COBHAM SATCOM

SAILOR XTR GX-R2
Installation manual

SAILOR XTR GX-R2
Quick guide

Installation wizard

This quick guide is for experienced service personnel who have installed the SAILOR XTR GX-R2 system before. It lists the minimum configuration tasks you have to make before the system can be used on-air on a satellite.

1. Connect a PC to the front LAN connector of the Below Deck Unit (BDU).
2. Open an Internet Browser and type the default IP address of the SAILOR XTR GX-R2: https://192.168.0.1.
3. Bypass the admin password by pressing the left arrow key on the BDU for 5 seconds.
4. After opening the web interface for the first time after power up you can step through the installation wizard.
5. Enter the necessary data on each page and click **Next**.
6. On the last screen click **Finish** to activate the VSAT profile.

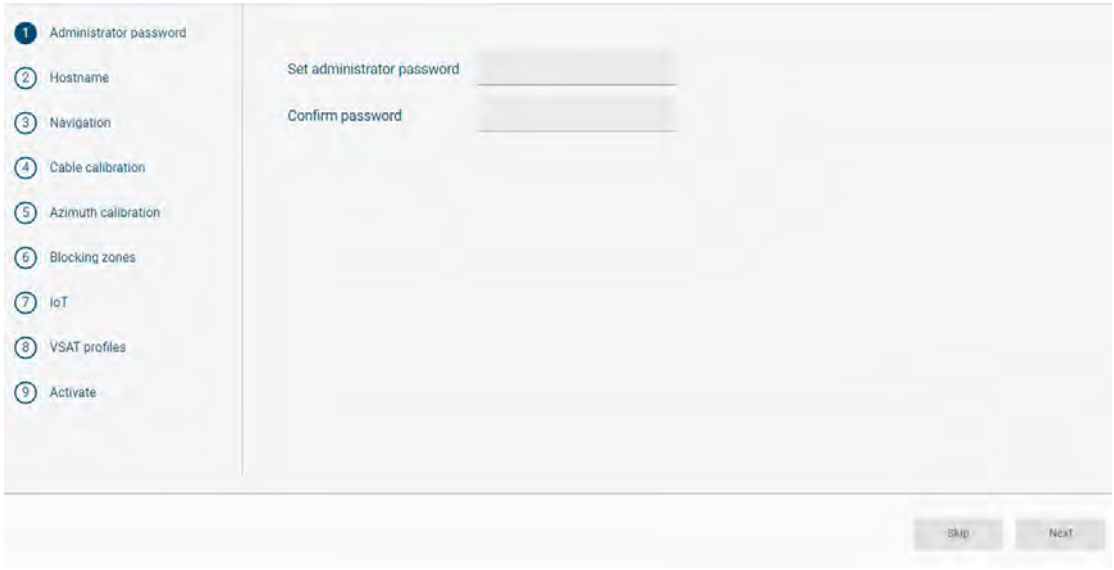


Figure -1: Installation wizard

For more detailed information about the setup tasks see chapter 4, *Setup of the antenna*.

SAILOR XTR GX-R2 4.5W/9W
Installation manual

SAILOR 1000 XTR GX-R2 and SAILOR 600 XTR GX-R2

Document number: 98-175666-C
Release date: 17 May 2022

Disclaimer

Any responsibility or liability for loss or damage in connection with the use of this product and the accompanying documentation is disclaimed by Thrane & Thrane A/S. The information in this manual is provided for information purposes only, is subject to change without notice and may contain errors or inaccuracies. Manuals issued by Thrane & Thrane A/S are periodically revised and updated. Anyone relying on this information should acquire the most current version e.g. from www.cobhamsatcom.com, **Cobham SYNC Partner Portal**, or from the distributor. Thrane & Thrane A/S is not responsible for the content or accuracy of any translations or reproductions, in whole or in part, of this manual from any other source. In the event of any discrepancies, the English version shall be the governing text.

Thrane & Thrane A/S is trading as Cobham Satcom.

Company address

Thrane & Thrane A/S, Lundtoftegårdsvej 93D, DK-2800, Kgs. Lyngby, Denmark

Copyright

Trademark acknowledgements

- Some product and company names mentioned in this manual may be trademarks or trade names of their respective owners.

Disposal

Old electrical and electronic equipment marked with this symbol can contain substances hazardous to human beings and the environment. Never dispose these items together with unsorted municipal waste (household waste). In order to protect the environment and ensure the correct recycling of old equipment as well as the re-utilization of individual components, use either public collection or private collection by the local distributor of old electrical and electronic equipment marked with this symbol.

Contact the local distributor for information about what type of return system to use.

GPL notification

The software included in this product contains copyrighted software that is licensed under the GPL/LGPL. The verbatim licenses can be found online at:

http://www.gnu.org/licenses/old-licenses/gpl-2.0.html
http://www.gnu.org/licenses/old-licenses/lgpl-2.1.html

For the parts of our software that fall under the GPL/LGPL licenses, you may obtain the complete corresponding source code from us for a period of three years after our last shipment of this product, which will be no earlier than 2027, by sending a money order or check for DKK 50 to:

SW Technology/GPL Compliance,
Cobham SATCOM (Thrane & Thrane A/S),
Lundtoftegaardsvej 93D
2800 Lyngby
DENMARK

Write "source for product SAILOR XTR GX-R2" in the memo line of your payment. This offer is valid to anyone in receipt of this information.
https://www.cobhamsatcom.com/legal/free-and-open-source-software-foss/

Safety summary

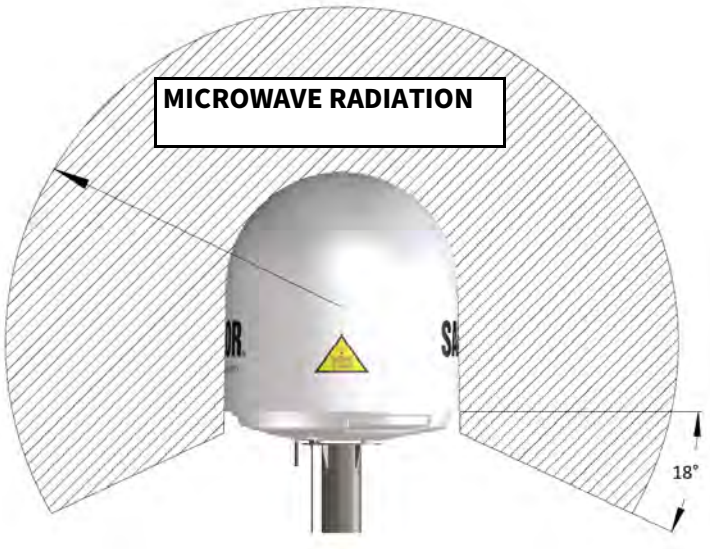
The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Thrane & Thrane A/S assumes no liability for the customer's failure to comply with these requirements.

Microwave radiation hazards

During transmission the Above Deck Unit (antenna) in this system radiates Microwave Power.This radiation may be hazardous to humans close to the Above Deck Unit. During transmission, make sure that nobody gets closer than the recommended minimum safety distance.

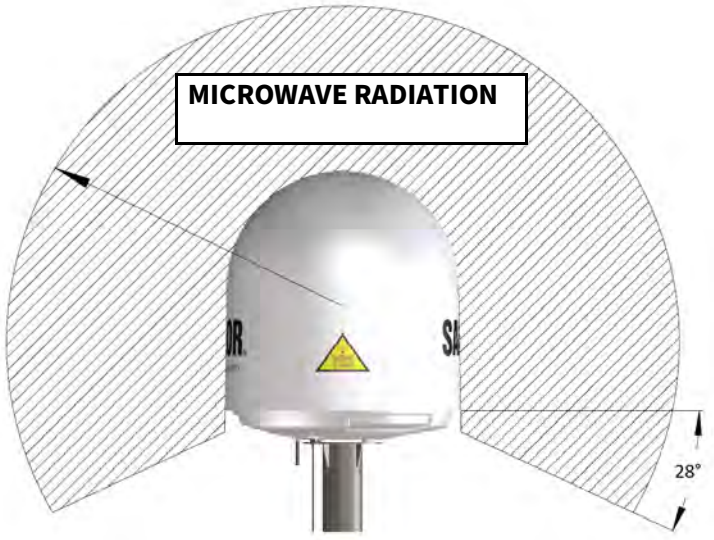
SAILOR 1000 XTR GX-R2

The minimum safety distance to the antenna reflector on the focal line is 30 m for SAILOR 1000 XTR GX-R2 4.5W, and 55 m for SAILOR 1000 XTR GX-R2 9W, based on a radiation level of 10 W/m^2. No hazard exists >18° below the antenna's mounting plane. Refer to the drawing below.



SAILOR 600 XTR GX-R2

The minimum safety distance to the antenna reflector on the focal line is 30 m for SAILOR XTR GX-R2 4.5W, and 44 m for SAILOR XTR GX-R2 9.0W, based on a radiation level of 10 W/m^2. No hazard exists >28° below the antenna's mounting plane. Refer to the drawing below.



No-transmit zones

In order to protect personnel no-transmit zones can be programmed. For further information see *Blocking zones – azimuth and elevation* on page 2-5.

Distance to other equipment

Do not move the Above Deck Unit closer to radars than the minimum safe distance specified in section *Interference from radar, GPS/GNSS, L-band and other transmitters* on page 2-13 — it may cause damage to the Above Deck Unit.

Compass Safe Distance:

SAILOR 1000 XTR GX-R2 4.5W and 9.0W antenna (ADU): min. 140 cm (IEC 60945
SAILOR 600 XTR GX-R2 4.5W and 9.0W antenna (ADU): min. 140 cm (IEC 60945).
SAILOR 7516A BDU (Below Deck Unit): min. 30 cm (IEC 60945).
SAILOR 7023A GMU (GX Modem Unit): min. 40 cm (IEC 60945).

Service

User access to the interior of the BDU is prohibited. Only a technician authorized by Cobham SATCOM may perform service - failure to comply with this rule will void the warranty. Access to the interior of the Above Deck Unit is allowed. Replacement of certain

modules and general service may only be performed by a technician authorized by Cobham SATCOM.

Grounding, cables and connections
To minimize shock hazard and to protect against lightning, the equipment chassis and cabinet must be connected to an electrical ground. The BDU must be grounded to the ship. For further grounding information see the respective sections and appendix in this manual.

Do not extend the cables beyond the lengths specified for the equipment. The cable between the BDU and Above Deck Unit can be extended if it complies with the specified data concerning cable losses etc.

Rx and Tx cables for the system are shielded and should not be affected by magnetic fields. However, try to avoid running cables parallel to high power and AC/RF wiring as it might cause malfunction of the equipment.

Power supply
SAILOR 7516A BDU: Voltage range 100-240 VAC. The ADU is powered by the BDU.
SAILOR 7023A GMU: Voltage range 100-240 VAC.

Do not operate in an explosive atmosphere
Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Keep away from live circuits
Operating personnel must not remove equipment covers. Component replacement and internal adjustment must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

Failure to comply with the rules above will void the warranty!

About this manual

Intended readers

This is an installation manual for the SAILOR XTR GX-R2 system intended for installers of the system and service personnel. Personnel installing or servicing the system must be properly trained and authorized by Cobham SATCOM. It is important that you observe all safety requirements listed in the beginning of this manual, and install the system according to the guidelines in this manual.

SAILOR XTR GX-R2 variants in this manual

The following variants of the SAILOR XTR GX-R2 system are described in this manual:

- SAILOR 1000 XTR GX-R2 4.5W BUC
- SAILOR 1000 XTR GX-R2 9W BUC
- SAILOR 600 XTR GX-R2 4.5W BUC
- SAILOR 600 XTR GX-R2 9W BUC

In the installation chapter the antennas are also named S1000and S600.

Manual overview

This manual has the following chapters:

- *Introduction*
- *Installation*
- *Interfaces*
- *Setup of the antenna*
- *Installation check lists*
- *Service*

This manual has the following appendices:

- *Technical specifications*
- *Dual antenna solution*
- *Miscellaneous*
- *Command line interface*
- *Inmarsat GX satellites*
- *Grounding and RF protection*
- *Event messages*
- *Approvals*

Software version

The manual covers the software version 3.04.

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...”.

Warnings, Cautions and Notes

Text marked with “Warning”, “Caution”, “Note” or “Important” show the following type of data:

- **Warning**: A Warning is an operation or maintenance procedure that, if not obeyed, can cause injury or death.
- **Caution**: A Caution is an operation or maintenance procedure that, if not obeyed, can cause damage to the equipment.
- **Note**: A Note gives information to help the reader.
- **Important**: A text marked Important gives information that is important to the user, e.g. to make the system work properly. This text does not concern damage on equipment or personal safety.

General precautions

All personnel who operate equipment or do maintenance as specified in this manual must know and follow the safety precautions. The warnings and cautions that follow apply to all parts of this manual.

WARNING! Before using any material, refer to the manufacturers’ material safety data sheets for safety information. Some materials can be dangerous.

CAUTION! Do not use materials that are not equivalent to materials specified by Cobham SATCOM. Materials that are not equivalent can cause damage to the equipment.

CAUTION! The system contains items that are electrostatic discharge sensitive. Use approved industry precautions to keep the risk of damage to a minimum when you touch, remove or insert parts or assemblies.

Table of contents

Introduction

This chapter has the following sections:

- *SAILOR XTR GX-R2 system*
- *Part numbers and options*

1.1 SAILOR XTR GX-R2 system

The SAILOR XTR GX-R2 is a unique stabilized maritime GX antenna system operating in the Ka-band (17.7 to 30 GHz). It is used with the Global Xpress service from Inmarsat, delivering consistent high-performance download speeds of up to 50 Mbps and 5 Mbps over the uplink. The following figure shows the coverage map of the GX service.

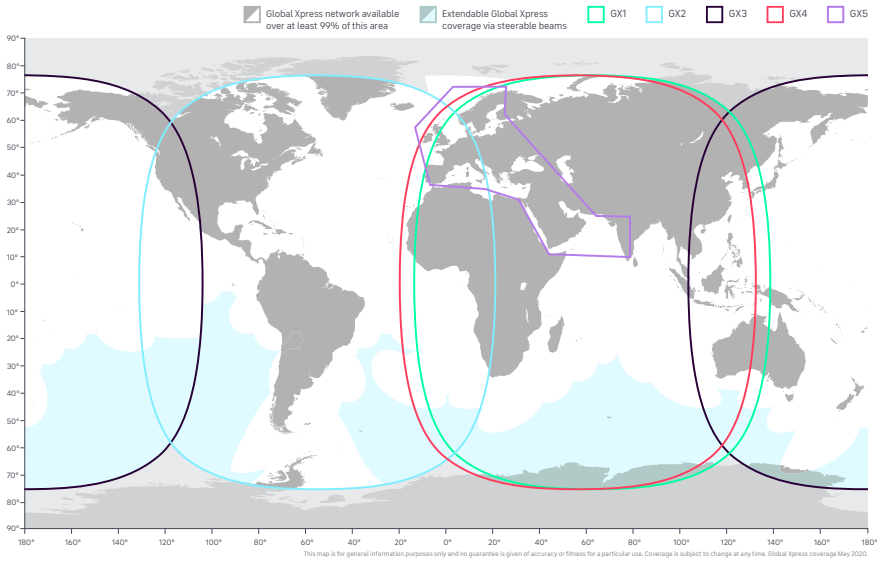


Figure 1-1: GX coverage map

The system requires a single 50 Ohm coaxial cable to provide the antenna (ADU) with both DC power, data and control information. The radome does not have to be removed neither before nor after the installation. To protect the ADU the built-in motors act as brakes during transport and when the ADU is not powered. You can access the SAILOR XTR GX-R2 remotely and make in-depth performance analysis using the built-in web interface.

The following figures show the SAILOR XTR GX-R2 system.

Figure 1-2: ADU, BDU and GMU

System features

- Single 50 Ohm coax cable for the ADU
- One Touch Commissioning
- GX-R2 support, wideband and dual polarisation.
- Standard 4.5W or High Power 9W BUC.
- Gyro-free operation
- Ka-to-Ku-band conversion
- Dual antenna operation to minimize blocking issues
- SNMP traps, IoT and syslog support for real-time monitoring
- REST API
- Remote service access via FleetBroadband, Iridium, LTE or other IP connection
- Remote or local simultaneous software update of ADU and BDU via PC and Internet browser
- Built-in test equipment (BITE) for troubleshooting purpose
- BDU with 5 x LAN, NMEA 0183, RS-232 and RS-422, TX Mute
- GMU with 8+2 LAN, RS-232 and RS-422 and I/O connector.
- No scheduled maintenance.
- Few spare parts, easy to service
- Support for Cobham ConnectIT
- Prepared for third-party IP devices in ADU

The system is set up using the built-in Installation wizard.

Service friendly system

The system configuration is saved in several modules, there is no loss of data at repair. There is a switch in the ADU to turn off the power to the antenna. All modules have an LED status indicator. Each module is encapsulated in a metal box with self-contained mounting bolts. If necessary, belts and modules can be exchanged through the service hatch on site for the SAILOR 1000 XTR GX-R2 antennas.

You can do remote diagnostics and service. The built-in test equipment of the antenna checks constantly the antenna modules for proper functioning, it monitors and logs information for all modules. The ADU performs a POST (Power On Self Test) and you can request a self test (PAST, Person Activated Self Test). Continuous Monitoring (CM) is always enabled. Error codes are read out in the web interface and in the display of the BDU. ADU software is updated automatically when making a software update through the BDU.

1.1.1 Above Deck Unit (ADU)

The SAILOR XTR GX-R2 ADU is a 103cm or 65 cm VSAT stabilized tracking antenna, consisting of a suspended antenna with a standard global RF configuration. It is stabilized by heavy-duty vibration dampers in 3-axis and can be used in environments with elevations of -20° to +120° for SAILOR 1000 XTR GX-R2 and -20° to +128° for SAILOR 600 XTR GX-R2. The SAILOR 1000 XTR GX-R2 antenna weighs 105 kg, and the SAILOR 600 XTR GX-R2 antenna weighs 37 kg. The antenna is powered by the BDU and protected by a radome. All communication between the ADU and the BDU passes through a single standard 50 Ohm cable (with N connector) through the rotary joint. No cable work is required inside the radome. The antenna has 4 LAN connectors and a DC power outlet in the ADU to connect third-party equipment.The SAILOR 1000 XTR GX-R2 antenna comes with lifting brackets pre-mounted. The SAILOR 600 XTR GX-R2 comes with a sling pre-mounted.

Modules in the ADU (SAILOR 1000 XTR GX-R2)

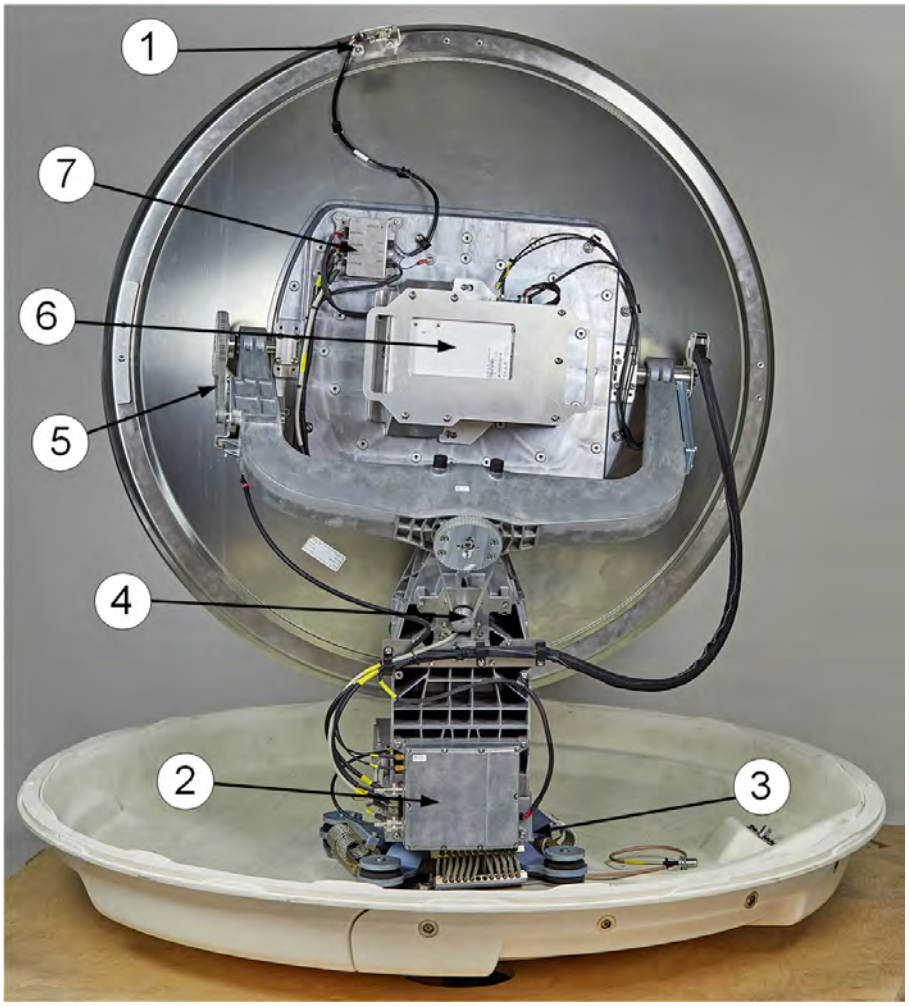


Figure 1-3: SAILOR 1000 XTR GX-R2 ADU modules 1/2

1. GNSS module (GPS, GLONASS, BEIDOU).
2. XTR Antenna Control Module (ACM).
3. ADU power on/off.
4. Cross elevation motor.
5. Elevation motor.
6. GX-R2 Ka-band transceiver
7. Inertial Sensor Module (ISM).

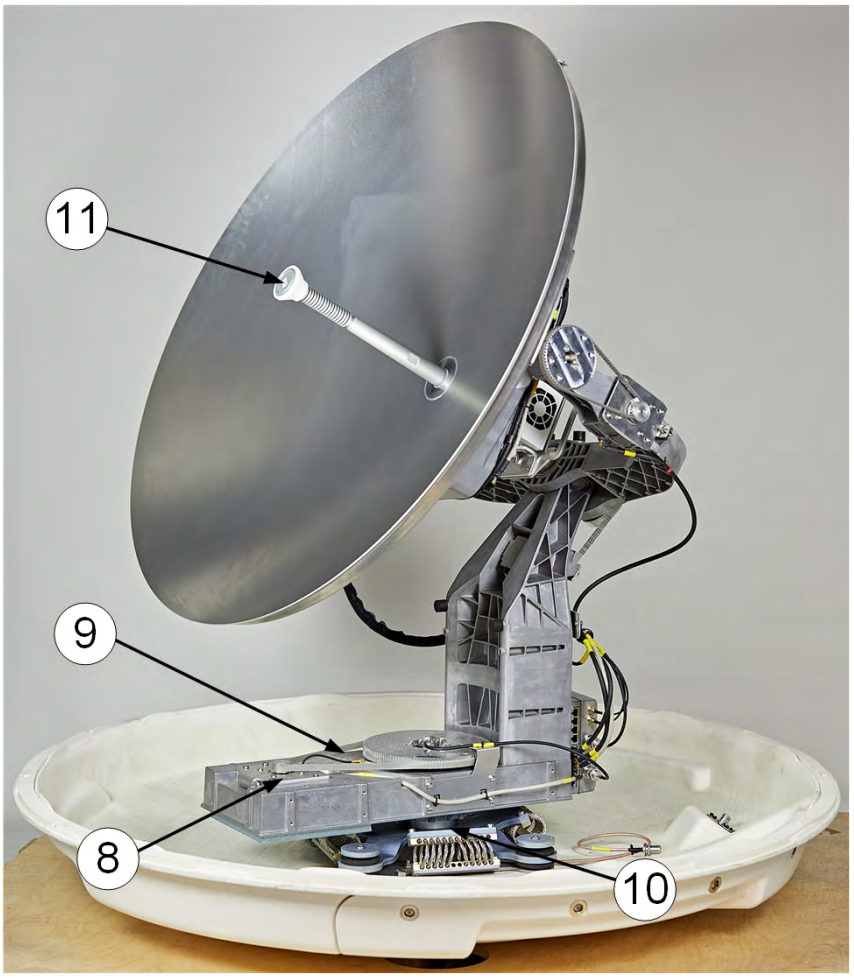


Figure 1-4: SAILOR 1000 XTR GX-R2: ADU modules 2/2

8. Azimuth motor.
9. Azimuth zero reference module.
10. Rotary joint.
11. Feed horn.

Modules in the ADU (SAILOR 600 XTR GX-R2)

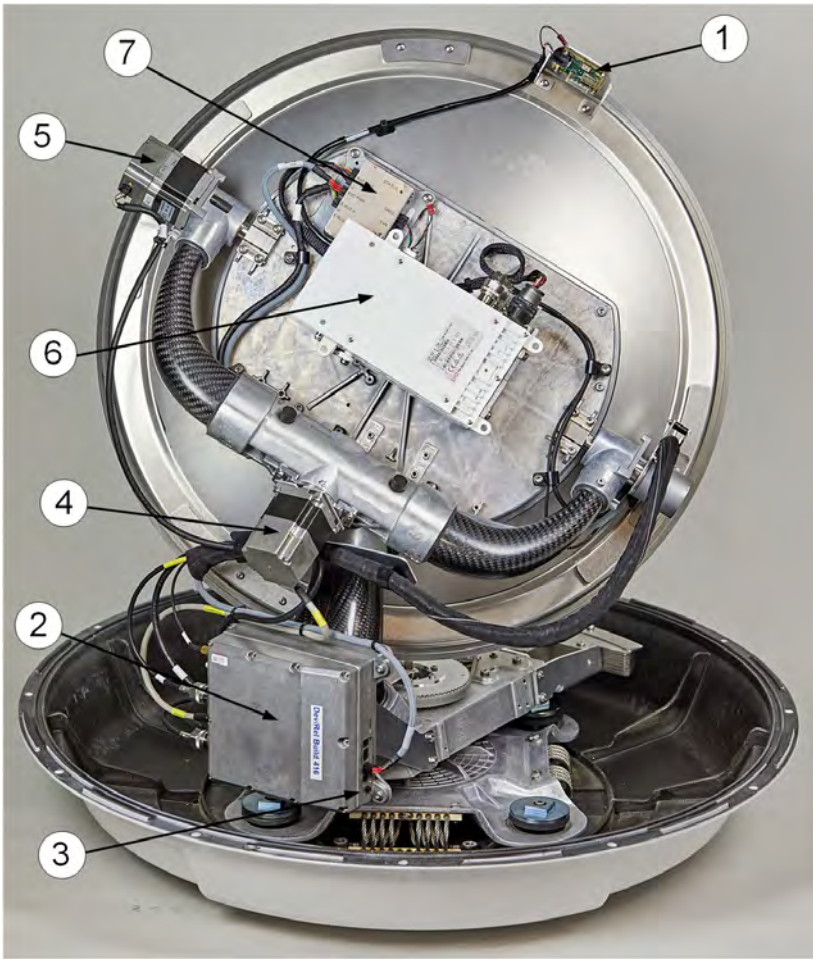


Figure 1-5: SAILOR 600 XTR GX-R2)ADU modules 1/2

1. GNSS module (GPS, GLONASS, BEIDOU).
2. XTR Antenna Control Module (ACM).
3. ADU power on/off.
4. Cross elevation motor.
5. Elevation motor.
6. GX-R2 Ka-band transceiver.
7. Inertial Sensor Module (ISM).

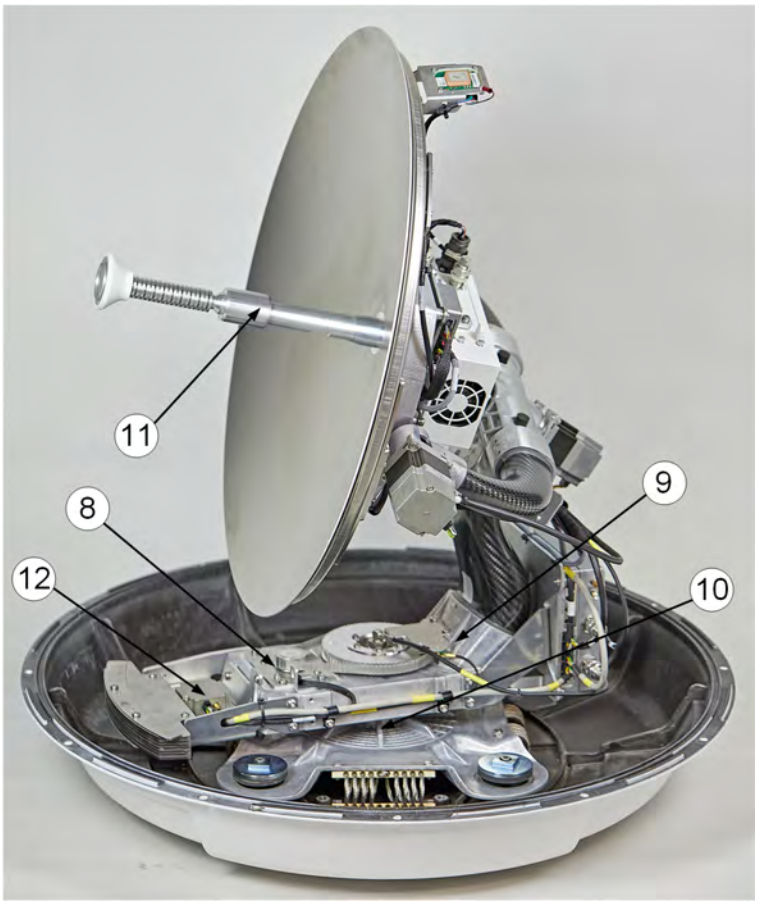


Figure 1-6: SAILOR 600 XTR GX-R2: ADU modules 2/2

8. Azimuth motor.
9. Azimuth zero reference module.
10. Rotary joint.
11. Feed horn.
12. Azimuth motor driver.

1.1.2 Below Deck Unit (BDU)

The BDU contains all user interfaces and manages all communication between the ADU and the connected VSAT modem, a connected PC and an optional FleetBroadband service communication line. The BDU comes in a 19” rack version, it has a display, status LEDs and a keypad. It provides a DHCP server and client mode. The BDU provides DC power to the ADU through a single coaxial cable. The BDU has the following interfaces:

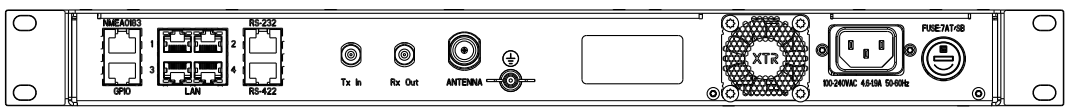


Figure 1-7: BDU, connector overview

BDU connector ID	Type	Function
NMEA0183	RJ-45	Vessel gyro input
GPIO	RJ-45	General Purpose I/O
LAN 1	RJ-45	VSAT modem
LAN 2	RJ-45	User LAN
LAN 3	RJ-45	User LAN
LAN 4	RJ-45	User LAN
RS-232	RJ-45	VSAT modem serial interface
RS-422	RJ-45	VSAT modem serial interface
TX In	F	VSAT modem TX (75 Ohm)
RX Out	F	VSAT modem RX (75 Ohm)
Antenna	N	ADU signal and power (50 Ohm)
LAN	RJ45	Front LAN service port (LAN 5)

Table 1-1: BDU connectors

The BDU has a an On/Off power switch and a LAN connector at the front for accessing the service port. The unit is AC powered.

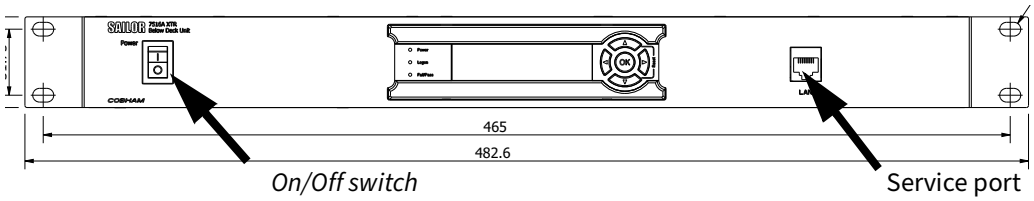


Figure 1-8: BDU front panel

1.1.3 GX Modem Unit (modem)

The modem (GMU) comes in a 19” rack version. The modem has the following interfaces and switch:

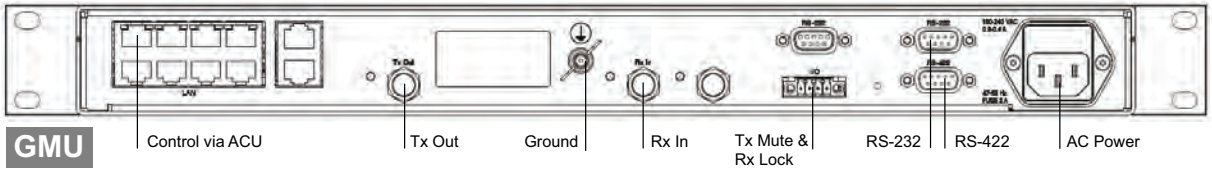


Figure 1-9: GMU (connector panel)

- 8 + 2 ports, one active for modem control and user equipment.
- 3 x F connectors for Rx and Tx cables (75 Ohm) to BDU (Rx2 not active).

- RS-422 interface for modem control.
- 2 x RS-232 interfaces, one for modem control, one not active.
- I/O connector for Tx Mute and Rx Lock.
- Ground wing nut.
- AC Power connector.
- On/Off power switch (at the front).

1.1.4 Satellite type approvals

For a list of satellite type approvals see the SAILOR XTR GX-R2 product page at www.cobhamsatcom.com.

1.1.5 Service activation

Before you can start using the SAILOR XTR GX-R2, you need to activate the system for VSAT service. Contact your service provider for activation.

1.2 Part numbers and options

1.2.1 Applicable model and part numbers

The following model and part numbers are available for the SAILOR XTR GX-R2 system:

Part number	Model number	Description
407509C-00540	7509C	SAILOR 1000 XTR GX-R2 4.5W ADU
407509D-00540	7509D	SAILOR 1000 XTR GX-R2 9.0 ADU
407506A-00540	7506A	SAILOR 600 XTR GX-R2 4.5W ADU
407506D-00540	7506D	SAILOR 600 XTR GX-R2 9.0W ADU
407516A-00500	7516A	SAILOR XTR BDU
407023A-00500	7023A	SAILOR Global Xpress Modem Unit GMU

Table 1-2: Model and part numbers for the SAILOR XTR GX-R2 system

1.2.2 Options

The following options are available for the SAILOR XTR GX-R2 system:

Part number	Description
407090A-950	Antenna cable 50 m N-Conn (not mounted), male/male
407090A-925	Pigtail Cable 1.25 m, N-Conn, female/male
407090-001	SAILOR 1m SMART Heater, operation down to -55 C (for 100 cm)

Table 1-3: Model and part numbers for options of the SAILOR XTR GX-R2 system

Installation

This chapter has the following sections:

2.1 What's in the box

2.1.1 To unpack

Unpack the ADU and BDU. Check that the following items are present:

- SAILOR ADU
- Accessory kit for SAILOR ADU:
  - Package with bolts and washers
- SAILOR 7516A BDU
- Accessory kit for SAILOR 7516A BDU:
  - Coax cable F-F, low loss, 75 Ohm (100 cm, 2 pcs)
  - Power cable (230 VAC) with Schuko (Euro) wall plug
  - Terminal block (DIN Rail Adapter for RJ-45 connector)
- SAILOR 7023A GMU
- Accessory kit for SAILOR 7023A GMU:
  - Wiecon 3.5 mm spacing, 4 pol connector for cable
  - RJ-45 patch cable (1 pce)
  - Power cable 230 VAC
  - RS-232/RS-422 cable (2 pcs)

2.1.2 Initial inspection

Inspect the packing material immediately upon receipt for evidence of damage during transport. If the shipping material is severely damaged or water stained, request that the carrier's agent be present when opening the cartons and wooden box. Save all box packing material for future use.

WARNING! To avoid electric shock, do not apply power to the system if there is any sign of shipping damage to any part of the front or rear panel or the outer cover. Read the safety summary at the front of this manual before installing or operating the system.

After unpacking the system, inspect the units thoroughly for hidden damage and loose components or fittings. If the contents are incomplete, if there is mechanical damage or defect, or if the system does not work properly, notify your dealer.

2.1.3 Tools needed

The following tools may be needed during the installation:

- Torx TX 30 to open the service hatch (if any)
- Torque wrench to fasten the mounting bolts for the ADU
- Torque wrench to fasten the N connector at the ADU
- HEX key (5mm) to take off the SAILOR 600 XTR GX-R2 radome
- PC and Internet browser
- Crimping tools for RF and RJ-45 connectors
- Ethernet cable
- RJ-45 connectors

2.1.4 Transport of the antenna

During transport the antenna must be able to move freely inside the radome. You must follow the instructions below to keep a valid warranty:

CAUTION!

Do not strap parts of the antenna. This might cause damage to the antenna.
Damage due to actions listed above will void the warranty.

2.2 Site considerations

Consider the following topics when installing the ADU:

- *General considerations*
- *Obstructions (ADU shadowing)*
- *Blocking zones – azimuth and elevation*
- *Safe access to the ADU: Radiation hazard*
- *Ship motion and offset from the ship's motion centre*
- *ADU mast flange and mast length*
- *Interference from radar, GPS/GNSS, L-band and other transmitters*
- *Condensation and water intrusion*

2.2.1 General considerations

For optimum system performance, follow the guidelines on where to install or mount the different units of the SAILOR XTR GX-R2 system. You do not have to align the ADU with the bow-to-stern line of the ship. When configuring the SAILOR XTR GX-R2 system, the azimuth calibration provides the correct azimuth of the ADU.

Mount the ADU on stiffened structures with a **minimum of exposure to vibrations**.

Safe access to the ADU: Radiation hazard

The radiation and safety distances are:

Antenna model		Maximum EIRP level	Safety distance
407509C-00540	SAILOR 1000 XTR GX-R2 4.5W ADU	53.5 dBW	30 m
407509D-00540	SAILOR 1000 XTR GX-R2 9.0 ADU	56.6 dBW	55 m
407506A-00540	SAILOR 600 XTR GX-R2 4.5W ADU	50.1 dBW	30 m
407506D-00540	SAILOR 600 XTR GX-R2 9.0W ADU	53.1 dBW	44 m

Table 2-1: Radiation and safety distance

Note The safety distance is based on a radiation level of 10 W/m^2.

Painting the radome

Customers may wish to paint the radome in order to match the vessel's color. Any paint used must be non-metallic based. Painting the radome may impact RF performance and may lead to over-heating, causing the antenna to go in safe mode (switch off).
Cobham Satcom recommends that the radome should NOT be painted. Painting the radome will not void the general warranty regarding material and workmanship etc. It is only the performance that cannot be guaranteed.

Modifying the radome or using another radome

The SAILOR XTR GX-R2 antenna comes with a type-approved radome fitted from the factory. This radome is specifically designed for a minimal loss of RF performance for this specific antenna. Insertion loss reduces the available signal and decreases the effective radiated power and G/T (the ability to receive a weak signal). Modifying the radome or using another radome may increase the antenna side lobes, resulting in interference with other communication systems and thereby void satellite operator approvals. Other electrical effects on antenna performance of another radome, or of modifying the radome, include a change in the antenna beam width and shifting of the antenna bore sight.

Cobham Satcom recommends **NOT** to modify the radome or change it to another type. Exchanging or modifying the radome will not void the general warranty for material and workmanship etc. but the performance cannot be guaranteed, and the satellite operator approvals will not be valid.

Ship motion and offset from the ship's motion centre

When installing the ADU you must consider the mounting height carefully. The higher up the ADU is mounted, the higher is the linear g force applied to the ADU. The g force also depends on the roll period of the ship, see Table 2-2. If the g force applied is too high, performance and ADU signal stabilization may be reduced and eventually the ADU may be damaged.

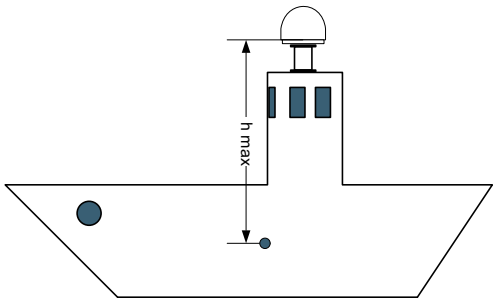


Figure 2-1: Maximum distance from the ship's motion centre (h max)

Even though it is recommended to mount the ADU high, keep the distance between the ADU and the ship's motion center as short as possible.

Minimum roll period	Maximum ADU mounting height (h max)	
	Full performance	Potential risk of damage
4 s	12 m	16 m
6 s	27 m	35 m
8 s	48 m	62 m
10 s	75 m	98 m

Table 2-2: Maximum distance from the ship's motion center versus ship's roll period

2.2.2 Obstructions (ADU shadowing)

The ADU beam is approximately 1 m in diameter for the first 30 m from the ADU. Beyond 30 m the beam gradually widens so that it is approximately 5 m in diameter at 100 m distance. This beam expansion continues with increasing distance. Any obstructions, such as masts, funnels, bridge house etc. within this field can cause signal degradation or signal loss.

