

COBHAM

SAILOR 6282 AIS Transponder SAILOR 6280/6281 AIS System

User manual



SAILOR 6282 AIS Transponder SAILOR 6280/6281 AIS System

User Manual

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Safety summary

Observe the following general safety precautions during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Cobham SATCOM assumes no liability for the customer's failure to comply with these requirements.

Ground the equipment

To minimise shock hazard, connect the SAILOR 6282 AIS Transponder to an electrical ground and follow the cable instructions.

RF exposure hazards and instructions

The SAILOR unit generates electromagnetic RF energy when transmitting. To ensure that you and those around you are not exposed to excessive amounts of energy and to avoid health hazards from excessive exposure to RF energy, all persons must be at least 1 ft (0.25 m) away from the antenna when the unit is transmitting.

Warranty limitation

IMPORTANT - The SAILOR 6285 GPS Antenna – Active is a sealed waterproof unit (classified IPx6 & IPx8). To create and maintain its waterproof integrity it was assembled in a controlled environment using special equipment. The SAILOR 6282 AIS Transponder is not a user maintainable unit, and under no circumstances should the unit be opened except by authorized personnel. Unauthorized opening of the unit will invalidate the warranty.

Installation and service

Installation and general service must be done by skilled service personnel.

Compass safe distance

Compass safe distance: 55 cm (standard magnetic compass), 45 cm (Emergency magnetic compass) from the SAILOR 6282 AIS Transponder.

Preface

Approvals

The SAILOR 6282 AIS Transponder fulfills the requirements of the Marine Equipment Directive 96/98/EC with 8th amend 2012/32/EU and is intended for use in maritime environment.

SAILOR 6282 AIS Transponder is approved to MED 2011/75/EU and fulfills the requirements in the standards: IEC 61993-2 (2012), IEC 60945 ed.4 (2002), ITU-R M.1371-4, IEC 61162-1 (2010), IEC61162-2 (1999), IEC61162-450 (2011).

SAILOR 6282 AIS Transponder is approved to FCC CFR47 part 80 with USCG approval no. 165.155/EC0168/BABT/MED000046/EC0575.

SAILOR 6282 AIS Transponder is approved to IC and fulfills the requirements in RSS-182.

The approvals of the SAILOR 6282 AIS Transponder are constantly monitored. New national approvals will be applied for and granted and new test standards may come into force. Therefore the above list may not be complete. Contact your authorized dealer for more information.

Training information

The SAILOR 6282 AIS Transponder is designed for *occupational use only* and is also classified as such. It must only be used in the course of employment by individuals aware of both the hazards as well as the way to minimize those hazards.

The unit is thus NOT intended for use in an uncontrolled environment by general public. The SAILOR 6282 AIS Transponder has been tested and complies with the FCC RF exposure limits for *Occupational Use Only*. The unit also complies with the following guidelines and standards regarding RF energy and electromagnetic energy levels including the recommended levels for human exposure:

FCC OET Bulletin 65 Supplement C, evaluating compliance with FCC guidelines for human exposure to radio frequency electromagnetic fields.

American National Standards Institute (C95.1) IEEE standard for safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz.

American National Standards Institute (C95.3) IEEE recommended practice for the measurement of potentially hazardous electromagnetic fields - RF and microwaves.

Below is a description of the RF exposure hazards and instructions in safe operation of the unit within the FCC RF exposure limits established for it.

Warning

Your SAILOR unit generates electromagnetic RF (radio frequency) energy when it is transmitting. To ensure that you and those around you are not exposed to excessive amounts of that energy (beyond FCC allowable limits for occupational use) and thus to avoid health hazards from excessive exposure to RF energy, FCC OET bulletin 65 establishes a Maximum Permissible Exposure (MPE) radius of 1 ft. (0.25 m) for the maximum power of your unit (12.5 W selected) with a half wave omni-directional

antenna having a maximum gain of 3 dB (5.2 dBi). This means all persons must be at least 1 ft. (0.25 m) away from the antenna when the unit is transmitting.

Alerte de Sécurité

Dangers liés à l'exposition aux fréquences radio et instructions. Conformément à la réglementation d'Industrie Canada, le présent radio émetteur ne peut fonctionner qu'avec une antenne de type omnidirectionnelle, demi-onde ou d'un gain maximale de 3 dB, approuvée par Industrie Canada. Pour éviter les risques pour la santé dûs à une exposition excessive aux champs de fréquences radio, une distance minimale de 25 cm est nécessaire entre l'utilisateur et le radio-émetteur.

Installation

The SAILOR 6282 AIS Transponder is designed for installation by a skilled service person.

1. An omni-directional antenna with a maximum power gain of 5.2 dBi must be mounted at least 7.6 ft. (2.25 m) above the highest deck where people may be staying during radio transmissions. The distance is to be measured vertically from the lowest point of the antenna. This provides the minimum separation distance which is in compliance with RF exposure requirements and is based on the MPE radius of 1 ft. (0.25 m) plus the 6.6 ft. (2 m) height of an adult.
2. On vessels that cannot fulfill requirements in item 1, the antenna must be mounted so that its lowest point is at least 1 ft. (0.25 m) vertically above the heads of people on deck and all persons must be outside the 1 ft. (0.25 m) MPE radius during radio transmission.
 - Always mount the antenna at least 1ft (0.25 m) from possible human access.
 - Never touch the antenna when transmitting
 - Use only authorized SAILOR accessories.

-
3. If the antenna has to be placed in public areas or near people with no awareness of the radio transmission, the antenna must be placed at a distance not less than 6 ft. (1.8 m) from possible human access.

Failure to observe any of these warnings may cause you or other people to exceed FCC RF exposure limits or create other dangerous conditions.

About the manual

Intended readers

This manual is a user manual for the SAILOR 6282 AIS Transponder system. This manual is intended for anyone who is using or intends to use this system. No specific skills are required to operate the SAILOR 6282 AIS Transponder. However, it is important that you observe all safety requirements listed in the beginning of this manual, and operate the system according to the guidelines in this manual.

Note that this manual does not cover installation of the system. For information on installation refer to the installation manual. Part numbers for related manuals are listed in the next section.

Related documents

The following table shows the documents related to this manual and to the SAILOR 6282 AIS Transponder.

Title and description	Document number
SAILOR 6280/6281 AIS System, Installation manual	98-137573
SAILOR 6004 Control Panel, Installation manual	98-136644
SAILOR 6282 AIS Transponder, Installation guide	98-136017
SAILOR 6283 AIS Connection Box and Wall Tray, Installation guide	98-136018
SAILOR 6285 GPS Antenna - Active, Installation guide	98-136019

Typography

In this manual, typography is used as indicated below:

Bold is used for the following purposes:

- To emphasize words.
Example: “Do **not** touch the antenna”.
- To indicate what the user should select in the user interface.
Example: “Select **SETTINGS** > **LAN**”.

Italic is used to emphasize the paragraph title in cross-references.

Example: “For further information, see *Connecting Cables* on page...”.

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Introduction

This chapter introduces the SAILOR 6282 AIS Transponder and gives an overview of the system and services. It has the following sections:

- *Introduction to AIS*
- *The SAILOR 6280/6281 AIS System*
- *System components*

Introduction to AIS

Overview

AIS (Automatic Identification System) is a communication system for the exchange of navigation data. An AIS station can be a ship station or a shore-side base station. AIS stations operate without interaction by ship or shore personnel (autonomous and continuous). AIS has evolved to include devices such as AIS as a navigation aid, AIS on search and rescue aircraft and AIS search and rescue transmitters (AIS SART).

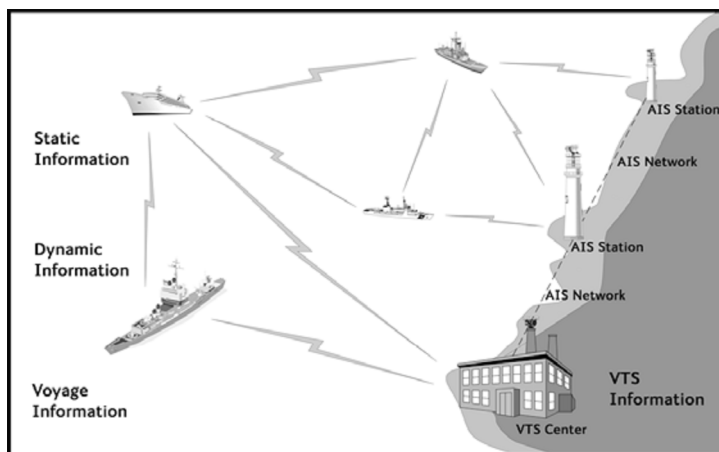


Figure 1: AIS for exchange of data

AIS enables the automatic exchange of shipboard information from the vessel's sensors (dynamic data), as well as manually entered static and voyage related data, between one vessel and another and between a vessel and a shore station(s). AIS also provides the possibility to send short safety related text messaging for ship or shore personnel. AIS devices are required internationally on most commercial vessels as identified by the International Maritime Organization (IMO) in the Safety of Life at Sea Convention (SOLAS), Chapter V. In addition, AIS is often required domestically on other vessels by some administrations.

AIS applications and purpose

The principal applications of AIS are:

- Information exchange between vessels within VHF range of each other, increasing situation awareness
- Information exchange between a vessel and a shore station, such as a Vessel Traffic Service (VTS), to improve traffic management in congested waterways
- Automatic reporting in areas of mandatory and voluntary reporting
- Exchange of safety related information between vessels and between vessels and shore station(s).

