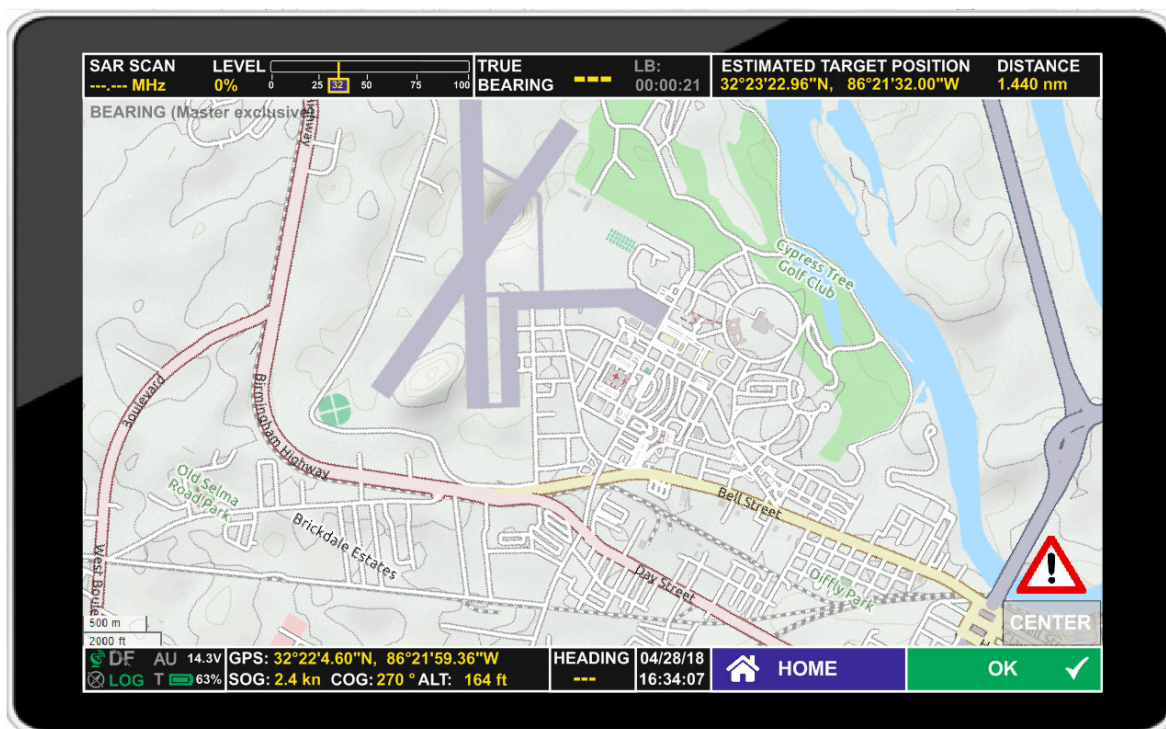
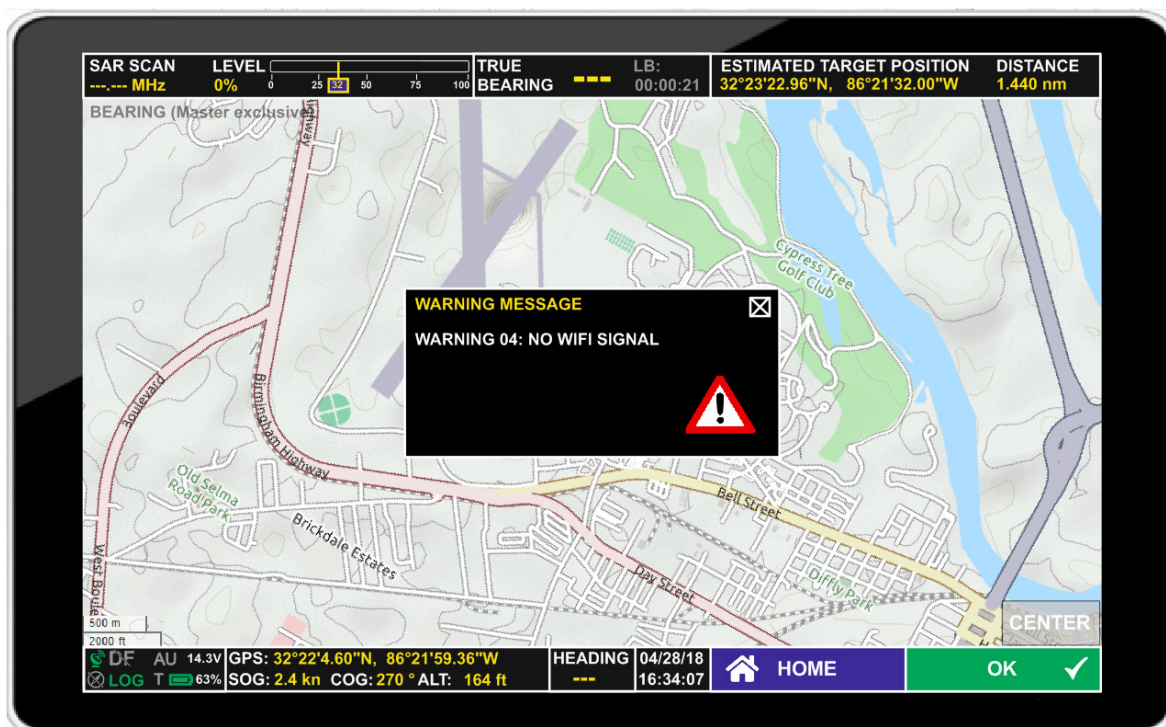