Note Due to the short wavelength at Ka band and the narrow beam width of the ADU even a **6 mm steel wire placed within 50 m** inside the beam can causes signal degradation.

For optimum performance adhere to the following guidelines:

1. Place the ADU so that it has as much **free line-of-sight to the satellite** as possible without any structures in the beam through one full 360 degrees turn of the vessel.
2. Do not place the ADU close to large objects that may block the signal.

3. Elevate the ADU by mounting it on a mast or on a mounting pedestal on a deck or deck house top to avoid obstruction.

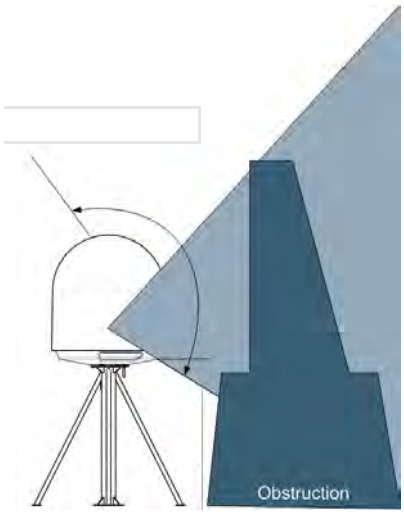


Figure 2-2: Signal degradation because of obstructing objects, look angle -18° to 118°

Blocking zones – azimuth and elevation

The installation may require to set up blocking zones for the ADU, i.e. areas where the ADU will not transmit and areas where transmit power is potentially dangerous for persons frequently being in these zones. 8 blocking zones can be set up. Each blocking zone is set up with azimuth start and stop, and elevation angle. The blocking zones are set up in the built-in web interface of the BDU.

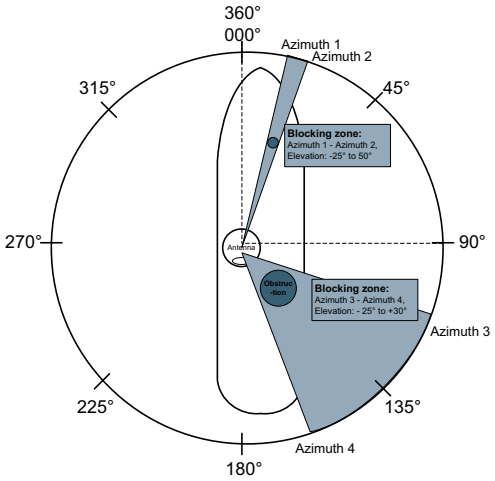


Figure 2-3: 2 Blocking zones with no-transmit zones, azimuth (example)

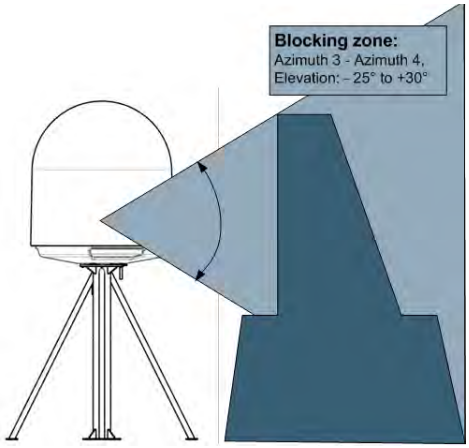


Figure 2-4: Blocking zone with no-transmit zones, elevation angle (example)

2.2.3 ADU mast flange and mast length

The system is designed for harsh environmental conditions at sea, both in regards to vibration amplitude and speed. The antenna system performs optimally when mounted on a properly designed foundation. When mounting the antenna the overall goal is to establish a foundation which is as rigid as possible. However, in some scenarios establishing a very rigid foundation can be difficult. This section aims at defining the minimum design criterion for the mast. In addition, some specific design suggestions are presented. Note that the design values given below depend on rigid interfaces between antenna and ship, the values are furthermore given based on a standard steel type (e.g. S235JR, S355JO).

The placement of the ADU must ensure a rigid structural connection to the hull or structure of the ship. Parts of the ship with heavy resonant vibrations are not suitable places for the ADU. A small platform or short mast must provide rigid support for the ADU fastening bolts and a rigid interface to the ship. If it is necessary to use a tall mast, you must stabilize the mast with bracing. In regards to stiffness the overall criterion is that the first structural mode of the mast or foundation (where the antenna system is mounted) should be above 30 Hz. All the designs presented in the following sections respect this standard.

Important An antenna mounted on a less stiff structure might be functional, but could lead to a decrease in the operational lifetime of the antenna system and possibly a decreased performance under operation

The ADU mast must carry the weight of the ADU unit, that is approximately105 kg (+ the weight of the mast flange) for the SAILOR 1000 XTR GX-R2 antenna and 37 kg (+ the weight of the mast flange) for the SAILOR 600 XTR GX-R2 antenna. The mast must also withstand on-board vibrations and wind speeds up to 110 knots on the radome, even in icing conditions.

CAUTION! Avoid sharp edges where the flange is in direct contact with the radome. Round all edges as much as possible to avoid damaging the surface of the radome.

ADU mast flange (S1000 antenna)

For best performance, do as follows:

1. Provide a mast flange with a minimum of four gusset plates.
2. Fit the top of the ADU mast with a flange with clearance holes matching the bushings in the radome and with minimum 4 gusset plates. No center hole is necessary in the flange.
   - **Flange thickness**: Minimum 15 mm.
   - **4 gusset plates**: Minimum 15 mm thick, must be placed as close as possible to the holes in the mounting plate while leaving space for the bolt head and welded seam.

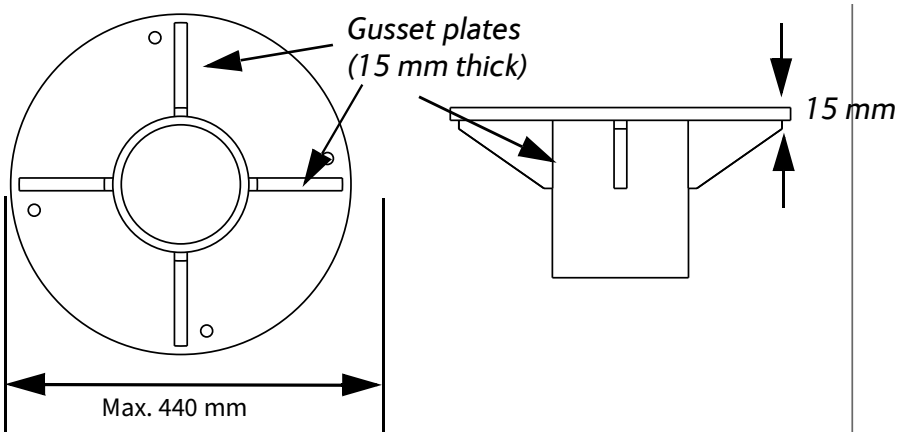


Figure 2-5: ADU mast flange, top and side view (S1000)

3. Make sure that the flatness on the mast mount plateau is below 3,0 mm.

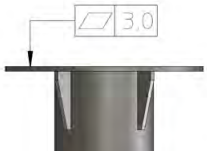


Figure 2-6: ADU mast flange, recommended flatness on the mast mount plateau

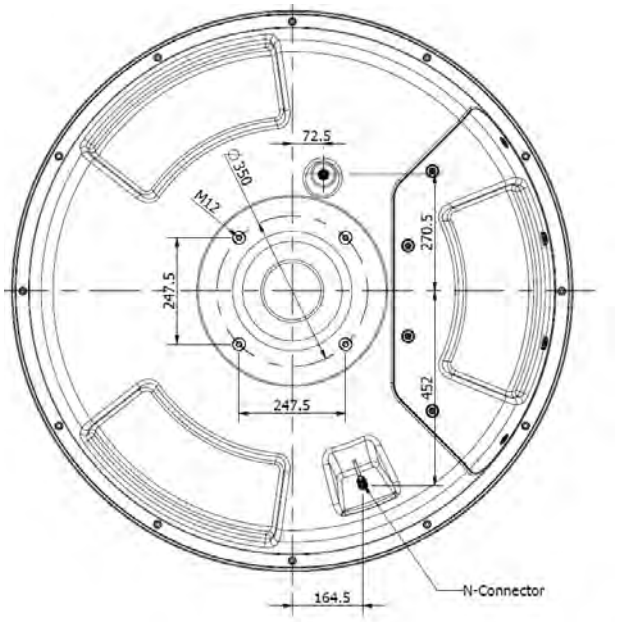


Figure 2-7: ADU, bottom view (S1000)

ADU mast flange (S600 antenna)

For best performance, do as follows:

1. Provide a mast flange with a minimum of four gusset plates.
2. Fit the top of the ADU mast with a flange with clearance holes matching the bushings in the radome and with minimum 4 gusset plates. No center hole is necessary in the flange.
   - **Flange thickness**: Minimum 5 mm.
   - **4 gusset plates**: Minimum 5 mm thick, must be placed as close as possible to the holes in the mounting plate while leaving space for the bolt head and welded seam..

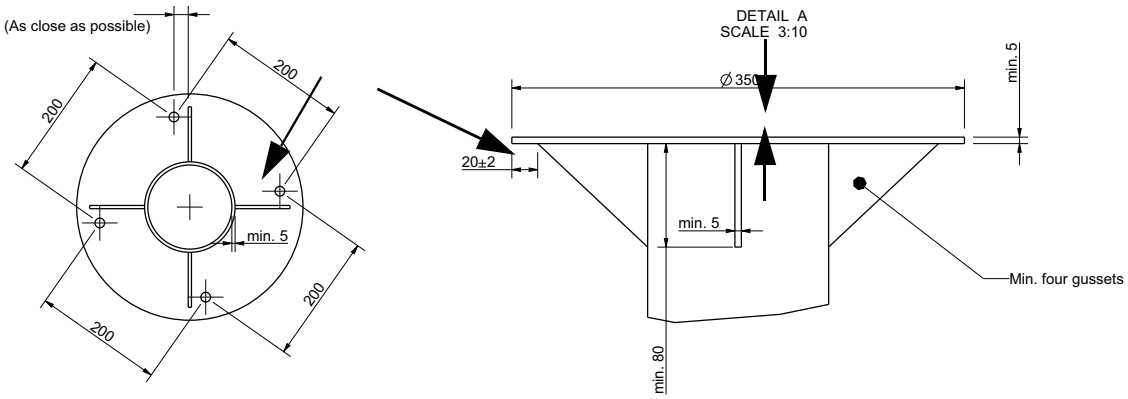


Figure 2-8: ADU mast flange, top and side view (S600 antenna)

3. Make sure that the flatness on the mast mount plateau is below 3,0 mm.

Figure 2-9: ADU mast flange, recommended flatness on the mast mount plateau

4. Use the dimensions in the following figure to prepare the mast flange for mounting of the ADU.

The following figure shows the bottom view of an antenna.

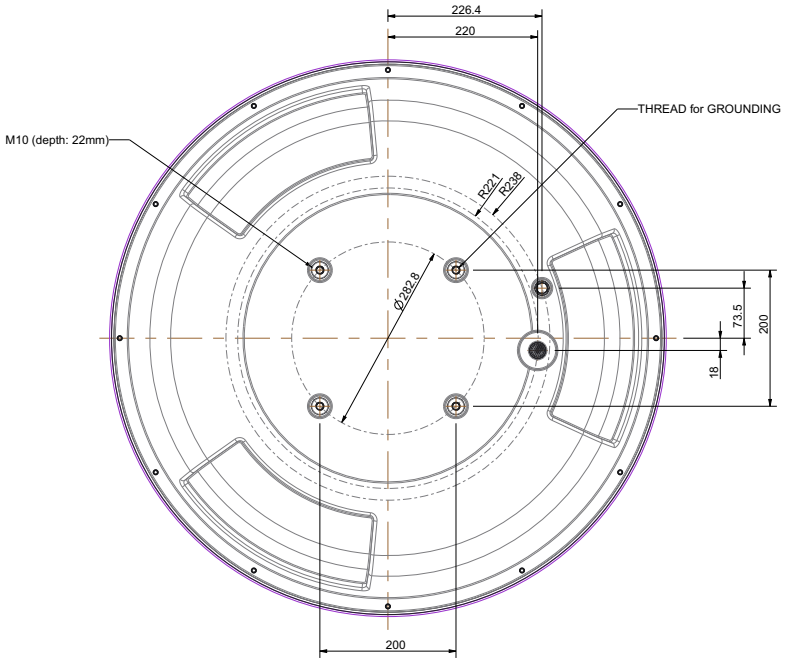


Figure 2-10: ADU, bottom view (S600 antenna)

Mast length and diameter

The following sections provide guidelines for choosing mast diameter and wall thickness for a given mast length (height). A larger wall thickness yields more stiffness

(valid design) whereas a thinner wall thickness yields a more weak structure (not valid design).

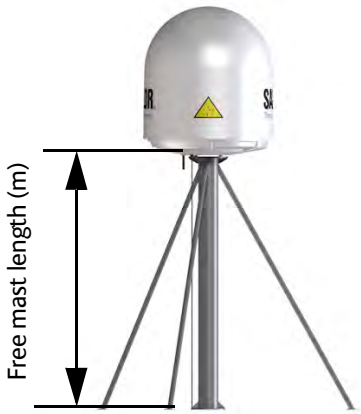


Figure 2-11: Free mast length and bracing for a tall mast

Note Make sure that there is free space below the drain tube.

Note The tables list the values for **steel masts**. For **aluminium masts**, the free mast length is reduced to 75% of the values for steel.

Note Bracing and rigid masts can still not prevent vertical vibration if the mast is attached to a deck plate that is not rigid. Make every effort to mount the mast on a surface that is well supported by ribs. If this is not possible, provide extra deck plate propping.

Mast length (S1000 antenna)

The below tables show the minimum dimensions for a SAILOR XTR GX-R2 ADU (S1000) mast with and without stays/braces. Note that the values are only guidelines - always consider the environment and characteristics of the ship before deciding on the mast dimensions.

Mast without braces	Max. free mast length (steel), (m)	Outer diameter (mm)	Wall thickness (mm)	Weight (kg/m)
	0.4[a]	200	5	24.0
	0.6	220	5	26.5
	0.8	250	5	30.2
	1	270	5	32.7

Table 2-3: Mast dimensions without braces (S1000)

a. The height of 0.4 m is not recommended to be used as it will make access through the ADU's service hatch difficult.

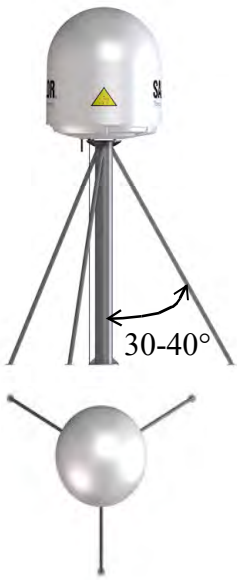
Mast with 3 braces	Max. free mast length (steel), (m)	Outer Diameter (mm)	Wall Thickness (mm)	Outer Diameter for brace (mm)	Thickness for brace (mm)
	1.2	140	10	50	5.0
	1.2	200	5	50	5.0
	1.6	140	10	70	5.0
	1.6	200	5	70	5.0
	2	160	10	70	5.0
	2	220	5	70	5.0
	2.5	180	10	80	5.0
	2.5	220	5	80	5.0

Table 2-4: Mast dimensions with 3 braces (S1000)

Mast length (S600 antenna)

Mast with 2 braces	Max. free mast length (steel), (m)	Outer Diameter (mm)	Wall Thickness (mm)	Outer Diameter for brace (mm)	Thickness for brace (mm)
	1.2	160	10	80	5.0
	1.2	200	5	80	5.0
	1.6	180	10	80	5.0
	1.6	220	5	80	5.0
	2	180	10	80	5.0
	2	240	5	80	5.0
	2.5	200	10	80	5.0
	2.5	260	5	80	5.0

Table 2-5: Mast dimensions with 2 braces (S1000)

The following tables show the minimum dimensions for a SAILOR 600 XTR GX-R2 ADU mast with and without stays/braces. Note that the values are only guidelines - always

consider the environment and characteristics of the ship before deciding on the mast dimensions.

Mast without braces	Max. free mast length (steel), (m)	Outer Diameter (mm)	Wall Thickness (mm)	Weight (kg/m)
	0.4	90	5	10.8
	0.6	116	5	13.9
	0.8	142	5	17.0
	1	168	5	20.2
	1.2	194	5	23.3
	1.4	220	5	26.4

Table 2-6: Mast dimensions without braces (S600 antenna)

Mast with 3 braces	Max. free mast length (steel), (m)	Outer Diameter (mm)	Wall Thickness (mm)	Outer Diameter for brace (mm)	Thickness for brace (mm)	Brace connection point from top of mast (m)
 	1.5	80	5	30	5.0	0.2
	2.0	115	5	50	5.0	0.4
	2.5	150	5	65	5.0	0.6
	3.0	185	5	80	5.0	0.8
	3.5	220	5	100	5.0	1.0

Table 2-7: Mast dimensions with 3 braces (S600 antenna)

2.2.4 Interference from radar, GPS/GNSS, L-band and other transmitters

Note Do not place the antenna close to interfering signal sources or receivers. For allowed distances to other transmitters see Figure 2-13. It is recommended to test the total system by operating all equipment simultaneously and verifying that there is no interference.

The ship's radar and high power radio transmitters may compromise the ADU performance. RF emission from radars might actually damage the ADU. The ADU itself may also interfere with other radio systems.

Radar

It is difficult to give exact guidelines for the minimum distance between a radar and the ADU because radar power, radiation pattern, frequency and pulse length/shape vary from radar to radar. Further, the ADU is typically placed in the near field of the radar ADU and reflections from masts, decks and other items in the vicinity of the radar are different from ship to ship. But it is possible to give a few guidelines. Since a radar radiates a fan beam with a horizontal beam width of a few degrees and a vertical beam width of up to +/- 15°, the worst interference can be avoided by mounting the ADU at a different level – meaning that the ADU is installed minimum 15° above or below the radar antenna. Due to near field effects the benefit of this vertical separation could be reduced at short distances (below approximately 10 m) between radar antenna and the ADU. Therefore it is recommended to ensure as much vertical separation as possible when the ADU has to be placed close to a radar antenna.

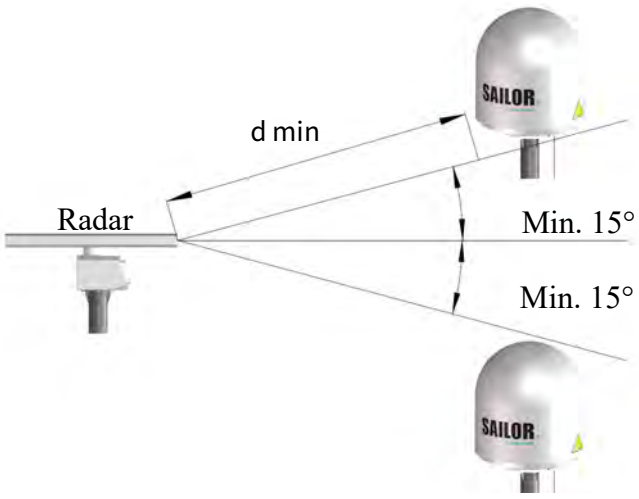


Figure 2-12: Interference with the vessel's radar

The minimum acceptable separation (d min.) between a radar and the ADU is determined by the radar wavelength/frequency and the power emitted by the radar. The tables below show some "rule of thumb" minimum separation distances as a function of radar power at X and S band. If the d min. separation listed below is applied, antenna damage is normally avoided. The separation distance for C-band (4-8 GHz) radars should generally be the same as for S-band and X-band radars.

"d min." is defined as the shortest distance between the radar antenna (in any position) and the surface of the ADU.

X-band (~ 3 cm / 10 GHz) damage distance		
Radar power	SAILOR XTR GX-R2 ADU	
	d min. at 15° vertical separation	d min. at 60° vertical separation
0 – 10 kW	1.0 m	1.0 m
30 kW	2.0 m	1.0 m
50 kW	3.3 m	1.7 m

Table 2-8: Minimum radar separation, X-band

S-band (~ 10 cm / 3 GHz) damage distance		
Radar power	SAILOR XTR GX-R2 ADU	
	d min. at 15° vertical separation	d min. at 60° vertical separation
0 – 10 kW	2.0 m	1.0 m
30 kW	3.0 m	1.5 m
50 kW	5.0 m	2.5 m

Table 2-9: Minimum radar separation, S-band

Interference from radar, GPS/GNSS receivers, L-band antenna and other transmitters

Even at distances greater than “d min.” in the previous section the radar might still be able to degrade the performance of the SAILOR XTR GX-R2 system. The presence of one or more S or X-band radars within a radius up to 100 m may cause a minor degradation of the Ka band connection. The degradation will be most significant at high radar pulse repetition rates.

As long as receiving conditions are favorable, this limited degradation is not important. However, if receiving conditions are poor – e.g. due to objects blocking the signal path, heavy rainfall or icing, low satellite elevation and violent ship movements – the small extra degradation due to the radar(s) could cause poor connection quality. The presence of S-band radar(s) is unlikely to cause any performance degradation – as long as the minimum distances (d min.) listed in the previous section are applied.

It is strongly recommended that interference-free operation is verified before the installation is finalized.

CAUTION! Never install the antenna closer to a radar than “d min.” - even if experiments show that interference free operation can be obtained at shorter distances than “d min.” in the previous section.

Good quality GPS/GNSS receivers will work properly very close to the ADU - typically down to one meter outside the main beam.

If L-band antennas are installed on the same vessel, keep a minimum distance of 3 meters from the SAILOR XTR GX-R2 ADU to the L-band antenna.

The following figure shows the minimum recommended distance to other transmitters in the frequency range below 1000 MHz.

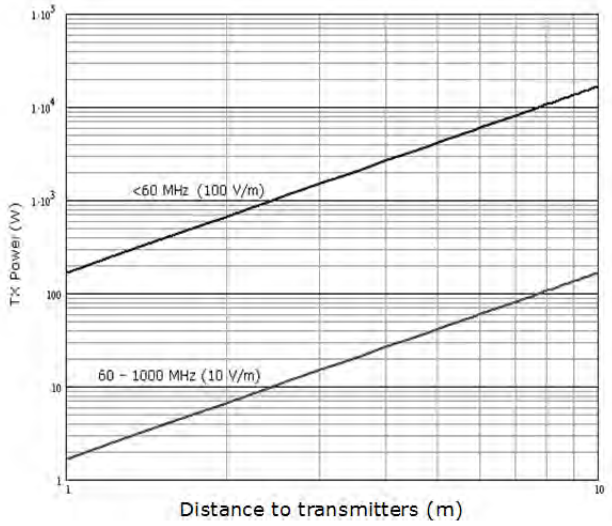


Figure 2-13: Recommended distance to transmitters (m) for frequencies below 1000 MHz

2.2.5 Condensation and water intrusion

In some weather conditions there may occur condensation inside the radome.

1. If possible, install the radome in such a way that direct spray of seawater is avoided.
2. Make sure the ADU's drain tube is open and that there it free space between the drain tube and the mounting surface so water can escape from inside the radome and there is ventilation for the ADU.

Figure 2-14: Drain tube with free space

3. Do not use pneumatic tools for cleaning the radome, especially at a short distance and directly at the split between top and bottom.
4. Do not place the ADU close to a funnel, as smoke deposits are corrosive. Furthermore, deposits on the radome can degrade performance.

2.2.6 Alternative ADU cable

The allowed RF loss in the antenna cable is determined by the attenuators of the antenna. The electronic design guarantees that minimum 20 dB RF loss @ 1700 MHz (S1000) and 20 dB RF loss @ 1950 MHz (S600) and maximum 35 dB RF loss @4450 MHz in the antenna cable will work, but typically an RF loss of about 25 dB will be within the limits of the cable calibration. You can verify the cable attenuation margin with the cable calibration. See **Azimuth calibration (user controlled)** on page 4-35 for more details.

The DC loop resistance of the antenna cable must be maximum 0.9 Ohm. This is to ensure the power requirements from BDU to the antenna and to ensure the performance of the system. Preferably choose one of the cable types listed in the table below.

Cable Type	Absolute max. length (m)	Absolute max. length (ft)
RG223-D	25 m	80 ft
RG214/U	50 m	160 ft
S 07272B-05	95 m	310 ft
LMR-600-50	135 m	440 ft
LDF4.5-50 Andrew	300 m	980 ft

Table 2-10: ADU cable types and maximum lengths

If you want to use an alternative ADU cable make sure that the following requirements are fulfilled:

1. Check the data sheet from the cable supplier and verify the values:
   The RF- attenuation and the DC loop resistance are kept within the maximum specified values:

Antenna cable data	
ADU cable RF-attenuation	at 1950 MHz: Max. 20 dB including connector.
ADU cable RF-attenuation	at 4450 MHz: Max. 35 dB including connector.
ADU cable modem-attenuation	at 10 MHz: Max. 2 dB
ADU cable DC loop resistance	max: 0.9 Ohm

Table 2-11: Antenna cable data

2. Ensure that the specified minimum bending radius is respected. If this is not the case, the loss in the cable will increase. Check the documentation from the cable supplier.

2.3 Installation of the ADU (S1000 antenna)

The following sections describe the installation and grounding of the ADU. The ADU is shipped fully assembled. Install it on the mast and attach the ADU cable.

WARNING! Use a strong webbed sling with a belt to lift the ADU without damaging the radome. Make sure that the sling can carry 105 kg.

WARNING! The ADU may be subject to swaying motions in windy conditions. Always use tag lines to stabilize the ADU during hoisting. It is the crane operator's responsibility to determine whether the environmental conditions are suitable for a safe lift.

2.3.1 To install the ADU

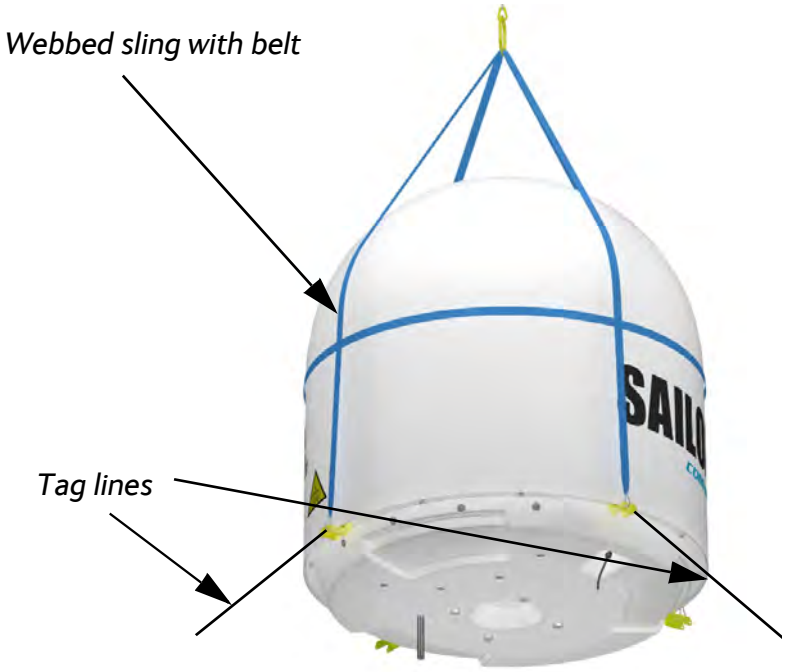


Figure 2-15: Use of strong sling with a belt and tag lines for safe hoisting

Prerequisites

- Ensure that the crane hook has a closing mechanism to prevent accidental slippage of the lifting straps.
- Mount the antenna as far away as possible from the ship's radar and high power radio transmitters, read more in *Interference from radar, GPS/GNSS, L-band and other transmitters* on page 2-13.
- Install the ADU at a location where **vibrations are limited to a minimum**.
- Make sure that there is sufficient space underneath the ADU to open the service hatch.
- **Important**: **Maintain the vertical orientation of the ADU center line**.

- Always use **all 4 bolts** when installing the ADU.

Figure 2-16: Free space for access to the service hatch

You do not need to align the ADU with the bow-to-stern line of the ship. When configuring the SAILOR XTR GX-R2 you make an automated azimuth calibration to obtain the correct azimuth of the ADU.

Installation procedure

To install the ADU, do as follows:

1. Install the mast with the mast flange and have the 4 M12 bolts ready.
2. Undo all shipping buckles, take off the wooden top and remove the casing.
3. Remove the wooden platform.
4. Attach a webbed, four-part sling with a belt to all 4 lifting brackets.

Figure 2-17: ADU installation, webbed sling attached to the 4 lifting brackets

5. Attach 2 tag lines of suitable length to 2 lifting brackets and man them.

6. With a crane lift the ADU off the wooden platform and move it on top of the ADU mast.
7. Install the ADU on the mast flange with 4 M12 bolts and washers. Tightening torque value: 30 Nm. Read carefully and follow instructions given in *To ground the ADU* on page E-2.

Figure 2-18: Mounting the ADU on the mast flange

8. Remove the 4 lifting brackets. Keep the lifting brackets on the vessel for future use.
9. Attach the N-connector of the ADU cable to the ADU and fasten it with 2.5 Nm.

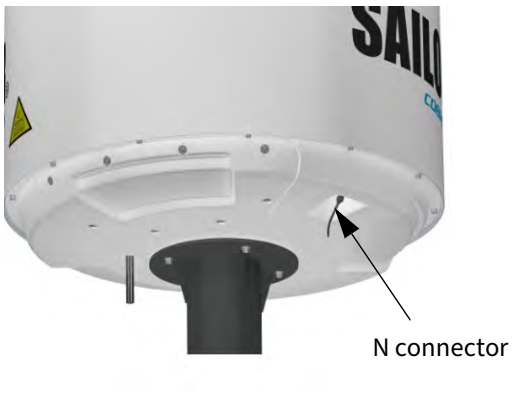


Figure 2-19: Connecting the ADU cable

10. Ensure that the connector is properly protected against seawater and corrosion. As a minimum, wrap it with self-amalgamating rubber.
11. Where the cables are exposed to mechanical wear — on deck, through bulkheads, etc. – protect the cables with steel pipes. Otherwise, follow standard procedures for cabling in ship installations.

Maximum allowed RF loss in the ADU cable

Maximum allowed cable loss is ≤ 20 dB at 1950 MHz. This is to ensure optimum performance of the system.

Maximum allowed DC loop resistance, screen plus center lead ≤ 0.9 Ohm

To open the service hatch

Do as follows to open the service hatch:

1. With a Torx TX30 screw driver, loosen the 8 screws that keep the hatch in place.
2. Lower the service hatch and let it hang in the 2 strips.

Figure 2-20: Opening the service hatch

2.3.2 . To ground the ADU

Ground the ADU at the mounting bolts. To ground the ADU do as follows:

1. Clean the metal underneath the head of **at least** one bolt of insulating protective coating and use a serrated washer to obtain a good ground connection. For optimum grounding connect the ground wire to the bolt marked in the figure below.

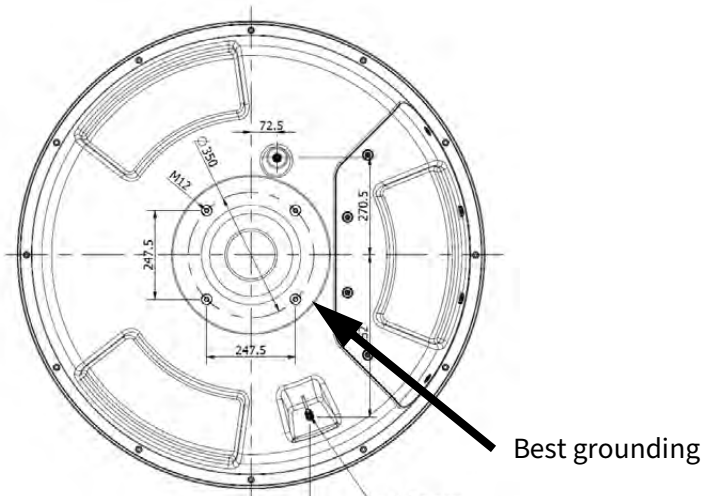


Figure 2-21: ADU, bolt for optimum grounding

2. Tighten the bolt. Use stainless steel bolts and washers.
3. Seal the area suitably in order to avoid corrosion of the grounding point (recommended).

If the ADU cannot or should not be electrically connected directly to the mounting surface, use a separate grounding cable to make the connection between the ADU and the common ground to which the BDU is also connected.

2.4 Installation of the ADU (S600 antenna)

The ADU is shipped fully assembled. You have to install it on the mast and attach the ADU cable.

WARNING! Use the already mounted lifting harness to lift the ADU without damaging the radome.

WARNING! The ADU may be subject to swaying motions in windy conditions. Always use tag lines to stabilise the ADU during hoisting. It is the crane operator's responsibility to determine whether the environmental conditions are suitable for a safe lift.

The antenna comes with a lifting harness already fitted. The lifting harness is provided solely for the purpose of installation of the antenna. The belt of fibre material prevents the antenna from toppling during the lifting process.

Figure 2-22: Use of the lifting harness and tag lines for safe hoisting

WARNING! Use the lifting harness only to lift the antenna. Do not lift other objects or persons with the harness.

The lifting harness (Cobham SATCOM part number TT 48-149056) is designed, tested and conforms to the requirements for lifting equipment in DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast). The Working Load Limit (WLL) is defined as 40 kg.

2.4.1 To install the ADU

Prerequisites

- Ensure that the crane hook has a closing mechanism to prevent accidental slippage of the lifting straps.
- Check for potential interference, read more in *Interference from radar, GPS/GNSS, L-band and other transmitters* on page 2-13.
- Install the ADU at a location where **vibrations are limited to a minimum**.
- **Important**: **Maintain the vertical orientation of the ADU center line**.
- Always use **all 4 bolts** when installing the ADU.

You do not need to align the ADU with the bow-to-stern line of the ship. When configuring the SAILOR XTR GX-R2 you make an automated azimuth calibration to obtain the correct azimuth of the ADU.

- Ensure that the crane hook has a closing mechanism to prevent accidental slippage of the lifting straps.

Installation procedure

To install the ADU, do as follows:

1. Install the mast with the mast flange and have the 4 M10 bolts ready.
2. Open the ADU cardboard packaging.
3. Remove the foam protection layer at the top.
4. Take the 4 lifting straps and connect them to the crane hook.

Figure 2-23: ADU installation, 4 lifting straps on crane hook

5. Attach two tag lines of suitable length to the harness and man them.
6. With a crane lift the ADU off the packaging and move it on top of the mast. Maintain **vertical orientation of the ADU center line**.

7. Install the ADU on the mast flange with 4 M10 bolts and washers. Tightening torque value: 30 Nm.
8. Read carefully and follow instructions given in the next section on grounding.
9. Remove the harness as shown in the following figure:

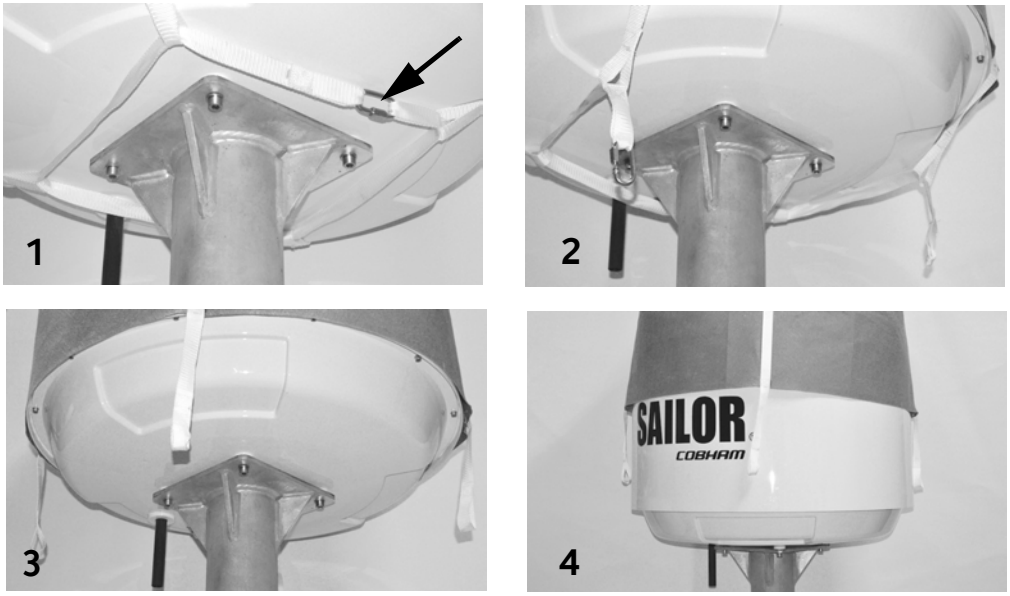


Figure 2-24: Removal of the harness

10. Locate the quick link (1) and open it (2).
11. Pull the strap with the quick link through the harness to remove it (3).
12. Slide the harness over the top of the ADU (4).
13. Dispose of the harness in a responsible manner.
14. Attach the N connector of the ADU cable to the ADU. Tightening torque value: 2.5 Nm.

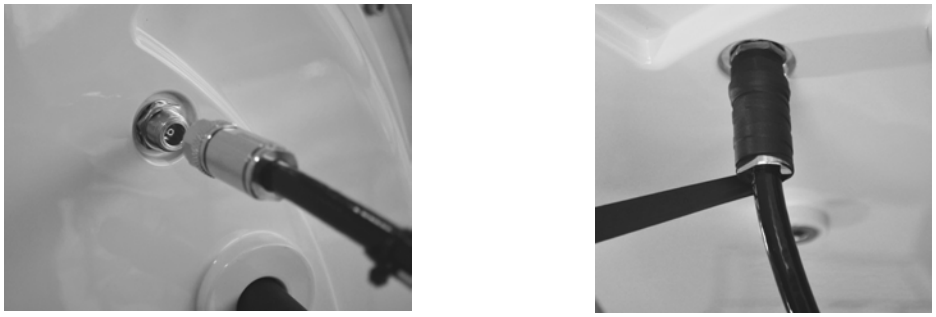


Figure 2-25: Attaching the N connector

15. Ensure that the connector is properly protected against seawater and corrosion. As a minimum, wrap it with self-amalgamating tape.
16. Where the cables are exposed to mechanical wear – on deck, through bulkheads, etc. – protect the cables with steel pipes. Otherwise, follow standard procedures for cabling in ship installations.

2.4.2 To ground the ADU

The ADU must be grounded using one of the mounting bolts. To ground the ADU do as follows:

1. Clean the metal underneath the head of **at least** one bolt of insulating protective coating and use a serrated washer to obtain a good ground connection. For optimum grounding connect the ground wire to the bolt marked in the figure below.

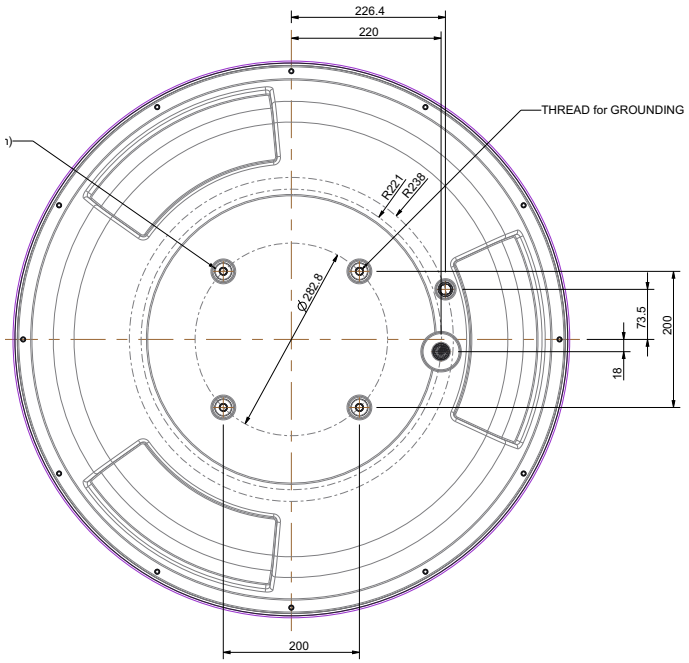


Figure 2-26: ADU, thread for optimum grounding (60 cm)

2. Tighten the bolt. Use stainless steel bolts and washers.
   Tightening torque value: 30 Nm.
3. Seal the area suitably to avoid corrosion of the grounding point (recommended).

If the ADU cannot or should not be electrically connected directly to the mounting surface, use a separate grounding cable to make the connection between the ADU and the common ground to which the BDU is also connected.

2.5 Installation of the BDU

The following sections describe the installation and grounding of the BDU.

2.5.1 To install the BDU

To install the BDU, do as follows:

1. Slide the BDU into a 1U space in a 19” rack.
2. Make sure that the air intakes on the side of the unit are not blocked.
3. Support the BDU in the 19" rack with standard 19" rack rails or 19" shelf and mount the screws in each side through the holes in the front and fasten the screws to the rack. Make sure that the unit is mounted securely according to the requirements for your 19” rack.
4. Connect all cables. See *Connector panel of the BDU* on page 3-1 for a description of the BDU connectors.