The purpose of AIS is to improve the safety of navigation and protection of the environment by assisting in the effective navigation of ships and the operation of VTS. This is achieved through the following:

- In a ship-to-ship mode for collision avoidance
- As a means for littoral states to obtain information about a ship and its cargo
- As a VTS tool, i.e. ship-to-shore, for traffic management
- Increased situational awareness which enables effective response to emergencies such as search and rescue (SAR) as well as environmental pollution
- Providing data to identify trends or improvements to enhance navigational safety.

Note

Not **all** ships are required to have AIS. Furthermore, AIS may be switched off if there is a potential risk that the operation of AIS might compromise the safety or security of the ship, or if security incidents are imminent.

If a vessel operating in a mandatory ship reporting system does switch off its AIS, this should be reported to the relevant authority. Note that some data is entered or updated manually, meaning that there is potential for false entry and for the entered data to become out of date. This includes data related to static information (e.g. ship identity, dimension) and voyage related data (e.g. navigational status).

AIS and radar

A difference between AIS and radar is that AIS uses an absolute referencing system to determine the position, whereas radar determines the position by relative measurements from the vessel or shore base to observed targets. AIS may be used together with radar information to provide:

- Vessel identification, heading, course over ground (COG) and speed over ground (SOG)
- Improved vessel tracking (no target swap)
- Wider geographical coverage
- Greater positional accuracy, dependent on the position input sensor
- Information in radar shadow area ('sees' around bends and behind islands)
- Maneuver data in nearly real time
- No loss of targets in sea, rain and snow clutter

AIS classes

AIS is not only used on board ships. It can be grouped by 'class' (shipborne) and function. A Ship borne AIS device which contributes by most of the flow of AIS information, is classified as either Class A or B. The AIS Class A stations are ship borne units which meet IMO performance standards and are required on most commercial ships by the International Maritime organization (IMO). The SAILOR 6282 AIS Transponder is a Class A AIS.

The SAILOR 6280/6281 AIS System

The SAILOR 6280 AIS System consists of the following units:

1. SAILOR 6282 AIS Transponder
2. SAILOR 6285 GPS Antenna - Active
3. SAILOR 6004 Control Panel
4. SAILOR 6283 AIS Connection Box and Wall Tray

The SAILOR 6281 AIS Basic System consists of the following units:

1. SAILOR 6282 AIS Transponder
2. SAILOR 6285 GPS Antenna - Active
3. SAILOR 6004 Control Panel

Overview of a SAILOR 6281 AIS Basic System

The following figure shows the system configuration.

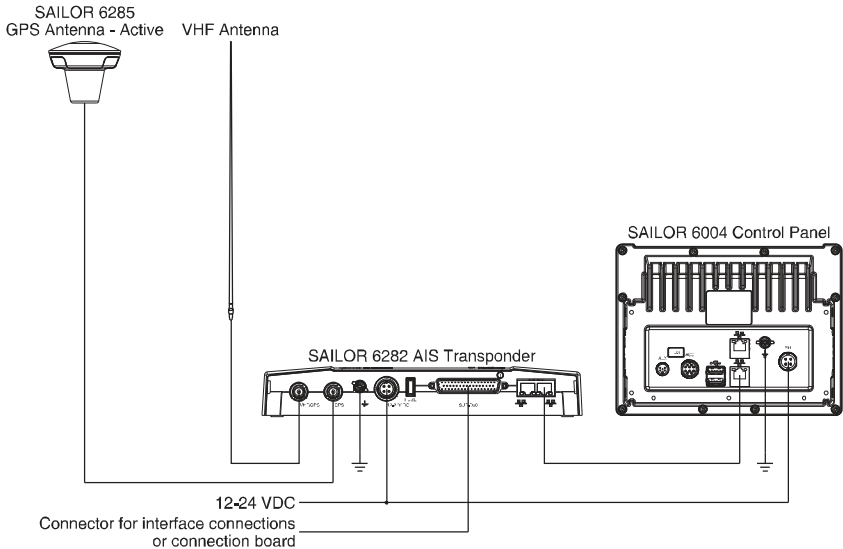


Figure 2: System configuration for the SAILOR 6281 AIS Basic System

The SAILOR 6004 Control Panel is connected to the SAILOR 6282 AIS Transponder through a LAN connection (LWE/IEC 61162-450), here after called LWE. The SAILOR 6281 AIS Basic System is operated using the touch display of the SAILOR 6004 Control Panel.

Features

- AIS Class A compliant and approved
- Active GPS antenna included
- Interface for ThraneLINK applications and INS available
- Programmable interface for connection to sensors using the NMEA interface versions 2.0, ..., 4.1
- Touch screen on the SAILOR 6004 Control Panel

- Easy installation with the dedicated connection box available (SAILOR 6283 AIS Connection Box and Wall Tray)
- Easy service - on the unit, through the ThraneLINK Management Application (TMA) or a web browser
- Built-in self-diagnostic system
- Built-in DC output on GPS antenna connector
- Possibility for a combined VHF and GPS antenna
- Works with both GPS and GLONASS
- Input for Low Power Forced Control, 1W output (gas alarm)
- Support of Class B carrier sense messages
- Function for discarding Class B messages
- Support for Long Range satellite tracking on channel 75 & channel 76
- Interface for pilot plug

System components

SAILOR 6282 AIS Transponder

The SAILOR 6282 AIS Transponder is a Class A AIS. It has connectors for GPS and VHF antenna, a ground stud, connector for DC power (12–24 VDC), multi connector for interfaces and 2 LAN connectors. The SAILOR 6282 AIS Transponder is always on, provided there is DC power.

The SAILOR 6282 AIS Transponder supports 3 sensor inputs for e.g. GPS and ROT and 4 presentation interfaces for e.g. ECDIS, Radar, Long Range and Pilot Plug. It also has inputs for Blue Sign functionality, Low Power Forced Control (gas alarm) and output for alarm. The SAILOR 6282 AIS Transponder has three LEDs showing the status of Power, Rx and Tx.



Figure 3: SAILOR 6282 AIS Transponder

SAILOR 6285 GPS Antenna - Active

The SAILOR 6285 GPS Antenna - Active is a robust, sealed and waterproof GPS antenna (classified IPx6 & IPx8).



Figure 4: SAILOR 6285 GPS Antenna - Active

SAILOR 6004 Control panel

The SAILOR 6004 Control panel is the user interface for the SAILOR 6282 AIS Transponder. Through the touch panel you access all settings that can be changed by the user. Alarms and notifications are shown in the display. The SAILOR 6004 Control panel has a buzzer for alarm tones. The display supports night mode. The AIS application is loaded into the SAILOR 6004 Control Panel during installation.



Figure 5: SAILOR 6004 Control panel

SAILOR 6283 AIS Connection Box and Wall Tray (optional)

The SAILOR 6283 AIS Connection Box and Wall Tray has spring-loaded terminals for easy connection of all interfaces. See *SAILOR 6282 AIS Transponder* on page 6 for more information on interfaces.



Figure 6: SAILOR 6283 AIS Connection Box and Wall Tray

Operation

This chapter has the following sections:

- *Getting started*
- *Settings*
- *Working with messages*
- *Alarms and notifications*

Getting started

As soon as DC power is provided the SAILOR 6282 AIS Transponder is on.

To switch on the SAILOR 6004 Control Panel push the power button. Operate the SAILOR 6004 Control Panel by tapping the touch screen. To switch off the SAILOR 6004 Control Panel push and hold the power button for 2 seconds and follow the instructions on the screen.



The AIS application has been installed during the installation of the SAILOR 6280/6281 AIS System. To start the AIS application tap the **AIS** icon in the display of the SAILOR 6004 Control Panel.

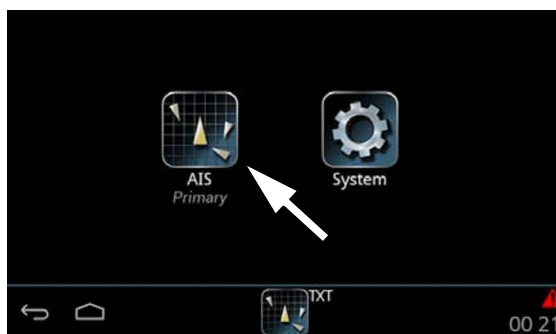


Figure 7: Screen after start-up (example)

The icon **System** holds the application manager and settings for the SAILOR 6004 Control panel, for more details see *App installation and system settings* on page 42.

AIS screen

The AIS app has the following idle screen:

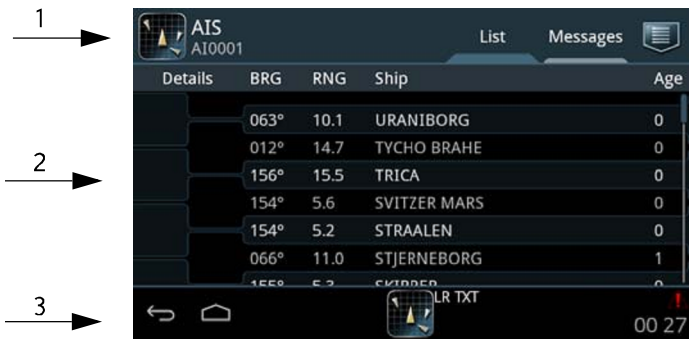


Figure 8: Sections in the AIS application screen (example)

1. Top bar



- Current app, in this case AIS, showing the name of the SAILOR 6282 AIS Transponder.
- Tab **List** showing a list of ships near own ship.
- Tab **Messages** showing all messages received and sent.
- Icon for sending messages and **Settings**.