Basic Elements of the Service Settings: Export Log Files Dialog



Symbol	Description
	SCROLL DOWN arrow is used to scroll down through the list of available logs.
	SCROLL UP arrow is used to scroll up through the list of available logs.
	Each log is named using a unique UTC timestamp in the file name: KML_LOG_2019-05-23T12-19-09Z: log started 23 rd of May 2019, at 12:19:09 UTC, size is 575 Byte, limit set to 200 MB. Logging stopped at 14:19:23 local system time
	The EXPORT button will store the log file into the “KML_LoggingData” Folder in the tablet’s main directory.
	The DELETE LOG button will delete the selected log. Before deleting a log, the user is asked to confirm the action by tapping “OK”.
	EXPORT ALL will export all log files into the “KML_LoggingData” folder in the tablet’s main directory.
	The DELETE ALL button will delete all logs.
	After successfully exporting a single KML log file, the successful export is confirmed under the “DELETE ALL” hotkey, and the path to the file and its name is reported.
	After successfully exporting all KML log files, the successful export is confirmed under the “DELETE ALL” hotkey, and the path to the files is reported.
	If an action which must be confirmed, such as deleting a log, has been chosen, the OK button is used to confirm the action. Otherwise, “OK” closes the dialog and switches back to the Service Settings Dialog.
	HOME closes the dialog and switches back to the map page.
	ESCAPE closes the dialog and switches back to the Service Settings Dialog.

4.7 Error and Warning messages

Every Warning or Error State detected by the system will be indicated as a pop-up dialog with an important message text.



Basic Elements of the Error and Warning Messages

Symbol	Description
	ESCAPE closes the dialog.
	The warning symbol in the lower right corner of the map display indicates that there is a warning. Tap the symbol to open the warning dialog.

List of Error Messages

Error Number	Error Text	Error Reason and Description
01	AU NO RECEIVER	Defective receiver circuit board in the Antenna Unit
04	AU REC. NO PLL	Error in receiver synthesizer oscillator in the Antenna Unit
05	DCU>AU NO DATA	No serial data from the RT-400 DF Scout to the Antenna Unit
06	DCU>AU BAD DATA	Incompatible or bad data connection between RT-400 DF Scout and Antenna Unit
07	AU LOW VOLTAGE	Supply Voltage of the Antenna Unit below 10 V
08	AU>DCU BAD DATA	Incompatible or bad data connection between Antenna Unit and RT-400 DF Scout
09	NO ANTENNA UNIT	No serial data from the Antenna Unit. Missing or damaged connection between the Antenna Unit and the Wi-Fi Module in the Antenna Unit, or defective Antenna Unit.

List of Warning Messages

Warning Number	Warning Text	Error Reason and Description
01	AU LOW VOLTAGE	Low supply voltage in the Antenna Unit. Supply voltage dropped below a defined threshold.
02	NO EXT. COMPASS FOUND	Data from external compass is not available. Warning only appears if external compass is configured as data source.
03	NO INT. COMPASS FOUND	Data from internal compass is not available. Warning only appears if internal compass is configured as data source.
04	NO WIFI SIGNAL	No Wi-Fi connection to the Antenna Unit
05	NO GPS	No signal from internal GPS. Warning only appears if there already was a successful GPS reception.
20	AU DATA RANGE	Bad data received on the tablet, mismatch of telegram length.