The BDU has an additional LAN connector at the front, for accessing the service port from the BDU front panel.

2.5.2 To ground the BDU

1. Make sure that the grounding requirements are met. See the appendix *Grounding and RF protection* on page E-1 for details about grounding.
2. At the BDU end, connect the shield of the ADU cable to ship ground.
3. Make sure the rack is connected to ship ground.

To ensure that the BDU is grounded – also if the ADU cable is disconnected from the BDU, connect an extra ground wire from the rack to the ground stud on the BDU. This ground wire must be a heavy wire or braid cable with a larger diameter than the coax cable.

2.6 Installation of the modem

2.6.1 To install the modem

To install the modem, do as follows:

1. Slide the modem into a 1U space in a 19” rack, preferably directly below or above the BDU.
2. Mount the screws in each side through the holes in the front and fasten the screws to the rack. Make sure that the unit is mounted securely according to the requirements for your 19” rack.

Important Make sure that the ventilation grills at the sides of the unit are not blocked.

2.6.2 To ground the modem

1. Make sure that the grounding requirements are met. See the appendix *Ground and RF protection* on page B-1 for details about grounding.

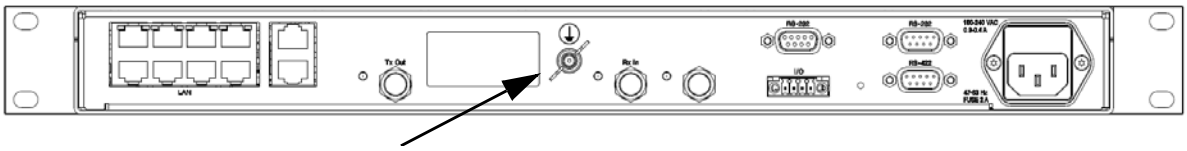


Figure 2-27: Ground stud, GMU

2.7 To connect the ADU, BDU and modem

The following sections show how to connect the ADU, BDU and the modem.

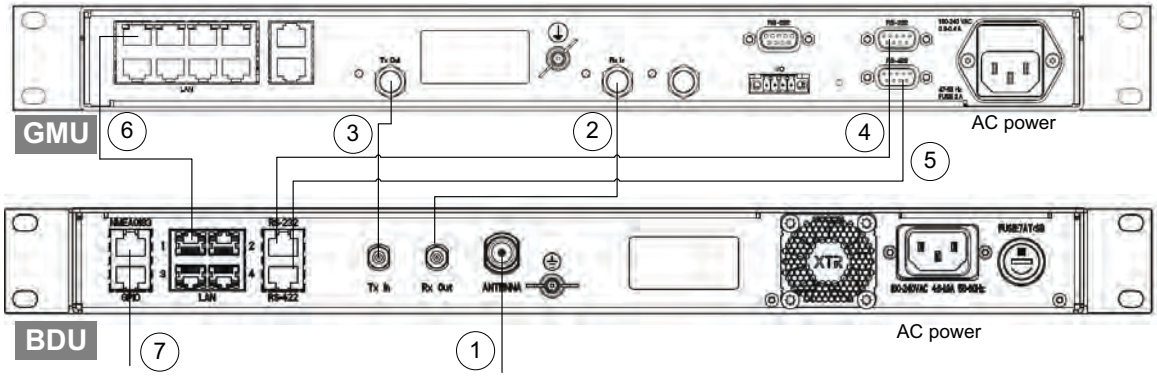


Figure 2-28: Connection between ADU, BDU and modem

1. Connect the antenna cable to **Antenna** at the BDU and the antenna.
2. Connect **Rx Out** at the BDU to **Rx In** at the modem with the supplied cable (75 Ohm coax, F-F, 1 m).
3. Connect **Tx In** at the BDU to **Tx Out** at the modem with the supplied cable (75 Ohm coax, F-F, 1 m).
4. Connect **RS-232** on the BDU to **RS-232** at the modem.
5. Connect **RS-422** on the BDU to **RS-422** at the modem.
6. Connect **LAN1** at the BDU to the upper left RJ45 connector at the modem.
7. Connect the green terminal block for the heading input from the gyro. For pin allocation see *NMEA 0183 RJ-45 connector* on page 3-2.

2.8 Integration of a 3rd party IP device

This section describes how to integrate a 3rd party device inside the antenna radome of the SAILOR 1000 XTR GX-R2. The antenna has the following interfaces for the integration:

- *Power connector*
- *Communication*
- *Mechanical interface*

2.8.1 Power connector

The power output options are 12 VDC / 2A and 5 VDC / 2A. The physical interface is a Molex 105308 4-pin nano-fit connector on the XTR Antenna Control Module (ACM).

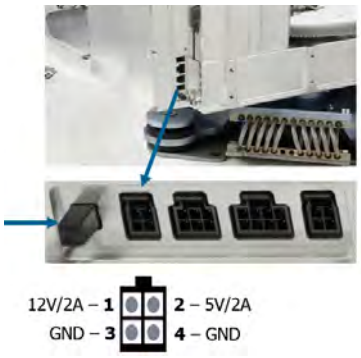


Figure 2-29: ADU power on off (left) and ACM 4-pin nano-fit connector

2.8.2 Communication

The ACM has four Ethernet LAN ports. LAN port 1 and 2 can be tunneled to the LAN ports of the BDU. The BDU LAN port and ACM LAN port are a transparent data channel that connects two devices.The ACM LAN ports are set up in the web interface

Figure 2-30: ACM LAN ports

2.8.3 Mechanical interface

The antenna pedestal is prepared for mounting devices on the side of the pedestal. The mounting screw holes (M5x8mm) can support a special designed mounting bracket to support mounting of a 3rd party hardware device in the antenna.

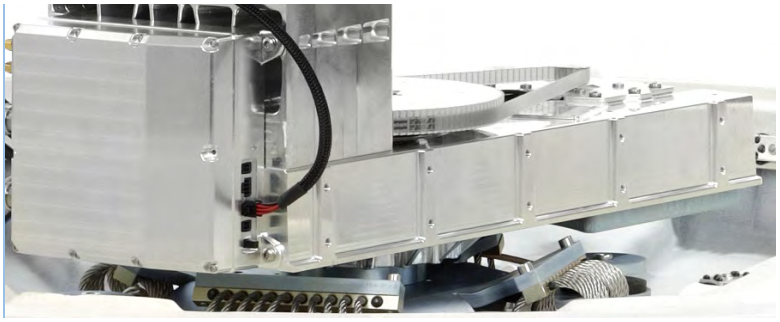


Figure 2-31: Mounting pattern on the pedestal

Fasten the mounting bracket with 4.5 Nm

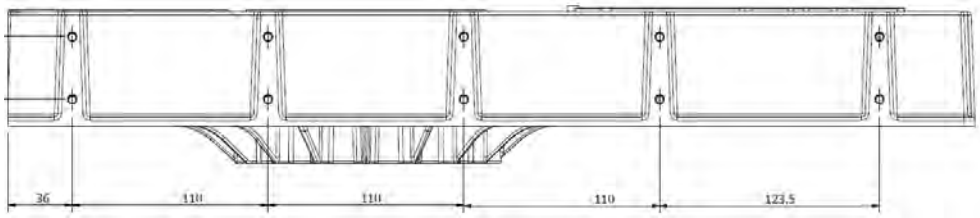


Figure 2-32: Mounting pattern, measures

2.8.4 Example of a 3rd party device integration

The nano-fit connector supplies 12 VDC to power the LTE modem, which interconnects to the antenna system on one of the LAN ports on the ACM.

Figure 2-33: LTE modem connection, example

The LTE modem enables remote access and/or near-shore high speed Internet. Having the LTE modem inside the antenna is the ideal position for best possible LTE signal reception.

Note Make sure that there is sufficient space for reflector and cable movement.

2.9 Power and startup

1. Connect power to the BDU.
2. Connect power to the VSAT modem.
3. Switch on the BDU. The unit starts up and goes through an initialization procedure:
   - Antenna POST pending
   - Antenna SW upload (If the software versions in the ADU and BDU are not the same, a software update is done during startup.)
   - Antenna POST
   - Not ready
   - Ready
   - Pointing antenna
   - Acquiring Signal
   - Tracking

   This may take some time (up to a couple of minutes).
4. The SAILOR XTR GX-R2 is ready to be calibrated (for first time power up) or receive data from the VSAT modem (when in normal operation).
   The LEDs **Power** and **Fail/Pass** are **steady green**, the LED **Logon** is off.
   Make sure there are no hardware failures or error codes present, check the display of the BDU for events.
5. Follow the instructions in the installation wizard to get the SAILOR XTR GX-R2 system operational, see *Installation wizard* on page 4-30.

2.9.1 Power cycle

To power cycle the BDU and ADU do as follows:

1. Flip the on/off switch at the front panel of the BDU.
2. Wait until the system has rebooted and is operational again (the display shows TRACKING). The last active satellite profile will be used.

Note that a reset via the arrow keys on the front panel is not supported.

Interfaces

3.1 Connector panel of the BDU

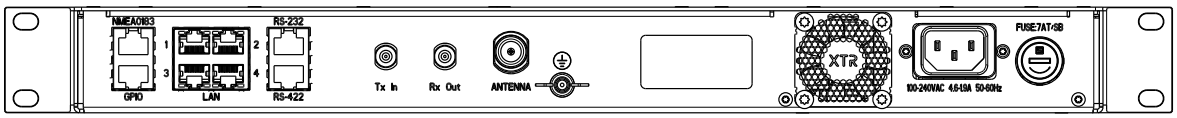


Figure 3-1: BDU: connector panel

3.1.1 AC input connector

Connect the power cable to the AC power connector.

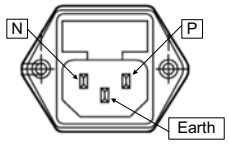
Outline (on the BDU)	Voltage range
	100–240 VAC

Table 3-1: AC power connector

3.1.2 ADU connector

There is just one cable from the BDU to the ADU. This is used to power the ADU, supply 10 MHz clock, handle all communication between BDU and ADU, and deliver the VSAT Rx and Tx signals.

Outline (on the BDU)	Conductor	Pin function
	Inner	DC to ADU 10 MHz clock to ADU BDU to ADU internal communication VSAT Rx/Tx
	Outer	GND (Shield)

Table 3-2: N connector, outline and pin assignment

Important Do not use TNC connectors on the ADU antenna cable or on pigtails. TNC connectors cannot carry the DC current for operating the ADU.

3.1.3 Rx/Tx connectors for modem

Connect the Rx and Tx channels of the modem to the Rx and Tx connectors of the BDU with the 2 supplied Rx/Tx cables (75 Ohm coax, F-F, 1 m).

Outline (on the BDU)	Pin number	Pin function
	1	Inner conductor: 10 MHz clock, VSAT Rx/Tx
	2	Outer conductor: GND (Shield)

Table 3-3: F connector, Rx and Tx, outline and pin assignment

For step-by-step guidelines how to set up the VSAT modem see *Miscellaneous* on page C-1.

3.1.4 NMEA 0183 RJ-45 connector

Connect the ship's gyro to the RJ-45 connector marked NMEA.

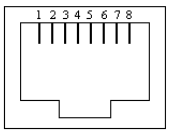
Outline (on the BDU) NMEA	Pin	I/O	Signal	Pin function
	1	O	RS-422 Line B (+)	Future use
	2	O	RS-422 Line A (-)	Future use
	3	I	RS-422 Line B (+)	Heading, balanced
	4	O	RS-232 TxD	Future use
	5		RS-422 shield	Connect only at one end
	6	I	RS-422 Line A (-)	Heading balanced
	7		RS-232 GND	Heading, single
	8	I	RS-232 RxD	Heading, single
	Shield		PCB ground	PCB ground

Table 3-4: NMEA 0183 RJ-45 connector, outline and pin assignment

To accommodate the gyro cable use the terminal block (DIN Rail Adapter 31-208142-000). The pin numbers on the adapter are the same as on the RJ-45 plug.

Figure 3-2: Gyro input, terminal block

NMEA 0183

The NMEA 0183 connection supports IEC 61162-1 and IEC 61162-2.

- IEC 61162-1, baud rate 4800, format 8N1.
- IEC 61162-2, baud rate 38400, format 8N1.

The baud rate is auto detected by the BDU, the user cannot configure this interface.

Supported NMEA strings in order of priority:

1. HEHDT (North seeking Gyro compass)
2. GPHDT (GPS compass)
3. HNHDT (Non-North seeking gyro compass)
4. IIHDT (Integrated Instrument)
5. HCHDT (Magnetic compass)

Note Any HDT sentence is supported as long as it complies with the following header format: "$xxHDT" where xx can be two characters e.g. IN for $INHDT.

Recommended NMEA 0183 cable: Ethernet Cat. 5 or better.

3.1.5 GPIO RJ-45 connector

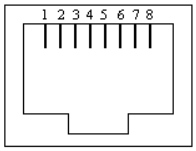
Outline on BDU	Pin	I/O	Signal	Pin function
	1	I	GPIO1	Tx mute (active high)
	2	O	12 VDC / 500 mA	Power output
	3	O	GPIO2	Rx lock (open drain)
	4	N/A	GPIO3	Future use
	5		GND	Ground
	6	O	12 VDC / 500 mA	Power output
	7	N/A	GPIO4	Future use
	8		GND	Ground
	Shield		PCB ground	PCB ground

Table 3-5: RJ-45 GPIO connector, outline and pin assignment

The Tx mute function can be controlled with a simple switch connected between pin 1 (Tx mute) and pin 2 (12 VDC). The Rx lock function is high and becomes low when the modem is not in Rx lock.

3.1.6 RS-232 RJ-45 connector

Use the following connector to connect the BDU to the VSAT modem

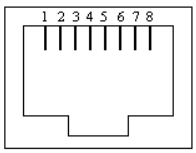
Outline	Pin	I/O	Signal	Function
	1	I	RSSI 2	CM temp out of range
	2	I	DTR/Rx Lock	CM power good
	3	I	RXD	BUC TXD
	4	-	GND	Ground
	5	-	GND	-
	6	O	TXD	BUC RXD
	7	I	DSR/TX Mute	GMU reset
	8	I	RSSI 1	CM RSSI
	Shield	-	PCB ground	PCB ground

Table 3-6: RJ-45 RS-232 connector, male, outline and pin assignment

3.1.7 RS-422 RJ-45 connector

Use the following connector to connect the BDU to the VSAT modem

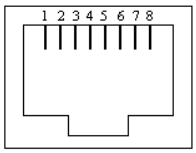
Outline	Pin	Signal	Pin function
	1	Line A RXD (+)	Receive data (non-inverting)
	2	Line A RXD (-)	Receive data (inverting)
	3	Line B TXD (+)	Transmit data (non-inverting)
	4	GND	Ground
	5	GND	Ground
	6	Line B TXD (-)	Transmit data (inverting)
	7	BUC Key line (+)	Key line (non-inverting)
	8	BUC Key line (-)	Key line (inverting)
	Shield	PCB ground	PCB ground

Table 3-7: RS-422 connector, male, outline and pin assignment

3.1.8 LAN connectors

The BDU has four Ethernet connectors (type RJ-45), located at the back of the unit, for PC/laptops, routers, wireless access points. LAN port 5 is for service access at the front. Depending on the VSAT modem, one LAN connector may be used for modem control.

The maximum cable length per connection is 100 m.

Cable type: CAT5, shielded.

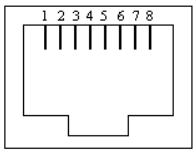
Outline	Pin	Pin function	Wire color
	1	Tx+	White/orange
	2	Tx-	Orange
	3	Rx+	White/green
	4	Not connected	Blue
	5	Not connected	White/blue
	6	Rx-	Green
	7	Not connected	White/brown
	8	Not connected	Brown

Table 3-8: Ethernet connector, outline and pin assignment

3.2 Interfaces of the modem

The following sections describe the connectors of the modem and how to connect to the BDU, power and other equipment.

3.2.1 Connector panel

The following figure shows the connector panel of the modem.

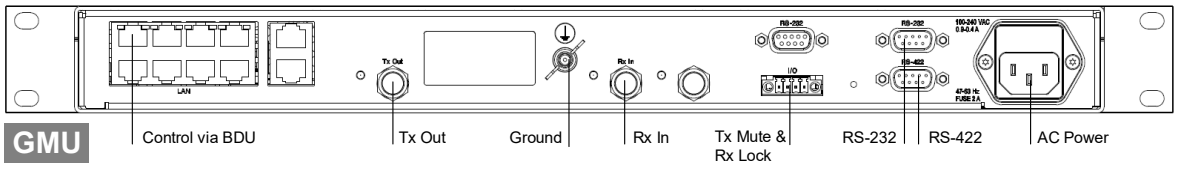


Figure 3-3: Connector panel of the modem

3.2.2 Rx In and Tx Out connectors

The modem has an Rx In and a Tx Out connector. Use these connectors to connect the BDU to the modem.

Outline (on the BDU)	Pin number	Pin function
	1	Inner conductor: 50 MHz clock, Rx/Tx
	2	Outer conductor: GND (Shield)

Table 3-9: F connector, Rx and Tx, outline and pin assignment

3.2.3 RS-232 and RS-422 connectors

The modem has two RS-232 and one RS-422 connector for control information to and from the BDU. See section *Connection between ADU, BDU and modem* on page 2-26 for details how to connect the BDU to the modem.

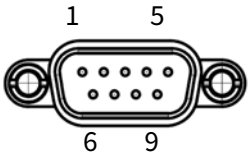
Outline (on the modem)	Pin	Pin function
	1	Not connected
	2	BUC TXD
	3	BUC RXD
	4	Not connected
	5	GND
	6	Power good
	7	GMU reset
	8	Temperature out of range
	9	Core module RSSI

Table 3-10: RS-232 connector, male, outline and pin assignment, modem

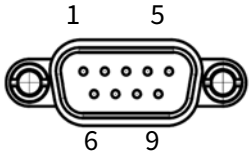
Outline (on the modem)	Pin	Pin function
	1	GND
	2	Key-line P
	3	Reset P
	4	GND
	5	GND
	6	Not connected
	7	Key-line N
	8	Reset N
	9	Not connected

Table 3-11: RS-422 connector, male, outline and pin assignment, modem

3.2.4 LAN connectors (8 + 2)

The modem has 8 Ethernet connectors (type RJ45). Port 1 connects to the BDU and is used for modem control. The other ports are not used. The maximum cable length per connection is 100 m. The Ethernet cable type must be CAT5, shielded. For outline and pin allocation see *LAN connectors* on page 3-6.

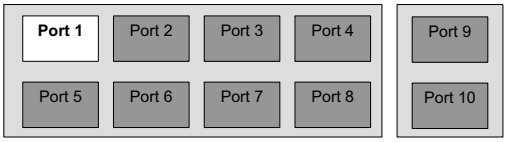


Figure 3-4: LAN connectors at the modem, Port 1 (modem control) connects to the BDU

3.2.5 I/O connector for Tx Mute and Rx Lock (future use)

The GMU has one I/O connector for Tx Mute and Rx Lock.

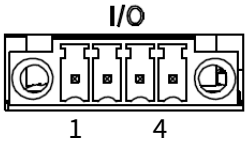
Outline (on the GMU)	Pin	Pin function
	1	GND
	2	Not connected
	3	Rx Lock out
	4	Tx Mute in

Table 3-12: I/O connector, outline and pin assignment, modem (future use)

3.2.6 GMU cables (RS-232 and RS-422)

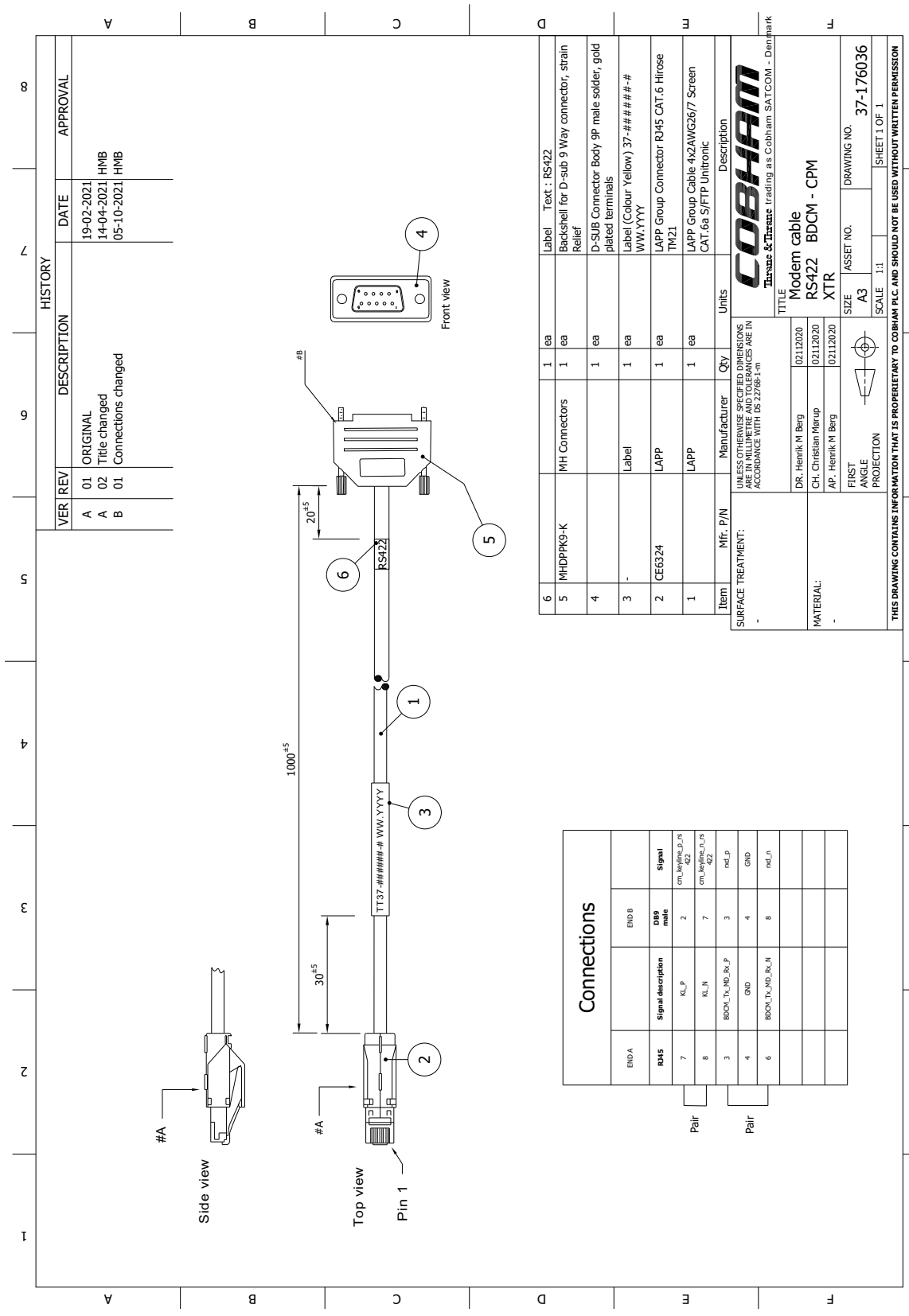


Figure 3-5: GMU cable (RS-422)

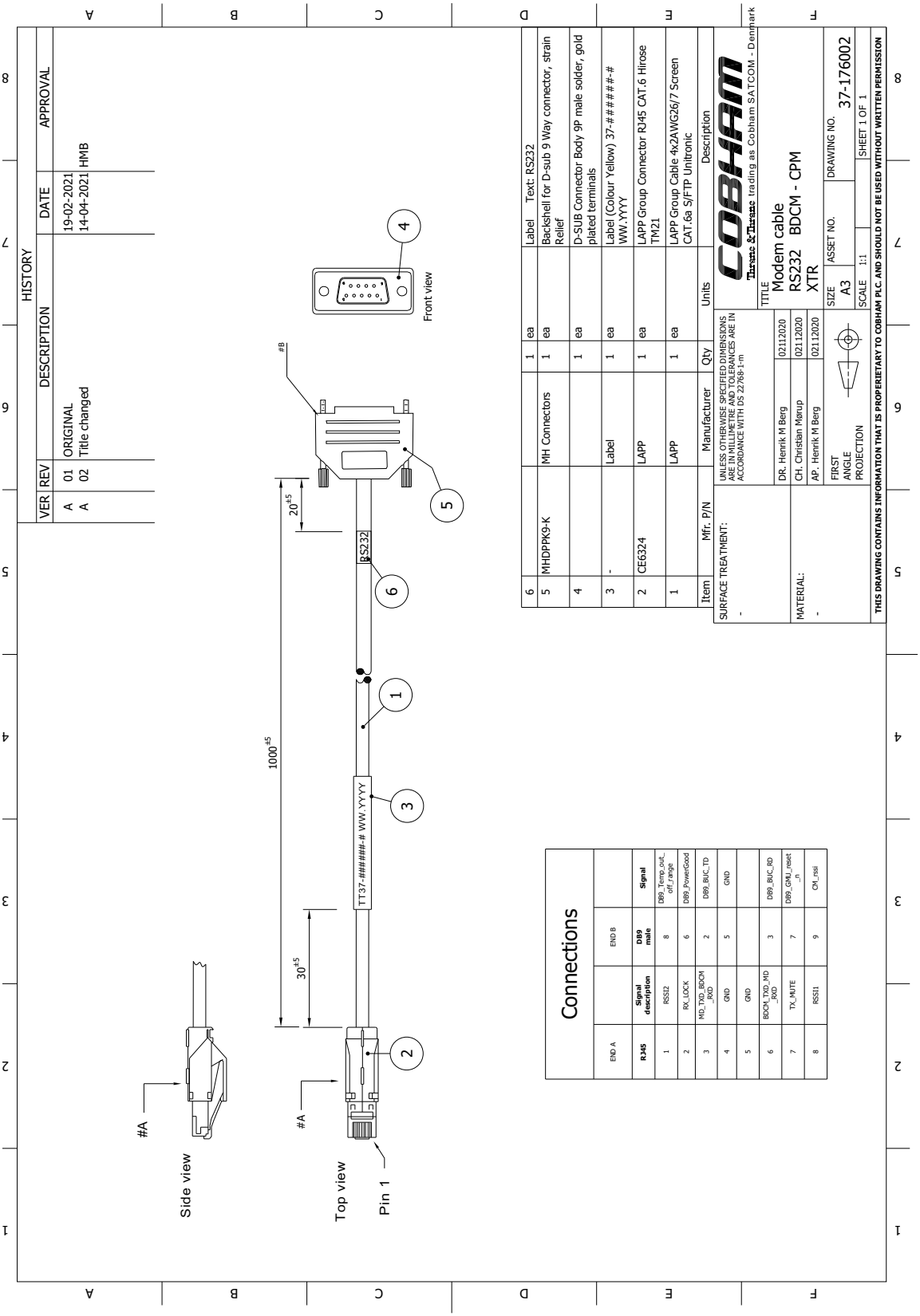


Figure 3-6: GMU cable (RS-232)

Setup of the antenna

This chapter has the following sections:

- *Introduction to the web interface*
- *Settings*
- *Service*
- *Keypad and menus of the BDU*
- *Startup sequence*

Important The SAILOR XTR GX-R2 system is not designed to be connected directly to the Internet. It must be connected behind a dedicated network security device such as a firewall.

If any ports of the SAILOR XTR GX-R2 are exposed to the Internet you must use a strong password as anyone with access and malicious intent can render the system inoperable

Note All antennas are set up in the same way as the SAILOR 1000 XTR GX-R2 antenna.

4.1 Introduction to the web interface

Use the built-in web interface of the BDU to set up the SAILOR XTR GX-R2. Use a standard Internet browser. The menus are grouped in three sections: **Dashboard**, **Settings** and **Service**.

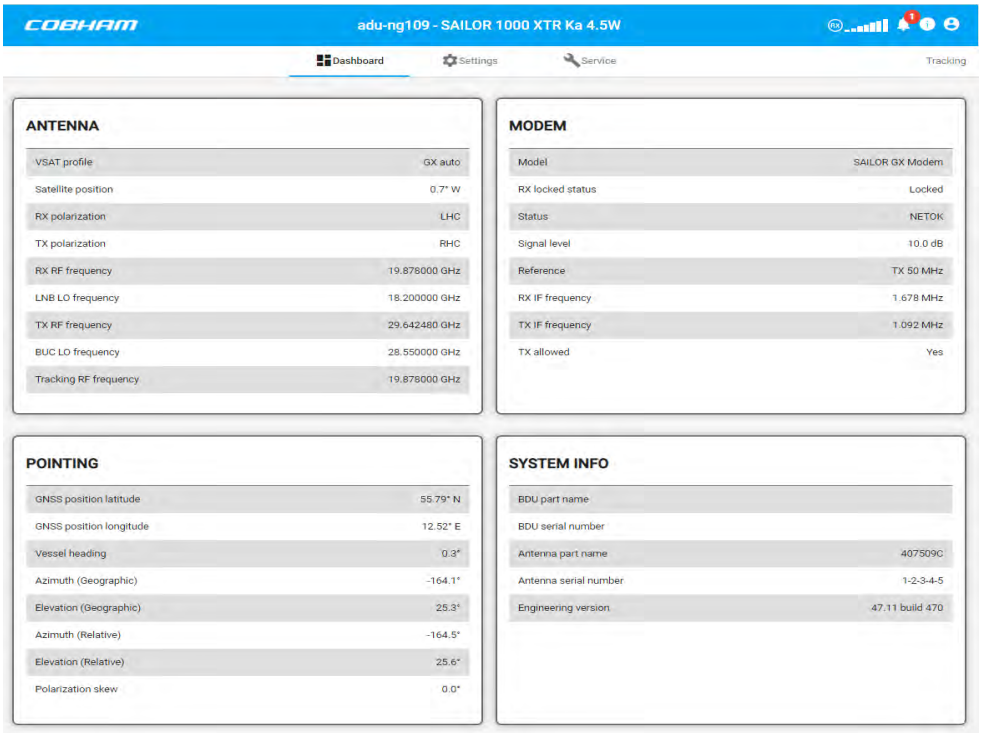


Figure 4-1: Dashboard (example)

The following figure shows the menu items of the sections **Settings** and **Service**.

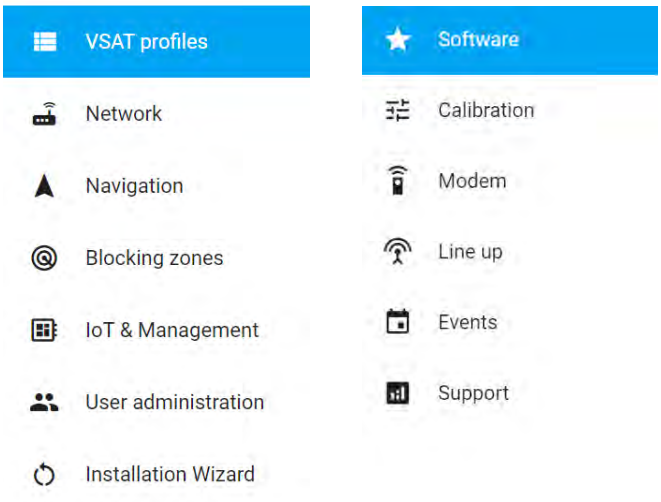


Figure 4-2: Menu items in **Settings** (left), **Service** (right)

4.1.1 Connecting to the web interface

To connect to the web interface do as follows:

1. Switch on the BDU.
2. Wait until the LEDs on the front plate of the BDU show that the system is ready to be configured.
   - Power LED: Green
   - Logon LED: Off
   - Fail/Pass LED: Flashing green, during power-on self test, after that steady green.
3. Connect a PC to the service port on the front panel of the BDU.

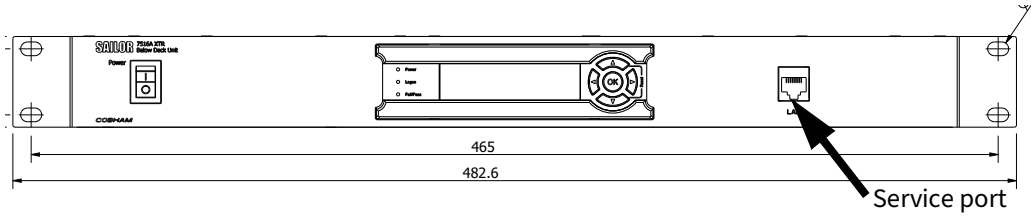


Figure 4-3: BDU, service port

4. Open an Internet browser and enter the IP address of the BDU. The default IP address is **http://192.168.0.1**. When the login screen is displayed you have verified that the connection to the SAILOR XTR GX-R2 can be established.

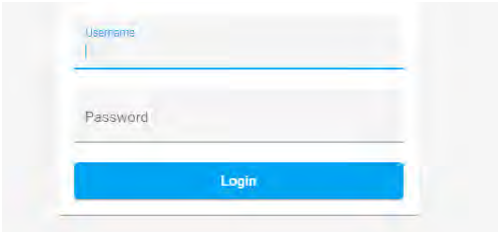


Figure 4-4: Login

There is an admin and a guest login. A guest can only access the functions that are allowed by an administrator. With the guest login (user name: guest, password: configured by the administrator) you can protect the system from accidental changes of the configuration.

Sections on the Dashboard

Parameter	Description
ANTENNA	
VSAT profile	Name of the currently active VSAT profile
Satellite position	Longitude position of the satellite
RX polarization	LHCP or RHCP, auto-selected by the modem
TX polarization	Co-pol or X-pol, auto-selected by the modem

Table 4-1: Sections and parameters on the Dashboard

Parameter	Description
RX RF frequency	Receiving transponder frequency
LNB LO frequency	Block-down Local Oscillator, auto-selected by the modem
TX RF frequency	Modem transmit frequency
BUC LO frequency	Block-Down Local Oscillator, depending on antenna hardware
Tracking RF frequency	Antenna tracking frequency
MODEM	
Model	VSAT modem model used with the currently active VSAT profile
RX locked status	Shows whether the modem is in lock with the hub
Status	Status information received from modem. Not available for all models.
Signal level	RSSI information from the modem. Depending on the modem type, the signal level can be the measured signal strength in *mV* or the reported RSSI value in *dB.*
Reference	Shows the BUC and LNB reference source
RX IF frequency	Shows the L-band RX frequency selected by the modem
TX IF frequency	Shows the L-band TX frequency used by the modem
TX allowed	On or Off. Indicates if the modem supplies BUC reference signal on its TX connector and if the modem indicates Rx locked and Tx ON (e.g. OpenAMIP message L (L 1 1).
POINTING	
GNSS position latitude	Current position of the vessel, reported by built-in GNSS module or external GPS source.
GNSS position longitude	Current position of the vessel, reported by built-in GNSS module or external GPS source.
GNSS position altitude	Current position of the vessel, reported by built-in GNSS module or external GPS source.
Vessel heading	Ship's heading in degrees with reference to North, provided by ship's gyro.
Azimuth (Geographic)	Current antenna pointing for geographic azimuth
Elevation (Geographic)	Current antenna pointing for geographic elevation

Table 4-1: Sections and parameters on the Dashboard (Continued)

Parameter	Description
Azimuth (Relative)	Current antenna pointing for relative azimuth
Elevation (Relative)	Current antenna pointing for relative elevation
Polarization skew	LNB skew angle to the current satellite
SYSTEM INFO	
BDU part name	BDU model
BDU serial number	BDU serial number, used for service cases
Antenna part name	ADU model
Antenna serial number	ADU serial number, used for service cases
Engineering version	Active software version

Table 4-1: Sections and parameters on the Dashboard (Continued)

Top bar

The top bar shows the host name and antenna model. It also has icons to report on the current status of the antenna. Underneath the top bar, to the right, the current antenna status is shown, e.g. **Tracking**.

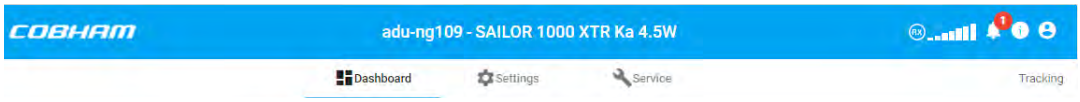


Figure 4-5: Top bar of the web interface (example)

Icon	Explanation
	TX icon, white: BUC unmuted, black: BUC muted
	TX signal. White: TX signal present, dark blue: No TX selected in Blocking zone, strike-through: No TX and system in blocking zone
	Rx signal strength
	System messages, number of active errors and warnings. Mouse over will show a list of the first 5 messages, a click on the list will display the event list.
	About and contact information
	Logout

Table 4-2: Icons in the top bar

4.2 Settings

In this section you can define a VSAT profile, enter navigation input, set the blocking zones and define settings for added third-party equipment mounted in the antenna. You can also set passwords and user permissions. Furthermore you can access the installation wizard.

4.2.1 VSAT profiles

In this section you set up the VSAT profile, including modem and satellite data. Once you have created a VSAT profile, you can edit or delete it. AUTO means that the modem selects automatically which satellite to connect to.

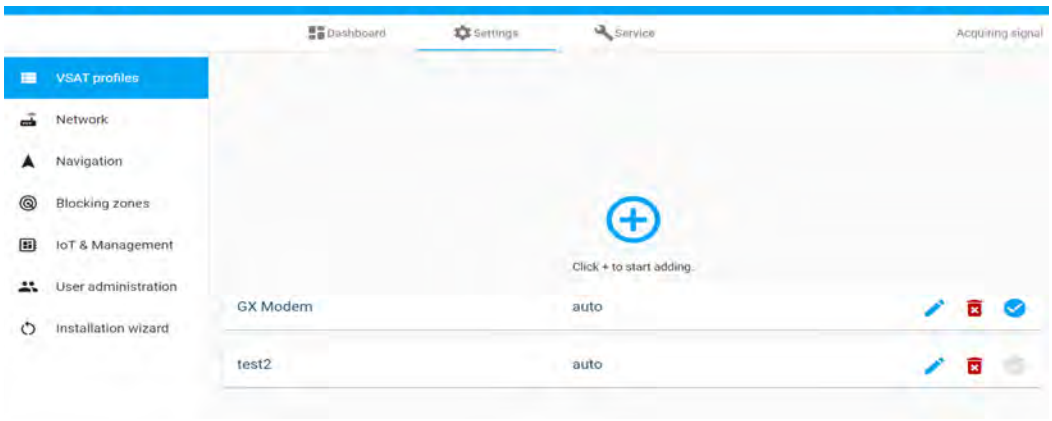


Figure 4-6: Settings - VSAT profiles

To set up a VSAT profile and activate it, do as follows:

1. Click **Settings** and then **VSAT profiles**.
2. Click the **+** icon to add a VSAT profile.

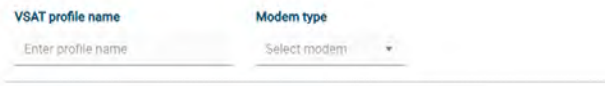


Figure 4-7: Settings - VSAT profile name and Modem type

3. At **VSAT profile name** enter a name of your choice.
4. Select the modem from the **Modem type** drop down list.
5. Fill in the data for your modem setup and desired tracking options.
6. Click the Save icon to save the VSAT profile.
7. Click the check mark icon to activate the VSAT profile.

4.2.2 Modem types

The following modem types are supported:

- *SAILOR GX Modem (GMU)*
- *Generic Modem*

SAILOR GX Modem (GMU)

To set up the modem type GX Modem, do as follows:

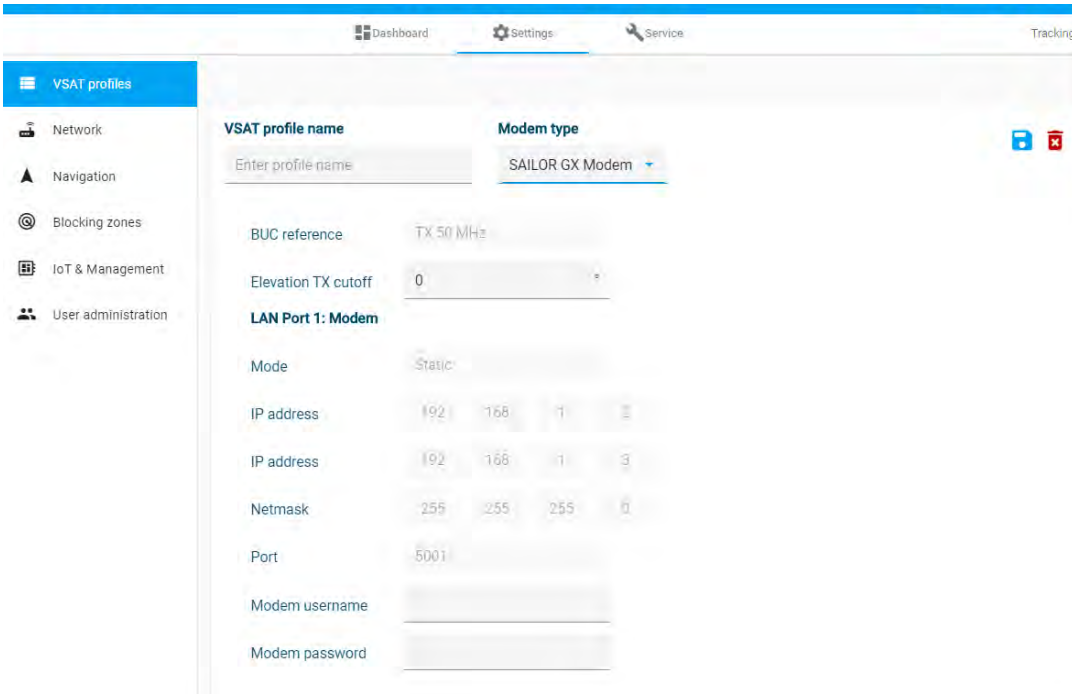


Figure 4-8: Setup of SAILOR GX Modem

1. Select the **Elevation TX cutoff**.
2. Enter **Modem user name** and **Modem password**.
3. Click the **Save** icon to save the VSAT profile.