2. AIS app-specific area

Details	BRG	RNG	Ship	Age
	063°	10.1	URANIBORG	0
	012°	14.7	TYCHO BRAHE	0
	156°	15.5	TRICA	0
	154°	5.6	SVITZER MARS	0

Each row represents a ship and its position relative to own ship.

- **Details** – tap to display a new screen with details for the selected ship.
- **BRG** shows the current bearing value to own ship.
- **RNG** shows the current distance (range) in nautical miles (NM) between own ship and ship in the AIS list.

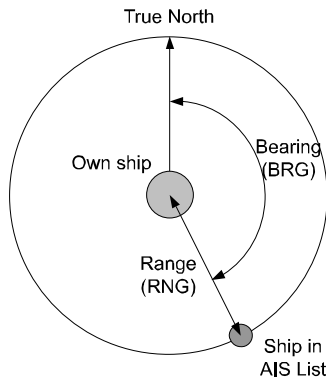


Figure 9: Bearing and range

- **Age** shows the number of minutes since this ship last reported data.

The list holds up to 200 targets within VHF range which are closest to own ship. A ship is cleared from the list after 7-18 minutes. You can sort the list, see *Sorting the list of ships* on page 13.

3. Bottom bar



- Icon for back function and collapsing the on-screen keyboard.
- Icon for going to the start screen.

- Icons for apps that are operated from this SAILOR 6004 Control Panel, including status information.

Letters next to AIS icon	Status information
LR	There are unread LR messages. For more information see <i>Long Range</i> on page 20.
TXT	The status information has changed. For more information see <i>Status (read only)</i> on page 26.
LO	The AIS unit is in low-power mode (Low power forced control (gas alarm)).

Table 1: Letters next to the AIS icon in the bottom bar

- Icon for unread messages, if any.
Unread safety messages are marked with a red exclamation mark.
- Icon for alarms present: from any unit controlled by this SAILOR 6004 Control Panel:
 - Flashing bright red triangle: Unacknowledged alarm(s).
 - Faded red triangle: Acknowledged alarm(s).
- UTC time, received from GPS receiver.

Sorting the list of ships

You can sort the list of ships by selecting the heading of the column you want to sort by. Select it again to toggle between ascending and descending order.

At **Ship** you can select whether to show the ship's MMSI number or the ship's name.



Figure 10: Sorting the list of ships (example)

Dim and night mode

Turn the dim knob of the SAILOR 6004 Control Panel to increase or decrease the display brightness. The display goes into **night mode** either when turning the dim knob on the front panel counterclockwise or when the internal light sensor detects the light level for changing to night mode.



To dim to level zero push the power button once. If an alarm appears while the display is in level zero, the display returns to the latest dim value and the alarm is displayed.

Show the ship details

The SAILOR 6282 AIS Transponder provides details for all ships listed. On the idle screen, tap the ship that you are interested in. Swipe upwards to display further items.

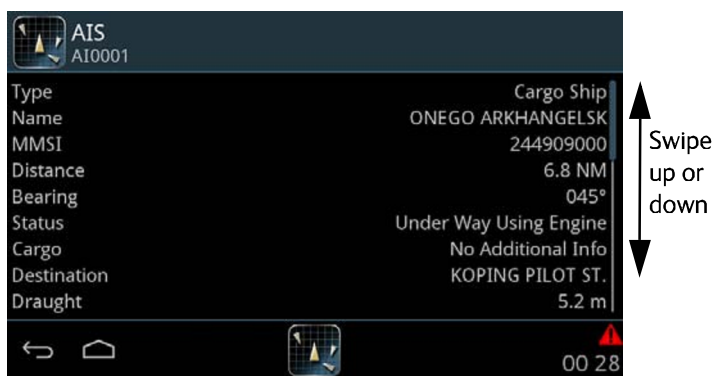


Figure 11: Ship details

Settings

To access the settings of the SAILOR 6282 AIS Transponder tap the menu icon, swipe upwards and then tap **Settings**.

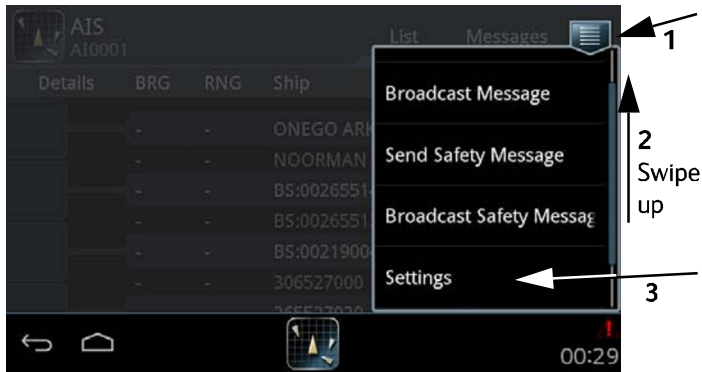


Figure 12: Accessing Settings

This menu has the following items:

- *Voyage*
- *Static Data (read only)*
- *Dynamic Data (read only)*
- *Long Range*
- *Test Message*
- *Channel Management*
- *Installation*
- *Connection*
- *Status (read only)*

Note

Only touch-screen keys that are required by the AIS standard 1371-4 table 44 are supported. Other keys are ignored.

Password protection

A number of settings is password protected against unauthorised or accidental use. They are marked with a padlock.

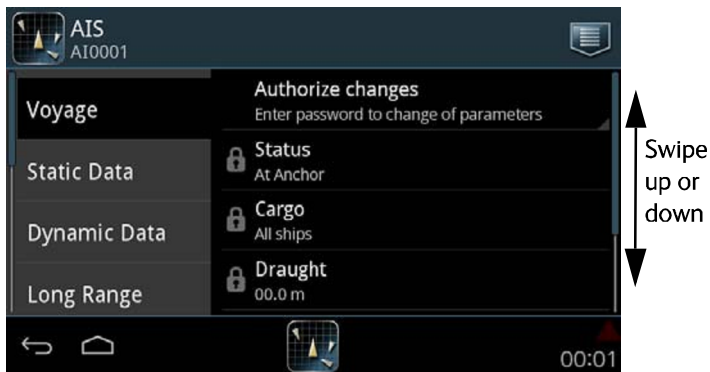


Figure 13: Password protection – example

To unlock a page with password protected parameters do as follows:

1. Tap the first line on the page: **Authorize changes**.
2. Tap the field **Authorize changes** to display the keypad.
3. Enter the user level password (default: user).
4. Tap **Done**.
5. Tap **Apply**.
6. The padlocks are opened and you can change a parameter.

When leaving the page, the parameters are locked again.

Voyage

Here you select or enter the various items for the ship's current voyage.
Swipe upwards to display further items.

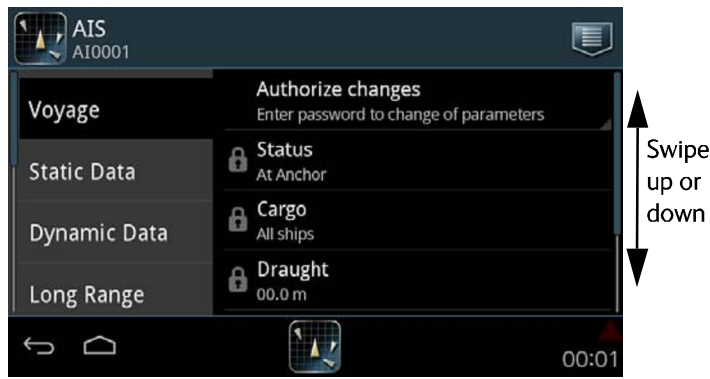


Figure 14: Settings – Voyage data

To change a parameter do as follows:

1. Unlock the page by entering the password.
2. Tap the parameter you want to change and follow the instructions in the display.

Item	Description
Status	Tap the field Status and set one option.
Cargo	Tap the field Cargo and set one option.
Draught	Tap the field Draught and select the draught xx.x m (0–25).(0–9). Tap Done .
Destination	Tap the field Destination and enter the destination using the keyboard on the screen. Tap OK to accept.
ETA	Tap the field ETA to enter the estimated time of arrival. Format: mm:hh dd/mm. Tap Done .

Table 2: Items in **Voyage**

Static Data (read only)

The static data is entered during installation. Swipe to display further items.

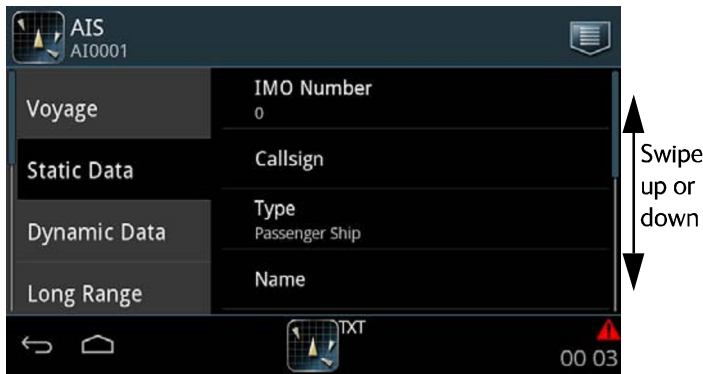


Figure 15: Settings – Static data (read only)

Item	Description
IMO Number	A unique identifier consisting of the three letters IMO followed by a unique seven-digit number assigned to own ship.
Callsign	Designation of this transmitting station.
Type	Type of own ship.
Name	Name of own ship.
MMSI	Nine digit number to uniquely identify own ship.
Length	Length of own ship.
Beam	Width at own ship's widest point at nominal waterline.