List of Warning Messages		
Warning Number	Warning Text	Error Reason and Description
21	AU DECODE ERR	Data decode error in COSPAS-SARSAT data block. Data could not be decoded. Usual reason: Signal level too low or other disturbances.
22	SEND FREQ. OFS-	Transmit frequency of received signal is too low. Probably the wrong receive frequency has been chosen or noise has been received. Indicated bearing might be wrong.
23	SEND FREQ. OFS+	Transmit frequency of received signal is too high. Probably the wrong receive frequency has been chosen or noise has been received. Indicated bearing might be wrong.
24	TEMPERATURE ANTENNA UNIT	Temperature of the Antenna Unit is too high.
30	FLASH CONFIG	Stored configuration settings cannot be read. The device will operate with default settings.
39	SIMULATION	The AU simulation mode is active.
40	NO MASTER DCU	A slave DCU does not find its corresponding master.

5 Troubleshooting

Connectivity Problems

Problem	Possible Reason and Solution
Delayed position updates and delayed Wi-Fi Connection after Power-On	<p>After a cold start of a tablet, and probably under other specific operating conditions, it could happen that the system's position is only available after a delay of several minutes.</p> <p>Also, it might happen that after an interruption of the Wi-Fi Link between DF-Scout and Antenna Unit, it takes one or more minutes until the system reconnects.</p> <p>This is a behavior dependent on the system architecture of the tablet computer and its operating system.</p>
No Wi-Fi Connectivity	<ul style="list-style-type: none"> • Wi-Fi deactivated. Check tablet's (Android) settings. • Too much distance or too many attenuating materials (faraday cage effect) between the Antenna Unit and the tablet. Try to change the tablet's or AU's position (normally, connections through a car's window or through a free space distance of 50 to 100 meters should work with typical tablets)

Map Problems

Problem	Possible Reason and Solution
Black screen instead of map. No GPS position available.	<ul style="list-style-type: none"> • GPS not received yet: Wait a few minutes for GPS to become available • GPS antenna covered by metal: Make sure the GPS antenna in your tablet has free view to the sky • GPS deactivated. Check tablet's (Android) settings (Settings / Connections / Location) • App permissions: Check that "Location" is enabled for DF Scout (Settings / Apps / DF-Scout / Permissions)
No details on map	<p>Reason: No detailed map installed for the area of operation</p> <p>Solution: Purchase map package for that area from RHOTHETA</p>

File Access Problems

Problem	Possible Reason and Solution
Configuration or KML files can't be handled	Check app permissions: Check that "Storage" is enabled for DF Scout

Licensing	
Problem	Possible Reason and Solution
After starting the Application, license key is requested	Refer to sub-chapter “licensing” of this manual. Contact RHOTHETA if the problem persists after entering an already purchased key code.
Frequency Input opens “Not licensed” dialog	<ul style="list-style-type: none"> The RT-400 you purchased has not been licensed for an optional frequency you want to use. Contact RHOTHETA for support. The frequency you tried to enter is not within the channel spacing foreseen for that specific frequency range. Enter a compliant frequency.

Operational issues	
Problem	Possible Reason and Solution
No target information in decode mode	<ul style="list-style-type: none"> ID is available: Beacon does not transmit a position ID not available: Beacon signal may be too weak or noisy to be decoded. Try switching to bearing mode to get a direction to the beacon. While approaching, beacon signal should improve and may be decoded successfully.
Frequency Offset Warning	<ul style="list-style-type: none"> DF set to the wrong frequency: Increase or decrease the DF frequency by single frequency steps until warning disappears. Beacon transmitting frequency tolerance is too high: Increase or decrease the DF frequency by single frequency steps until warning disappears.
No HEADING information	Heading source chosen is not available. Use a different heading source (System settings).
Wrong bearing direction shown with wrong sense of rotation.	Wrong “Antenna Unit Mounting” sense selected (System settings).
Licensed frequency not selectable	Frequency has been locked (System settings).
Continuous offset of several degrees on the map	Compass variation has been set to a wrong value (system settings). Set the value corresponding to your location.

6 Notes