Generic Modem

To set up the modem type Generic, do as follows:

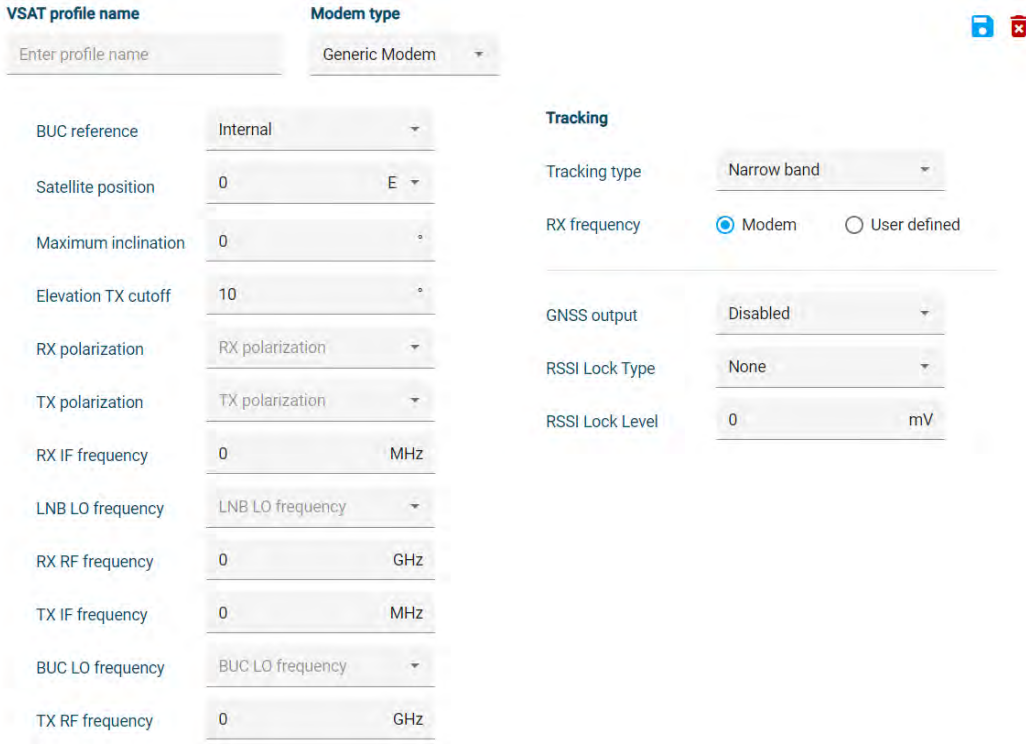


Figure 4-9: Setup of Generic Modem

Use the generic modem profile with any type of single beam VSAT modem.

1. Select the **BUC reference**. The setting is: TX 50 MHz
2. Use the **Predefined satellites** drop down list to select the VSAT service satellite or enter the satellite position and polarization skew manually.
3. Enter the **Maximum inclination** for the VSAT service satellite. Normally 0° but older satellites might have an inclination where it moves in a larger area in the sky.
4. Configure **Elevation TX cutoff** according to the country regulation. It is the low elevation level according to the horizon where the antenna will seize transmission.
5. Configure all the data for the frequency setup and polarization for the VSAT service satellite.
6. Select **Tracking type** for the antenna. Recommended setting is **Narrow band** and check **Modem** at **RX frequency**.
7. Select **GNSS output** and appropriate baud rate if the modem need GPS input. GPS NMEA strings are available on the RS-232 connector of the BDU.
8. Select **RSSI lock type** and **RSSI lock level** if the modem can supply analog RX lock information. Input the RSSI lock to the RS-232 connector of the BDU.
9. Click the Save icon to save the VSAT profile.

Elevation TX cutoff versus VSAT modem bandwidth and power

1. At **Elevation TX cutoff** enter the minimum elevation angle for the antenna to function in accordance with ETSI (ETSI EN 302 340) and FCC (FCC §25.205) regulations.
   - **FCC (FCC §25.205)**: 5 degrees
   - **ETSI (ETSI EN 302 340)**: The minimum elevation angle depends on the Tx bandwidth and the nominal power of the VSAT modem, see the table below.

Bandwidth	Nominal modem power								
Modem Power [dBm]	-22	-20	-18	-16	-14	-12	-10	-8	-6
EIRP@14.25 [a]GHz [dBm]	63.4	65.4	67.4	69.4	71.4	73.4	75.4	77.4	79.4
64 kHz	3°	4°	4°	5°	6°	7°	8°	10°	12°
128 kHz	3°	4°	4°	5°	6°	7°	8°	10°	12°
256 kHz	3°	4°	4°	5°	6°	7°	8°	10°	12°
512 kHz	3°	4°	4°	5°	6°	7°	8°	10°	12°
1024 kHz	3°	4°	4°	5°	6°	7°	8°	10°	12°
2048 kHz	3°	3°	3°	4°	5°	5°	6°	8°	9°
4096 kHz	3°	3°	3°	3°	4°	4°	5°	6°	7°
8192 kHz	3°	3°	3°	3°	3°	3°	4°	5°	5°
16384 kHz	3°	3°	3°	3°	3°	3°	3°	4°	4°
32768 kHz	3°	3°	3°	3°	3°	3°	3°	3°	3°

Table 4-3: SAILOR 1000 XTR GX-R2 4.5W Elevation TX cutoff (in degrees) versus VSAT modem bandwidth and power

a. EIRP = Fixed system gain 44 dB + antenna gain @ 14.25 GHz 41.4 dB + modem power

Bandwidth	Nominal modem power								
Modem Power [dBm]	-16	-14	-12	-10	-8	-6	-4	-2	0
EIRP@14.25 GHz [dBm][a]	69.1	71.1	73.1	75.1	77.1	79.1	81.1	83.1	85.1
64kHz-1MHz	6°	7°	8°	9°	11°	13°	16°	19°	22°
2048 kHz	4°	5°	6°	7°	8°	10°	12°	14°	17°
4096 kHz	3°	4°	5°	6°	7°	8°	9°	11°	13°

Table 4-4: SAILOR 1000 XTR GX-R2 9W: Elevation TX cutoff (in degrees) versus VSAT modem bandwidth and power

Bandwidth	Nominal modem power								
8192 kHz	3°	3°	4°	4°	5°	6°	7°	8°	10°
16384 kHz	2°	2°	3°	3°	4°	5°	6°	7°	8°
32768 kHz	2°	2°	2°	3°	3°	4°	4°	5°	6°

Table 4-4: SAILOR 1000 XTR GX-R2 9W: Elevation TX cutoff (in degrees) versus VSAT modem bandwidth and power (Continued)

a. EIRP = Fixed system gain 47 dB + antenna gain @ 14.25 GHz 41.1 dB + modem power.

Bandwidth	Nominal modem power [dBm]								
Modem Power [dBm]	-22	-20	-18	-16	-14	-12	-10	-8	-6
EIRP@14.25 GHz [dBm][a]	62	64	66	68	70	72	74	76	78
64 kHz	12°	12°	12°	14°	18°	18°	18°	18°	26°
128 kHz	5°	12°	12°	12°	14°	14°	18°	18°	18°
256 kHz	5°	5°	12°	12°	12°	12°	14°	18°	18°
512 kHz	3°	5°	5°	12°	12°	12°	12°	14°	14°
1024 kHz	3°	3°	5°	5°	5°	12°	12°	12°	12°
2048 kHz	3°	3°	3°	5°	5°	5°	12°	12°	12°
4096 kHz	3°	3°	3°	5°	5°	5°	5°	12°	12°
8192 kHz	3°	3°	3°	5°	5°	5°	5°	12°	12°
16384 kHz	3°	3°	3°	5°	5°	5°	5°	12°	12°
32768 kHz	3°	3°	3°	5°	5°	5°	5°	12°	12°

Table 4-5: SAILOR 600 XTR GX-R2 6W Elevation cutoff (in degrees) versus VSAT modem bandwidth and power

a. Eirp = Fixed system gain 42.8 dB + antenna gain @ 14.25 GHz 40.0 dB + modem power

4.2.3 Network settings

On this page you enter the host name and set up the network settings for the LAN ports of the BDU and the LAN ports of the ADU.

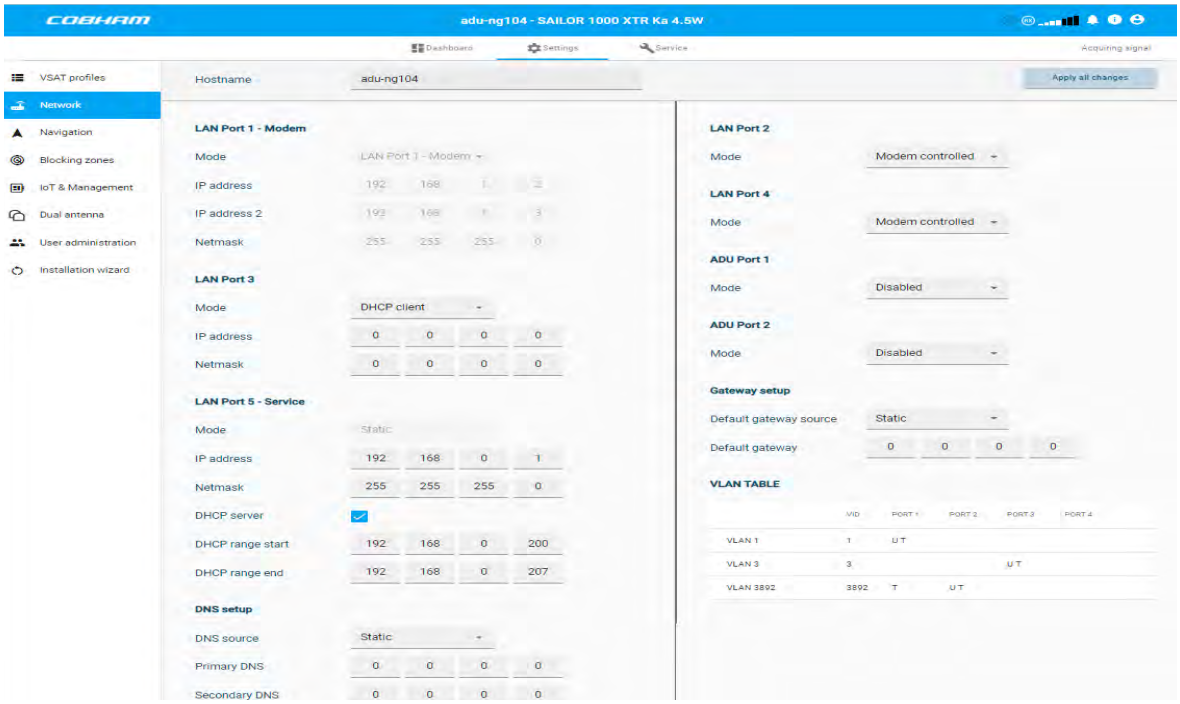


Figure 4-10: Settings, Network page (example)

Static IP or DHCP Client

The default setting for LAN Port 3 is DHCP client.

If you select **DHCP client** the network IP address and sub-net mask must be provided by a DHCP server on that network. If you select **Static IP** address you must specify a unique IP address and a sub-net mask.

DHCP Server Settings.

On the service LAN port 5 at the front you can select to run a DHCP server. Select the check box **DHCP Server**. The DHCP start and end addresses must be on the same network as the port's static IP. The default setting for service LAN port 5 at the front is DHCP server.

DNS setup

If you have access to a Domain Name Server (DNS) you can specify the address of the e-mail server by using the server name instead of its IP address. This can be used in **Outgoing mail server** in *E-mail setup (secure e-mail)* on page 4-22. You may statically specify the address of one or two DNS. Select the DNS source as static and fill in IP address or addresses. Alternatively, if your DHCP server can provide a DNS address and you have selected DHCP client above, then select the same LAN as your DNS source.

Gateway setup

If the BDU needs to communicate with network units outside the specified sub-nets, you must specify a default gateway (typically a router). The default gateway can be set as a static IP address. Then set the default gateway source to static and enter the IP address of the default gateway. To remove the default gateway set it to 0.0.0.0. Alternatively, if your DHCP server is able to provide a default gateway address and you have selected DHCP client above, then select the same LAN as your default gateway source.

ADU port setup

The LAN ports in the ADU can be set up according to the following table.

ADU Connector ID	Type	Function
1	RJ-45	Disabled / Service / BDU LAN port 3
2	RJ-45	Disabled / Service / BDU LAN port 4
3	RJ-45	Disabled
4	RJ-45	Disabled

Table 4-6: ADU LAN connectors

- **Disabled**: No access to antenna system.
- **Service**: Access to the XTR web interface for service and configuration at ADU
- **BDU LAN port #**: Tunnels ACM LAN port to BDU LAN port. Used for integration of 3rd party IP devices.

BDU / ADU LAN port modes

BDU LAN port 1 - Mode

Modem: Parameters are based on the modem type selected in the VSAT profile. VLAN 1

BDU LAN port 2 - mode

LAN port 1	Modem: LAN Port 2 assigned to LAN Port 1 VLAN / IP-subnet.
LAN port 5	Service: LAN Port 2 assigned to LAN Port 5 VLAN / IP-subnet.
Static	User defined IP subnet - VLAN 2

Table 4-7: BDU LAN port 2

DHCP client	Network parameters obtained via DHCP - VLAN 2
Modem controlled	User defined VLANS configured by GMU via SNMP

Table 4-7: BDU LAN port 2 (Continued)

BDU LAN port 3 - mode

LAN port 1	Modem: LAN Port 3 assigned to LAN Port 1 VLAN / IP-subnet.
LAN port 5	Service: LAN Port 3 assigned to LAN Port 5 VLAN / IP-subnet.
ADU port 1	BDU LAN Port 3 + ADU LAN Port 1 assigned to VLAN 6
Static IP	Used defined IP subnet - VLAN 3
DHCP client	Network parameters obtained via DHCP - VLAN 2

Table 4-8: BDU LAN port 3

BDU LAN 4 - mode

LAN port 5	Service LAN Port 4 assigned to LAN Port 5 VLAN / IP-subnet.
ADU port 2	BDU LAN Port 4 + ADU LAN Port 2 assigned to VLAN 7
Static IP	Used defined IP subnet - VLAN 4
DHCP client	Network parameters obtained via DHCP - VLAN 4
Modem controlled	LAN Port 1 VLAN's configured by GMU via SNMP

Table 4-9: BDU LAN port 4

BDU LAN 5 - Mode:

Static + DHCP server: Used defined Network setup - VLAN 5

ADU LAN 1 - Mode

Disabled	ADU LAN Port 1 disabled.
Service	ADU LAN Port 1 assigned to BDU LAN Port 5 VLAN / IP-subnet.
LAN port 3	BDU LAN Port 3 + ADU LAN Port 1 assigned to VLAN 6

Table 4-10: ADU LAN 1

ADU LAN 2 - Mode

Disabled	ADU LAN Port 1 disabled
Service	ADU LAN Port 1 assigned to BDU LAN Port 5 VLAN / IP-subnet.
LAN port 4	BDU LAN Port 4 + ADU LAN Port 2 assigned to VLAN 7

Table 4-11: ADU LAN 2

VLAN TABLE

The VLAN table shows which VLANs are set up per physical Ethernet port on the BDU. U means Untagged, T means Tagged.

Important VLAN 1 through 8 are used internally by the SAILOR XTR GX-R2 antenna system. Do not use them with external equipment connected to the LAN ports of the BDU/ACM. A maximum of 12 additional user VLAN is supported.

System VLANs

The VLANs 1-8 are defined as System VLANs, used by the BDU/ADU switch. They are not available for the user.

VLAN 1 + IP-subnet	Default VLAN + Native VLAN (untagged frames on a T port) OPENAMIP traffic from Modem + SAILOR Management (ADU CPU - WEB MMI, SSH, IoT)
VLAN 2 + IP-subnet	Assigned to BDU LAN 2 in Mode: static and DHCP client Management of the SAILOR VSAT (ADU CPU)
VLAN 3 + IP-subnet	Assigned to BDU LAN 3 in Mode: Static and DHCP client Management of the SAILOR VSAT (ADU CPU)
VLAN 4 + IP-subnet	Assigned to BDU LAN 4 in Mode: Static and DHCP client Management of the SAILOR VSAT (ADU CPU)
VLAN 5 + IP-subnet	Assigned to BDU LAN 5 Management of the SAILOR VSAT (ADU CPU)
VLAN 6	Assigned to BDU LAN 3 and ADU LAN 1 User traffic, third party equipment in the ADU
VLAN 7	Assigned to BDU LAN 4 and ADU LAN 2 User traffic, third party equipment in the ADU
VLAN 8	Assigned to BDU LAN 7 and ADU LAN 7 Internal SAILOR system traffic, BDU/ADU

Table 4-12:

User defined VLAN's (SNMP from the iDirect Core module / GMU)

12 User defined VLANs are supported. The IDs of the user defined VLANs must be outside the 1-8 range used internal by the SAILOR BDU/ACU switch. (System VLANs, see previous section).

User defined VLANS are used to transfer user related traffic to the modem (GMU), via the BDU. A User defined VLAN set up the BDU LAN Port 2 and 4 as either a T or a U (trunk or access port), and will automatically set up the BDU LAN 1 as a T

Example: Network setup:
BDU LAN 1 mode: Modem.
BDU LAN 2 mode: Modem controlled.
BDU LAN 3 mode: Modem.
BDU LAN 4 mode: ADU port 2.
BDU LAN 5 mode: Service
ADU LAN 1 mode: service
ADU LAN 2 mode: Lan port 4

User defined VLANs
1010 - 1020 - 1030

BDU ports VLAN Id	**1**	**2**	**3**	**4**	**5**	**BDU CPU**	**BDU- ADU MoCa**	**ADU ports**	**1**	**2**	**ADU CPU**
VLAN 1	U		U				T		U		T
VLAN 2											
VLAN 3											
VLAN 5					U		T				T
VLAN 6											
VLAN 7				U			T			U	
VLAN 8						U	T				T
VLAN 1010	T	T									
VALN 1020	T	T									
VLAN 1030	T	T									

Table 4-13: VLAN table, example

System subnet:

VLAN 1: 192.168.1.0/24

VLAN 5: 192.168.0.0/24

4.2.4 Navigation

You must set the heading and position before you start the calibration procedure.

Note If you change the heading settings from external to fixed or vice versa you must make a new azimuth calibration.

1. Click **Settings > Navigation**.
2. Select a heading mode.

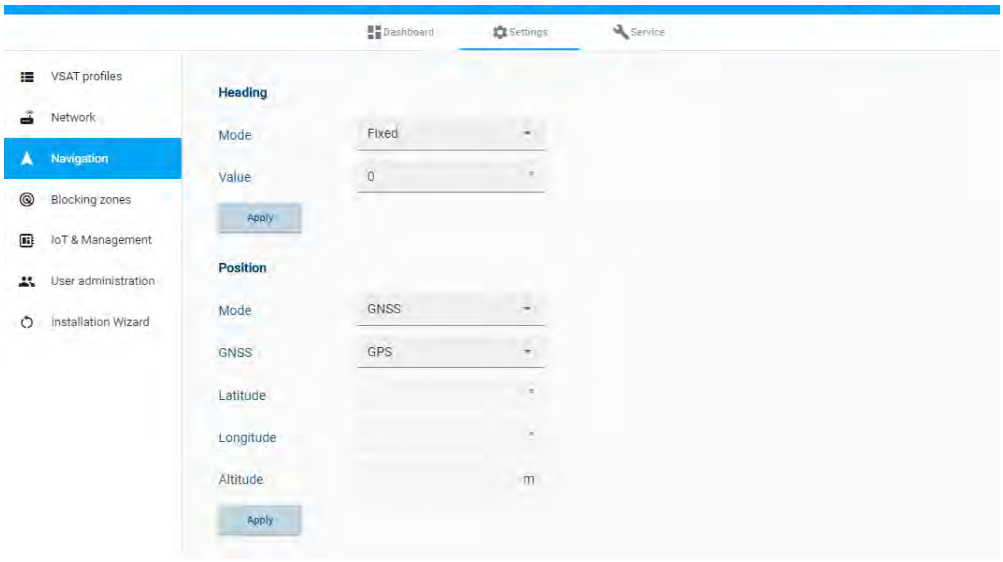


Figure 4-11: Settings, Navigation (Heading and Position), (example)

Heading mode	Description
External	Heading input from the vessel's gyro compass (default). If there is no heading input due to failure, alarms are raised and the antenna continues in gyro-free mode. When heading input is available again and a new acquisition is made, alarms are cleared.
Fixed	Use this setting for an azimuth and cable calibration if there is no input from the vessel's gyro compass and for permanent installations like remote areas or oil rigs, or during training and test. For **Fixed**, enter the vessel heading in degrees. If the heading is not known, set it to 0. **Important: Fixed heading is not allowed for sailing vessels!**
None	**Important: You must make an azimuth and cable calibration with Fixed before you can use this setting. This is required for using blocking zones. After a successful azimuth and cable calibration you must change the heading input setting from Fixed to None.** Select this setting after a successful azimuth calibration with Fixed heading if the system does not have input from the vessel's gyro compass.

Table 4-14: Heading modes

3. Click **Apply**.
4. Select the desired position mode.

Position mode	Description
Mode	Select one of the following: • GNSS (default) • Manual • External
GNSS	Select one of the following: • GPS (default) • BEIDOU • GPS + BEIDOU • GLONASS • GPS + GLONASS
Latitude, Longitude, Altitude	Only if **Position Mode** is set to **Manual:** Enter the values

Table 4-15: Position modes

5. Click **Apply**.

4.2.5 Operation in gyro-free mode

Heading input: none

If input from a gyro compass is not available, information from the GPS position is used when searching for a satellite.

When the antenna does not have ship heading input from the vessel's gyro compass, the azimuth direction of the satellite is not known. In this case the antenna will start a 360 degrees sky scan and scan until it finds a satellite. The satellite search time to find the satellite and start tracking is therefore raised considerably. If the ship is on a steady course and sails at a speed over ground above 5 kn, the system can use an estimated heading from the current GPS position. This will reduce the search time, but it will still be a longer search time than with heading input.

This mode can be difficult for inclined orbit satellites and elevations <5 and >70 degrees, see the following sections for details.

If a system loses the signal from the satellite, i.e. due to blockage, and the duration of signal loss is longer than approximately 1 minute, a system without heading input must do a new sky scan to find the satellite when the antenna is out of blockage.

Inclined orbit satellites

If the wanted satellite is an inclined orbit satellite, the system does not have any information of the satellite latitude position but only information about inclination. This means longer search times, depending on the maximum inclination. With the increased search time for a system without heading input the search time can be so long that it will be more or less useless in practice.

Tracking for satellite elevation between 5 and 75 degrees

When the system has found the satellite and is in pointing mode, the performance of a system with heading input and a system without heading input will be very similar. Note that this is only the case for a satellite elevation range from 5 to 75 degrees.

If the satellite is an inclined orbit satellite, the missing heading information introduces a polarization error depending on the satellite elevation and the inclination. Normally it is required that the polarization is controlled within 1 degree towards the satellite. This gives the following limit for use of inclined orbit satellites (a purely physical limit), and all systems without heading input have this limit.

Satellite elevation	Maximum allowed inclination
<20	2.5
<50	0.7
<70	0.3
≤75	0

Table 4-16: Satellite elevation and maximum allowed inclination

Tracking for satellite elevation above 75 degrees

It is not possible to use a system without heading input from the vessel's gyro compass with satellites at an elevation of higher than 75 degrees because the system will not have the required polarization accuracy of the transmitted signal.

4.2.6 Acquisition process and search pattern

With heading input or fixed heading

1. The antenna starts the acquisition, searches for 10 seconds at the expected position. If RX lock is detected the antenna goes to Tracking.
2. If no RX lock is detected, a box search pattern is started and the positions where RF power can be received are stored.

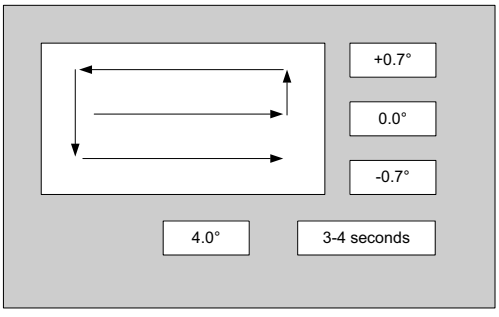


Figure 4-12: Acquisition, search pattern

3. The antenna checks each stored position for up to 10 seconds. If RX lock is detected for more than 20% of the time, the antenna goes to Tracking.

With heading input or fixed heading, Inclined Orbit Satellite

1. The antenna starts the acquisition, searches for 10 seconds at the expected position. If RX lock is detected the antenna goes to Tracking.
2. If no RX lock is detected, a box search pattern is started and the positions where RF power can be received are stored.

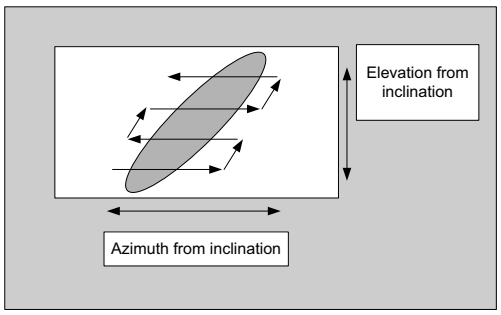


Figure 4-13: Acquisition, search pattern for inclined orbit

3. The antenna checks each stored position for up to 10 seconds. If RX lock is detected for more than 20% of the time, the antenna goes to Tracking.

Without heading input and not fixed heading (Gyro-free)

1. A box search pattern is started and the positions with reception of RF power are checked for up to 10 seconds. If RX lock is detected for more than 20% of the time, the antenna goes to Tracking.

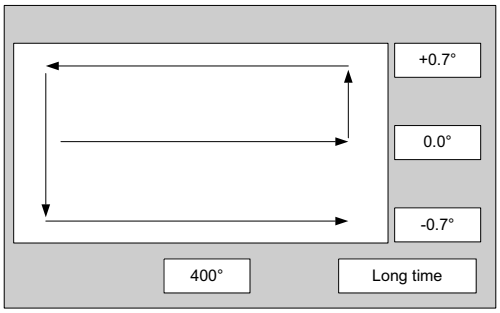


Figure 4-14: Acquisition, search pattern in gyro-free mode

Acquisition times

Activity/Inclination	0°	1°	2°	3°	4°
Initial search	10 s	10 s	10 s	10 s	10 s
Scan box pattern	5 s	10 s	15 s	25 s	30 s
Validate result (10 s per result)	10 - 30 s	10 - 30 s	10 - 30 s	10 - 30 s	10 - 30 s
Max. total time	25 - 45 s	30 - 50 s	35 - 55 s	45 - 65 s	50 - 70 s

Table 4-17: Acquisition time

4.2.7 Blocking zones

You can define blocking zones, i.e. No TX and RX zones by entering azimuth and elevation angles for each blocking zone. The system's blocking map is built up over some weeks and shows where the actual blocking zones are. This is useful if the antenna looses the signal frequently and you might want to check whether the blocking zones are set up correctly. To enable a blocking zone and display it on the blocking map you must select **Active**.

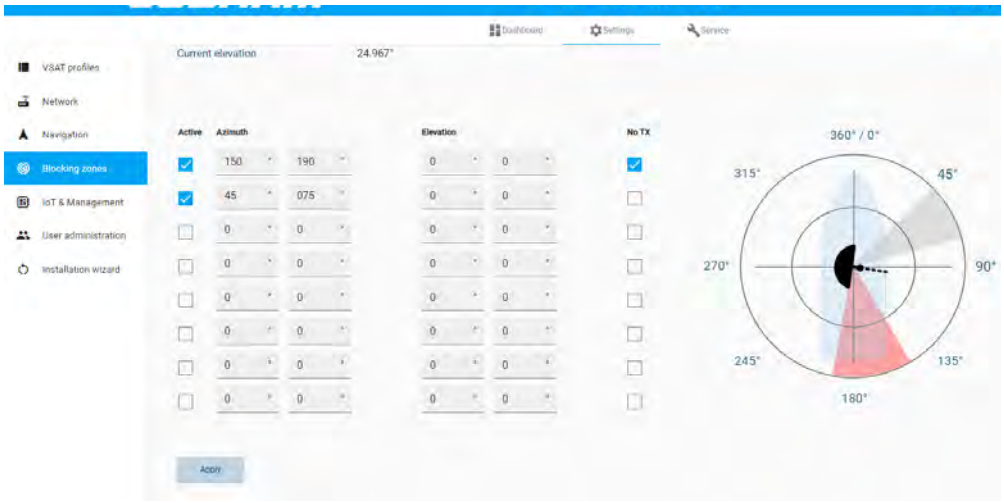


Figure 4-15: Settings, Blocking zones

To set up a blocking zone, do as follows:

1. Select **Settings > Blocking zones**.
2. Select **Active** to enable the blocking zone and display it in the blocking map. Gray shading shows a blocking zone, red shading shows a **No TX** zone.
3. Enter start and stop azimuth value in degrees for the blocking zone. Values allowed: 0 to 360 degrees. Enter clockwise.
4. Enter the start and stop elevation angle for the blocking zone. If you enter nothing, there will be no blocking zone. Values allowed: -30 to 90 degrees.

   Important You must enter 2 different elevation angles to have an active blocking zone.

5. Select **No TX** for zones if you don't want the system to transmit when the antenna points within this zone (e.g. no radiation exposure on sun deck or bridge).
   If **No TX** is not selected, the system also transmits when pointing through areas with blocking objects. The VSAT modem will shut off for TX if no signal is received.

   Note If a blocking zone is defined with **No TX** not checked, the modem is not informed about the blocking zone.
   Modems may react differently when informed about a blocking zone, this has influence on recapturing the link. The worst case is that the modem will search the entire list of available satellites and frequencies when unaware of the blocking zone, resulting in prolonged down times until the link is recaptured. For optimum performance it is recommended to check **No TX**.

6. Click **Apply** to save the blocking zones.

Blocking map for optimization of blocking zones

The blocking map is intended as a tool to optimise the blocking zones in order to reduce the antenna's downtime. It shows the active blocking zones and an automatic evaluation of the antenna reception. Over time the antenna can determine where the signal is blocked by structures on the ship. The blocking map helps you to set more accurate blocking zones.

To enable a blocking zone and display it on the blocking map you must select **Active**. The re-defined zones will show immediately on the map. The blocking map is updated every 12 hours, showing whether the antenna has been in a blocking zone or has received a signal. After a voyage of days, weeks, months the blocking map will display where the blocking zones are. The time it takes to draw a meaningful map depends on the ship's size and motions throughout the voyage. A small ship following a school of fish will have a populated map faster than a larger tanker sailing across the Atlantic ocean. The following figure shows an example.

You can clear the map at any time.

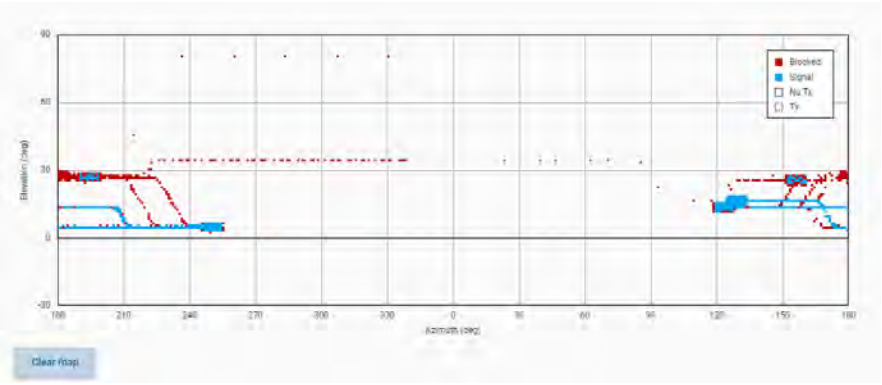


Figure 4-16: Populated blocking map (example)

4.2.8 IoT & management

On this page you can set up e-mail, remote syslog, SNMP, diagnostics and statistics reporting, and IoT.

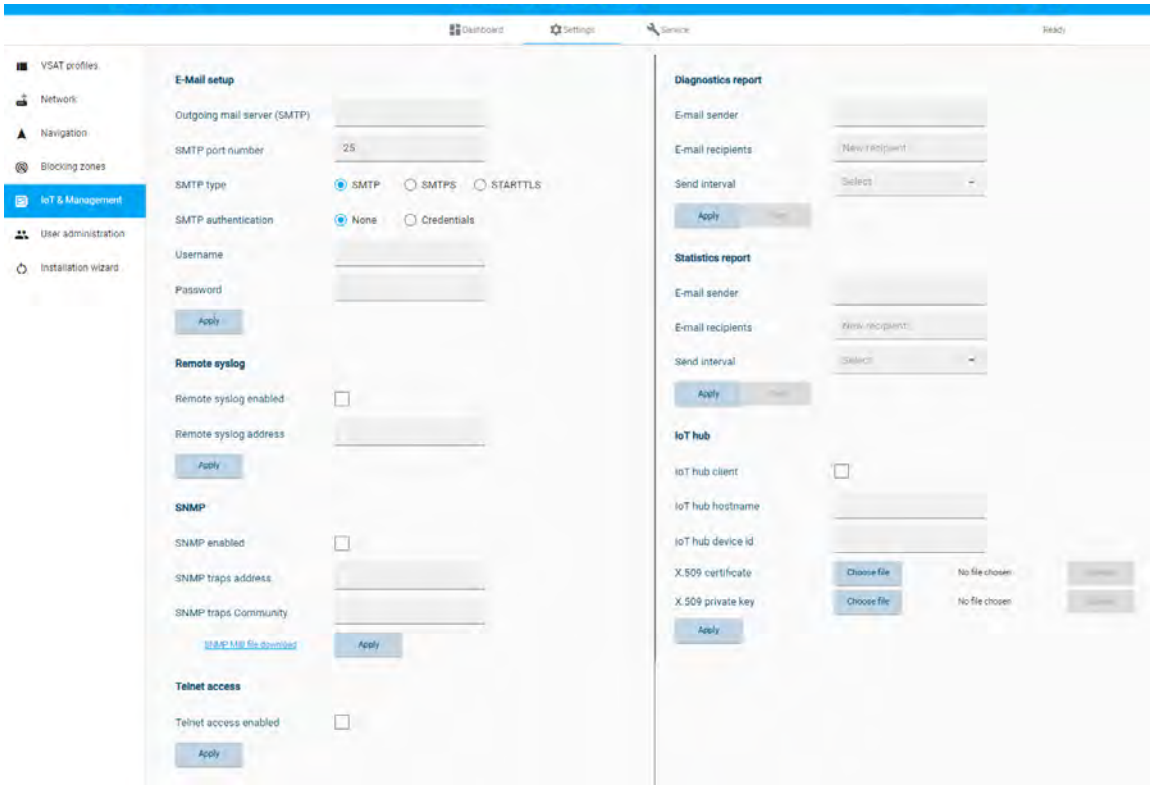


Figure 4-17: Settings, IoT & management (example)

E-mail setup (secure e-mail)

To send e-mails from the antenna you must set up some parameters.

SMTP port numbers:

- Insecure Simple Mail Transfer Protocol: SMTP port number 25.
- SMTPS for secure Simple Mail Transfer Protocol: IP port 465.
- STARTTLS to upgrade SMTP to Secure Socket Layer (SSL) or Transport Layer Security (TLS): IP port 587.

Contact your IT department for the specific data. To set up e-mail, do the following:

1. Go to **Settings > E-mail setup.**
2. Enter the data for Outgoing mail server (SMTP) and SMTP port number.
   SMTP: SMTP over port 25
   SMTPS: SMTP SSL/TLS encrypted over port 465.
   STARTTLS: SMTP with STARTTLS upgrading to encrypted over port 587.
3. Select SMTP type.
4. Select SMTP authentication. If you have selected **Credentials**, you must specify a User name and password. This data is typically provided by your IT department.

Note You must set **Outgoing mail server** to an IP address if DNS has not been set up in **DNS setup** in *Network settings* on page 4-11.

Remote syslog

The antenna can send each syslog message to a syslog server to advise the system administrator of the current status of the antenna. To set up sending syslog messages to a syslog server, do as follows:

1. Select **Settings > IoT & Management**.
2. In the section **Remote syslog** select **Remote syslog enabled** (default: not ticked).
3. Enter the address of the remote syslog server.
4. Click **Apply**.

SNMP

SNMP traps, or notifications, are network packets which advise the system administrator about significant events in the antenna, e.g. alarms and system error messages. They are generated by the antenna and can be sent automatically to an SNMP trap receiver/manager. The event time is UTC time. In this section there is a link from which you can download the SNMP MIB file. To set up reporting SNMP traps to an SNMP server, do as follows:

1. Select **Settings > IoT & Management**.
2. In the section **SNMP** select **SNMP enabled** (default: not ticked).
3. Enter the SNMP traps address.
4. Enter the SNMP traps Community name. This is the name of the SNMP trap receiver/manager. This is needed for authentication of the SNMP trap request.
5. Click **Apply**.

The SAILOR XTR GX-R2 supports SNMP v2 requests to retrieve configuration and present settings. SNMP is always enabled on all Ethernet interfaces. The SNMP community string is **public**. The SAILOR XTR GX-R2 offers via SNMP most of the data that are available from the DASHBOARD web pages. Detailed documentation about supported OIDs can be found in the MIB file. The MIB entries are grouped as shown below:

- System configuration
- Navigation coordinates
- Antenna pointing
- Dashboard and profile
- Tracking receiver

Note None of the SNMP values need to be polled more often than once a minute. Polling SNMP values more frequently will impact the performance of the SAILOR XTR GX-R2.

To download the BDU MIB file directly, do as follows:

1. Click the link **SNMP MIB file download** and save the file on your computer.

Telnet access

You can enable **Telnet access** to access the antenna via a command line interface. SSH command line interface is enabled by default.

Diagnostics report

This report contains information from the ADU and BDU that are relevant for the service personnel during troubleshooting. The report contains data for the selected download intervals. You can send automatically generated diagnostic reports at fixed intervals. It is also useful documentation of the current setup and contains all parameters set during configuration. The main sections of the diagnostics report are:

- Software
- System
- Hardware
- Setup - System data
- Calibration - Calibration Data
- Blocking zones - Blocking zone configuration
- Network - LAN Configuration
- Modems - Modem profiles
- Satellites - Satellite profiles
- Operation - Current modem and navigation parameters.
- POST - results of the Power-On-Self-Test
- Active Events - lists the currently active events
- Events - List of all cleared events.
- System log

To set up sending a diagnostics report, do as follows:

1. Click **Settings > IoT & Management**.
2. In the section **Diagnostics report** enter the following:
   - E-mail sender.
   - E-mail recipients (comma separated).
   - Send interval: Select **Daily, Weekly** or **Monthly**.
3. Click **Apply.**

Statistics report

This report contains historical information from the SAILOR XTR GX-R2 of up to 1 month. It is sent as a zipped attachment to an e-mail. The file format is a comma separated value file (csv). The report can then be processed in spreadsheet applications, e.g. Microsoft Excel.

To set up sending a statistics report, do as follows:

1. Configure e-mail first, see *E-mail setup (secure e-mail)* on page 4-22.
2. Go to **Settings > Reporting**.
3. In the section **Statistics report** enter the following:
   - Email sender.
   - Email recipients (comma separated).
   - Send interval: Select **Daily** (2-minute samples)**, Weekly** (hourly samples) **or Monthly** (hourly samples).
4. Click **Apply.**

The following parameters are recorded in the statistics report:

Parameter recorded	Description
Host name	Host name, entered in the web interface on the page **Settings > Network**.
BDU SN	BDU serial number
ADU SN	ADU serial number
SW ver.	Software version
System type	SAILOR 1000 XTR GX-R2 4.5W (example)

Table 4-18: Statistics report, header record

Parameter recorded	Description
UTC. (s) UTC (YYYY-MM-DD hh:mm)	UTC in seconds and date format for the data set.
RSSI.Av RSSI.Max RSSI.Min	Received signal strength (average, maximum and minimum value) for the sampling interval.
POS.Lat (degree) POS.Long (degree) POS.Valid	Latitude value of position. Longitude value of position. Fix = valid position, No Fix = invalid position.
Heading.Samp (degree) Heading.Max (degree) Heading.Min (degree) Heading.Range (+/-degree)	Ship's heading (sample, maximum and minimum value, range) for the sampling interval. See Figure 4-18: *Statistics — how to read data for a range*.
Antenna.Azi (degree) Antenna.Azi Max (degree) Antenna.Azi Min (degree) Antenna.Azi Range (+/-degree)	Current antenna azimuth (sample, maximum and minimum value, range) for the sampling interval. See Figure 4-18: *Statistics — how to read data for a range*.
Antenna.Ele (+/-degree) Antenna.Ele Max (+/-degree) Antenna.Ele Min (+/-degree)	Current antenna elevation (sample, maximum and minimum value) for the sampling interval.
Vsat.rx_lo_freq (GHz) Vsat.tx_lo_freq (GHz)	Rx frequency of VSAT modem for this record. Tx frequency of VSAT modem for this record.
Tracking.rf freq (GHz) Tracking.type	Tracking RF frequency for this record. Narrow filter, DVB-S2 decoder.
Sat.long (degree)	Longitude position of the satellite.