Table 3: Items in **Static Data**

Item	Description
Internal antenna position	Physical location of the internal GNSS sensor, e.g. SAILOR 6285 GPS Antenna - Active, connected directly to the GPS antenna connector of the SAILOR 6282 AIS Transponder.
External antenna position	Physical location of the external GNSS sensor on own ship, i.e. the antenna for the main GPS receiver that is connected to a sensor input of the SAILOR 6282 AIS Transponder.

Table 3: Items in **Static Data (Continued)**

Dynamic Data (read only)

The dynamic data is provided by the ship's sensors. Swipe upwards to display further items.

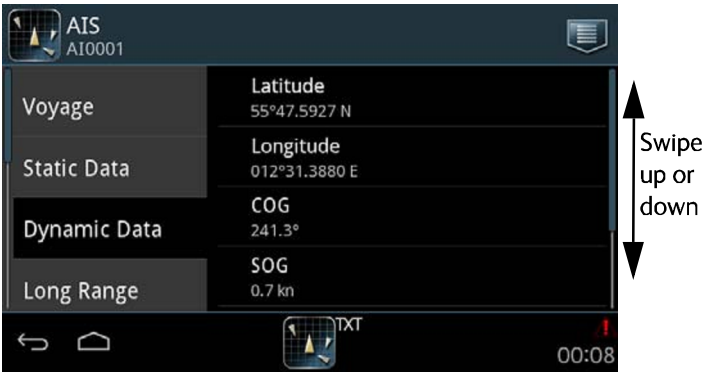


Figure 16: Settings – Dynamic data (read only)

Item	Description
Latitude	Current value for latitude.
Longitude	Current value for longitude.
COG	Course over ground, relative to True North.

Table 4: Items in **Dynamic Data**

Item	Description
SOG	Speed over ground.
Heading	1 – True North 2 – Heading
Rate of turn	Right or left, from 0 to 720 degrees per minute.

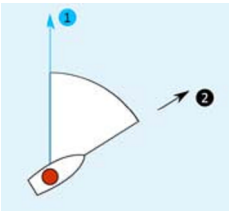


Table 4: Items in **Dynamic Data** (Continued)

Long Range

The SAILOR 6282 AIS Transponder can broadcast **long range** messages. You can manually set which information to include in the **long range** message. Swipe upwards to display further items.

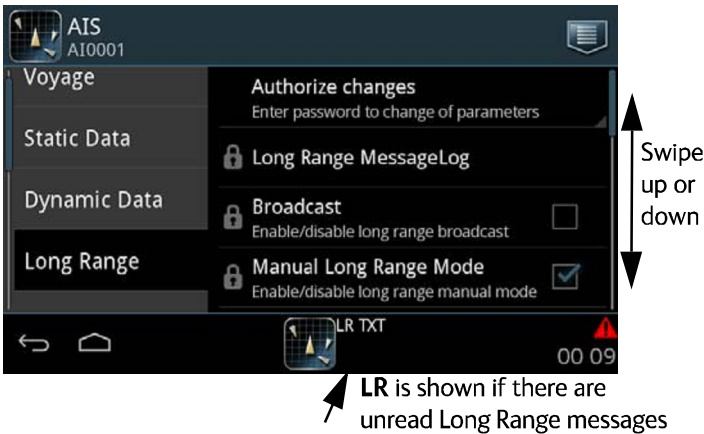


Figure 17: Settings – Long Range

To change a parameter do as follows:

1. Unlock the page by entering the password.

2. Tap the parameter you want to change and follow the instructions in the display.

Item	Description
Long Range Message Log	Tap here to display the log of received long range messages.
Broadcast	Tap Broadcast to enable or disable broadcast of long range messages.
Manual Long Range Mode	Tap Manual Long Range Mode to enable or disable long range manual mode. If enabled, tap the items to include in the long range message: • Name, callsign and IMO (A) • Date and time of message (B) • Position (C) • Course over ground (E) • Speed over ground (F) • Estimated Time of Arrival (I) • Draught (O) • Ship/Cargo (P) • Length, breadth and type (U) • Persons on board (W) The letter in parentheses is displayed in the LR message log.

Table 5: Items in **Long Range**

Tap **Clear Log** to clear the list of received Long Range messages.

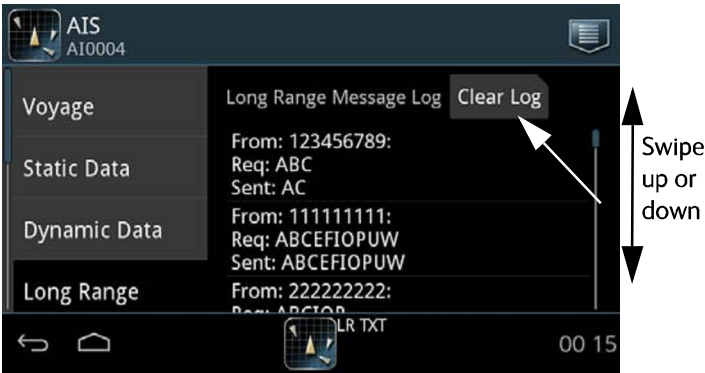


Figure 18: Long Range Message Log

Item	Description
From	MMSI number of the ship that has broadcasted the long range message.
Req.	Items requested by the AIS base station.
Sent	Items sent.

Table 6: Items in **Long Range Message Log**

Test Message

Use **Test Message** to check that the SAILOR 6282 AIS Transponder can send a text message to and receive a text message from other transponder systems. This test is done automatically. No action from the message recipient is required.

A target with at suitable range (15-25 NM) is selected if such a target has been received by the SAILOR 6282 AIS Transponder.

To start the **Test Message** do as follows:

1. Unlock the page by entering the password.
2. Tap the **AIS SART Test** selection box.

The result of the communication test is shown on the screen.

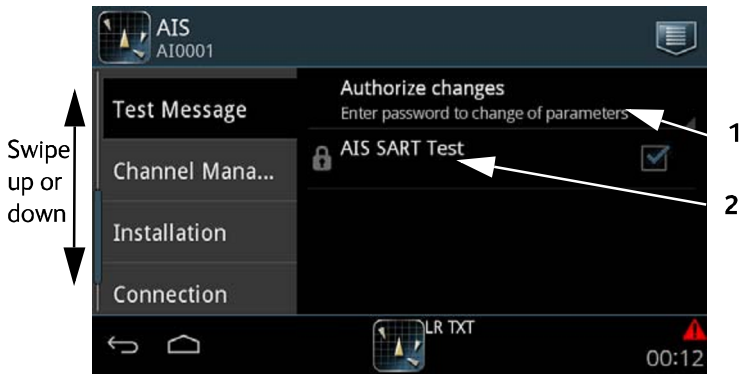


Figure 19: Settings – Test Message

Channel Management

The AIS channel is preset. If required, the AIS parameters (up to 8 sets) can be changed. The AIS parameters can be changed as follows:

- AIS message 22 with new parameters (set automatically in the SAILOR 6282 AIS Transponder).
- Through a received DSC message with new parameters (set automatically in the SAILOR 6282 AIS Transponder).
- Manual input of new parameters, e.g. you have received the new parameters in a text message or via VHF radio.

The SAILOR 6282 AIS Transponder decides which of the frequencies to use.

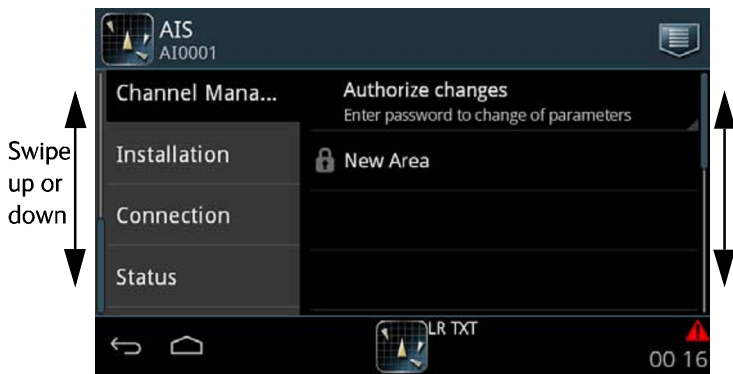


Figure 20: Settings – Channel Management

Entering new AIS parameter set manually

To enter a new area do as follows:

1. Unlock the page by entering the password.
2. Tap **New Area** and fill in the following parameters:
 - Set Area
 - NE Latitude
 - NE Longitude

- SW Latitude
- SW Longitude
- Channel A Frequency
- Channel A RX
- Channel A TX
- Channel B Frequency
- Channel B RX
- Channel B TX
- Transition zone
- High Power

Installation

On this screen you can view and access the Service Interface. This tool is used during installation of the SAILOR 6282 AIS Transponder. It is password protected and intended for use by authorized personnel.

For further information see the installation manual of the SAILOR 6280/6281 AIS System.