Table 4-19: Parameters in a statistics report

Parameter recorded	Description
Carrier rf.rx (GHz) Carrier rf.tx (GHz)	Rx frequency of carrier for this record. Tx frequency of carrier for this record.
Pol.rx Pol.tx	Current Rx and Tx polarization modes
Rx Lock (%) Logon (%)	Rx locked and logon time, in percent, for the sampling interval.
Pos Ok (%)	Valid position, in percent of the sampling interval.
VMU Connection (%)	Link with VSAT modem, in percent of the sampling interval.
Blocking (%)	Ship in blocking zone, in percent of the sampling interval.
DualAntenna.mode DualAntenna.logon_remote (%) DualAntenna.active (%)	Shows the current mode and the time active and remote logon.

Table 4-19: Parameters in a statistics report (Continued)

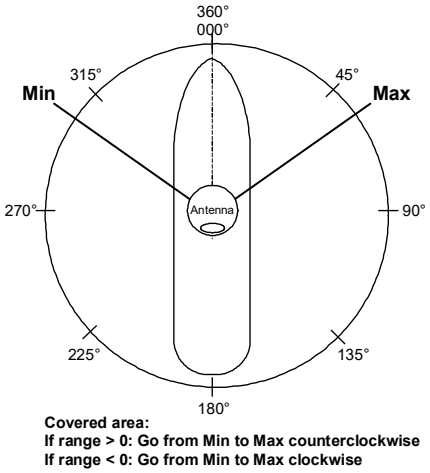


Figure 4-18: Statistics — how to read data for a range

Processing the statistics report in a spreadsheet application

The statistics report is in a data format that can be imported into spreadsheet applications, e.g. Microsoft Excel, for further processing.

1. Save the zipped file to your computer and extract the text file. The file name contains the identification of the system (example: adu-acu3_stat_20111021110901_day.csv).
2. Open the spreadsheet application. On the tab Data click the tab Import from text. Import the unzipped text file and follow the instructions in the wizard. When asked about the delimiter, select ‘comma’.

IoT hub configuration

The IoT hub supports the monitoring solution from Cobham SATCOM where antenna data are sent directly into the Cobham SATCOM IoT hub. This monitoring solution requires a subscription.

Important

The IoT hub will not work without a subscription.

It is not possible to connect to the IoT hub or the data stream from external systems.

Once the subscription has been purchased from Cobham SATCOM a list of IoT Keys will be provided. Each IoT key is unique and will be bound to the antenna the first time it connects. After a connection has been made, the IoT key cannot be used on other antennas.

To enable IoT management on the page **IoT & Management**, do as follows:

1. Enter one of the provided IoT keys in the **IoT key** field.
2. Check the **IoT hub client** field.
3. For release 3.03 X.509 certificate and X.509 private key: you must manually upload them to the antenna. Contact Cobham SATCOM to receive a valid certificate and key.
4. Click **Apply**.

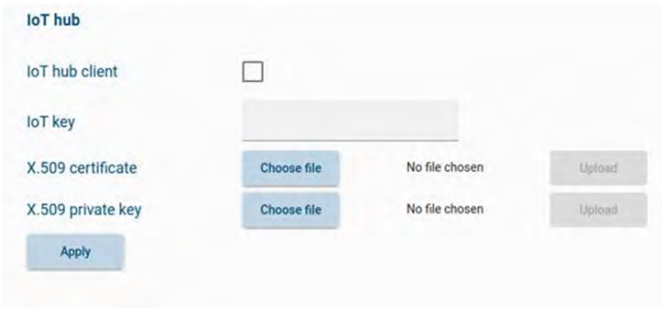


Figure 4-19: Setup of the IoT hub

4.2.9 Dual antenna

For details how to set up Dual antenna operation see Appendix B, *Dual antenna solution*.

4.2.10 User administration

In this section of the web interface you can configure the following administrative settings:

- *To change a password*
- *To set up permissions for guest user*

To change a password

On the page **User administration** you can change the password for admin or guest. You can bypass the admin password by pressing the left arrow key on the BDU for 5 seconds.

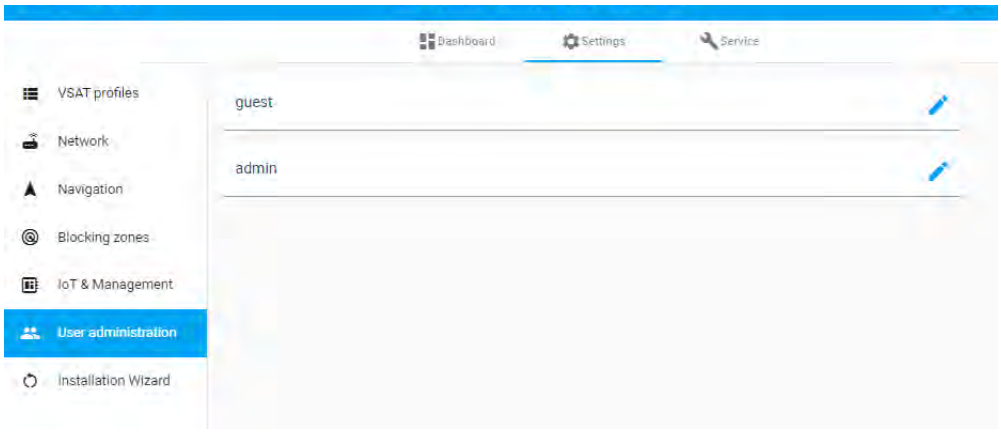


Figure 4-20: User administration, change password for admin

To change the current password, do as follows:

1. Click **Settings** and **User administration**.
2. Click the pen icon for **guest** or **admin**.
3. Enter the current password.
4. Type in the new password using minimum 8 characters, one lower and upper case letter, one number and one special character and retype it on the next line.
5. Click the icon for saving. At the next login the new password is required.

To set up permissions for guest user

You can manage user access (guest) to certain functions of the SAILOR XTR GX-R2 system. You can select R/W, R/O or no access to a number of functions. This is useful if you want to protect the system against unintended changes or tampering of the system. The guest account is disabled before the administrator gives it a password.

Important Study this screen thoroughly and decide which areas of the SAILOR XTR GX-R2 functions you want to give guest users access to.

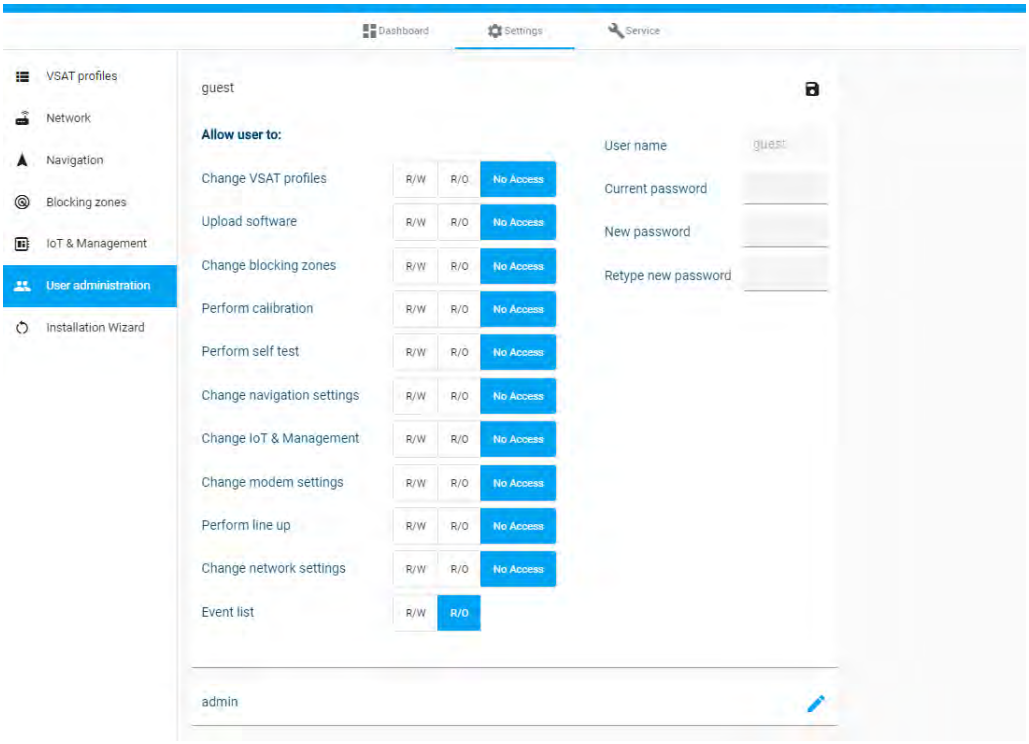


Figure 4-21: Permissions for guest users

To set up the user permissions, do as follows:

1. From the left navigation pane, select **Settings > User administration**.
2. Click the pen icon for **guest**
3. For each item under **Allow user to:** select
   - **R/W** to allow access
   - **R/O** to block access to the settings. Then the pages are read-only.
   - **No Access**, then the page is not available.
4. Click the icon for saving.

4.2.11 Installation wizard

The installation wizard guides you through the necessary steps to set up the antenna. You start the installation wizard from the section **Settings**.

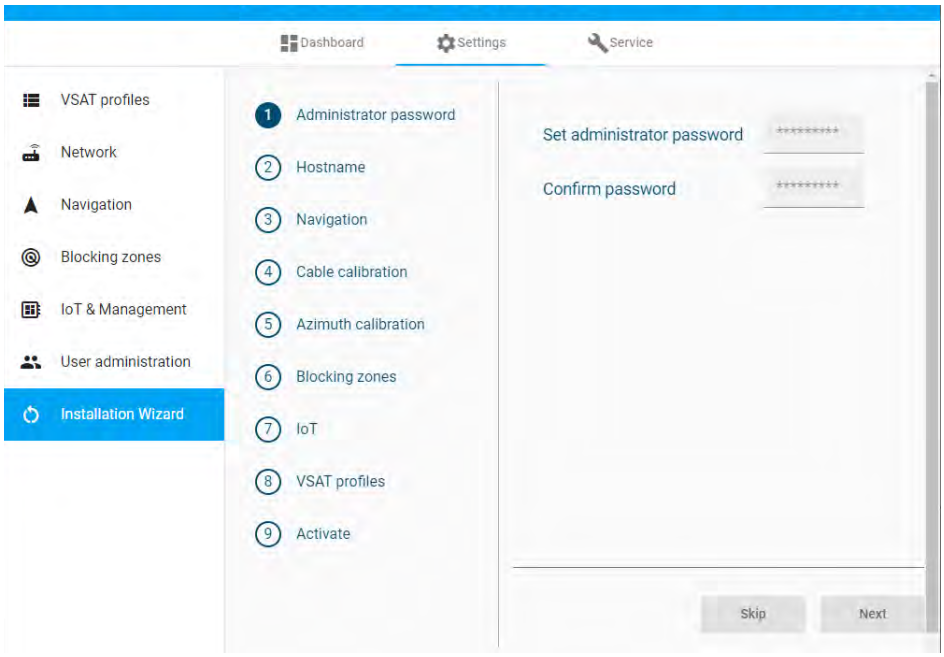


Figure 4-22: Installation wizard

1. Enter the necessary data on each page and click **Next**.
2. If there are no changes on a page click **Skip**.
3. On the last screen click **Finish** to activate the VSAT profile.

4.3 Service

4.3.1 Software

In this section you can manage software versions, upload and save configurations and reset the SAILOR XTR GX-R2 to factory default.

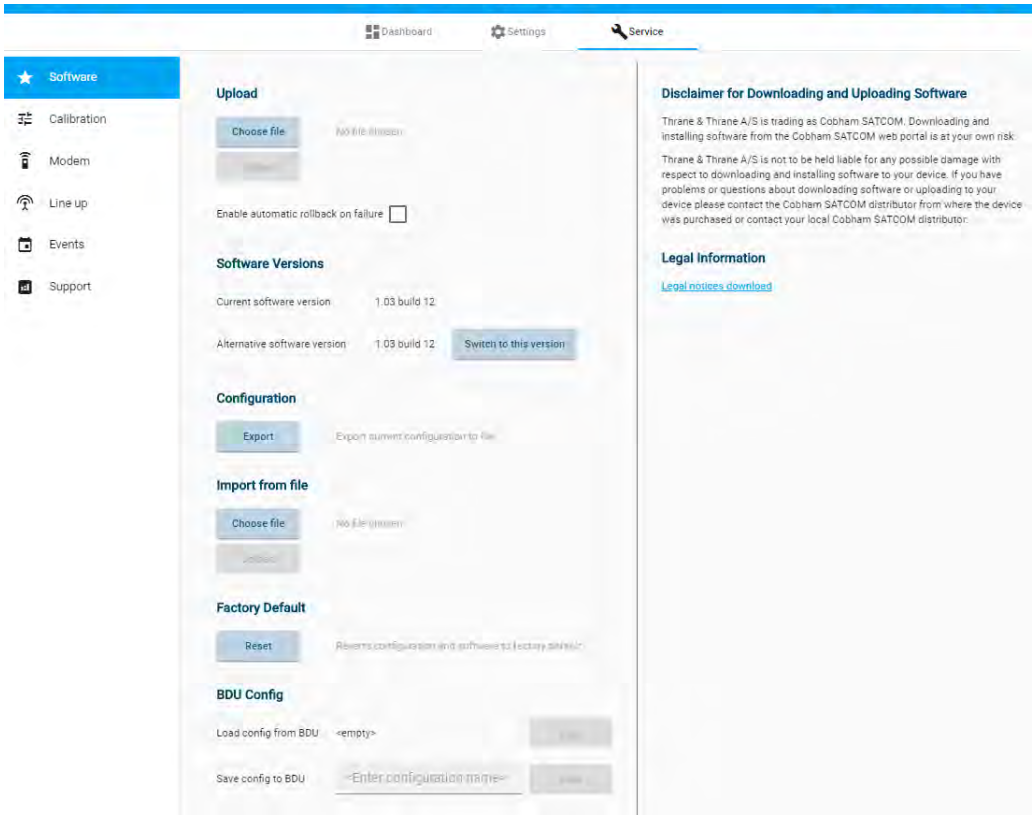


Figure 4-23: Service - Software

Upload

The following items are required before the software can be updated:

- One computer with a standard Ethernet port available.
- A standard Internet browser.
- One straight LAN cable.
- The file with the new software.

Note Only qualified service personnel should make a software update.

1. Power up the SAILOR XTR GX-R2 system, i.e. switch on the BDU. Wait until the text INITIALISING has disappeared from the BDU display.
2. Connect a PC to he front LAN connector of the BDU.
3. Open your Internet browser and enter the IP address of the BDU. The IP address is **http://192.168.0.1** (default).
4. Type in the user name (admin or guest) and password.

5. The web interface opens directly with the **Dashboard** page.
6. Click **Service** in the top bar. The **Software** page is displayed.
7. Click **Choose file** and locate the new software file.
8. Click **Upload**.
   The upload procedure takes a couple of minutes. When done, the system automatically restarts with the new software version.

Important Do not browse away from the upload page. This will terminate the upload process. Wait for the browser to reload automatically.

9. To make the system return to the previous software if POST fails after boot of the updated software, select **Enable automatic rollback on failure**.
10. Click **Switch to this version** if you want to force the system to use the alternative software version.

Software recovery procedure (SAFE MODE)

To recover from a failed software upload, turn off the BDU and turn it on again., then the normal software image is restored.

1. Wait for the safe image.
2. Install the software and reboot.
3. When the new software version is visible in the safe image, make a physical power cycle with the power button on the BDU.

The upload procedure takes a couple of minutes. When done, the BDU automatically restarts with the new software version.

Important Do not browse away from the upload page. This will terminate the upload process. Wait for the browser to reload automatically.

After completing the software update procedure, the SAILOR XTR GX-R2 will perform a POST (Power On Self Test). When the POST has finished, the green Pass/Fail LED on the front of the BDU must become steadily green. Verify that the Pass/Fail LED is not red nor flashing orange once every 2 seconds. Wait until the Pass/Fail LED is green.

You can verify that the software update has been completed successfully. Check the software version number in the **Dashboard i**n the box **SYSTEM INFO**.

You can enter safe mode press left and right key on the BDU while power cycling.

To import and export a system configuration

If you need to reuse a configuration in another SAILOR XTR GX-R2, you can save the current configuration to a file, which can then be loaded into another SAILOR XTR GX-R2. You can also use this feature for backup purposes. The configuration file contains all the settings you have entered during system setup: VSAT profiles, network setup, blocking zones, etc.

To save a configuration to a file, do as follows:

1. Select **Service> Software** and locate the section **Configuration**.
2. Click the button **Export**. Follow the download instructions on the screen. You can use this configuration file for upload into another SAILOR XTR GX-R2,

To load a configuration from a file, do as follows:

1. Select **Service > Software** and locate the section **Import from file**.
2. Click the button **Choose file** and locate the configuration file (.cfg file) you want to upload. Then click the button U**pload**.

Factory default

When resetting SAILOR XTR GX-R2 to factory default, the following settings are deleted:

- Passwords
- VSAT profiles
- Blocking zones
- Heading settings
- Network setup
- User permissions for guest
- BDU display: brightness setting

Note Calibration data for azimuth and cable calibration are not reset during factory default.

To reset to factory default settings, do as follows:

1. From the left navigation pane, select **Service > Software**.
2. Locate the section **Factory Default,** click **Reset**.

BDU Config (save antenna settings in the BDU)

You can save the current antenna/ACU settings in the BDU and upload these settings at a later stage to another antenna. The configuration file contains all the settings you have entered during system setup: satellite profiles LAN setup, blocking zones, etc.

To save an antenna/ACU configuration to the BDU, do as follows:

1. Click **Service > Software**.
2. Locate the section **BDU Config**.
3. At **Save config to BDU** enter the name for the configuration file and click **Save**.

To load an antenna configuration from a file in the BDU into the antenna, do as follows:

1. Select **Service > Software**.
2. Locate the section **BDU Config.**
3. At **Load config from BDU** click **Load**.

4.3.2 Calibration

Before the SAILOR XTR GX-R2 can be used you must select a heading input in order to make an azimuth and cable calibration. The azimuth calibration is required in order to determine the offset of the ADU zero direction to the bow-to-stern line of the ship. This procedure is fully automatic. The satellite data for calibration can be entered directly

on the calibration page. A cable calibration is required in order to record the cable characteristics of the antenna cable which is used in the fixed gain feature.

Important You must log in as an administrator to do a calibration.

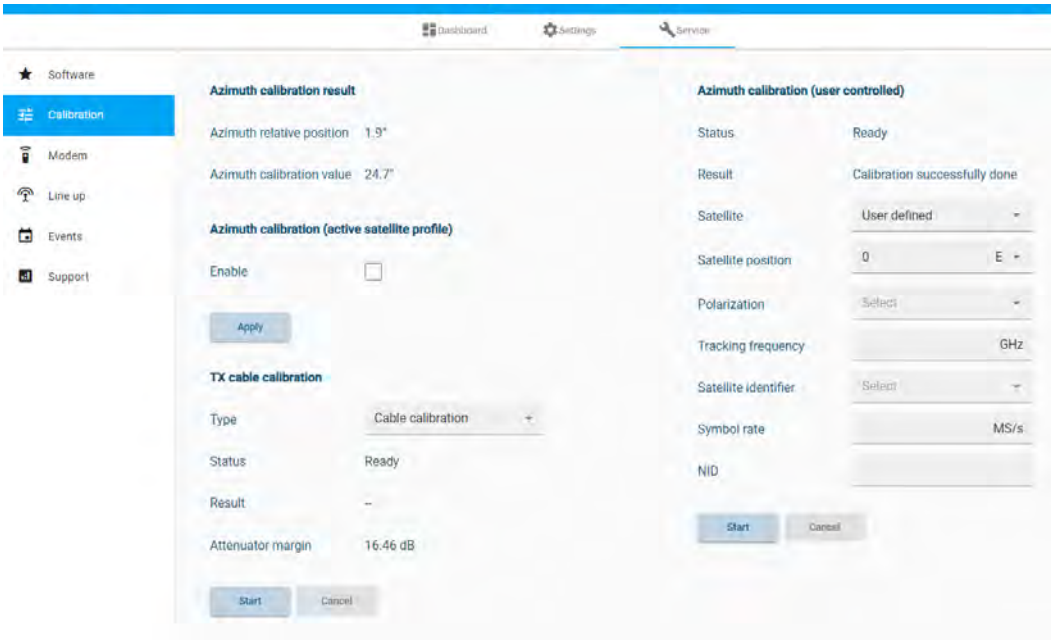


Figure 4-24: Service - Calibration

Azimuth calibration

Azimuth calibration is done toward a satellite of a known position. After finding the satellite, the system can calculate the azimuth offset of the ADU. The satellite and transponder properties for the calibration can be selected from a list of service profiles or supplied manually. The azimuth relative position is the momentary azimuth value of the ADU, a dynamic value. The Azimuth calibration value is the calculated ADU azimuth value after an azimuth calibration, a fixed value.

Note If the target satellite is in inclined orbit, the elevation range is extended accordingly.

Automatic azimuth calibration with an active VSAT profile

You can enable automatic azimuth calibration, even if there is no line of sight to an azimuth calibration satellite from the place of installation. To use this feature you must have made a valid VSAT profile and have activated it. When the vessel leaves the harbor and gets line of sight to the satellite, the system automatically finds and tracks the satellite and makes the azimuth calibration. After a successful azimuth calibration the BDU will automatically disable the setting **Azimuth calibration (active satellite profile)** on the page **Service > Calibration**.

To enable automatic azimuth calibration, do as follows:

1. Create a VSAT profile
2. Click **Settings** and **Activate** the satellite profile.
3. Click **Service > Calibration**.

4. Select **Enable** in the section **Azimuth calibration (active satellite profile)**.
5. Click **Apply**.
6. Switch on the modem.

Azimuth calibration (user controlled)

1. On the page **SERVICE > Calibration**, in the section **Azimuth calibration (user controlled)**, select **User defined** in the **Satellite** drop down list.

Note If you do not want to enter the satellite data on the calibration page you can select a dedicated satellite service profile for calibration and select it.

Check that the satellite transponder is visible from the location of the installation and that it is at an elevation angle between 5 and 85 degrees.

2. Type in the longitude of the satellite.

Satellite	Position	Frequency	Polarisation	Satellite identifier
GX1 –IOR	62.6 E	19.707 GHz	LHC	GSC
GX2 –AOR	55 W	19.707 GHz	LHC	GSC
GX3 –POR	179.6 E	19.707 GHz	LHC	GSC
GX4 –IOR	56.6 E	19.707 GHz	LHC	GSC
GX5 –EME	11.0 E	19.701 GHz	LHC	GSC

Table 4-20: Inmarsat GSC satellite information

Important The calibration function is not able to verify the correctness or precision of the supplied longitude. It is therefore important to supply the correct longitude including the first decimal.

3. Type in its tracking frequency, 19.707 GHz.
4. Select **Satellite identifier**: GSC, NID, Orbital position (DVB-S, DVB-S2)[1].
5. Click **Start** and wait typically 5 minutes for the azimuth calibration to finish. A progress bar is shown during calibration and a message is displayed when the

1. Use Orbital position and NID if you want to use NID or orbital position or other KA band satellites with DVB-S2 support. The DVB symbol rate must be >5 Ms/s. For NID use preferably a unique NID (ONID). An azimuth calibration without NID can be useful in regions where the satellite operators do not broadcast NID (US, China, Australia etc.). For NID=0 the NID is not used when checking the satellite link. For NID 1 to 65535 the supplied NID is matched against the Network ID broadcast by the satellite. For orbital position the supplied longitude is matched with the orbital position broadcast by the satellite. Not all service providers broadcast the orbital position.

calibration has completed. In case of failure, see the table in the following section for a description of error codes during calibration.

Important It is strongly recommended to verify the result of a calibration performed with user defined data. This can be done by making a new calibration on a different satellite and verify that the resulting Azimuth calibration value differs less than one degree.

The following table shows the error codes that might be displayed during a calibration.

Error code	Explanation
1	The elevation of the selected satellite is too low. Select another satellite.
2	The elevation of the selected satellite is too high. Select another satellite.
4	The calibration values could not be saved. Possibly due to defective hardware.
5	The antenna could not point with sufficient precision. Check that the antenna is mounted in a stable way. Other possible causes might be electrical or mechanical faults.
6	No signal received. Check that there is free line of sight. Try again or try with another satellite.
7	RF setup error, e.g. missing or invalid TX frequency.
8	Invalid satellite, e.g. satellite not visible.
9	Unknown error

Table 4-21: Possible error codes during calibration

Cable calibration

You must make a cable calibration. It is also recommended to make a cable calibration when servicing the system to check if the antenna cable is still in good order. If the attenuator margin changes by 2 dB or more after a cable calibration, it is recommended to do a P1dB compression measurement to verify that the VSAT modem configuration is correct.

1. Select **Service > Calibration**.
2. In the section **TX cable calibration**, select the **Type**:
   - Cable calibration: The system will make a complete cable calibration (recommended).
   - Disable TX cable calibration: The gain is set at a maximum and no cable calibration is made. It is up to the modem to make the necessary adjustments.
3. Click **Start**.
4. Wait typically for 2 minutes for the calibration to finish. A message is displayed when the calibration has been completed successfully.The screen shows how

much attenuation margin is left for the antenna cable. This indicates whether the antenna cable and connectors are in good condition and well crimped.

The SAILOR XTR GX-R2 is calibrated now. If the calibration failed there will be a message.

Important If input from the vessel's gyro compass is not available: Change the heading input setting from **Fixed** to **None** at **Heading** – **Input**. **Fixed heading is not allowed for sailing vessels!**

4.3.3 Manual OTC (BUC calibration) and GX modem access

This section describes manual OTC and modem access configuration.

Manual One Touch Commissioning (OTC)

When the modem starts up for the first time it will automatically register with the BUC and perform P1dB compression on multiple frequencies and thereafter register with the network. During the P1dB compression the antenna will point away from the satellite and transmit on 950 MHz to 1950 MHz in 50 MHz steps. The BDU will show **BUC calibration** on the **DASHBOARD** and the BDU display. This may take up to 10 minutes.

If a new cable calibration is made, the BDU displays the warning **BUC calibration outdated**. Then you must make a manual OTC.

To make a manual OTC for the modem, do as follows:

WARNING! For your safety: Active RF transmission may occur during an OTC procedure. Software updates may also occur, yet the system is in receive-only mode during such auto-updates.

Important You must use the Internet browser **Firefox**.

1. Connect a PC to the service port on the front panel of the BDU.
2. Enter the web interface (via Firefox browser) and go to **SERVICE > Modem**.

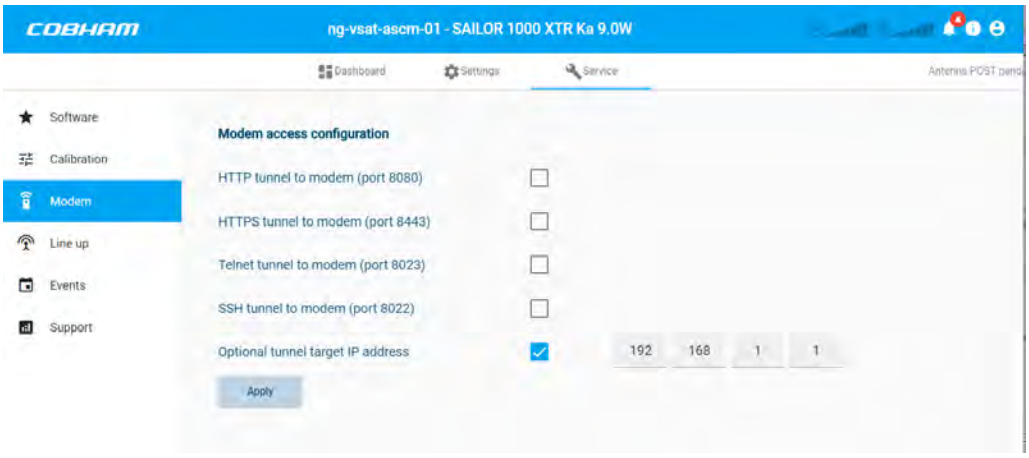


Figure 4-25: Web interface: SERVICE > Modem

3. At **Modem access** click the link.

4. Type the user name **admin** (default) and the password **iDirect** (default).

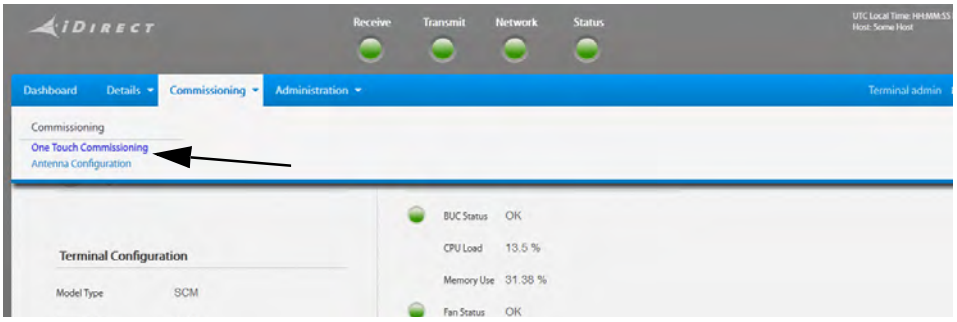


Figure 4-26: Unified web interface of the Core Module

5. In the menu **Commissioning** click **One Touch Commissioning**.
6. Click **Start**. One Touch Commissioning takes place. When commissioning is completed the antenna will search for the I5 satellite with the highest elevation.
7. The antenna will find the satellite and the modem will perform the necessary steps to enter the network (software upgrades, if available).
8. The web interface of the iDirect core module will indicate the modem in the network and the modem status is shown in the display in the menu **MODEM** of the SAILOR XTR GX-R2 web interface.
9. When commissioning is completed, test all subscribed services.
10. Exit the iDirect web interface.

4.3.4 Modem access configuration (port forwarding)

For ease-of-use, you can access the modem (e.g. modem web interface) through the BDU using port forwarding. To make the modem accessible via the BDU, do as follows:

1. In the BDU web interface, select **Service** > **Modem**.
2. Select one of the following methods to access the modem.
   - HTTP tunnel to modem (port 8080)
   - HTTPS tunnel to modem (port 8443)
   - SSH tunnel to modem (port 8022)
   - Optional tunnel target IP address (blank to disable)

   Note For Ku terminals, you must always enter the modem IP address here, it cannot be left blank.
3. Click **Apply**.

Example: To access the web interface of your modem using HTTPS, select **HTTPS tunnel to modem (port 8443)** and click **Apply**.
Then, in the address bar of your browser, enter:
https://<BDU IP address or hostname>:8443
You should now see the web interface of the modem.

4.3.5 Line up

The SAILOR XTR GX-R2 has been tested at the factory and online on a live satellite link to calibrate the TX polarization unit. You can fine-tune the TX polarization by doing a line up.

Figure 4-27: Service - Line up

Note The ship must not move during the line-up procedure.

To do the line up, do as follows:

1. Open an Internet browser and enter the IP address of the BDU (default IP address: **http://192.168.0.1)**.
2. Activate a VSAT profile.
3. Click **Service > Line up**. The antenna must be in tracking mode and point to the satellite.
4. Wait until **Status** shows: **Ready for lineup**.
5. Click the button **Activate Lineup** and wait until the **Status s**hows **Antenna ready**. Follow the instructions from your service provider for Azimuth and Elevation Offset.
6. Set the values as advised by the service provider:
   - Azimuth
   - Elevation
7. Follow the instructions from the service provider to make a P1dB compression test (VSAT modem).
8. Click the button **Deactivate** to leave the line up procedure.

4.3.6 Fixed TX gain principle

The SAILOR XTR GX-R2 uses a TX IF gain concept. After calibration it provides a fixed average gain from the TX-port of the BDU to the input of the BUC. Advantages of the fixed TX IF gain principle are:

- Average TX IF gain independent of antenna cable length[1]

1. You find the maximum allowed cable loss at *Prerequisites* on page 3-18.

- Compatibility with the TX Power control feature

When installing the SAILOR XTR GX-R2 you make a cable calibration. At that point every installation adjusts to the same average TX IF gain regardless of the ADU cable length. Additionally the SAILOR XTR GX-R2 system also compensates for variations of the cable characteristics or loss over frequency.

4.3.7 Events

This page shows a detailed list of active events and notifications including the time of the first occurrence, ID and severity of the event message, and a short text describing the error. Events can be of the type WARNING or ERROR. The event time is UTC time. Active events are cleared from the event list when the error is cleared. They are moved to the section **Cleared events last 24 hours** and are displayed for 24 hours. All entries in this section are cleared automatically after 24 hours and after restart of the system.

When an event is registered, the web interface shows an event icon (bell) in the top bar as long as the event is active. The number of new events since last viewing is also shown. To view the event list with active events, click the event icon from the icon bar at the top of the web interface, or select **Service > Events.**

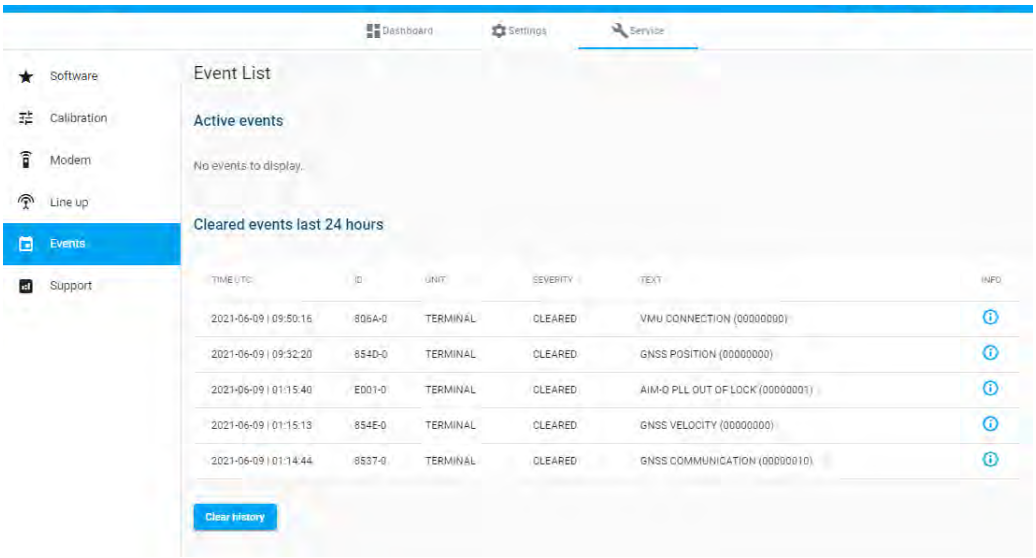


Figure 4-28: Service - Event list (example)

4.3.8 Support

On this page you can download this manual as pdf, download various reports and start a self test of the antenna. You can enable extra diagnostic logging, i.e. include data for modem communication and BUC communication in the diagnostics report.

The self test checks all vital parts of the antenna and BDU. If a malfunction is detected after restart, the unit provides system messages with a description of the failing test. This will be indicated in the icon bar in the web interface and also in the BDU display. An extended antenna POST is available[1]. This test lasts longer and checks more components than the regular self test.

Important The SAILOR XTR GX-R2 reboots to perform the self test. Rebooting terminates all existing connections.

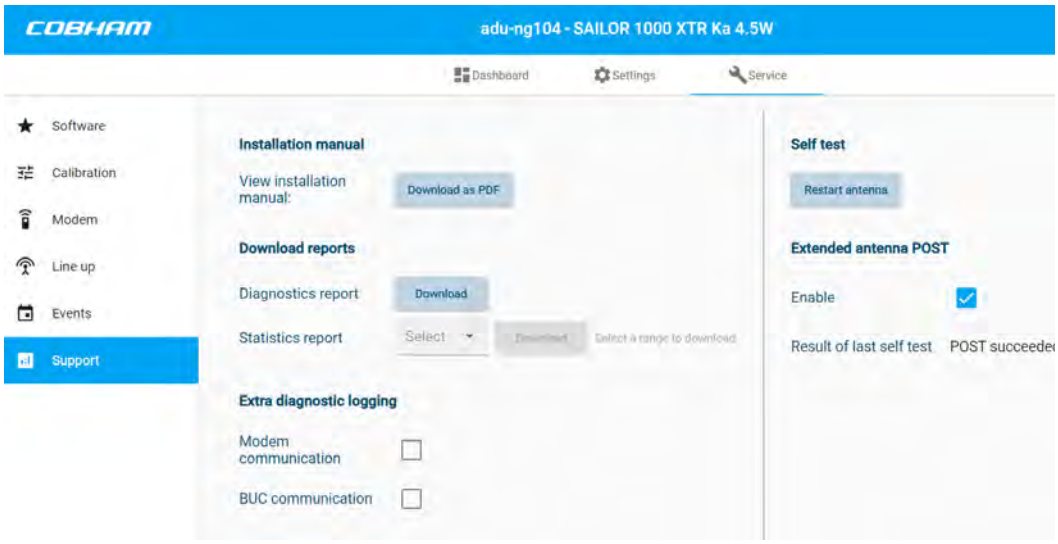


Figure 4-29: Service - Support

4.4 Keypad and menus of the BDU

4.4.1 BDU display and keypad

In the BDU display you can see the current state of the system. You can also see events (warnings, errors and information) and how the system has been configured. Use the keypad to navigate through the menu tree.

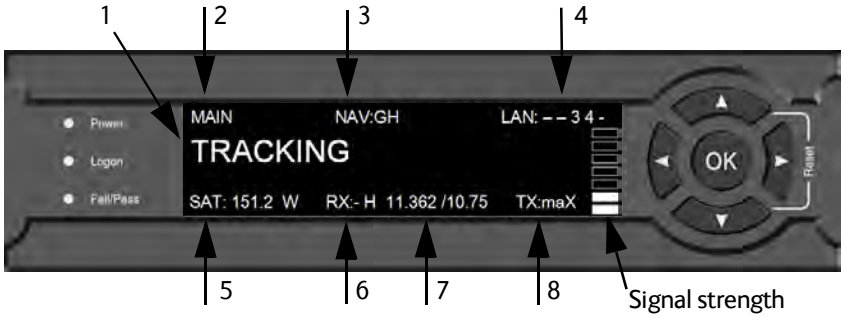


Figure 4-30: Display (example) and keypad of the BDU

1. Current status of the SAILOR XTR GX-R2.
2. Current menu.
3. **NAV**: Navigational information
   First letter: **G** (Valid GPS signal received from the GPS module) or **g** (No valid GPS fix)
   Second letter: **H** (Valid ship heading data received from the ship's gyro) or **h** (No valid heading data).
4. **LAN**: LAN connectors used, **1**, **2**, **3**, **4**, **5**, **–**.

1. For SAILOR 600 XTR GX-R2 the extended POST is mainly the same as the normal POST.

5. **SAT**: Longitude, satellite position of the currently active satellite profile.
6. **RX: 1** (Rx Lock: **-** or **1**), **H** (horizontal) or **V** (vertical) (RX polarization of currently active satellite profile).
7. RF tracking frequency in GHz and LNB LO Frequency.
8. **TX**: <External Un-mute> <Modem TX allowed> <ADU TX allowed> <TX pol>
   Read the TX status as follows: Upper case: Ok, lower case: Not ok, - unknown.
   <External Un-mute> = [U,u], <Modem TX allowed> = [m,M], <ADU TX allowed> = [a,A]
   <Tx pol>=[-,X,C]

After 1 hour the display is dimmed to lowest intensity. Press any key to light up the display.

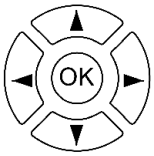
Adjusting brightness of the display

To adjust the brightness do the following:

1. Press and hold **OK** for a short moment until BRIGHTNESS XXX% is displayed (XXX is the current brightness value).
2. Hold OK pressed + press ▲ for lighter or ▼ for darker display.
3. Release OK to leave the brightness menu.

Navigating the menus

Use the keypad to navigate the menus.



- Press **OK** or ▶ to select a menu item.
- Use the arrow keys ▲ and ▼ to go through the menu items.
- Use the arrow keys ◀ and ▶ to go through the settings and move from one digit to the next.
- Press ◀ again to move one level up. If applicable, confirm to store the new setting by pressing **OK**.

4.4.2 List of menus

The following tables show the main menu and submenus.

Top-level	Description
MAIN	View with current status of the SAILOR 1000 XTR GX-R2 4.5W. This view is displayed after a time out of 10 minutes. Press any key (except left arrow) to enter the menu at **MAIN**. New events are shown in this display. If an event is displayed, press **OK** to jump directly to the menu **EVENTS** for viewing the currently active events.
ANTENNA	Shows the current ADU parameters, position, software version and serial numbers of the ADU and BDU.
MODEM	Selected VSAT modem type and setup, including signal level.

Table 4-22: Top-level menus of the BDU

Top-level	Description
NETWORK	Shows the IP addresses and netmasks of the LAN connectors of the BDU and the management mask.
SATELLITE	Current satellite information. This information is entered using the web interface.
EVENTS	View system events. Active events are shown as: X ACTIVE EVENTS in the **MAIN** display. Press **OK** to update the list.

Table 4-22: Top-level menus of the BDU (Continued)

ANTENNA	Description
POINTING	ANTENNA STATE: Current state of the antenna, e.g. TRACKING ELEVATION: Current elevation angle of the antenna AZIMUTH: Current azimuth of the antenna, with reference to North
POLARISATION	RX POLARISATION: RHC or LHC read from connected VSAT modem TX POLARISATION: RHC or LHC read from connected VSAT modem
GNSS	LATITUDE: current latitude, read from GNSS module. LONGITUDE: current longitude, read from GNSS module. FIX TYPE: 2D or 3D
HEADING	Ship's heading in degrees with reference to North, provided by the ship's gyro.
VERSIONS	Current software version.
SERIAL NUMBERS	BDU: BDU serial number ADU: Serial number of the antenna
LOCAL ADMINISTRATION	Select LOCAL ADMINISTRATION to get administrator access for 1 hour or until next reboot

Table 4-23: ANTENNA menu of the BDU

MODEM	Description
MODEM TYPE	Activated modem type.
TX ENABLE	On or off, information delivered by the connected VSAT modem.
RX LOCK	On or off, information delivered by the connected VSAT modem.

Table 4-24: MODEM menu of the BDU

MODEM	Description
NET LED	LED indication from modem. Steady or flashing green/amber/red, OFF
STAT LED	
TX LED	
RX1 LED	
RX2 LED	
PWR LED	
TEMP LED	
FAN LED	

Table 4-24: MODEM menu of the BDU (Continued)

NETWORK	Description
HOST NAME	The host name is used for identification purposes, e.g. in reports.
PORT 1 IP	Current IP address for LAN 1.
MASK 1	Current netmask for LAN 1.
PORT 2 IP	Current IP address for LAN 2.
MASK 2	Current netmask for LAN 2.
PORT 3 IP	(LAN 3) Current IP address of the SAILOR 1000 XTR GX-R2 4.5W web interface (default: 192.168.0.1).
MASK 3	(LAN 3) Current netmask of the SAILOR 1000 XTR GX-R2 4.5W web interface (default: 255.255.255.0).
PORT 4 IP	Current IP address for LAN 4.
MASK 4	Current netmask for LAN 4.
DEFAULT GATEWAY	Current default gateway.
PORT 5 IP	Current IP address for LAN 5.
MASK 5	Current netmask for LAN 5.
DEFAULT GATEWAY	Current default gateway.

Table 4-25: NETWORK menu of the BDU

SATELLITE	Description
POSITION	Position of the current satellite.
RX POLARISATION	Right Hand Circular, Left Hand Circular, auto-selected by the VSAT modem
TX POLARISATION	X-polarization or Co-polarization, auto-selected by VSAT modem
RX FREQUENCY	Ka band receiving frequency of the active satellite, auto-selected by VSAT modem.
LNB LO	Auto selected by VSAT modem.
BUC LO	BUC Local Oscillator, auto-selected by VSAT modem

Table 4-26: SATELLITE menu of the BDU

EVENT	Description
<EVENT>	In this menu all active events are listed. Use ▼ and ▲ to go through the active events. If a new event occurs or there is a change in the event list while you are in the **EVENTS** menu, a * is shown in the upper left corner of the display, next to the menu name. Press **OK** to update the EVENTS list, the * will be removed. A **>** means the event text is longer than the display can show. Press to **>** to see the remaining text.

Table 4-27: EVENTS menu of the BDU

Example: **EVENT 1/4***: This is the first event out of a list of 4 and there has been a change in the list. EVENT 1/4 will always be shown, the * indicates that there has been a change.

4.5 Startup sequence

Once the system is configured and a VSAT profile is active, the startup sequence is as follows:

- Antenna POST pending
- Antenna SW upload (If the software versions in the ADU and BDU are not the same, a software update is done during startup.)
- Antenna POST
- Ready
- Acquiring Signal
- Tracking

When the display shows **TRACKING** and the LED **Logon** is steady green, the system is operational.

Installation check lists

Use the following sections to verify that the system is ready for customer delivery.

5.1 Installation check list: Antenna

Step	Task	Further information	Done
1.	Check that the antenna is free of obstructions.	See *Obstructions (ADU shadowing)* on page 2-4.	
2.	Make sure there is sufficient space for access through the service hatch.	See *To install the ADU* on page 2-17.	
3.	Make sure to maintain the vertical orientation of the ADU center line.		
4.	Check that the ADU is installed where vibrations are limited to a minimum.		
5.	Check that you programmed the blocking zones correctly.	See *Blocking zones – azimuth and elevation* on page 2-5 and *Blocking zones* on page 4-20.	
6.	Check that the safety distance for radiation hazard is obeyed.	See *Safe access to the ADU: Radiation hazard* on page 2-3.	
7.	Check that the mounting height of the antenna is in accordance with the ship's min. roll period.	See *Ship motion and offset from the ship's motion centre* on page 2-4.	
8.	Make sure that the requirements for mast foundation and height, including flatness, gusset plates and distance from welding seams are met.	See *ADU mast flange and mast length* on page 2-6.	
9.	Make sure that the distances to radar, Inmarsat systems, GPS receivers and other transmitters are as required.	See *Interference from radar, GPS/GNSS, L-band and other transmitters* on page 2-13.	

Table 5-1: Installation check list: Antenna

Step	Task	Further information	Done
10.	Make sure that the drain tube is open and risk for water intrusion is at a minimum.	See *Condensation and water intrusion* on page 2-15.	
11.	Check that the ADU is grounded correctly, using the mounting bolts.	See . *To ground the ADU* on page 2-20 and *Grounding and RF protection* on page E-1.	

Table 5-1: Installation check list: Antenna (Continued)

5.2 Installation check list: BDU, connectors and wiring

Step	Task	Verification and further information	Done
1.	Check that the BDU is grounded correctly, using the mounting bolts and washers.	See *To ground the BDU* on page 2-25 and *Grounding and RF protection* on page E-1.	
2.	Make sure you strain relieved the cables.	See *To install the BDU* on page 2-25.	
3.	Make sure that the VSAT modem is mounted close to the BDU.		
4.	Check that the ADU antenna N-connector is properly connected with the 50 Ohm RF cable.	Visual inspection of the cover plate at the bottom of the ADU.	
5.	Check that the BDU antenna N-connector is properly connected with the 50 ohm RF cable.	Visual inspection of the connector panel of the BDU.	
6.	Check that the BDU's **Rx Out** is connected to the VSAT modem's Rx in using the included 1 m F-F 75 ohm cable.	Visual inspection of the connector panel of the BDU and the VSAT modem.	
7.	Check that the BDU's **Tx In** is connected to the VSAT modem's Tx out using the included 1 m F-F 75 ohm cable.	Visual inspection of the connector panel of the BDU and the VSAT modem.	
8.	Check connection of the VSAT modem:	Visual inspection of the connector panel of the BDU and the VSAT modem.	
9.	Check that the ADU's NMEA 0183 connector is connected to the NMEA0183 bus of the vessel using the included multi-connector	Visual inspection of the connector panel of the BDU connector.	

Table 5-2: Installation check list: BDU, connectors and wiring

5.3 Installation check list: Functional test in harbor

Step	Task	Further information	Done
1.	Check that the antenna is tracking the satellite	The logon LED in the BDU display must be steady green and the display shows: **TRACKING**. In the web interface top bar check that the system status shows Tracking	
2.	Check that the VSAT modem is in lock and ready for Tx.	In the web interface Dashboard on modem card check RX frequency and signal level shows values.	
3.	Connect a user PC LAN (not the service PC) to the Internet LAN connector of the VSAT system.	Check the VSAT modem documentation for details.	
4.	Make sure that the computer has no access to the Internet through other means (Wifi, 3G, 4G etc.). Open a command prompt and type: ping 4.2.2.2.	Check that you get a response.	
5.	Make sure that the computer has no access to the Internet through other means (Wifi, 3G, 4G etc.). Open a web browser and browse to e.g. www.google.com.	Check that the web page is downloaded.	
6.	If step 4 is successful and step 5 is not then it seems like the DNS is not configured correctly.	Check the VSAT modem documentation how to set up the DNS server, “Obtain DNS server address automatically” or enter specific DNS server addresses.	

Table 5-3: Installation check list: Functional test in harbor

Service

This chapter has the following sections:

- *Built-in test and LEDs*
- *Removal and replacement of the BDU*
- *Removal and replacement of ADU modules*
- *Troubleshooting basics*
- *Returning units for repair*

6.1 Built-in test and LEDs

The ADU and the BDU have a Built-In Test Equipment (BITE) function in order to make fault diagnostics easy during service and installation. The BITE test is performed during:

- Power On Self Test (POST), which is automatically performed each time the system is powered on.
- Self Test, (web interface at **Service > Support**).

LEDs on the front panel of the BDU are used to signal:

- Power on/off
- Logon
- Fail/Pass

The built-in web interface shows events (BITE error codes) with a short message describing each error or warning. This is also displayed in the BDU. In an error situation, one of the following system status messages may be shown:

- BDU POST error
- ADU POST error
- SAFE MODE (plus information about the specific error, see *Event messages* on page F-1).

6.1.1 LEDs of the modules in the ADU

Each ADU module has one multi-color LED.

LED	Behavior	Description
RED	Steady	Powered but CPU not booted
RED	Blinking	Module failure
GREEN	Steady	Module OK
GREEN	Blinking	Boot loader/SW Upload

Table 6-1: LEDs of the ADU modules

6.1.2 LEDs in the BDU

The BDU has 3 LEDs: Power, Logon and Fail/Pass LED.

Figure 6-1: BDU — LEDs

LED	Behavior	Description
Power	Steady green	Power supply OK
	Steady red	Power supply failure
	Off	No power
Logon	Flashing green	Current status is displayed: • Searching satellite • Identifying satellite • Carrier lock & TX enabled from modem
	Steady green	Satellite link established
	Off	No satellite link acquired
Fail/ Pass LED	Steady red	A fault which prevents operation is present in the system (ADU, BDU).
	Flashing green	A Power On Self Test (POST) or Self Test in progress. The current status is displayed.
	Flashing red	Active BITE failure or warning. The event is shown in the BDU display.
	Steady green	No faults.

Table 6-2: LEDs on the BDU

6.2 Removal and replacement of the BDU

There are no parts in the BDU that you can remove or replace. Contact your Cobham SATCOM service partner for repair or replacement.

6.3 Removal and replacement of ADU modules

All replacement of modules must be done by a Cobham SATCOM service partner. Before contacting your service partner check the LEDs on all modules (ACM, ISM and motors).

6.4 Troubleshooting basics

6.4.1 Overview

This section describes an initial check of the primary functions of the SAILOR XTR GX-R2 system, and provides some guidelines for troubleshooting. Generally, if a fault occurs without any obvious reason, it is always recommended to observe the LEDs and the BDU display showing the active events. Possible failure states are shown in the web interface and the display of the BDU:

- SAFE MODE (e.g. hardware error, missing communication link between the ADU and BDU, excessive ship motion)
- ADU POST error (hardware error)
- BDU POST error (hardware error)

For a list of all the error messages and warnings, see Appendix F.

6.4.2 Administrator password forgotten

If you do not know the administrator password you can get temporary access (1 hour) to the system.

Do as follows:

1. On the BDU keypad, push and hold the **left arrow key** for 5 seconds.
2. Wait for the very short display of **Local administration**, followed by the event text: **0807F-0 WARNING Local administration enabled.**
   This will give you temporary administrator access **for 1 hour or until next restart**.
3. Open your browser and access the web interface.
4. Enter user name: **admin** (no password is required).
   The **Dashboard** is displayed.

   Note Accessing the BDU with the local administration function does not change the current administrator password.

5. To create or change the password select **Settings > User administration**.
6. Click on the pencil-shaped icon next to **Admin**.
7. Type in the new administrator password (minimum 8 characters) and click **Apply**.

The web interface shows the **Dashboard** page.

6.4.3 To verify that the antenna can go into tracking mode

In case there is no RX lock on the connected VSAT modem you can activate a VSAT profile using the generic modem to verify that the transponder data used during calibration are received correctly. If the SAILOR XTR GX-R2 can go into tracking mode it is most likely not defective.

1. Go to **Settings** > **VSAT profiles**.
2. Activate a VSAT profile that is used for azimuth calibration. This is a satellite profile that uses the VSAT modem profile **Service & Calibration**.

3. Go to DASHBOARD and monitor the system status. If the field ends up showing Tracking, the SAILOR XTR GX-R2 can track the satellite and is most likely not the reason why the VSAT modem is not in RX lock.

6.5 Returning units for repair

Should your Cobham Satcom product fail, contact your dealer or installer, or the nearest Cobham Satcom partner. You will find the partner details on www.cobhamsatcom.com/where-to-buy. You can also access www.cobhamsatcom.com and select **COBHAM SYNC PARTNER 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.

Technical specifications

This appendix has the following sections:

- *Specifications SAILOR 1000 XTR GX-R2*
- *Specifications SAILOR 600 XTR GX-R2*
- *Patents*
- *Outline drawings*

A.1 Specifications SAILOR 1000 XTR GX-R2

SPECIFICATIONS	
Reflector size	103 cm / 40.6”
Type approvals	Inmarsat
Certification	Compliant with CE (Maritime), ETSI, FCC
System power supply range	100-240 VAC, 50-60 Hz
Antenna system power consumption	4.5W: 135W typ. 185W max. 9.0W: 180W typ. 215W max.

FREQUENCY BAND	
Rx	17.7 to 20.2 GHz
Tx	27.5 to 30.0 GHz

ANTENNA CABLE	
BDU to ADU cable	Coax cable (50 Ω) for Rx, Tx, MoCA and DC power on a single cable
ADU cable connector	Female N-Connector (50 Ω)
BDU cable connector	Female N-Connector (50 Ω)

SAILOR XTR ABOVE DECK UNIT (ADU)	
Antenna type, pedestal	3-axis stabilized tracking antenna with integrated GNSS supporting GPS, GLONASS and Beidou
Antenna type, reflector system	Reflector/sub-reflector, ring focus
Transmit Gain	47.4 dBi typ. @ 29.5 GHz (incl. radome)
Receive Gain	43.5 dBi typ. @ 19.7 GHz (incl. radome)
System G/T	20.9 dB/K typ. @ 19.7 GHz, at ≥10° elevation and clear sky (incl. radome)
GX-R2 transceiver output power	4.5 Watt or 9 Watt
EIRP	4.5 W: ≥54.1 dBW (incl. radome) 9.0 W: ≥57.1 dBW (incl. radome)
LNB	Inmarsat GX-R2 transceiver
Polarisation	Circular (RHCP, LHCP) independent controlled for Rx and Tx
Tracking Receiver	Internal “all band/modulation type” including e.g. power, DVB-S2X, GSC and modem RSSI
Satellite acquisition	Automatic - with Gyro/GPS Compass input. Sup port for gyro free operation.
Elevation Range	-20° to +120°
Cross Elevation	-37° to +37°
Azimuth range	Unlimited (Rotary Joint)
Ship motion, angular	Roll ±30° (6 sec), Pitch ±15° (5 sec), Yaw ±10° (8 sec)
Ship, turning rate and acceleration	15°/S and 15°/S2
ADU motion, linear	Linear accelerations ±2.5 g max any direction
Vibration, operational	Sine: EN60945 (8.7.2), DNV 2.4A, MIL-STD-167-1 (5.1.3.3.5). Random: Maritime
Vibration, survival	Sine: EN60945 (8.7.2) dwell, MIL-STD-167-1 (5.1.3.3.5) dwell. Random: EN60721-3-6 class 6M3 mod. by EN60721-4-6
Shock	EN60721-3-6 class 6M3 mod. by EN60721-4-6. MIL-STD-810F 516.5 (Proc. II)
Temperature (ambient)	Operational: -25°C to +55°C / -13°F to +131°F Storage: -40°C to +85°C / -40°F to +185°F
With SAILOR Smart heater option:	
P/N: 407090-001	Operational: -55°C to +55°C / -67°F to +131°F
Humidity	95%, condensing
Rain / IP class	EN60945 Exposed / IPx6
Wind	80 knots operational, 110 knots survival
Ice, survival	25 mm / 1”
Solar radiation	1120 W/m2 to MIL-STD-810F 505.4
Compass safe distance	1.5 m / 3.3 lb to EN60945
Maintenance, scheduled	None
Maintenance, unscheduled	All modules, motor, RF parts and belts are replaceable through service hatch
Built In Test	Power On Self-Test, Person Activated Self-Test and Continuous Monitoring w. error logging
Dimensions	Height: H 150 cm / 58.9” Diameter: Ø 130 cm / 51.3”
Weight	105 kg / 231 lb

SAILOR XTR BELOW-DECK UNIT (BDU)	
Dimensions	1U 19” Rack Mount HxWxD: 4.4 x 48 x 33 cm / 1.75” x 19” x 13”
Weight	3.6 kg / 8 lb
Temperature (ambient)	Operational: -25ºC to +55ºC / -13°F to +131°F Storage: -40ºC to +85ºC / -40°F to +185°F
Humidity	EN60945 Protected, 95% (non-condensing)
IP class	IP30
Compass safe distance	0.3 m / 0.7” to EN60945
Interfaces	1x N-Connector for antenna RF Cable (50 Ω) with automatic cable loss compensation 2 x F-Connectors (75 Ω) for Rx & Tx to VSAT modem 1 x Ethernet Data (VSAT Modem Control) 2 x Ethernet (User) 1 x Ethernet (Remote access) 1 x Ethernet for Service and Configuration 1 x RJ-45, RS-422 Data (VSAT Modem Control) 1 x RJ-45, RS-232 Data (VSAT Modem Control) 1 x RJ-45, NMEA 0183 (RS-422 / RS-232) for Gyro/GPS Compass and external GPS input 1 x RJ-45, 4 x General purpose GPIO, Tx mute and Rx lock. 1 x Universal AC power input 1 x Grounding bolt
User interface	Webserver, OLED display (red), 5 pushbuttons, 3 discrete indicator LEDs and On/Off switch, TX Mute and Modem Lock indicator
Temperature control	Built-in fan
No transmit zones	Programmable, 8 zones with azimuth and elevation Real-time blocking map recorder
Remote management and IoT	HTTPS, SSH, Telnet, SNMP Traps, Syslog, CLI, Diagnostic, Statistic, RESTful, MQTT

VSAT MODEM SUPPORT	
Modem protocols	Generic, OpenAMIP, OpenBMIP
Modem hardware	SAILOR GX Modem

SAILOR GX MODEM UNIT (GMU)	
Dimensions	1U 19” Rack Mount HxWxD: 4.4 x 48 x 33 cm / 1.75” x 19” x 13”
Weight	3.5 kg / 7.7 lb
Humidity	EN60945 Protected, 95% (non-condensing)
IP class	IP30
Compass safe distance	0.3 m / 0.7” to EN60945
Interfaces	2 x F-Connectors (75 Ω) for Rx and Tx to BDU 1 x RJ-45 Ethernet for control and user data, routes through BDU 1 x RS-422 (Modem Control) 1 x RS-232 Data (Modem Control) 1 x RS-232 Modem console 1 x Universal AC power input 1 x Grounding bolt
Input power	100-240 VAC, 50-60 Hz, 90 W peak, 30 W typical
Modem interface control	OpenAMIP, OpenBMIP, RS-422 and RS-232
User interface	Web MMI, On/Off switch and power LED
Temperature control	Built-in fan and heater

For further information please contact:

satcom.maritime@cobhamsatcom.com

71-177909-A01 01.22

A.2 Specifications SAILOR 600 XTR GX-R2

SYSTEM SPECIFICATIONS	
Frequency band	Ka-band (Inmarsat GX-R2)
Reflector size	65 cm / 25.5”
Type approvals	Inmarsat
Certification	Compliant with CE (Maritime), ETSI, FCC
System power supply range	100-240 VAC, 50-60 Hz
Total system power consumption	4.5W: 135 W typical, 185 W max (excl. Modem) 9.0W: 180 W typical, 215 W max (excl. Modem)

FREQUENCY BAND	
Rx	17.7 to 20.2 GHz
Tx	27.5 to 30.0 GHz

ANTENNA CABLE & CONNECTORS	
BDU to ADU cable	Coax cable (50 Ω) for Rx, Tx, MoCA and DC power on a single cable
ADU cable connector	Female N-Connector (50 Ω)
BDU cable connector	Female N-Connector (50 Ω)

ABOVE DECK UNIT (ADU)	
Antenna type, pedestal	3-axis stabilized tracking antenna with integrated GNSS supporting GPS, GLONASS and Beidou
Antenna type, reflector system	Reflector/sub-reflector, ring focus
Transmit Gain	43.6 dBi typ. @ 29.5 GHz (Incl. radome)
Receive Gain	39.1 dBi typ. @ 19.7 GHz (Incl. radome)
System G/T	16.4 dB/K typ. @ 19.7 GHz, at ≥10° elevation and clear sky (incl. radome)
GX-R2 transceiver output	4.5W or 9.0W
EIRP	4.5W: 50.1 dBW typ. @ 29.5 GHz (incl. radome) 9.0W: 53.1 dBW typ. @ 29.5 GHz (incl. radome)
LNB	Inmarsat GX-R2 transceiver
Polarisation	Circular (RHCP, LHCP) independent controlled for Rx & Tx
Tracking receiver	Internal “all band/modulation type” including e.g. power, DVB-S2X, GSC and modem RSSI
Satellite acquisition	Automatic - with and without Gyro/GPS Compass input. Support for gyro free operation.
Elevation Range	-20° to +128°
Cross Elevation	-42° to +42°
Azimuth Range	Unlimited (Rotary Joint)
Ship motion, angular	Roll ±30° (6 sec), Pitch ±15° (5 sec), Yaw ±10° (8 sec)
Ship, turning rate and acceleration	15°/s and 15°/s2
ADU motion, linear	Linear accelerations +/-2.5 g max any direction
Vibration, operational	Sine: EN 60945 (8.7.2), DNV 2.4A, MIL-STD-167-1 (5.1.3.3.5). Random: Maritime
Vibration, survival	Sine: EN 60945 (8.7.2) dwell, MIL-STD-167-1 (5.1.3.3.5) dwell. Random: EN60721-3-6 class 6M3 mod. by EN60721-4-6
Shock	EN60721-3-6 class 6M3 mod. by EN60721-4-6. MIL-STD-810F 516.5 (Proc. II),
Temperature (ambient)	Operational: -25°C to +55°C / -13°F to +131°F Storage: -40°C to +85°C / -40°F to +185°F
Humidity	95%, condensing
Rain / IP class	EN 60945 Exposed / IPx6
Wind	80 knots operational / 110 knots Survival
Ice, survival	25 mm
Solar radiation	1120 W/m2 to MIL-STD-810F 505.4
Compass safe distance	1.5 m / 59” (EN 60945)
Maintenance, scheduled	None
Maintenance, unscheduled	All modules, motor, RF parts and belts are replaceable
Built In Test	Power On Self-Test, Person Activated Self-Test and Continuous Monitoring w. error logging
Dimensions (over all)	Height: H 91 cm / 36” Diameter: Ø 82 cm / 32”
Weight	35 kg / 77 lb

BELOW DECK UNIT (BDU)	
Dimensions	1U 19” rack mount HxWxD: 4.4 x 48 x 33 cm / 1.73” x 18.9” x 13”
Weight	3.6 kg / 8 lb
Temperature (ambient)	Operational: -25°C to +55°C / -13°F to +131°F Storage: -40°C to +85°C / -40°F to +185°F
Humidity	EN 60945 Protected, 95% (non-condensing)
IP class	IP30
Compass safe distance	0.3 m / 12” to EN60945
Interfaces	1 x Male N-Connector for antenna RF Cable (50Ω) with automatic cable loss compensation. 2 x F-Connectors (75 Ω) for Rx and Tx to VSAT modem 1 x Ethernet Data (VSAT Modem Control) 2 x Ethernet (User) 1 x Ethernet (Remote access) 1 x Ethernet for Service and Configuration 1 x RJ-45, RS-422 Data (VSAT Modem Control) 1 x RJ-45, RS-232 Data (VSAT Modem Control) 1 x RJ-45, NMEA 0183 (RS-422 / RS-232) for Gyro/ GPS Compass and external GPS input 1 x RJ-45, 4 x General purpose GPIO, Tx mute and Rx lock. 1 x AC Power Input 1 x Grounding bolt
User Interface	Webserver, OLED display (red), 5 pushbuttons, 3 discrete indicator LEDs and On/Off switch, TX Mute and Modem Lock indicator.
Temperature control	Built-in fan
No transmit zones	Programmable, 8 zones with azimuth and elevation Real-time blocking map recorder
Remote management and IoT	HTTPS, SSH, Telnet, SNMP Traps, Syslog, CLI, Diagnostic, Statistic, RESTful, MQTT

VSAT MODEM SUPPORT	
Modem protocols	Generic, OpenAMIP, OpenBMIP, Custom protocol
Modem hardware	SAILOR GX Modem

SAILOR GX MODEM UNIT (GMU)	
Dimensions	1U 19” Rack Mount HxWxD: 4.4 x 48 x 33 cm / 1.73” x 18.9” x 13”
Weight	3.5 kg / 7.7 lb
Humidity	EN60945 Protected, 95% (non-condensing)
IP class	IP30
Compass safe distance	0.4 m / 16” to EN60945
Interfaces	2 x F-Connectors (75 Ω) for Rx and Tx to BDU 1 x RJ-45 LAN connector for control and user data, routes through BDU 1 x RS-422 (Modem Control) 1 x RS-232 Data (Modem Control) 1 x RS-232 Modem console 1 x Universal AC Power input 1 x Grounding bolt
Input power	100 – 240 VAC, 50-60 Hz, 90 W peak, 30 W typical
Modem interface (control)	OpenAMIP, OpenBMIP, RS-422 and RS-232
Display	Web MMI, On/Off switch and power LED
Temperature control	Built-in fan and heater

For further information please contact:
satcom.maritime@cobhamsatcom.com

71-178146-A01 01.22

A.3 Patents

The patents listed below apply to SAILOR XTR

Patent application number	Description
11749202.5; 10-2013-7008607; 13/819,621	An assembly comprising a movable and brakable/dampable part and a method for braking a movable part
PCT/EP2012/063849	Combined antennas without switch

Table A-1: Patents

A.4 Outline drawings

A.4.1 ADU SAILOR 1000 XTR GX-R2

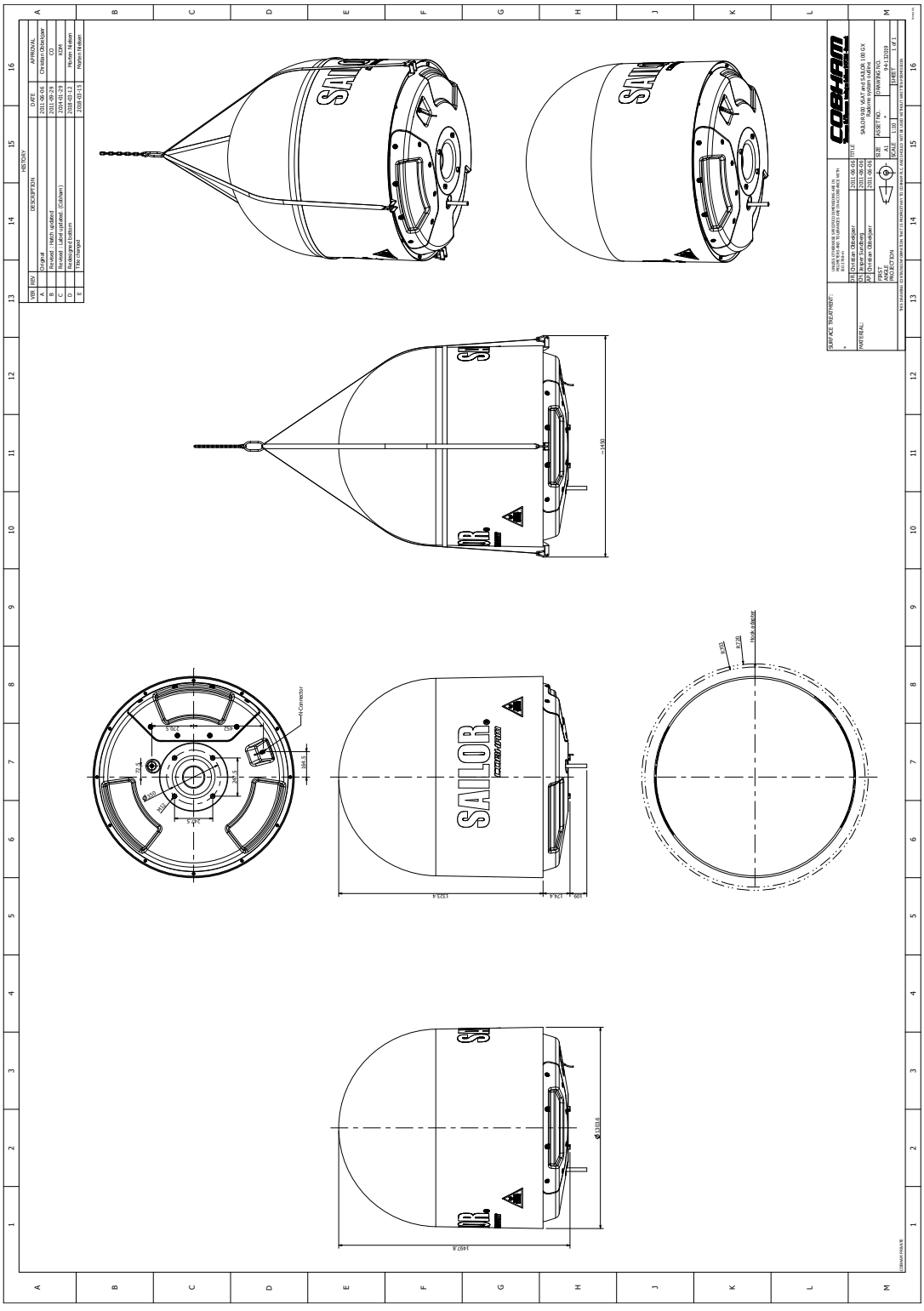


Figure A-1: Outline drawing: ADU (S1000)

A.4.2 ADU SAILOR 600 XTR GX-R2

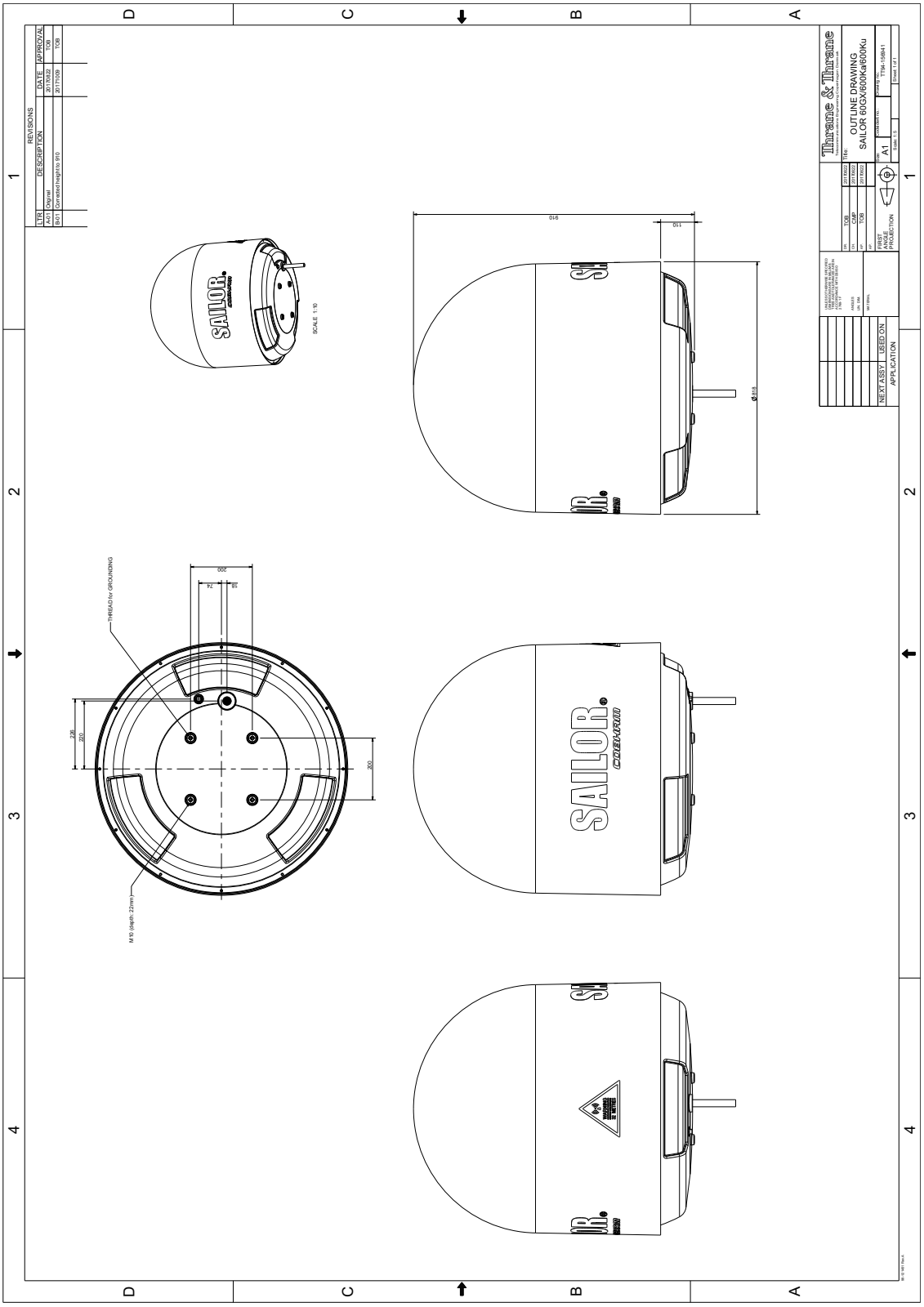


Figure A-2: Outline drawing: ADU (S600)

A.4.3 BDU

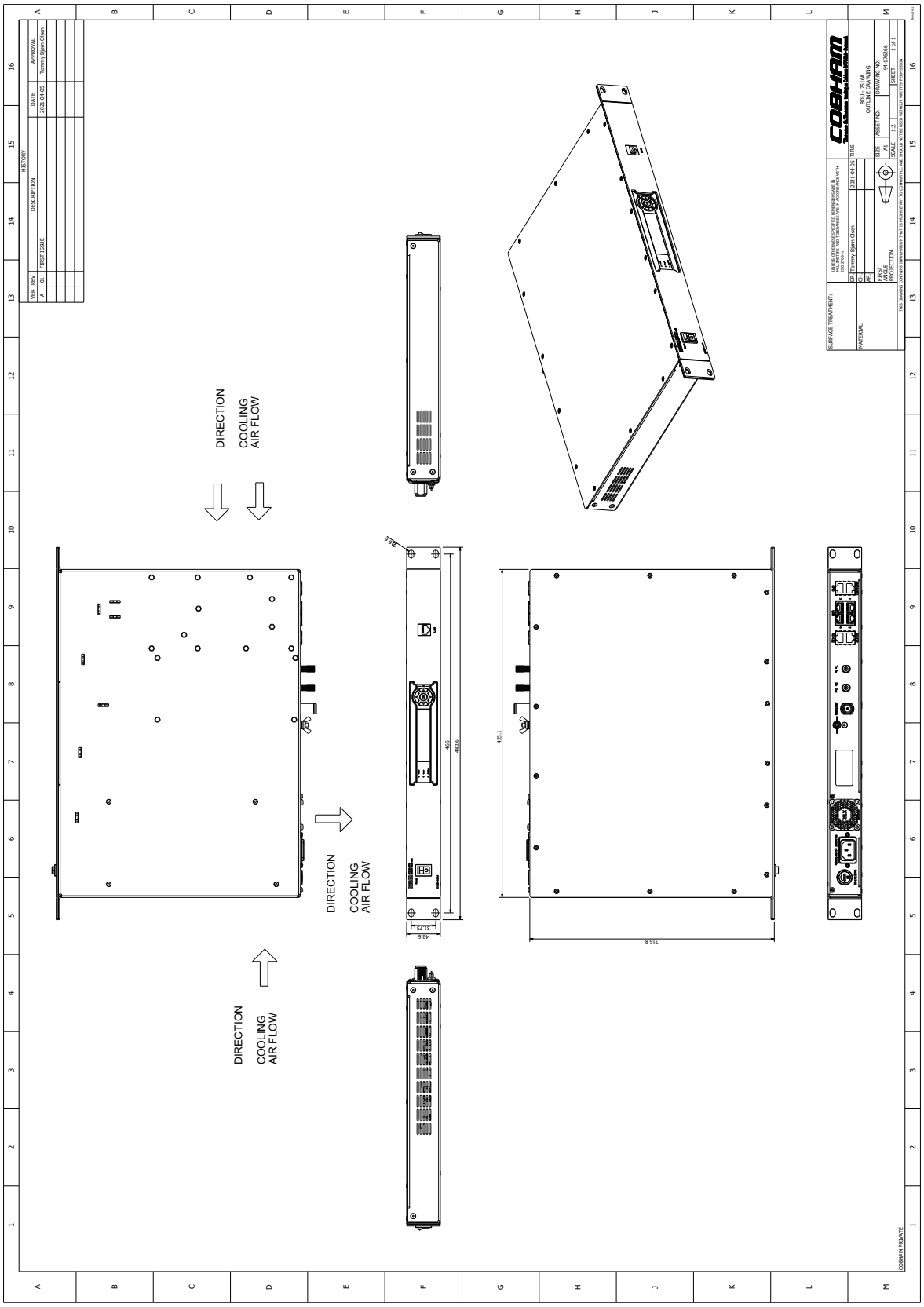


Figure A-3: Outline drawing: BDU

A.4.4 GX GMU

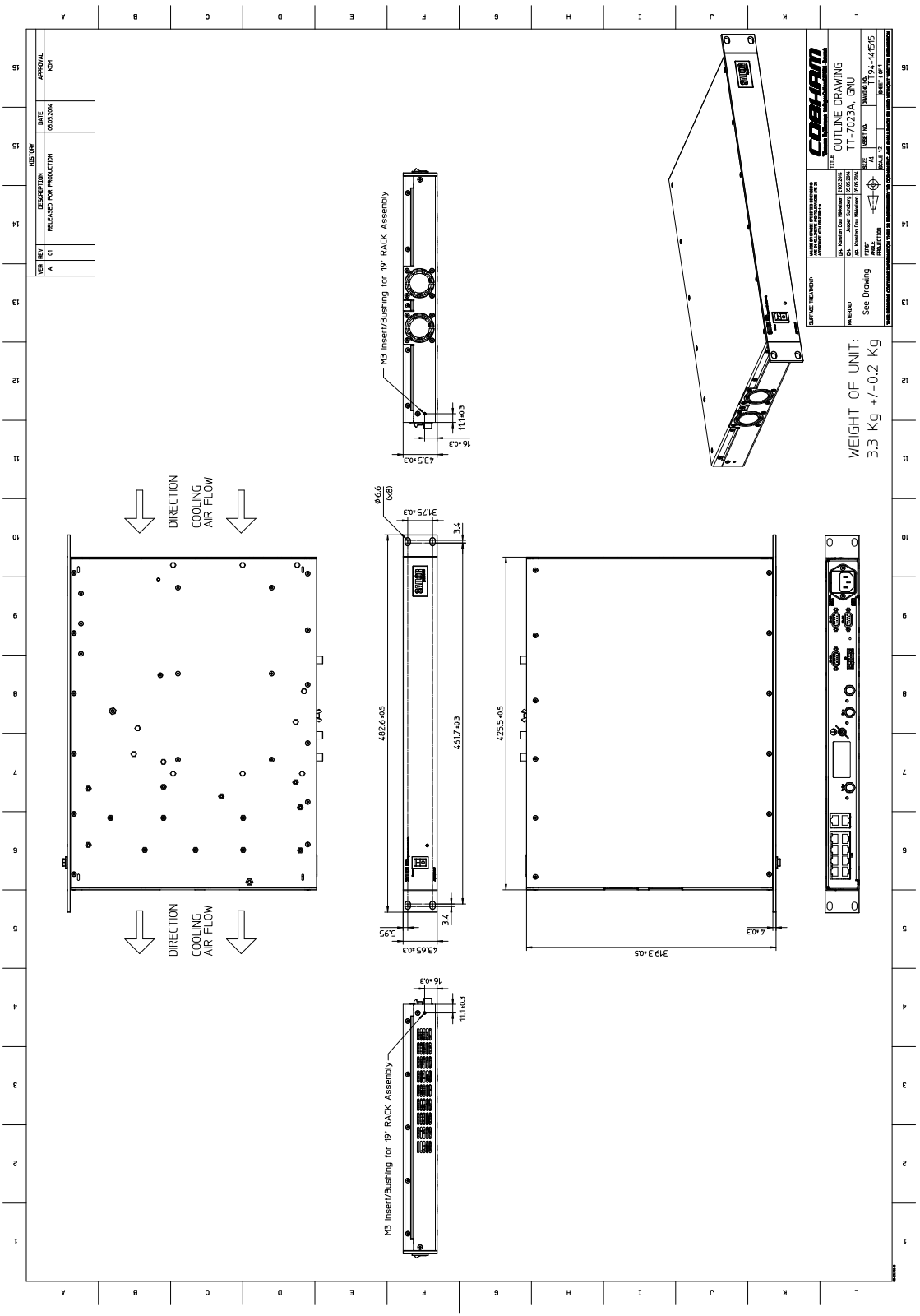


Figure A-4: Outline drawing: BDU

Dual antenna solution

This appendix has the following sections:

- *Introduction*
- *Installation of the dual antenna solution*
- *Configuration of the dual antenna solution*
- *Dual antenna software upgrade procedure*
- *Flow chart for installation of the dual antenna solution*
- *Dual antenna splitter cable*

B.1 Introduction

The SAILOR XTR GX-R2 Dual antenna solution has the following features:

- Simple installation due to single cable antenna system.
- Both antennas share the same modem.
- Ensures maximum system uptime.
- Fully automatic switching to other VSAT antenna, no user intervention needed.
- Switching upon programmed blocking zones.
- Switching if tracking signal strength drops 4 dB below the signal strength in the idle antenna.
- Switching if the ADU is malfunctioning.
- Configured using the built-in web server user interface.