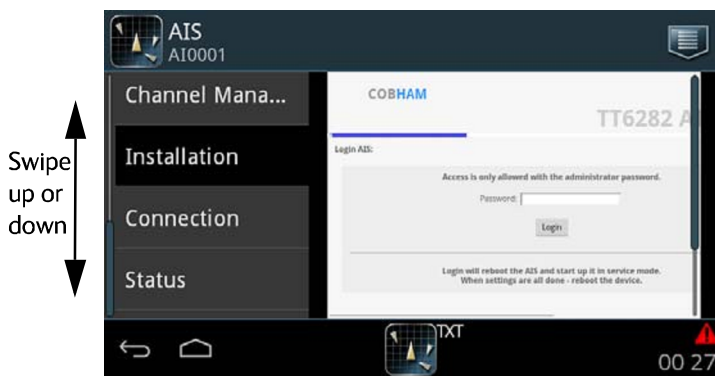


Figure 21: Settings – Installation

Connection

The connection data is typically entered during installation.

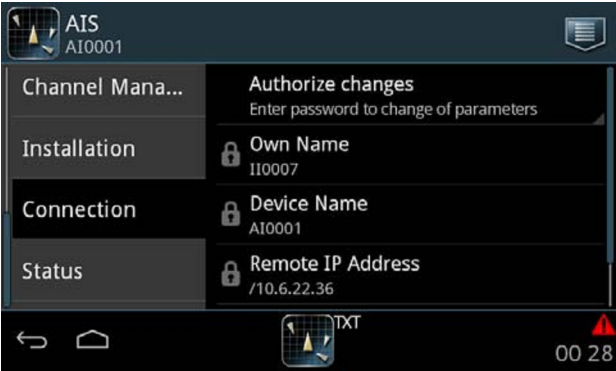


Figure 22: Settings – Connection

To change a parameter do as follows:

- 1. Unlock the page by entering the password.
- 2. Tap the parameter you want to change, see the table below.

Item	Description
Own name	Identification of the SAILOR 6004 Control Panel in the network. Tap and enter the letters II followed directly by 4 digits.
Device name	Identification of the SAILOR 6282 AIS Transponder in the network. Tap and enter the letters AI followed directly by 4 digits.

Table 7: Items in **Connection**

Item	Description
Remote IP Address	IP address of the connected SAILOR 6282 AIS Transponder. The IP address is needed for setup, service and maintenance. The IP address is acquired automatically (read only).
Own IP Address	IP address of the SAILOR 6004 Control Panel. The IP address is needed for service and maintenance. The IP address is acquired automatically (read only).

Table 7: Items in **Connection**

Status (read only)

The items on this page show the current status of a couple of parameters.



Figure 23: Settings – Status

Working with messages

Overview

You can send, broadcast and receive text messages and safety messages to and from all ships within VHF range. Unread messages are indicated in the bottom bar.

The latest 20 addressed safety-related messages are stored (minimum). Broadcast safety-related messages (SART) are updated continuously, the newest one is stored and can be displayed. The oldest messages are overwritten.

To view all messages tap the tab **Messages** in the idle screen.

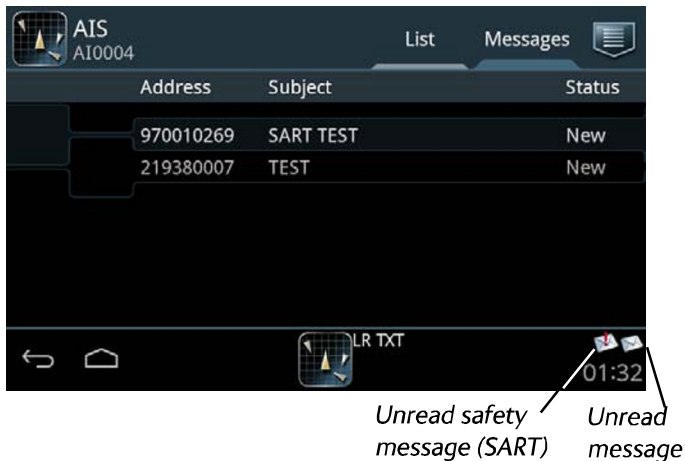


Figure 24: The tab **Messages**

Sending and broadcasting messages

To send or broadcast a message or safety message, do as follows:

1. Tap the icon for **Messages**.
2. Select which type of message you want to send. A message can be addressed to a specific MMSI number or broadcast. The content of a message can be ordinary text or a safety message.
Unread messages are indicated as a closed envelope icon. Unread safety messages pop up on the screen on arrival.

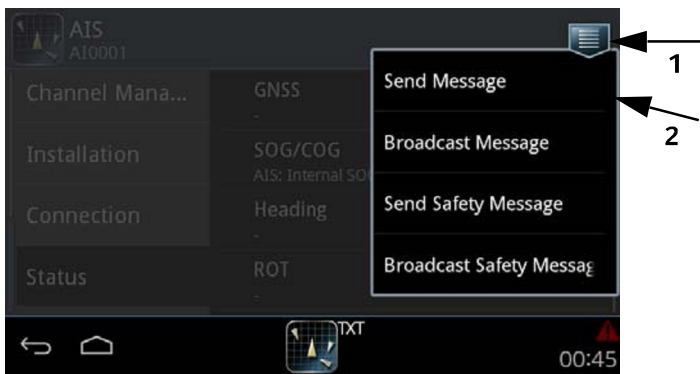


Figure 25: Message types

3. Tap the address field and enter the MMSI number of the ship using the on-screen keypad (not applicable for broadcasting messages).



Figure 26: Entering MMSI number

4. Tap **Next** and enter the message text using the on-screen keyboard.
5. Tap **Done** or the symbol in the lower left corner to collapse the keyboard.

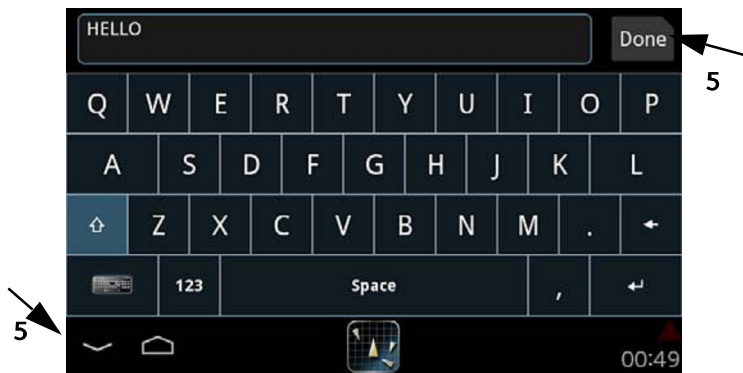


Figure 27: Writing a message

6. Tap **Send** to send the message. The message will be shown in the list of messages sent and received.

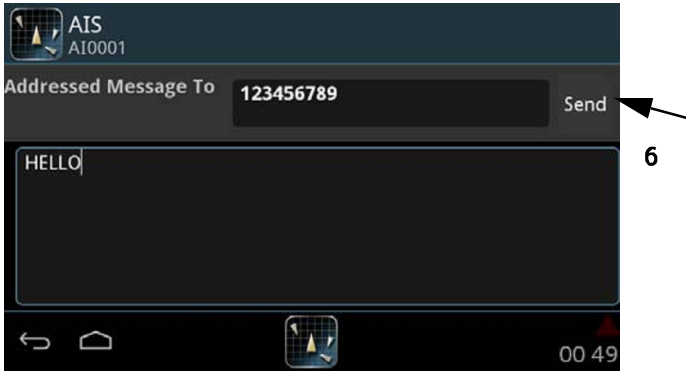


Figure 28: Sending a message

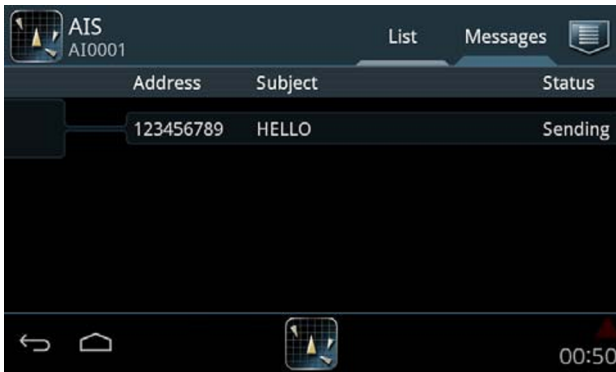


Figure 29: List of messages

A message sent by the SAILOR 6282 AIS Transponder can have one of the following states:

- **Sending** – The message is under transmission.
- **Sent** – The message has been sent completely.
- **Delivered** – The message is confirmed delivered to the receiving AIS but not necessarily read.

Viewing and replying to messages

If there are unread messages, an icon appears in the bottom bar.



1. Tap the icon for unread messages to display a window with the list of unread messages.



Figure 30: Viewing messages

2. Tap the message you want to read. The message opens and you can directly enter text and send a reply.

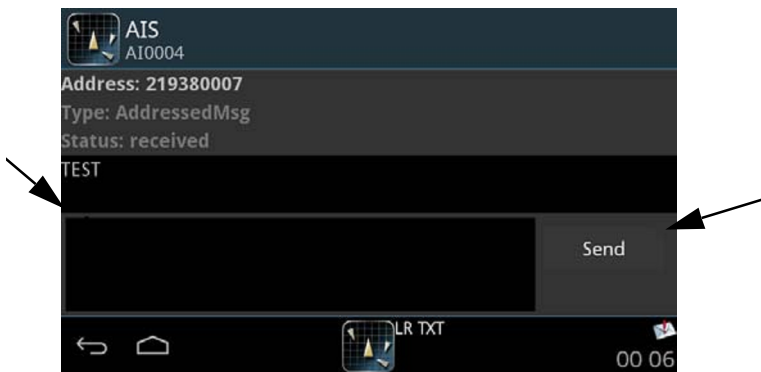


Figure 31: Replying to a message

Deleting messages

All messages are deleted when the SAILOR 6282 AIS Transponder is restarted (power cycle).

Alarms and notifications

If an alarm is reported from the SAILOR 6282 AIS Transponder a flashing red triangle appears in the bottom bar of the SAILOR 6004 Control Panel display:

- Flashing, bright red triangle: Unacknowledged alarm(s).
- Faded red triangle: Acknowledged alarm(s).

To acknowledge an alarm do as follows:

1. Tap the flashing, bright red triangle to display the list with active alarms.
2. Tap the alarm to acknowledge the alarm.

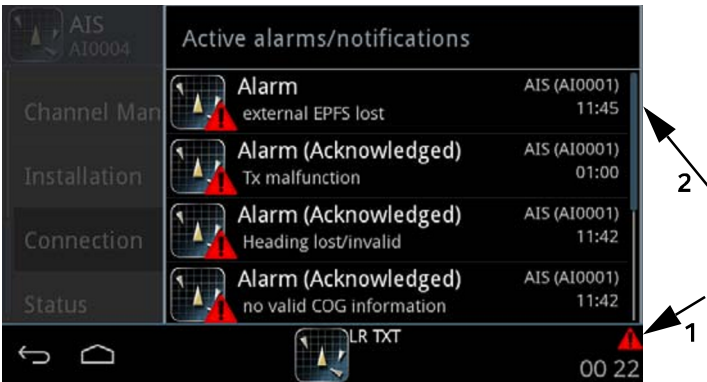


Figure 32: Active alarms

When all active alarms are acknowledged the bright red triangle turns into a faded red triangle.

Internal hardware errors in the SAILOR 6282 AIS Transponder are reported as Rx channel malfunction alarm messages. See Table 8 on page 33 for further details.

List of alarms

Alarm	Consequence	Reason	Remedy
Tx malfunction (ID 001)	The SAILOR 6282 AIS Transponder stops transmission.	Reason for this alarm is one of the following conditions: – The AIS is not able to transmit for technical reasons (VSWR exceeds allowed ratio, see alarm ID 002) – Missing or invalid MMSI – The integrity of the VDL is degraded by incorrect transmitter behaviour (for instance in case of the Tx shutdown procedure has been activated).	Check the VHF antenna, plugs, and cable to the AIS transceiver. Check correct programming of the MMSI.
Antenna VSWR exceeds limit (ID 002)	The SAILOR 6282 AIS Transponder continues operation.	For every transmission, the VSWR is checked. If it exceeds the warning threshold, this alarm is generated. The alarm is cleared by the AIS when the VSWR is measured to be below the threshold again.	Check the VHF antenna, plugs, and cable to the AIS transceiver.
Rx channel AIS 1 malfunction (ID 003)	The SAILOR 6282 AIS Transponder stops transmission on the affected channel.	If continuous monitoring of the receiver channel1 shows inconsistency, this alarm is activated.	Check the VHF antenna, plugs, and cable to the AIS transceiver.

Table 8: AIS Alarms

Alarm	Consequence	Reason	Remedy
Rx channel AIS 2 malfunction (ID 004)	The SAILOR 6282 AIS Transponder stops transmitting on the affected channel.	If continuous monitoring of the receiver channel 2 shows inconsistency, this alarm is activated.	Check the VHF antenna, plugs, and cable to the AIS transceiver.
Rx channel 70 malfunction (ID 005)	The SAILOR 6282 AIS Transponder continues operation, but external channel management is not possible.	If continuous monitoring of the receiver channels shows inconsistency, this alarm is activated.	Check the VHF antenna, plugs, and cable to the AIS transceiver.
General failure (ID 006)	The SAILOR 6282 AIS Transponder stops functioning. In case of severe software or hardware failure, this alarm is activated.		Check the power supply to the AIS transceiver.
UTC sync invalid (ID 007)	The SAILOR 6282 AIS Transponder continues operation using indirect or semaphore synchronization.	If the internal GNSS receiver cannot receive a synchronization signal from the satellites, this alarm is activated.	Check the GNSS antenna, plugs, and cable to the AIS transceiver.
MKD connection lost (ID 008)	The SAILOR 6282 AIS Transponder continues operation with DTE set to 1, the MKD is not active.	This alarm is activated by the system, if the AIS transceiver does not receive heartbeat messages from at least one minimum keyboard display (MKD) unit.	Check the Ethernet connection between the AIS transceiver and the SAILOR 6004 Control Panel. Restart both units.

Table 8: AIS Alarms (Continued)

Alarm	Consequence	Reason	Remedy
Internal / external GNSS position mismatch (ID 009)	The SAILOR 6282 AIS Transponder continues operation.	This alarm is activated when the distance between the external and internal GNSS position remains >100 m for an interval longer than 15 minutes.	Check the NMEA connection between external GNSS receiver and the AIS transceiver. Check as well the GNSS antenna, plugs, and cable to the AIS transceiver.
NavStatus incorrect (ID 010)	The SAILOR 6282 AIS Transponder continues operation.	This alarm is activated if a mismatch exists between the sensor input and the Voyage settings status. E.g. when the status is set by the operator to At Anchor and the ship is moving faster than 3 kn, this alarm is activated.	Enter the AIS Application on the SAILOR 6004 Control Panel and set Status in Settings > Voyage to the correct state according to the ship's current movement.
Heading sensor offset (ID 011)	The SAILOR 6282 AIS Transponder continues operation.	This alarm is activated when SOG is greater than 5 kn and the difference between COG and HDT is greater than 45° for 5 min.	Check the heading sensor and its NMEA connection to the AIS transceiver.
Active AIS-SART (ID 014)	The SAILOR 6282 AIS Transponder continues operation.	This alarm is activated when the SAILOR 6282 AIS Transponder receives a position report from an AIS search and rescue transponder (SART). The AIS SART indicates the position of persons in distress. It is displayed on the first line in the AIS list view on the SAILOR 6004 Control Panel.	

Table 8: AIS Alarms (Continued)

Alarm	Consequence	Reason	Remedy
External EPFS lost (ID 025)	The SAILOR 6282 AIS Transponder continues operation, based on the internal GNSS.	The alarm is activated if the external electronic position fixing system (EPFS) is lost.	Check the NMEA connection between the external GNSS and the AIS transceiver.
No position sensor in use (ID 026)	The SAILOR 6282 AIS Transponder continues operation.	The alarm is activated in case none of the GNSS connected to the AIS transceiver provide valid position data to the AIS transceiver.	Check the GNSS antenna, plugs, and cable to the AIS. Check the NMEA connections between the external GNSS and the AIS transceiver. Check the status of the external GNSS at its own control panel. Check that the GNSS antennas are not covered and free to receive satellite signals.
No valid SOG information (ID 029)	The SAILOR 6282 AIS Transponder continues operation using default data.	This alarm is activated when none of the sensor inputs reports a valid speed over ground (SOG).	Check the NMEA connection between speed measuring device and AIS transceiver; check the GNSS antenna, plugs, and cable to the AIS transceiver; check the NMEA connection between the external GNSS receiver and the AIS transceiver.

Table 8: AIS Alarms (Continued)

Alarm	Consequence	Reason	Remedy
No valid COG information (ID 030)	The SAILOR 6282 AIS Transponder continues operation using default data.	This alarm is activated when none of the sensor inputs reports a valid course over ground (COG).	In order to solve the problem,; check the GNSS antenna, plugs, and cable to the AIS transceiver; check the NMEA connection between the external GNSS receiver and the AIS transceiver.
Heading lost/invalid (ID 032)	The SAILOR 6282 AIS Transponder continues operation using default data.	This alarm is activated when none of the sensor inputs reports a valid heading.	Check the NMEA connection between heading sensor and the AIS transceiver,.
No valid ROT information (ID 035)	The SAILOR 6282 AIS Transponder continues operation using default data.	This alarm is issued if the rate of turn (ROT) cannot be determined from sensor data or internal calculations.	Check the NMEA connection between ROT sensor and AIS transceiver; check the GNSS antenna, plugs, and cable to the AIS transceiver; check the NMEA connection between the external GNSS receiver and the AIS transceiver.

Table 8: AIS Alarms (Continued)

Service & maintenance

This chapter has the following sections:

- *Maintenance*
- *Troubleshooting guide*
- *Service and repair*

Maintenance

Maintenance of the SAILOR 6282 AIS Transponder can be reduced to a maintenance check at each visit of the service staff. Inspect the unit for mechanical damages, salt deposits, corrosion and any foreign material. Due to its robust construction and ruggedness the unit has a long lifetime. Anyway it must carefully be checked at intervals not longer than 12 months – dependent on the current working conditions.

Contact for support

Contact an authorized dealer for technical service and support of the SAILOR 6282 AIS Transponder. Before contacting the authorized dealer you can go through the troubleshooting guide to solve some of the most common operational problems.

System LEDs

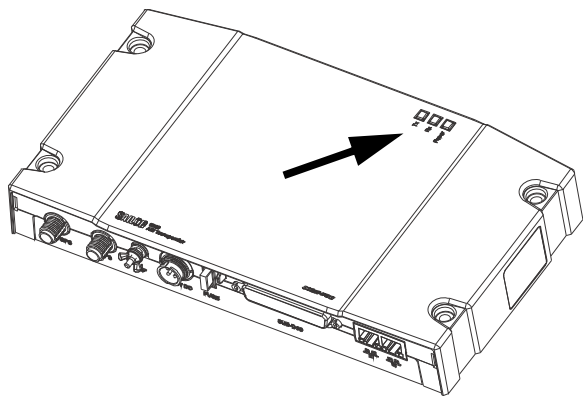


Figure 33: LEDs on the SAILOR 6282 AIS Transponder

LED	Colour	Description
Power	Green	Power on.
Rx	Yellow	Rx mode. Lights up when a message is received. Off when no activity.
Tx	Red	Tx mode. Lights up when a message is transmitted. Off when no activity.