B.2 Installation of the dual antenna solution

B.2.1 System overview

You can use the SAILOR XTR GX-R2 in dual antenna mode with 2 ADUs, 2 BDUs and the dual-antenna accessories kit. The kit consists of two 75 Ohm RF cables, an RF splitter and an RF combiner plus a modem keyline splitter cable. In case one antenna enters a blocking zone, the other antenna of the dual-antenna system takes over and the system continues working.

There is a Master BDU and a Slave BDU. The VSAT modem is connected to and configured in the Master BDU. The Slave BDU is configured as a slave unit, using a Master BDU as VSAT profile. The slave BDU is connected with an Ethernet cable to the Master BDU from which it gets all satellite information. You can use any LAN port as long as the Master and the Slave are in the same IP subnet. The system switches from one antenna to the other based on the programmed blocking zones in the two antennas and actual signal blockages from vessel structures, cranes etc.

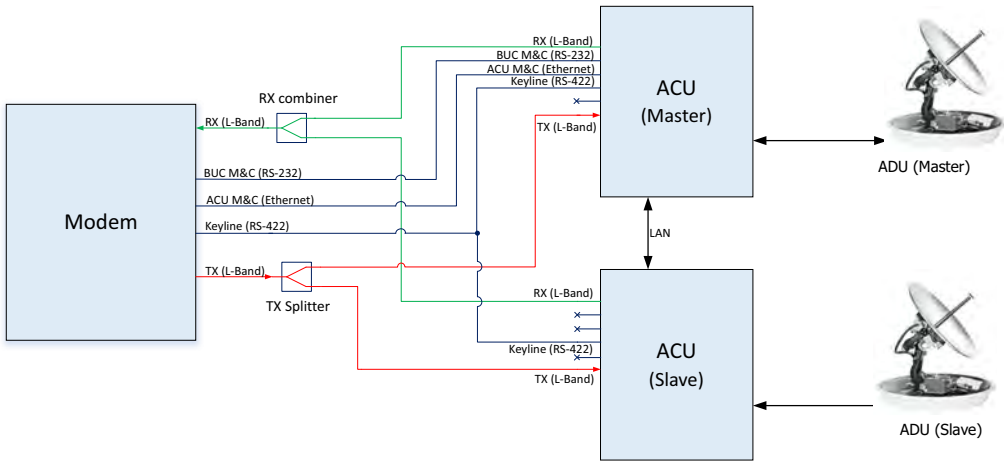


Figure B-1: Dual mode antenna, connection diagram

Important

OPERATION ON INCLINED ORBIT SATELLITES

Dual antenna installations might experience degraded performance when operated on inclined orbit satellites. These satellites change their position during the day. The changed satellite position affects the inactive (passive) antenna, resulting in mis-pointing to the satellite at the time the antenna becomes active.

In a dual antenna configuration, the inactive (passive) antenna points where the satellite was found at start-up or where last tracked while the antenna was active. The inactive (passive) antenna uses the following criteria to dynamically maintain the correct relative azimuth and elevation irrespective of whether the antenna can receive the satellite signal or not (open loop algorithm):

1. The NMEA-0183 heading data, which must come from a gyro compass without drift, deviation, speed or latitude errors.
2. The built-in rate sensors, accelerometers and GNSS receiver.
3. The calculated change in azimuth and elevation of the satellite position (Clarke belt) as the vessel moves.

Parts needed

The following parts are needed for the SAILOR XTR GX-R2 Dual antenna solution:

- 1 x SAILOR XTR GX-R2 System (Master System)
- 1 x SAILOR XTR GX-R2 ADU (Slave Above Deck Unit)
- 1 x SAILOR XTR GX-R2 BDU (Slave Below Deck Unit)
- 1 x Accessory Kit for Dual Antenna operation
  consists of 2 x RF Splitter/Combiner and 2 x Coax cables with F-connectors, RS-422 modem keyline/dual antenna splitter cable (37-179068)

B.2.2 Installation

To install the dual antennas, do as follows:

1. Install the master ADU, BDU, the RX combiner and the VSAT modem.
2. Install the slave ADU, BDU and the TX splitter.
3. Provide vessel heading input to the master BDU and slave BDU.
4. Connect the cables.

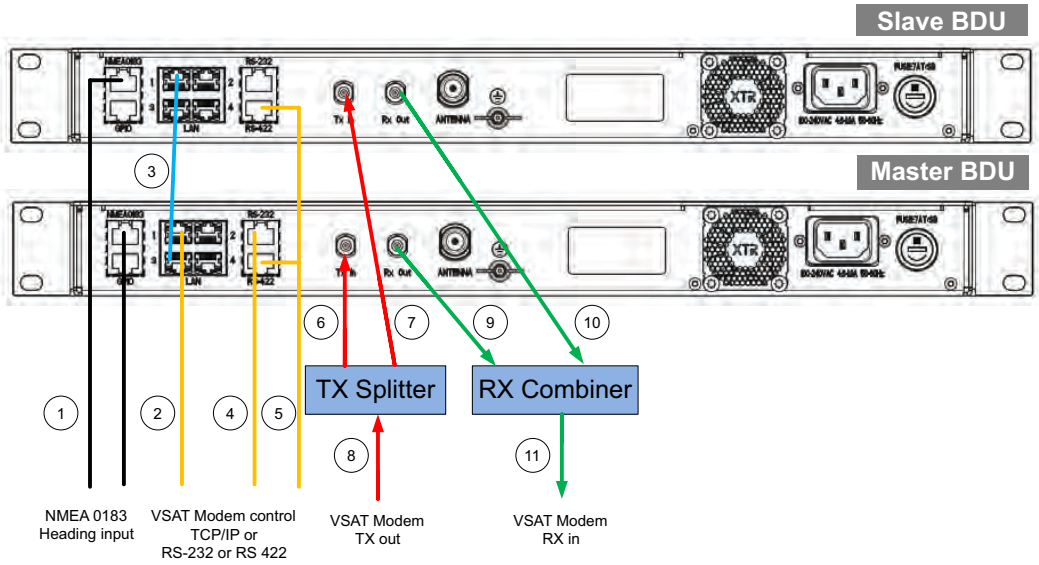


Figure B-2: Dual mode antenna, connecting cables (example)

Cable	Connection	Purpose
1	NMEA0183 to Slave BDU and to Master BDU	NMEA heading input
2	Master BDU LAN1 to GMU LAN1	OpenAMIP communication
3	Master BDU LAN3 to Slave BDU LAN1	Dual communication
4	Master BDU RS-232 to GMU RS-232	GMU control
5	Master and Slave BDU RS-422 to GMU RS-422	GMU Keyline splitter
6	Master BDU Tx in to TX splitter out	Tx when master is active
7	Slave BDU Tx in to TX splitter out	Tx when slave is active
8	GMU Tx out to TX splitter in	Tx from GMU
9	Master BDU Rx in to RX splitter in	Rx when master is active
10	Slave BDU Rx in to RX splitter in	Rx when slave is active
11	GMU Rx in to RX splitter out	Rx from GMU

Table B-1: Dual mode antenna, cabling

B.3 Configuration of the dual antenna solution

B.3.1 Overview

The master antenna VSAT profile is configured the same way as a single antenna system. The master is additionally enabled to be a dual antenna master system and will always listen for a slave connection. The slave antenna initiates the master/slave connection. When master has connectivity to a slave, it will forward satellite pointing data to the slave. If the master loses connection to the slave it will continue in stand-alone operation. The following list shows the tasks for setting up a dual-antenna system:

- *To configure the Master BDU*
- *To configure the Slave BDU*
- *Blocking zone setup for dual antenna setup*
- *Lineup and commissioning for dual antenna setup*
- *To make an OTC for dual antenna systems*

On the DASHBOARD, section SYSTEM INFO, there is a link saying **Slave ADU** or **Master ADU** where you can switch between the master/slave dashboard. Below the top bar you can see whether the current system is active or not.

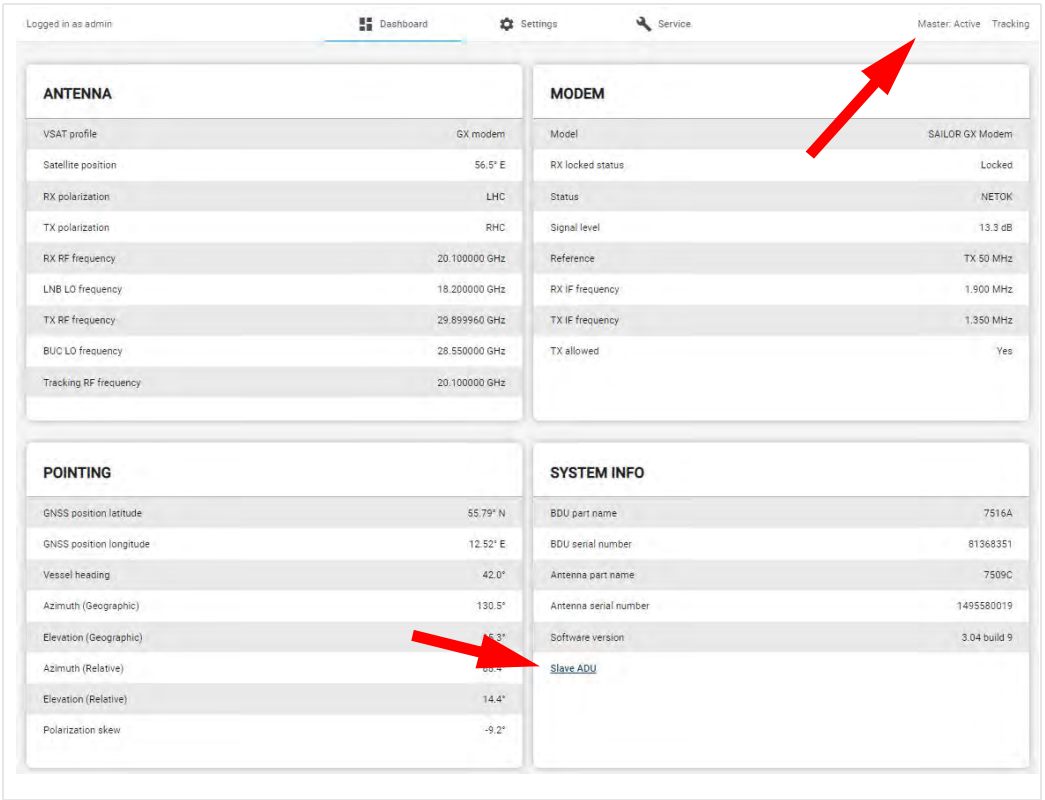


Figure B-3: Dual-antenna mode, link on DASHBOARD (example for Ku antenna)

The dual-antenna system switches between the 2 antennas in the following scenarios:

- When in a programmed blocking zone.
- When the signal for the active antenna is blocked for more than 2 minutes.
- Malfunctioning ADU.

- When signal strength drops 4 dB lower than the in-active antenna.

B.3.2 To configure the Master BDU

The configuration of the master BDU depends on which ports are used and how your network has been configured.

Important Before you enable dual mode, set up the master and the slave to be on the same subnet but with different IP addresses.

Configure the Master BDU VSAT profile exactly the same way as a single SAILOR XTR GX-R2 system. Recommended network settings are shown in the following figure.

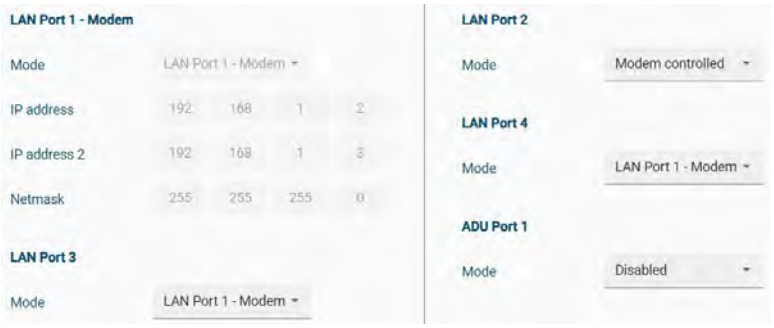


Figure B-4: Master BDU, Network settings

After the Master BDU has been configured, do as follows:

1. Click **SETTINGS > Dual antenna**.
2. Select **Set this antenna as master in dual configuration** and click **Apply**.

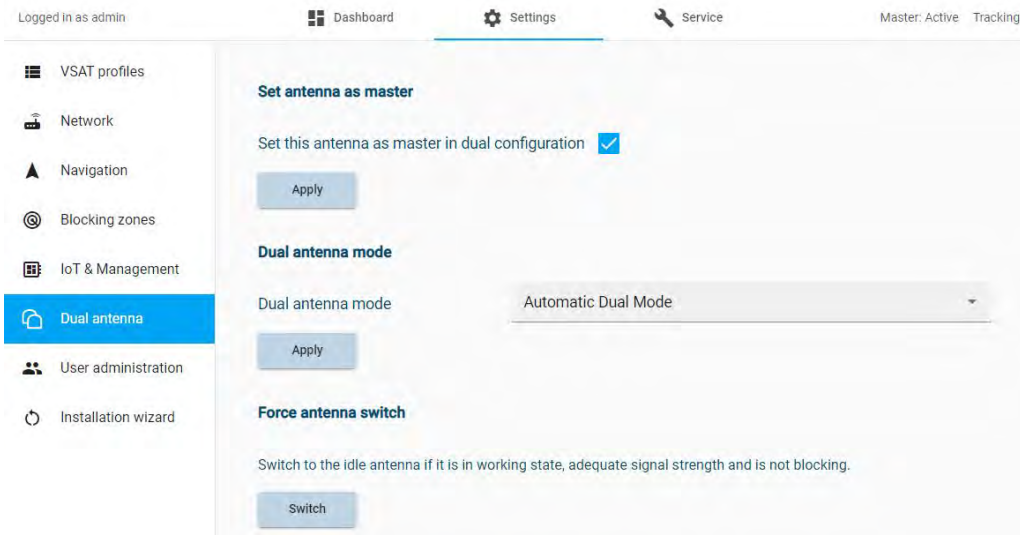


Figure B-5: Enabling dual-antenna mode in the Master BDU

3. Dual antenna mode, select Automatic Dual Mode.
4. If needed, click Switch to the other antenna in the dual antenna system.

B.3.3 To configure the Slave BDU

The Slave BDU is configured to use the Master BDU as VSAT profile. The VSAT profile must point to the IP address of the Master BDU, that is the IP address of the LAN port at which the Master/Slave communication cable is connected.

1. Add a specific VSAT profile for dual antenna mode, go to **SETTINGS > VSAT profiles**.
2. Add a profile, name it for example **ADU Slave**.
3. Select modem type **Master BDU**.
4. Set the IP address and netmask for the Slave BDU VSAT profile to match the subnet of the Master BDU.
5. Enter the IP address of the master BDU. IP addresses for the master and slave must be in the same subnet. Recommended network settings are shown in the following figure.

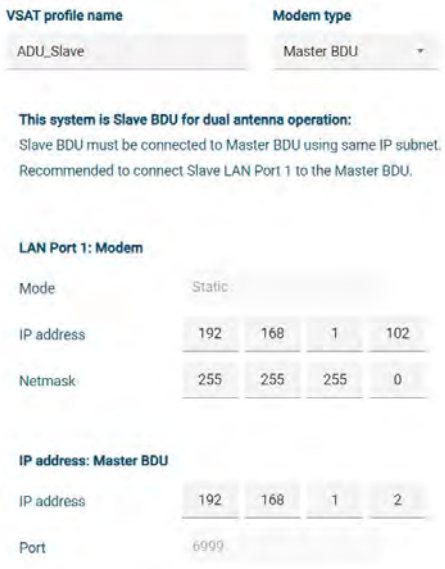


Figure B-6: Slave BDU VSAT profile

6. Click the save icon to save the VSAT profile.
7. Click **SETTINGS > VSAT profiles**.
8. Click **Activate** to activate the VSAT profile **ADU Slave**.

B.3.4 Blocking zone setup for dual antenna setup

It is recommended to define the following 3 blocking zones in each SAILOR XTR GX-R2 system:

1. Actual blocking zones on the vessel (No TX)
2. Switching blocking zones (TX allowed)
3. Personnel safety zones (No TX)

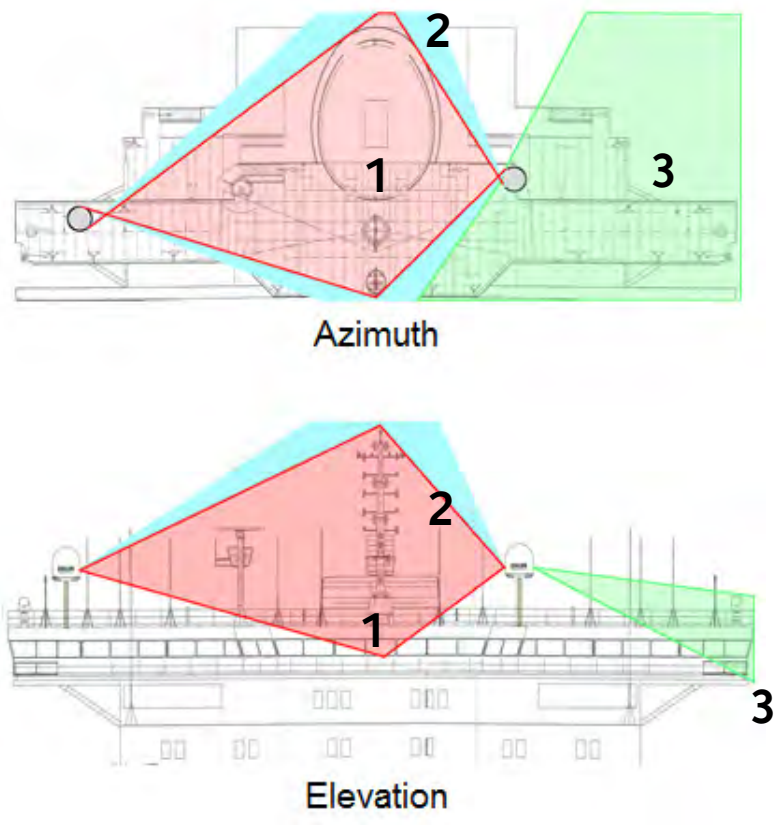


Figure B-7: Dual-antenna mode, blocking zones — azimuth and elevation

B.3.5 Lineup and commissioning for dual antenna setup

The master BDU and the slave BDU must be lined up and commissioned one by one. . Do as follows:

1. Connect cables, RX combiner and TX splitter as described in B.2.2 Installation.
2. Master lineup:
   a. Configure the Master VSAT profile to match the modem and activate the profile.
   b. Wait for the modem to get Rx lock with the satellite.
   c. Go to the Master lineup page and make the lineup with the hub.
3. Slave lineup:
   a. Disconnect the Ethernet cable from Master LAN1 and connect it to Slave LAN1 so the slave can communicate with the modem.
   b. Configure a Slave VSAT profile to match the modem and activate the profile.
   c. Wait for the modem to get Rx lock with the satellite.
   d. Go to Slave lineup page and make the lineup with the hub.
   e. Disconnect the Ethernet cable from Slave LAN1 and re-connect it to Master LAN1 so the master antenna system can communicate with the modem again.

Now configure the slave antenna system:

1. Connect the slave antenna to the master.
2. Log in to the Master.

3. Go to Setting - Dual antenna page to set the antenna as master in dual configuration.

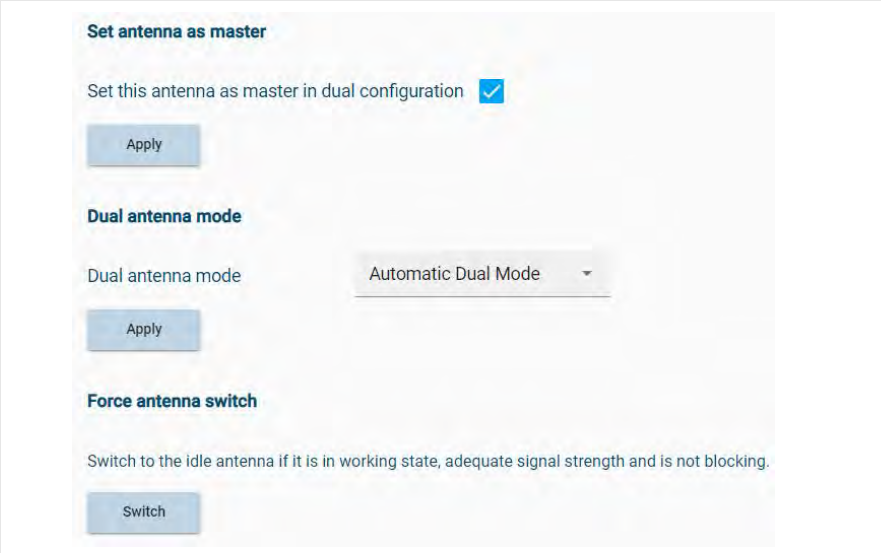


Figure B-8: Dual-antenna mode

B.3.6 To make an OTC for dual antenna systems

Important Do not power up the GMU at this point in time.

1. Make an azimuth calibration with both antenna systems (master and slave) using manual azimuth calibration mode and one of the GX satellites, **Make sure you have line-of-sight**..
2. Make a TX calibration for the master antenna system and for the slave antenna system.

The entire dual antenna system is now ready for OTC.

1. Turn on the modem power.
   The first time the modem is turned on it will perform an OTC both on the master and the slave antennas. During this process the modem will restart several times before pointing towards the satellite and establish the link.
2. Be patient. The OTC procedure will take at least 16 minutes.

   Important Interrupting the process before it has completed will cause the process to restart.
3. If for some reason you make a TX cable calibration again, the system will request the operator to initiate a manual OTC procedure. You can start the OTC procedure from the modem dashboard.

B.4 Dual antenna software upgrade procedure

When making a software upgrade of a dual antenna system, it must be done in the correct order to limit downtime of the VSAT service. It is recommended to do the upgrade at a location where both antennas have connection to the satellite and are outside blocking zones. In general a dual antenna system must have the same software version in both antennas, otherwise a software mismatch warning will be active on the system.

To make a software upgrade, do as follows:

1. Connect to the Slave BDU web server and upload the new software.
2. Wait for the Slave antenna system to reboot and to have finished its Power On Self-Test (POST) and having connected to the Master antenna system again. The dual antenna system might show a warning with software mismatch information.
3. Connect to the Master BDU web server and upload the new software.
4. Wait for the Master antenna system to reboot and finish its Power On Self-Test (POST).

The dual antenna system should now be fully functional without any errors or warnings present.

B.5 Flow chart for installation of the dual antenna solution

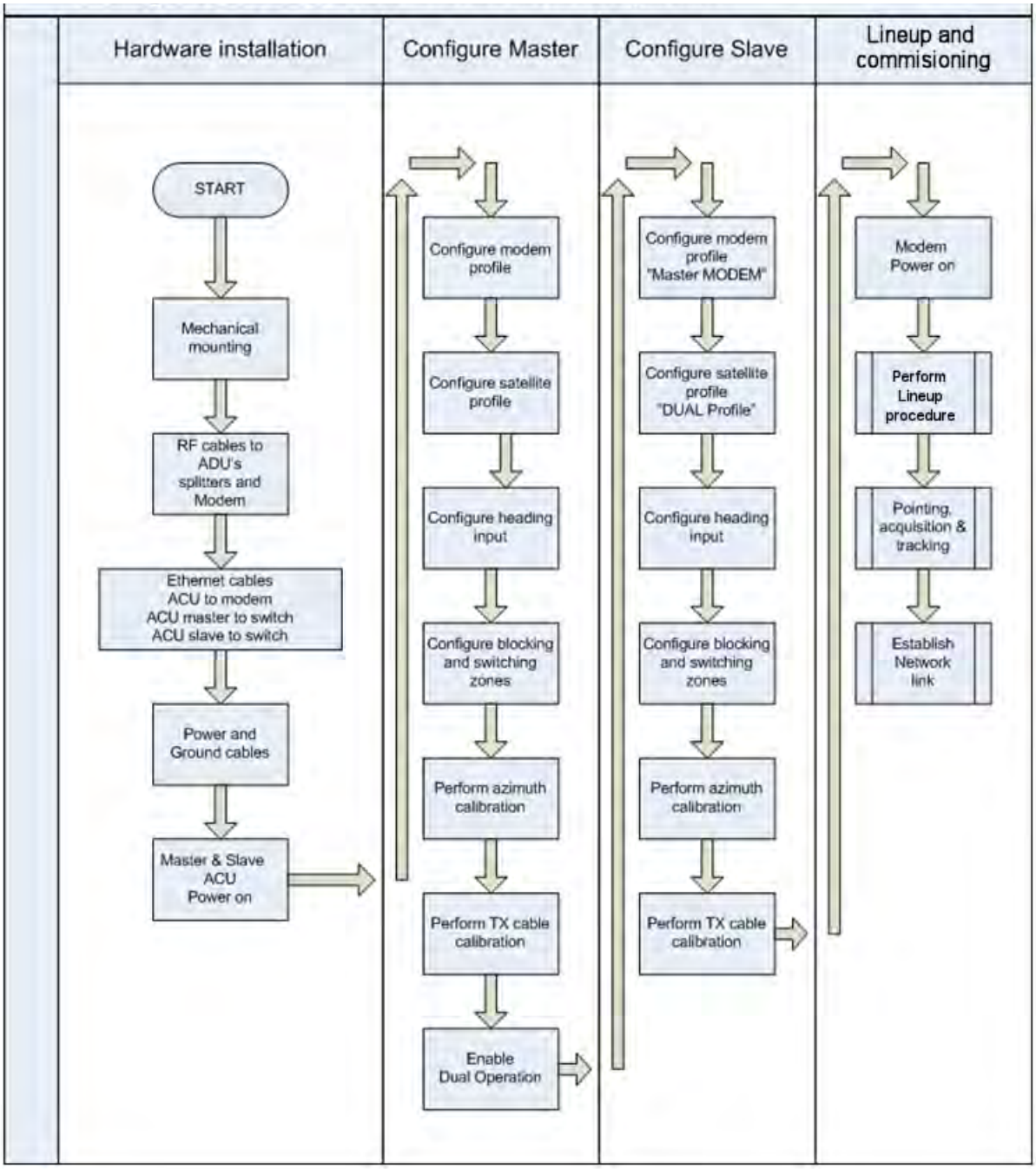


Figure B-9: Flow chart for dual antenna installation

B.6 Dual antenna splitter cable

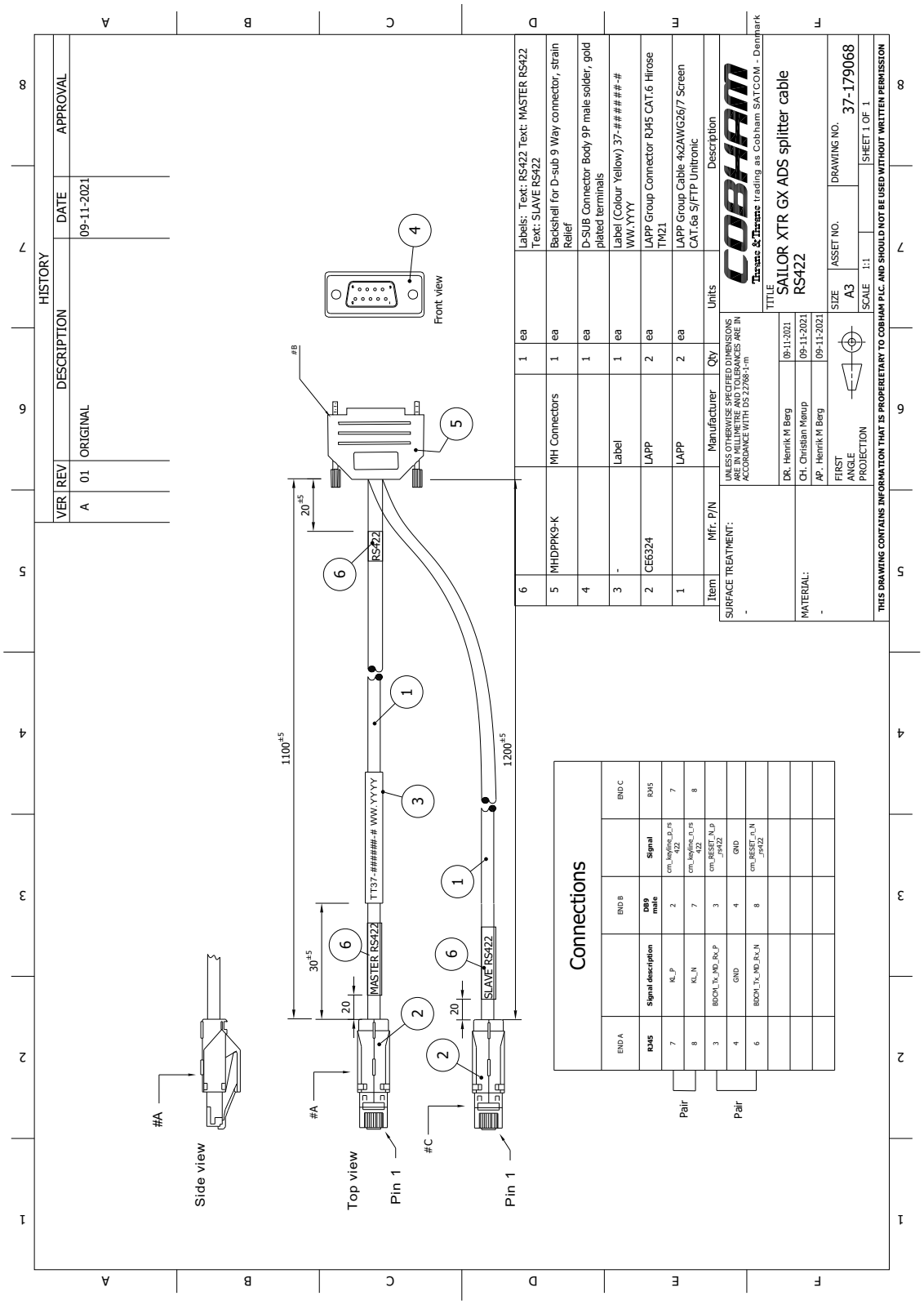


Figure B-10: Splitter cable

Miscellaneous

C.1 Performance optimization for blockage

C.1.1 Encountering blockage, configured with multiple satellites.

Definition of blockage

In most VSAT installations the VSAT antenna is installed in a position with areas of blockage. Blockage is often caused by the vessel's masts, stacks and other equipment installed on board. During installation the blockage areas should be entered in the web interface, see *Blocking zones* on page 4-20.

When blockage occurs, the BDU can inform the VSAT modem (if the blocking zones have been typed correctly into the BDU web interface). It is often seen that by not informing the VSAT modem of blockage the VSAT system gains a higher uptime, although the quality of the extra gained uptime is not good enough to give the user a stable data connection. Therefore it is not of any value to the user. Another disadvantage of not informing the VSAT modem of blockage is that the VSAT modem does not have the option to switch to a different satellite to avoid the blockage.

VSAT modems can typically[2] only receive one signal from the BDU, which is "TX-mute" / "modem must not transmit", they are therefore not able to perform fast switching, but are limited to use a simple time-out, which is configured as a fixed value in the modem configuration.

The simple time-out means that there is a fixed delay, plus the time needed to acquire another satellite, before there is a chance of regaining good link performance.

If the signal is not sent to the modem, the system can in some cases remain linked and have a higher uptime, but not provide a stable data connection. Such a link is of no value to the subscriber. Not sending the blockage (TX-Mute) signal also extends the period of the poor-quality link, as the VSAT modem is still relying on a time-out before switching to another satellite, and the time-out may be constantly reset by the link coming and going.

Better blockage communication

A major disadvantage of this single signal is that if the VSAT modem has multiple satellites to choose from, then, when selecting a new satellite, the VSAT modem is again relying on the simple time-out. This continues until a satellite with no obstruction in the view from the satellite terminal is selected. If the VSAT modem was able to receive information from the BDU that the view towards the current satellite is blocked, it would be able to choose a visible satellite much faster without the need to wait for multiple time-outs.

2. There are VSAT modems that can interpret more detailed information about blockage from the BDU. This allows for increased performance in the event of blockage.

Minimum elevation angle

One safe way of getting optimum performance under the current conditions is to switch to a satellite in view as fast as possible. This is done by having well defined satellite parameters in the VSAT modem configuration. It is the VSAT modem that has the task of selecting the correct satellite, and since the VSAT modem is only concerned about the satellite visibility at the current geographic position, it is very important to enter the minimum elevation of a satellite at which a stable link can be established.

It is often seen that the minimum elevation is set to 0 (zero). A setting of 0 is not only in many cases below the usable limit of the satellite, but also a violation against ETSI EN 302 340, where a calculated minimum elevation ranges from 12° to 3° depending on power and bandwidth must be ensured or FCC §25.205 which states the minimum elevation to be 5°. Unless the vessel is operating in international waters with no other options, a minimum elevation of 10° or higher is recommended.

Conclusion

Fewer but well-functioning satellites to choose from give better user performance than having many satellites, which may have a longer uptime but do not provide a stable data connection. In the end it is not the actual uptime the subscriber is concerned about, but it is the uptime where the link gives a stable data connection.

Command line interface

D.1 Connection modes

After you have done the initial configuration and connected the SAILOR XTR to your network, you can use SSH to configure the SAILOR XTR. You can also set up VSAT modem parameters. Note that the following sections cover the command line interface for all SAILOR XTR antennas.

Some of the commands may not be relevant for the antenna described in this manual.

SSH and Telnet connection

You can access the command line interface (UCLI) via SSH or Telnet. The UCLI interface is available on the standard SSH port 22 or Telnet port 23.

Important Check that you have **Telnet access** enabled on the page **IoT & Management** in the web interface.

Access to the SAILOR XTR system is protected by the password for the admin account. This is the same password that is used in the web interface.

Use any BDU LAN port and corresponding IP address to get access to the UCLI. To start an UCLI session do as follows:

1. Open an SSH or Telnet client of your choice.
2. Enter the IP address for the BDU LAN port, login user: admin and password for admin account.

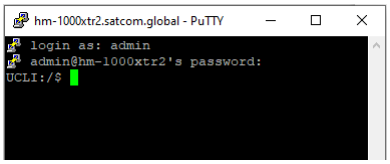


Figure D-1: Command line interface, login

D.2 List of commands

The following commands are described in detail. They are listed in alphabetical order.

- *antenna_data*
- *calib*
- *config*
- *demo*
- *dual_antenna*
- *exit*
- *help*
- *navigation*

- *status*
- *system*
- *test*
- *iothub*

D.2.1 antenna_data

Command	Description
antenna_data	Shows detailed information of this specific command.
antenna_data type	Shows current antenna type. Example output: UCLI:/$ antenna_data type System: 7509D Type: 2 Oem: inmarsat sub type: 0 lnb type: 1 buc type: 4
antenna_data type	antenna type [<adu-id> [<sub-type>]]: sets the antenna type and the optional sub-type.

Table D-1: UCLI command: `antenna_data`

D.2.2 calib

Command	Description
calib	Shows the commands for encoder, ZRM and compass calibration
calib zrm	Start XEL/ELE ZRM calibration
calib ?	Other calibrations currently not supported

Table D-2: UCLI command: `calib`

D.2.3 config

Command	Description
config	Shows detailed information of this specific command.
config current_list	Shows the current configuration.

Table D-3: UCLI command: `config`

D.2.4 demo

Command	Description
demo	Shows detailed information of this specific command.
demo start	Starts a demo pattern where the antenna will turn azimuth, elevation and cross elevation until it receives the command **demo stop.**
demo stop	Stops the antenna demo pattern.
demo reset	Resets the antenna to angle 0.

Table D-4: UCLI command: demo

D.2.5 dual_antenna

Command	Description
dual_antenna mode	Shows the current dual antenna mode • single • master • slave
dual_antenna status	• Shows the current dual-antenna mode status • active • inactive

Table D-5: UCLI command: dual_antenna

D.2.6 exit

Command	Description
exit	Exits the connection to the SAILOR XTR GX-R2.

Table D-6: UCLI command: exit

D.2.7 help

Command	Description
help	Shows detailed information of this specific command.
help status	Shows the sub commands and description for the command status.
help system	Shows the sub commands and a short description for the command system.

Table D-7: UCLI command: **help**

Command	Description
help config	Shows the sub commands, unit and description for the command `config`.
help demo	Shows the sub commands, unit and description for the command `demo`
help dual antenna	Shows the sub commands, unit and description for the command `dual antenna`
help exit	Shows the sub commands, unit and description for the command `exit`

Table D-7: UCLI command: **help** (Continued)

D.2.8 navigation

Command	Description
navigation	Shows detailed information of this specific command.
navigation heading	Shows the current navigation configuration. navigation heading <mode> [value]: sets navigation configuration. Modes can be: • external: Use external NMEA input • fixed: Use fixed heading • none: Use headingless

Table D-8: UCLI command: **navigation**

D.2.9 status

Command	Description
status	Shows detailed information of this specific command.
status system	Shows the current status of the SAILOR XTR GX-R2.
status track_all	Shows the current values for all tracking parameters: • vessel heading • azimuth relative • elevation relative • polarization skew • GPS latitude and longitude
status event_list	Shows a list of active events.

Table D-9: UCLI command: **status**

D.2.10 system

Command	Description
system	Shows detailed information of this specific command.
system restart	Sends a command to the BDU to restart the system instantaneously. It makes a power-on self test and then points to the last used satellite.
system info	Shows the software version, part names and serial numbers of the SAILOR 1000 XTR GX-R2 4.5W.

Table D-10: UCLI command: **system**

D.2.11 test

Command	Description
test	Shows detailed information of this specific command.
test frict	test frict [axis]: performs a friction test on given axis. Omitted or a = AZI, e = ELE, x = XEL, * = All 3

Table D-11: UCLI command: test

D.2.12 iothub

Command	Description
iothub	Shows detailed information of this specific command.
iothub set <hostname|deviceid|enable> <value>	Sets iothub configuration parameters.
iothub read <hostname|deviceid|enable>	Shows iothub configuration parameters
iothub_cert set <key|cert>	iothub_cert iothub certificate/private key You have 30 s to enter the certificate key.
iothub_cert read <key|cert>	Shows iothub certificate/private key

Table D-12: UCLI command: iothub

Command	Description
iothub_schedule set <group> [parameter] <value>	Sets iothub scheduler configuration parameters.
iothub_schedule read <group> [parameter] <value>	Reads iothub scheduler configuration parameters.

Table D-12: UCLI command: `iothub (Continued)`

Grounding and RF protection

E.1 Introduction

E.1.1 Reasons for grounding

Grounding the SAILOR XTR GX-R2 system is required for at least two reasons:

- Safety: Lightning protection of persons and equipment.
- Protection: ESD (Electro Static Discharge) protection of equipment.

E.1.2 Safety

First of all grounding of the system is required for safety reasons. In the event of a lightning strike at the ADU a proper grounding of the system will provide a low resistance path to divert the strike discharge to seawater.

E.1.3 ESD Protection

The ESD protection circuits in the BDU rely on proper grounding of the system in order to work properly. Otherwise sensitive circuits within the BDU might be damaged due to ESD when you are handling the equipment.