Table 9: LEDs on the SAILOR 6282 AIS Transponder

App installation and system settings

The AIS app is installed in the SAILOR 6004 Control Panel during installation of the SAILOR 6280/6281 AIS System.

Having switched on the SAILOR 6004 Control Panel, an icon named **System** is always displayed, plus the icon(s) of the applications that are

installed. Here you can set up and manage the SAILOR 6004 Control Panel.

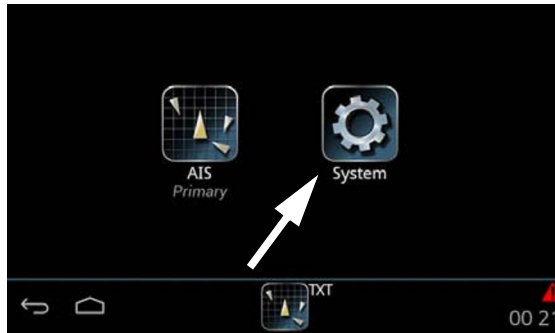


Figure 34: Screen to enter **System** (example)

Tap the icon **System** and the following topics are available:

- *Settings*
containing Network, Date/Time and Debugging.
- *Applications*
containing installed and available applications.
- *Self Test*
containing a self test of Touch, Controls Display, Audio, USB, Light Sensor, Alarm Output, NMEA and LAN.
- *About*
containing Legal information, software versions and network information (IP address and MAC address of the SAILOR 6004 Control panel).

Settings

Tap **Settings** to enter the section for network configuration, date and time setting and debugging. Tap the section you want to work with and explore the touch screen for each setting.

To change a setting you must enter the password for user **level** and tap **OK**.

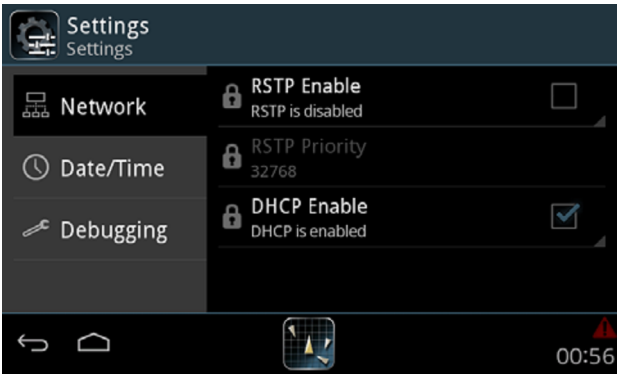


Figure 35: System - Settings, Display

Applications

Tap **Applications** to install or uninstall applications. This section has two tabs: **Available**, showing the apps that are available to the SAILOR 6004 Control Panel on the current network, and **Installed**, showing which apps are already installed.

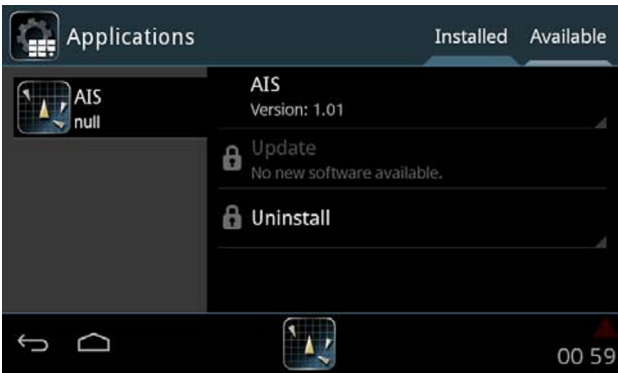


Figure 36: System – Applications (example)

To install an app, do as follows:

1. Tap **Available** to display the apps that are available on this SAILOR 6004 Control Panel.
2. Tap the app you want to install.
For each app there are the following items:
 - App name and version, e.g. AIS Version 1.0.
 - **Install** to install this app on the SAILOR 6004 Control Panel.
3. Enter the password for user level and tap **OK**.

To manage an already installed app, do as follows:

1. Tap **Installed** to display the apps that are installed on this SAILOR 6004 Control Panel.
2. Tap the app you want to manage.
For each app there are the following items:
 - App name and version, e.g. AIS Version 1.0.
 - **Update** (if available, else grayed out) – tap here to update this app.
Enter the password for user level and tap **OK**.
 - **Uninstall** – tap here to uninstall this app from the SAILOR 6004 Control Panel.
3. Enter the password for user level and tap **OK**.

Self Test

Tap **Self Test** to start the self test of the SAILOR 6004 Control Panel. For further details on the self test see the installation manual of the SAILOR 6004 Control Panel.

About

Tap About to view the following:

- **Legal** with legal and copyright information, open source licences, etc.
- **Version** with various software versions and serial number of the SAILOR 6004 Control Panel.
- **Network** with IP address and MAC address of the SAILOR 6004 Control Panel.

Troubleshooting guide

Problem	Symptom	Remedy
The SAILOR 6282 AIS Transponder will not turn on.	Green LED on SAILOR 6282 AIS Transponder is off.	If the power cable is connected directly to the SAILOR 6282 AIS Transponder then check that the white wire in the power cable is connected to the black wire (-DC). If power to SAILOR 6282 AIS Transponder is connected via the connection board then check the jumper W8 is placed in position AIS ON . For further details see the Installation manual.
No communication	No flashing yellow or red LED on AIS transponder	Check if a valid MMSI has been entered. For further details see the installation manual.
No GPS	No signal from GPS. Position requested.	Check the antenna cable to the GPS.
Missing MMSI		When powering up the SAILOR 6282 AIS Transponder for the first time after leaving the factory there is no MMSI stored in the SAILOR 6282 AIS Transponder. Enter a valid MMSI to operate the SAILOR 6282 AIS Transponder. For further details see the Installation manual.
Wrong MMSI		If a wrong MMSI number has been entered and stored, or if there is a requirement to change it, contact your authorized dealer.

Table 10: Troubleshooting guide

Problem	Symptom	Remedy
Device failure		If any of the checks and tests described in this section do not assist in resolving the difficulties experienced in the operation and/or performance of the AIS installation, a fault may have developed in the AIS System. When contacting an authorized representative be sure to provide as much information as possible describing the observed behaviour - also including the type of the AIS units, serial number, and software release version. You find this information in the setup menu of the connected SAILOR 6004 Control Panel.
SAILOR 6004 Control Panel cannot be switched off.		If the SAILOR 6004 Control Panel cannot be switched off normally (e.g. due to a fault): Push and hold for 12 seconds.
The Test Message does not pass.		If you do not receive an answer within 30 seconds try the test with another ship.

Table 10: Troubleshooting guide (Continued)

Service and repair

Should your Cobham SATCOM product fail, please contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on cobham.com/satcom where you also find the Cobham SATCOM Self Service Center web-portal, which may help you solve the problem.

Your dealer, installer or Cobham SATCOM partner will assist you whether the need is user training, technical support, arranging on-site repair or sending the product for repair.

Your dealer, installer or Cobham SATCOM partner will also take care of any warranty issue.

Applicable SAILOR and part numbers

This installation manual is for the SAILOR 6280/6281 AIS System and is applicable to the part numbers below:

Part number	Description
406282A	SAILOR 6282 AIS Transponder
406283A	SAILOR 6004 Control Panel
406285A	SAILOR 6285 GPS Antenna - Active
406283A	SAILOR 6283 AIS Connection Box and Wall Tray

Table 11: Part numbers for the SAILOR 6280/6281 AIS System

Accessories

The following accessories are included in the delivery:

Part number	Description accessories
37-130130	DC Power cable for SAILOR 6282 AIS Transponder and SAILOR 6004 Control Panel
37-135955	SUB-D50 cable, 1 m
37-207073-000	RJ45 Cat5e STP LAN cable, 5 m
41-135855	GPS Antenna bracket
67-135974	Pilot plug

Table 12: Part numbers for accessories

Replacing the fuse

One fuse is installed in the SAILOR 6282 AIS Transponder. If this fuse is blown, do as follows:

1. Track down why the fuse was blown and solve the problem.
2. Take out the old fuse. Use the fuse puller.
3. Insert the new fuse. The fuse rating is 5 A T.

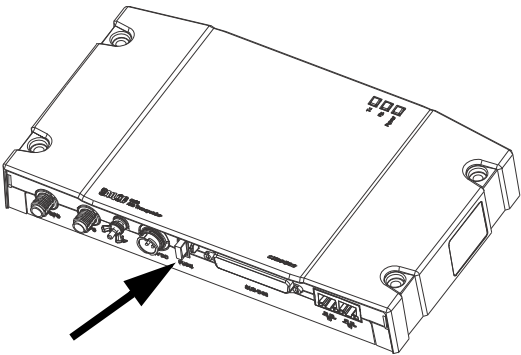


Figure 37: 5 A T fuse in the SAILOR 6282 AIS Transponder

Repacking for shipment

Should you need to send the product for repair, please read the below information before packing the product.

The shipping carton has been carefully designed to protect the SAILOR 6282 AIS Transponder and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, part number and full serial number. Mark the carton FRAGILE to ensure careful handling.

Note | Correct shipment is the customer's own responsibility.

If the original shipping carton is not available, the following general instructions should be used for repacking with commercially available material.

1. Wrap the defective unit in heavy paper or plastic. Attach a tag indicating the type of service required, return address, part number and full serial number.
2. Use a strong shipping container, e.g. a double walled carton.
3. Protect the front- and rear panel with cardboard and insert a layer of shock-absorbing material between all surfaces of the equipment and the sides of the container.
4. Seal the shipping container securely.
5. Mark the shipping container FRAGILE to ensure careful handling.

Failure to do so may invalidate the warranty.

Specifications

SAILOR 6282 AIS Transponder

Item	Specification
Weight	1.15 kg
Dimensions (L x W x H)	160 x 270 x 42 mm
Equipment class	Protected, according to IEC 60945
Input voltage	10.8 VDC to 31.2 VDC
Power consumption	12 W (0.5 A @24 VDC input voltage)
Heat dissipation	10 W
Temperature	-15 °C to +55 °C (Operational) -30 °C to +70 °C (Storage)
Compass Safe Distance	55 cm (standard magnetic compass) 45 cm (Emergency magnetic compass)
Receivers	156.025 - 162.025 MHz (TDMA) 156.525 MHz (Channel 70, DSC)
Channel bandwidth	25 kHz
RF Output Power	High: 12.5 W Low: 1 W Low power forced control (gas alarm): 1 W
Frequency	156.025 - 162.025 MHz
VHF connector	TNC female

Table 13: SAILOR 6282 AIS Transponder specifications

Item	Specification
GPS connector	TNC female
VHF and GPS cable	RG214 or better
Connection to SAILOR 6004 Control Panel	LAN (LWE IEC 61162-450)
Connections to sensors and PI	50 pin sub-D

Table 13: SAILOR 6282 AIS Transponder specifications

Reporting Intervals

The SAILOR 6282 AIS Transponder is transmitting in different intervals depending of the dynamic input data as speed and turn. The reporting intervals are as follows:

Type of information	Reporting interval
Static Information	Every 6 min. or when data has been amended and on request.
Dynamic Information	Depending on speed and course alteration, see the table below.
Voyage related information	Every 6 min. or when data has been amended and on request.
Safety related message	As required.

Table 14: Reporting intervals

Type of ship	Reporting Interval
Ship at anchor or moored and not moving faster than 3 knots	3 min
Ship at anchor or moored and moving faster than 3 knots	10 s
Ship with a speed of between 0 - 14 knots	10 s
Ship with a speed of between 0 - 14 knots and changing course	3 1/3 s
Ship with a speed of between 14 - 23 knots	6 s
Ship with a speed of between 14 - 23 knots and changing course	2 s
Ship with a speed of greater than 23 knots	2 s
Ship with a speed of greater than 23 knots and changing course	2 s

Table 15: Reporting intervals for types of ship

SAILOR 6285 GPS Antenna - Active

Item	Specification
Dimensions	Ø: 91 mm, H: 77.5 mm
Weight	0.15 kg
Mounting	Bracket mount on pipe, thread 1" x 14 TPI
Equipment class	Exposed, according to IEC 60945
Antenna type	Active patch antenna
Frequency	1570 to 1608 MHz
Impedance	Nominal 50 Ohm
Polarization	Circular right-hand
Coverage	Hemispherical
Selectivity	45 dB down at center ± 25 MHz
Gain	28 dB
Supply voltage	5 $\pm$ 1 VDC
Current consumption	Approx. 30 mA
Connector	TNC female
Cable	RG214 recommended
Operating temperature	-40 °C to +55 °C
Storage temperature	-40 °C to +70 °C

Table 16: SAILOR 6285 GPS Antenna - Active specifications

SAILOR 6283 AIS Connection Box and Wall Tray

Item	Specification
Weight without SAILOR 6282 AIS Transponder	2.15 kg
Weight with SAILOR 6282 AIS Transponder mounted	3.30 kg
Dimensions (L x W x H)	340 x 310 x 55 mm
Equipment class	Protected, according to IEC 60945

Table 17: SAILOR 6283 AIS Connection Box and Wall Tray specifications

SAILOR 6004 Control Panel

Item	Specifications
Mounting method	Flush mount or bracket
Voltage	10.8 to 31.2 VDC
Power consumption	Typical: 18 W active Peak: 42 W 3.15 A internal fuse (non-serviceable)
Audio input	Up to 6 W in 8 Ohm
Interfaces	2 x Ethernet (10/100 Mbit/s) Accessories connector Auxiliary connector
Compliance	• IEC 60945 • IEC 60950-1
IP rating	IP54 ^a
Ambient temperature	-15 °C to 55 °C
Storage temperature	-30 °C to 80 °C
Compass safe distance	0.6 m
Dimensions W x H x D	191 mm x 145 mm x 61 mm (without mounting bracket)
Weight	1.1 kg (1.25 kg with mounting bracket)

Table 18: SAILOR 6004 Control Panel specifications

a. Estimated.

NMEA sentences

Supported sentences

Sentences defined in IEC 61993-2

IEC 61993-2 sentence	Support
IEC 61162-1 sensor sentences	DTM, GNS, GBS, RMC, VBW, HDT, THS, ROT
AIS High-speed input data and formats	VSD, SSD, ABM, BBM, MEB, ABK, AIR, ACA, HBT, ACK, LRF
AIS high speed output data and formats	ABK, VDO, ALR/TXT, ACA, VDM, LRI, LRF, SSD, VSD, VER
AIS Long-Range communications input data and formats	LRI, LRF
LR output data formats	LR1, LR2, LR3
Optional PI port sentences	EPV, SPW, TRL
Transmission of binary Message 25 and 26	ABM, BBM, ABK

Table 19: Supported NMEA sentences IEC 61993-2

Sentences defined by Cobham SATCOM

Proprietary protocol.

- PTHRTSI
- PTHRAOC
- PTHRTSR
- PTHRROS

A

AIS SART AIS Search And Rescue Transmitters

AIS Automatic Identification System

C

COG Course Over Ground

D

DSC Digital Selective Calling. Primarily intended to initiate ship-to-ship, ship-to-shore and shore-to-ship radiotelephone and MF/HF radiotelex calls. Each DSC-equipped ship, shore station and group is assigned a unique 9-digit Maritime Mobile Service Identity. DSC distress alerts, which consist of a preformatted distress message, are used to initiate emergency communication with ships and rescue coordination centers.

DTE Data Terminal Equipment

E

ECDIS Electronic Chart Display and Information System (ECDIS) is a computer-based navigation information system that complies with International Maritime Organization (IMO) regulations and can be used as an alternative to paper nautical charts.

G

GLONASS GLObal'naya NAVigatsionnaya Sputnikovaya Sistema. Global Navigation Satellite System in English.

GNSS Global Navigational Satellite System

GPL General Public License, software license, which guarantees individuals, organizations and companies the freedom to use, study, share (copy), and modify the software.

GPS Global Positioning System. A system of satellites, computers, and receivers that is able to determine the latitude and longitude of a receiver on Earth by calculating the time difference for signals from different satellites to reach the receiver.

H

HDT HeaDing True

I

IEC International Electrotechnical Commission. The international standards and conformity assessment body for all fields of electrotechnology.

IMO International Maritime Organization

INS Integrated Navigation System

IP Ingress Protection. An international classification system for the sealing effectiveness of enclosures of electrical equipment against the intrusion into the equipment of foreign bodies (i.e. tools, dust, fingers) and moisture. This classification system uses the letters "IP" followed by two or three digits. An "x" is used for one of the digits if there is only one class of protection; e.g. IPX4 which addresses moisture resistance only.

L

LAN Local Area Network

LGPL Lesser General Public License

LWE LightWeight Ethernet

M

MKD Minimum Keyboard Display

MMSI MMSI Maritime Mobile Service Identity. A series of nine digits which are sent in digital form over a radio frequency channel in order to uniquely identify ship stations, ship earth stations, coast stations, coast earth stations, and group calls. These identities are formed in such a way that the identity or part thereof can be used by telephone and telex subscribers connected to the general telecommunications network to call ships automatically.

N

NMEA National Marine Electronics Association (standard). A combined electrical and data specification for communication between marine electronic devices such as echo sounder, sonars, anemometer (wind speed and direction), gyrocompass, autopilot, GPS receivers and many other types of instruments. It has been defined by, and is controlled by, the U.S.-based National Marine Electronics Association.

P

PI Presentation Interface

R

RF Radio Frequency

ROT Rate Of Turn

S

SART Search And Rescue Transponder

SOG Speed Over Ground.

SOLAS (International Convention for the) Safety Of Life At Sea. Generally regarded as the most important of all international treaties concerning the safety of merchant ships.

T

TDMA Time-Division Multiple Access

TPI Threads Per Inch

U

UTC Universal Time, Coordinated. The International Atomic Time (TAI) with leap seconds added at irregular intervals to compensate for the Earth's slowing rotation. Leap seconds are used to allow UTC to closely track UT1, which is mean solar time at the Royal Observatory, Greenwich.

V

VDL VHF Data Link

VHF Very High Frequency. 30-300 MHz, a "straight-line" signal used for short-distance terrestrial communication and navigation.

VSWR Antenna Voltage Standing Wave Ratio

VTS Vessel Traffic Service, a marine traffic monitoring system established by harbour or port authorities, similar to air traffic control for aircraft.

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