E.1.4 RF interference

Interference induced from nearby high-power RF transmitters might cause system failures and in extreme cases permanent damage to the SAILOR XTR GX-R2 equipment. If there are problems with interference from HF transmitters, it is advisable to mount ferrite clamps on the coax cable in order to provide suppression of induced RF. The ferrites will have no effect on the differential-mode signals but increases the impedance in relation to common-mode RFI.

Recommendations

Use 1-5 pcs. hinged clamp cores (e.g. the RFC or SFC series from Kitagawa) mounted on the ADU cable near the ADU.

E.2 Grounding Recommendations

E.2.1 To ground the BDU

The BDU should be grounded to the ship/hull. For this purpose you may use a short ADU cable and a grounding kit. Further, the BDU must be grounded at its grounding stud in order to ensure proper grounding if the short ADU cable is disconnected. For further information, see *To ground the BDU* on page 2-25.

If you use the Extended cable support, make the ground connections through the cable support. You may need to extend the ground plane using copper foil, see the following section.

To extend the ground plane

In some cases it may not be possible to access the hull and at the same time place the BDU in a suitable place. A way to insure good grounding and at the same time make it possible to ground the coax cable - is to extend the ship ground plane by means of copper foil. The maximum length of the foil is determined by the width of the foil:

Copper foil 5 cm wide: Max 50 cm
Copper foil 10 cm wide: Max 100 cm
Copper foil 20 cm wide: Max 200 cm

Note The foil must be at least 0.1 mm thick.

Connect the foil to the hull by plenty of screws or hard–soldering. Run the foil past the place where the short ADU cable is to be grounded and mount a grounding kit on top of the foil. For details on the jumper cable see *Jumper cable for grounding* on page E-9.

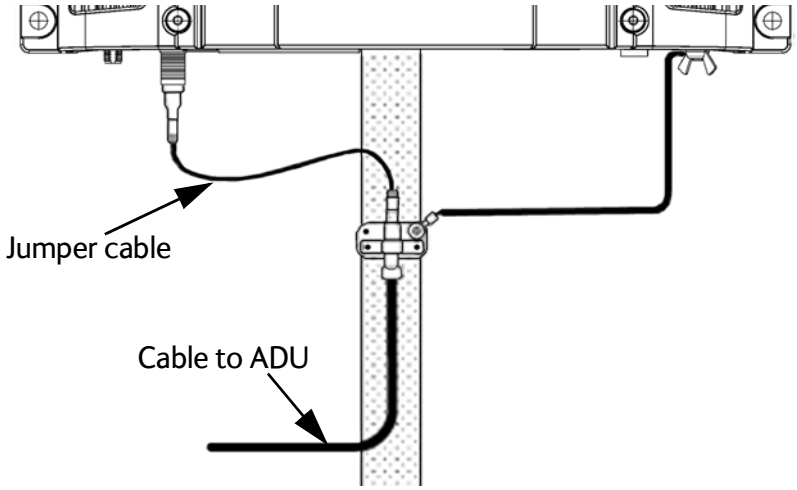


Figure E-1: Extending the ground plane

E.2.2 To ground the ADU

You can ground the ADU to the ship/hull via one or more of its mounting bolts. Make sure to remove painting, dirt, grease etc. at the mounting holes in order to make good

electrical contact to the hull. Use serrated washers when securing the mounting bolts and seal the joint with protective coating to avoid corrosion.

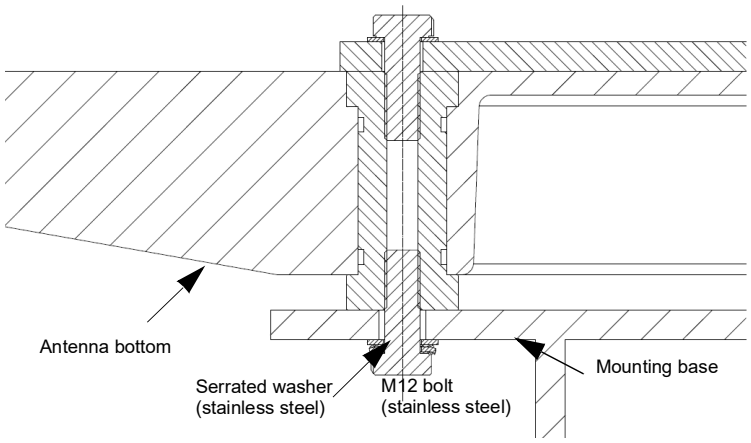


Figure E-2: Grounding the ADU

Note For optimum grounding use the mounting bolt located closest to the ADU cable plate, see . *To ground the ADU* on page 2-20.

It is always recommended to establish the shortest possible grounding path e.g. on steel hulls the ADU should be grounded directly to the hull[3]. However, due to the fact that this is not possible on e.g. fiberglass hulls (nor is it preferable on aluminium hulls) a number of alternative grounding methods are suggested in the following paragraphs.

E.2.3 Alternative grounding for steel hulls

The following guidelines assume a two-wire, isolated grounding arrangement; that is no part of the circuit, in particular the battery negative, is connected to any ground potential or equipment.

To ground the BDU

The BDU should preferably be grounded to the ship with the short cable. Further, the BDU must be grounded at its grounding stud in order to ensure a proper grounding if the short ADU cable is disconnected.

The ground connection can be established either at the hull (recommended) or at a dedicated RF ground if available (alternative).

Important However, bear in mind that the ADU ground connection is to be made at the **same electrical ground potential as the BDU** (see *To ground the ADU*).

The BDU provides galvanic isolation (as required) from its input power terminals to the chassis/grounding stud. This way the isolated grounding arrangement is maintained.

3. Please note that the ADU ground connection is made at the same electrical ground potential as the BDU.

To ground the ADU

Note For optimum grounding use the mounting bolt located closest to the ADU cable plate, see . *To ground the ADU* on page 2-20.

Terminal grounded at the hull (recommended)

In this case the ADU is grounded to the ship via one (or more) of its mounting bolts. Make sure to remove painting, dirt, grease etc. at the mounting holes in order to make good electrical contact to the hull. Use serrated washers when securing the mounting bolts and seal the joint with protective coating to avoid corrosion.

Terminal grounded at a dedicated RF ground (alternative)

In this case the ADU is grounded with a separate ground cable. The ground cable must be routed parallel and close to the shielded coax cable connecting the ADU to the BDU grounding kit. A heavy gauge wire with tinned strands (min. 6 mm^2) can be used for this purpose.

Note The ADU must be electrically isolated at its mounting bolts by means of shoulder bushings and washers ensuring the isolated RF ground - see *Isolation of the ADU from the mounting base* on page E-7.

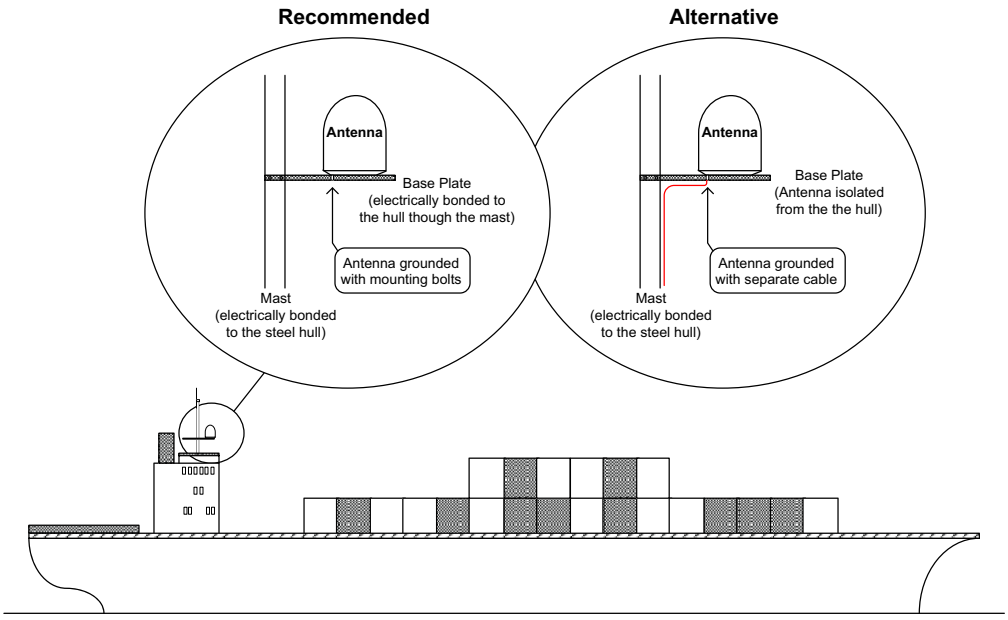


Figure E-3: Grounding at a dedicated RF ground (alternative)

E.2.4 Alternative grounding for aluminum hulls

The following guidelines assume a two-wire, isolated grounding arrangement; that is no part of the circuit, in particular the battery negative, is connected to any ground potential or equipment.

To ground the BDU

The BDU should preferably be grounded with the short cable. Further, the BDU must be grounded at its grounding stud to ensure a proper grounding if the short ADU cable is disconnected.

The ground connection must be established at a dedicated RF ground (either capacitively or electrically coupled).

Important Remember to make the ADU ground connection at the **same electrical ground potential** as the BDU (see *To ground the ADU*).

The BDU provides galvanic isolation (as required) from its input power terminals to the chassis/grounding stud. This way the isolated grounding arrangement is maintained.

To ground the ADU

If the mounting base of the ADU is electrically connected to the hull (or any other ground potential than the BDU), the ADU must be isolated at its mounting bolts by means of shoulder bushings and washers, see . This is done in order to prevent DC currents flowing in the hull thus causing electrolytic corrosion.

However, a ground connection must be established via one of the mounting bolts using a separate ground cable. The ground cable must be routed parallel and in close proximity to the shielded coax cable hence connecting the ADU to the BDU Grounding kit. A heavy gauge wire with tinned strands (min. 6 mm^2) can be used for this purpose.

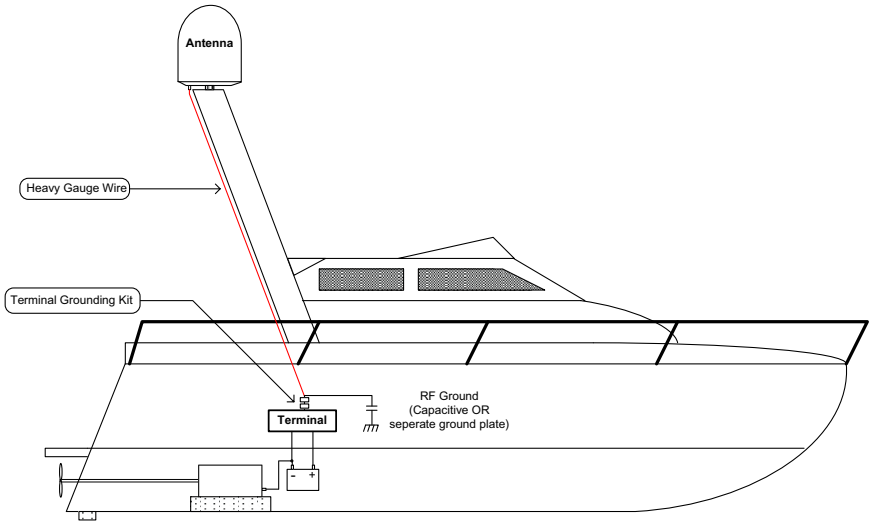


Figure E-4: Alternative grounding for aluminium hulls

E.2.5 Alternative grounding for fiber glass hulls

To ground the BDU

The BDU should preferably be grounded with the short ADU cable and a grounding kit (available from Cobham SATCOM). Further, the BDU must be grounded at its grounding stud in order to ensure a proper grounding if the short ADU cable is disconnected.

The ground connection must be established at a dedicated RF ground (either capacitive or electrical coupled).

Important

Bear in mind that the ADU ground connection is to be made at the **same electrical ground potential** as the BDU (see *To ground the ADU*).

To ground the ADU

If the mounting base of the ADU is electrically connected to any other ground potential than the BDU (e.g. Lightning Ground), the ADU must be isolated at its mounting bolts by means of shoulder bushings and washers - see section .

However, a ground connection must be established via one of the mounting bolts using a separate ground cable. The ground cable must be routed parallel and in close proximity to the shielded coax cable hence connecting the ADU to the BDU Grounding kit. A heavy gauge wire with tinned strands (min. 6 mm^2) can be used for this purpose.

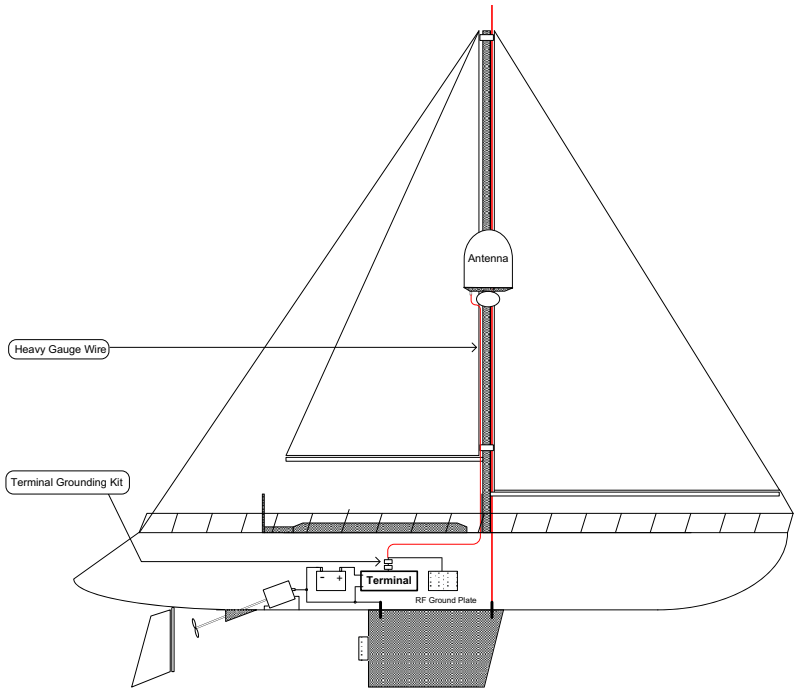


Figure E-5: Alternative grounding for fiberglass hulls

E.2.6 Separate ground cable

Ground cable - construction

When dealing with electrical installations in a marine environment, all wiring must be done with double insulated, tinned strands, high quality and if exposed also UV resistant cables. This shall also apply to the separate ground cable mentioned in the previous paragraphs.

The ground cable is constructed using an appropriate cable with a cross section area of at least 6 mm^2 (AWG10) and terminated with insulated ring crimp terminals – see

illustration below. The crimp terminals must be a marine approved type e.g. the DuraSeal series from Raychem.

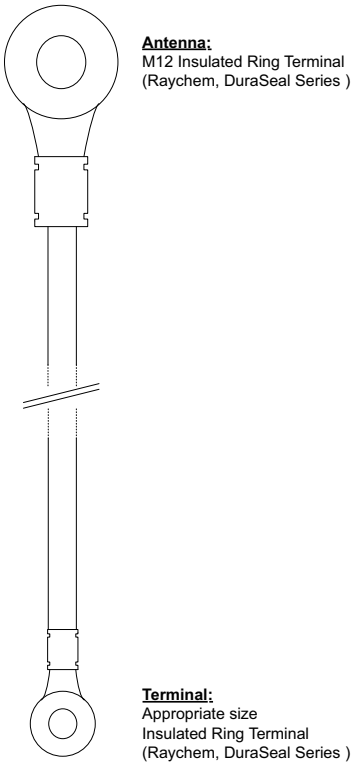


Figure E-6: Separate ground cable

Ground cable - connection

Mount the ground cable close to and parallel to the shielded coax cable thus minimizing ground loop problems. If possible, route the coax cable and the ground cable in metal conduits bonded to the hull or within a mast (depending on the actual installation).

The ground cable must be connected at one of the mounting/grounding bolts on the ADU. Use bolts and washers of stainless steel and seal the joint with protective coating to avoid corrosion. If the ADU is to be isolated from the mounting base, shoulder bushings and washers must be used — see figure E-7, *Isolation of the ADU from the mounting base* on page E-8.

At the other end, connect the ground cable as described in *To ground the BDU* on page E-2.

Isolation of the ADU from the mounting base

In cases where the ADU is to be isolated from the mounting base, shoulder bushings and washers (accessories) must be used as illustrated below. Please note that the

isolation has to be implemented on all four mounting bolts (including the bolt securing the ground cable).

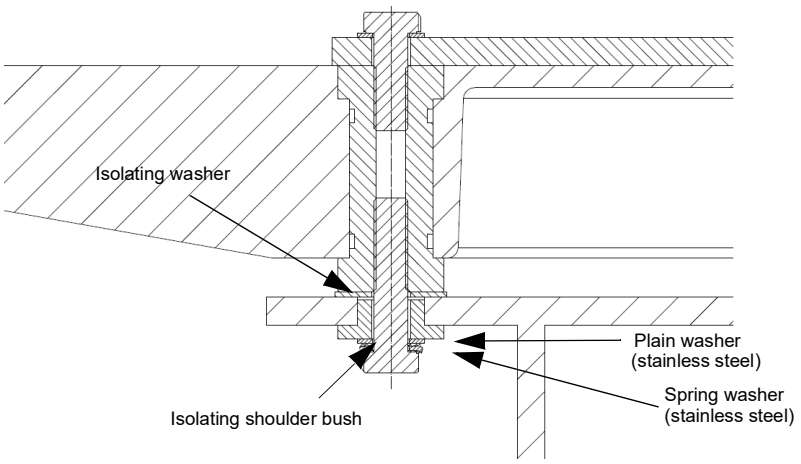


Figure E-7: Isolation of the ADU from the mounting base

The ground cable must be connected at one of the mounting/grounding bolts on the ADU as illustrated below. Remember to seal the joint with protective coating to avoid corrosion.

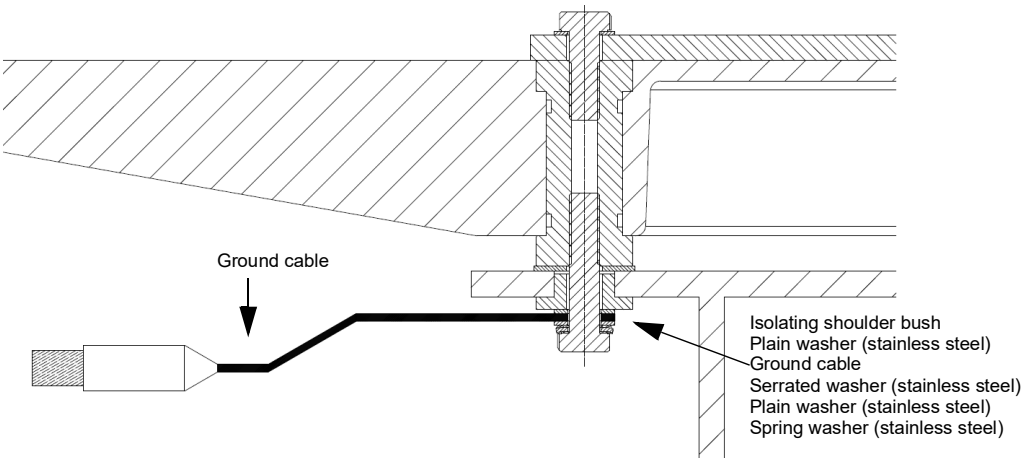


Figure E-8: ADU isolation and grounding cable

E.3 Jumper cable for grounding

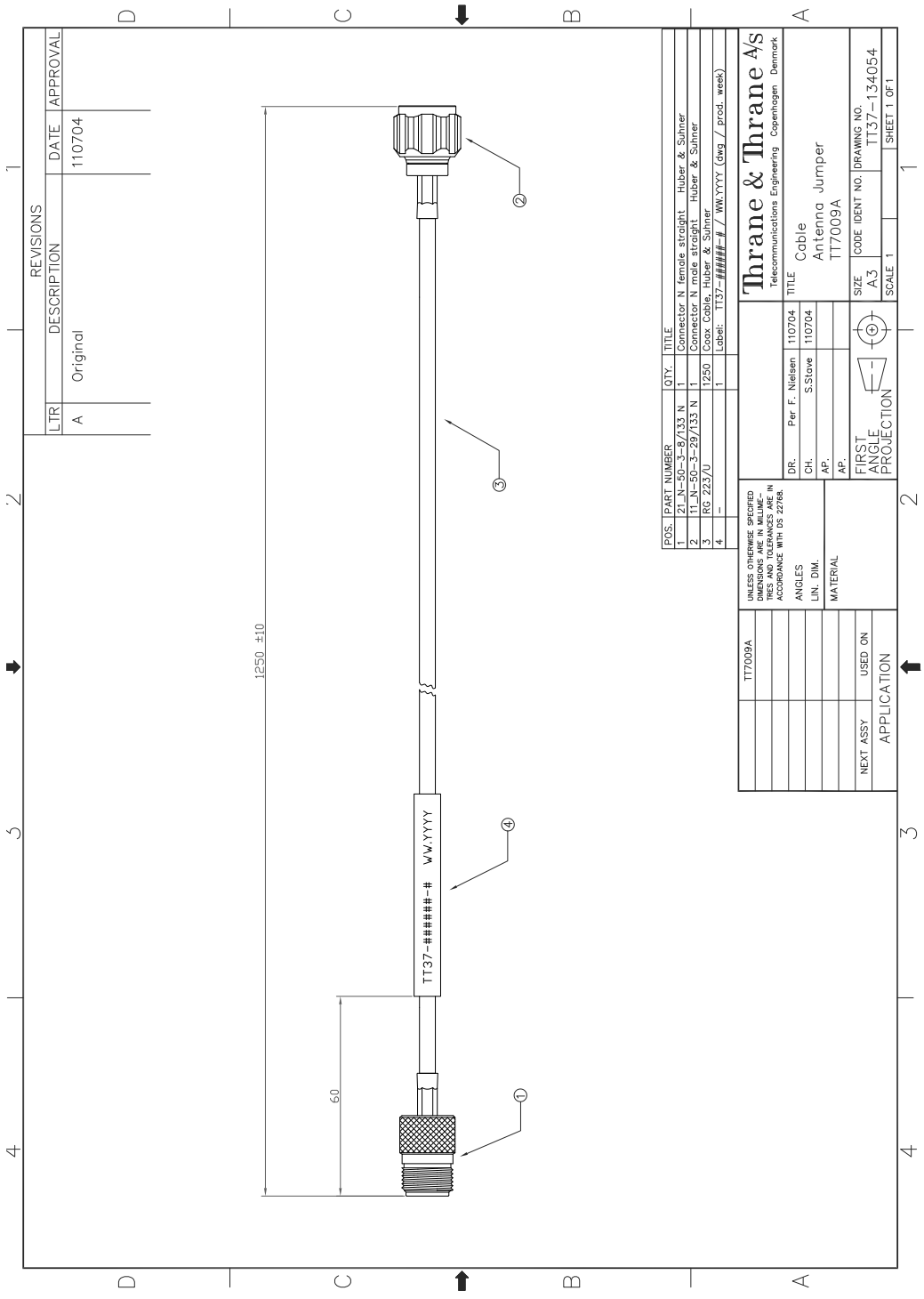


Figure E-9: Jumper cable for grounding (specifications)

Event messages

F.1 Overview

The SAILOR XTR GX-R2 detects events during

- POST (Power On Self Test) – a self test performed at every power-up.
- Self test – started in the web interface
- CM (Continuous Monitoring) – automatically performed while the system is in operation.

When the SAILOR XTR GX-R2 detects an event that requires your action, it issues an event message and the red Fail/Pass LED in the LED panel of the BDU is lit. As long as an event is active, it is shown in the BDU display and the web interface (in **Service > Events** or click the event icon in the top bar.

Note Active events and notifications are shown. As soon as the event is cleared, it is not displayed any longer. It is then moved to the section **Cleared events last 24 hours**.

State the Event ID when contacting your service partner.

The event description might contain a number of digits in brackets, e.g. (00000005). This is supplemental information and used for service and diagnostics purposes.

Some of the messages may not be relevant for the antenna described in this manual.

F.2 List of events

(170322)

ID	Module	Type	Description	Explanation
08061-0	ADM	WARNING	VMU linux shell password	The specified password (root) for the satellite modem is not accepted by the modem. (!T,!G,!S)
08062-0	ADM	WARNING	VMU debug shell password	The specified password (user) for the satellite modem is not accepted by the modem. (!T,!G,!S)
08069-0	ADM	WARNING	Blocking Zone	The antenna has entered a blocking zone. (!S)
0806A-0	ADM	WARNING	VMU connection	The BDU has lost connection to the satellite modem. (!T)
0806C-0	ADM	WARNING	VMU frequency setup	There is a mismatch in the frequency setup. Probably the satellite modem is not configured correctly to match the requirements of the BDU and antenna. A common mismatch is the absence of Rx or Tx LO parameter in the satellite modem. (!T)
08073-0	ADM	WARNING	Slave connection	The system is configured as a dual antenna master, but no dual antenna slave is connected to it. Either disable the dual antenna master in the web interface or configure a another system as a dual antenna slave. (!T,!S)
08074-0	ADM	WARNING	Master connection	The system is configured as a dual antenna slave, but it was not possible to connect to the dual antenna master. Check that the IP address entered in the modem profile is correct and check that the master and slave systems are physically connected as described in the manual. (!T,!S)
08075-0	ADM	WARNING	Rx cable calibration	Calibration of the antenna cable failed. The cable could be defective, too long, connectors not properly connected, or the BDU or ADU hardware could be defective.

Table F-1: Event messages

ID	Module	Type	Description	Explanation
08076-0	ADM	WARNING	Dual mode configuration	The system is configured as a dual antenna system, but the master and slave systems are not identical. The dual mode function may not work properly or performance could be degraded. Info code: xxxxxxx1 = Antenna types are different xxxxxxx2 = Antenna subtypes are different xxxxxxx3 = Software versions on master and slave are different xxxxxxx4 = LNB types are different xxxxxxx5 = BUC types are different xxxxxxx6 = OEM ids are different (!T,!S)
08077-0	ADM	WARNING	BUC LO frequency invalid	The satellite modem provided an invalid BUC LO frequency. A default BUC LO frequency is assumed based on antenna type. To remove this warning re-configure the modem to provide a valid BUC LO frequency. (!T)
08078-0	ADM	WARNING	VMU TX frequency invalid	The satellite modem did not provide a Tx frequency, or it is invalid. A default Tx frequency is assumed, but this may degrade Tx performance. To remove this warning re-configure the modem to provide the correct Tx frequency. (!T)
0807A-0	ADM	WARNING	Automatic azimuth calibration pending	Automatic azimuth calibration mode is enabled. The system tries to perform an azimuth calibration using the target satellite whenever satellite data is received from the modem. After successful calibration the feature is automatically disabled and the system returns to normal operation. WARNING: If a system has not completed azimuth calibration after the installation, the blocking zones may appear to be at wrong angles. (!T)
0807B-0	ADM	WARNING	OTC required (Calibration outdated)	BUC calibration is outdated. Rerun it from the Core Module by using the One Touch Commissioning in the web interface. (!T,!V,!S)
0807E-0	ADM	WARNING	Keyline signal	The keyline signal on the dual antenna master does not match the keyline signal on the slave. Check that the keyline splitter cable is connected to the RS422 connectors. When fixed, the BDU's needs to be rebooted to clear the event. (!S,!V)

Table F-1: Event messages (Continued)

ID	Module	Type	Description	Explanation
0807F-0	ADM	WARNING	Local administration enabled	Local administration mode is currently enabled. This allows login without providing the admin password. Will be disabled after 1 hour or next reboot.
08081-0	ADM	WARNING	BUC communication	Missing communication between VMU and BUC. Info: 0x00000001: From VMU to BUC Info: 0x00000002: From BUC to VMU (!T,!V,!S)
08082-0	ADM	WARNING	Modem configuration load	Unable to load configuration on modem. Info: 0x00000001: Configuration index invalid 0x00000002: Changing parameter not permitted 0x00000004: Modem not in Remote Mode (!T,!G,!S)
08083-0	ADM	WARNING	Vsat Modem network settings	VSAT Profile activation issue: Modem LAN port settings rejected
08084-0	ADM	WARNING	Radome fan blocked/not rotating	Radome fan is blocked or not rotating even if it should.
08085-0	ADM	INFO	Radome temp too high	The temperature in the radome is too high.
08086-0	ADM	WARNING	GPIO Tx mute active	Tx has been muted from GPIO on the BDU. (!T)
08087-0	ADM	WARNING	Temperature protection	Temperature too high. BUC shut down.
08088-0	ADM	WARNING	Antenna data not synchronised	Persistent antenna data not synchronized in all backup locations. Retry will happen on next boot. Info code shows sum of all outdated copies Info: 0x00000002 ISCM 0x00000004 Azimuth IFDM 0x00000008 Cross elevation IFDM 0x00000010 Elevation IFDM 0x00000020 Polarisation IFDM (!T)
08089-0	ADM	INFO	Socat workaround reboot	A reboot was initiated by the socat workaround. Check diagnostics log to verify no false positive. (!T)
0810A-0	ADM	ERROR	ASCM production data	Production data has been corrupted.
0810F-0	ADM	ERROR	ASCM Devices	Startup of ascm_devs application failed.
08110-0	ADM	ERROR	ASCM - APSM Communication	Communication between ASPM and ASCM.

Table F-1: Event messages (Continued)

ID	Module	Type	Description	Explanation
08111-0	ADM	ERROR	Presence of EBUS devices	Present EBUS devices matches antenna type. The info code shows the sum of all missing or unexpected modules, see below: 0x00000001: Azimuth IFDM 0x00000002: Cross Elevation IFDM 0x00000004: Elevation IFDM 0x00000008: ISCM 0x00000010: Polarisation IFDM
08112-0	ADM	ERROR	Elect of antenna data	No antenna data blob was elected.
08113-0	ADM	ERROR	APSM production data	APSM production data is corrupted.
08114-0	ADM	ERROR	ASCM FS	File system partition corrupt
0850A-0	ADM	ERROR	GNSS Initialization	GNSS initialization failed.
0851E-0	ADM	ERROR	Sensor sanity	Too many invalid values measured by the ISM during initialisation. Check for vibrations or malfunctioning ISM.
08521-0	ADM	ERROR	Azi axis calibration	Azimuth axis zero reference not found. Check belt and zero reference module. Info: 0x00000001: Timeout (operation did not complete in time) 0x00000010: Encoder or mechanical problem 0x00000020: Zero reference not found 0x00000040: End stop not found.
08522-0	ADM	ERROR	Xel axis calibration	Cross-elevation axis zero reference or end stops not found at expected locations. Check belt, zero reference module, and end stops. Info: See 08521-0.
08523-0	ADM	ERROR	Ele axis calibration	Elevation axis zero reference or end stops not found at expected locations. Check belt, zero reference module, and end stops. Info: See 08521-0.
08524-0	ADM	ERROR	Pol axis calibration	Polarisation axis zero reference or end stops not found at expected locations. Check movement of the polarisation unit and the zero reference module. Info: See 08521-0. (!T,!G)
08525-0	ADM	ERROR	Antenna calibration	One or more errors occurred during antenna start-up Info: 0x00000001: Timeout (calibration did not complete in time) 0x00000010: Azimuth axis 0x00000020: Cross-elevation axis 0x00000040: Elevation axis 0x00000080: Polarisation axis

Table F-1: Event messages (Continued)

ID	Module	Type	Description	Explanation
08534-0	ADM	WARNING	BDU communication	The communication link between BDU and antenna is not working.
08537-0	ADM	INFO	GNSS communication	Lost connection to the GNSS device.
08538-0	ADM	INFO	GNSS data range	Received information from the GNSS device which is out of range.
08539-0	ADM	WARNING	GNSS device warning	Local GNSS device warning.
0853A-0	ADM	WARNING	GNSS device error	Local GNSS device error.
08541-0	ADM	WARNING	BUC voltage low	The voltage for the BUC is too low, probably caused by a malfunctioning VIM or BUC. (!T,!G)
08542-0	ADM	WARNING	BUC voltage high	The voltage for the BUC is too high probably caused by a malfunctioning VIM. (!T,!G)
08543-0	ADM	WARNING	LNB voltage low	The voltage for the LNB is too low probably caused by a malfunctioning VIM or LNB.
08544-0	ADM	WARNING	LNB voltage high	The voltage for the LNB is too high probably caused by a malfunctioning VIM.
08546-0	ADM	WARNING	Antenna temperature	The temperature of the antenna is too high. Check if the fan is working. (!T,!G)
0854A-0	ADM	INFO	Xel encoder slip	A slip of the cross-elevation encoder has been detected. If this event is not resolved by itself after some time, check the belt and encoder of the cross-elevation axis.
0854D-0	ADM	WARNING	GNSS position	No position available from the GNSS device or position too old.
0854E-0	ADM	INFO	GNSS velocity	No velocity available from the GNSS device.
0854F-0	ADM	WARNING	Heading data	Heading information is missing in the antenna.
0855E-0	ADM	WARNING	Low elevation	The antenna is not allowed to transmit because the elevation is too low. (!T)
0855F-0	ADM	WARNING	Heading range	Heading data range error. External heading unit supplies unreliable data.
08562-0	ADM	WARNING	High elevation	The antenna cannot perform acquisition in gyro-free mode because the elevation is too high.

Table F-1: Event messages (Continued)

ID	Module	Type	Description	Explanation
08841-0	ADM	ERROR	Tuner lock	The internal tuner PLL was unable to lock. (!V,!T)
08842-0	ADM	WARNING	GSC demodulator	The GSC demodulator has reported an error. (!V,!T)
08843-0	ADM	WARNING	DVBS demodulator	The DVBS demodulator cannot be initialised and loaded correctly. (!V,!T)
08844-0	ADM	WARNING	BUC voltage out of range	The BUC voltage is out of range. (!V,!T)
08845-0	ADM	WARNING	LNB voltage out of range	The LNB voltage is out of range. The LNB might be switched off to protect the power supply circuitry. Reactivate satellite profile to try again, check LNB cable and surroundings if the problem persists. (!V,!T)
08846-0	ADM	WARNING	AIM-O supply voltage out of range	Supply voltage measured at AIM-O is not within expected range (!V,!T)
08847-0	ADM	WARNING	AIM-O Master PLL lock	The AIMO master PLL has lost lock. Check the input reference signal. (!T)
08848-0	ADM	WARNING	TX Calibration missing	Tx calibration not performed. (!T)
08880-0	ADM	WARNING	WLAN configuration error	Configuration of WLAN module failed. (!V,!T)
08881-0	ADM	WARNING	DHCP Client address	An IP address was received from an external DHCP server that overlaps another VLAN. Traffic on these VLANs may be unpredictable. Reconfigure the server or IP settings of that VLAN.
08A00-0	ADM	WARNING	GX Core Module fan	There is a problem with the Core Module fan. Check/clean and replace if necessary. (!V,!T)
08A01-0	ADM	WARNING	GX Core Module heater	There is a problem with the Core Module heater. Check and replace if necessary. (!V,!T)
08A02-0	ADM	WARNING	GX Core Module temperature	The Core Module temperature is out of range. This may affect performance, and the Core Module will be shut down if the situation gets worse. If the "GX core module heating" event is also present, the internal heater is currently warming up the unit to its operational temperature. (!V,!T)

Table F-1: Event messages (Continued)

ID	Module	Type	Description	Explanation
08A03-0	ADM	WARNING	GX Core Module power	The Power Good signal from the Core Module is low. The issue can either be: - Internal Core Module or internal cable failure - Temperature of Core Module is too high and it has been turned off (*) - GMU has been manually switched off on the front panel (*) (*) = Only on systems with GMU. (!V,!T)
08A04-0	ADM	WARNING	iDirect modem	The BDU detected a warning/error in the iDirect modem. Log into the modem for more information. Info: 0x00000001: Temperature error 0x00000002: Test error 0x00000004: Fan error (!V,!T)
08A05-0	ADM	WARNING	GX Core Module heating	The GX core module heater is active. It will automatically be cleared when the core module reaches the operational temperature level. (!V,!T)
08B00-0	ADM	INFO	IoT med priority msg rate exceeded.	The message rate limit has been reached for the medium priority queue. The iothub client will pause transmission of medium priority messages for a short while.
08B01-0	ADM	INFO	IoT low priority msg rate exceeded.	The message rate limit has been reached for the low priority queue. The iothub client will pause transmission of low priority messages for a short while.
08B02-0	ADM	INFO	Iothub disabled	The iothub client has been disabled.
09000-0	KDM	ERROR	KDM 3V3 supply	Internal 3V3 voltage supply error in the KDM.
09001-0	KDM	ERROR	KDM 12V supply	Internal 12V voltage supply error in the KDM.
09002-0	KDM	ERROR	KDM display	Display hardware error in the KDM.
09010-0	KDM	ERROR	KDM link/SW version	Link to the KDM module could not be established. Either the KDM board is malfunctioning, or - if the system software has just been updated - the software is too old and is not compatible with the KDM hardware.
0A080-0	Antenna	ERROR	EBUS loop interrupted	EBUS communication error, loop interrupted.
0A081-0	Antenna	ERROR	ISCM error	Communication error with ISCM. Info: 0x00000001: Key line signal
0A100-0	Antenna	ERROR	ISCM Gyro communication	Internal communication error on ISCM.

Table F-1: Event messages (Continued)

ID	Module	Type	Description	Explanation
0A101-0	Antenna	ERROR	ISCM Accelerometer communication	Internal communication error on ISCM.
0A102-0	Antenna	ERROR	ISCM Magnetometer communication	Internal communication error on ISCM.
0A103-0	Antenna	ERROR	ISCM IMU communication	Internal communication error on ISCM.
0A104-0	Antenna	WARNING	ISCM OMT analog	No analog communication to OMT. Check cable.
0A105-0	Antenna	WARNING	ISCM OMT digital	No digital communication to OMT. Check cable.
0A106-0	Antenna	INFO	ISCM ADC volt	Voltage out of range.
0A107-0	Antenna	WARNING	ISCM Power good	Internal PSU error.
0A108-0	Antenna	ERROR	ISCM Prod data	Internal production data invalid.
0A180-0	Antenna	WARNING	ISCM Fan error	BUC fan failure. Check fan movement.
0A181-0	Antenna	ERROR	ISCM No response	No communication with ISCM. Check cable.
0A200-0	Antenna	ERROR	Azi Motor prod data	Internal production data invalid.
0A201-0	Antenna	ERROR	Azi Motor ZRM	No zero reference found. Check from motor to ZRM and free movement of the antenna.
0A280-0	Antenna	ERROR	Azi Motor Driver fault	Driver could not move antenna. Check free movement of the antenna.
0A281-0	Antenna	ERROR	Azi Motor Power fault	No power to motor driver. Check input power to system.
0A282-0	Antenna	ERROR	Azi Motor Shutdown	Internal error. Motor is shut down.
0A283-0	Antenna	WARNING	Azi Motor Over temperature warning	Motor temperature too high.

Table F-1: Event messages (Continued)

ID	Module	Type	Description	Explanation
0A284-0	Antenna	ERROR	Azi Motor Over temperature fault	Motor temperature too high. Motor shut down.
0A285-0	Antenna	INFO	Azi Motor Over current fault	Over current protected activated. Check free movement of antenna.
0A286-0	Antenna	ERROR	Azi Motor No response	No communication with motor. Check cable.
0A300-0	Antenna	ERROR	Xel Motor prod data	Internal production data invalid.
0A301-0	Antenna	ERROR	Xel Motor ZRM	No zero reference found. Check from motor to ZRM and free movement of the antenna.
0A380-0	Antenna	ERROR	Xel Motor Driver fault	Driver could not move antenna. Check free movement of the antenna.
0A381-0	Antenna	ERROR	Xel Motor Power fault	No power to motor driver. Check input power to system.
0A382-0	Antenna	ERROR	Xel Motor Shutdown	Internal error. Motor is shut down.
0A383-0	Antenna	WARNING	Xel Motor Over temperature warning	Motor temperature too high.
0A384-0	Antenna	ERROR	Xel Motor Over temperature fault	Motor temperature too high. Motor shut down.
0A385-0	Antenna	INFO	Xel Motor Over current fault	Over current protected activated. Check free movement of antenna.
0A386-0	Antenna	ERROR	Xel Motor No response	No communication with motor. Check cable.
0A400-0	Antenna	ERROR	Ele Motor prod data	Internal production data invalid.
0A401-0	Antenna	ERROR	Ele Motor ZRM	No zero reference found. Check from motor to ZRM and free movement of the antenna.
0A480-0	Antenna	ERROR	Ele Motor Driver fault	Driver could not move antenna. Check free movement of the antenna.
0A481-0	Antenna	ERROR	Ele Motor Power fault	No power to motor driver. Check input power to system.
0A482-0	Antenna	ERROR	Ele Motor Shutdown	Internal error. Motor is shut down.

Table F-1: Event messages (Continued)

ID	Module	Type	Description	Explanation
0A483-0	Antenna	WARNING	Ele Motor Over temperature warning	Motor temperature too high.
0A484-0	Antenna	ERROR	Ele Motor Over temperature fault	Motor temperature too high. Motor shut down.
0A485-0	Antenna	INFO	Ele Motor Over current fault	Over current protected activated. Check free movement of antenna.
0A486-0	Antenna	ERROR	Ele Motor No response	No communication with motor. Check cable.
0A500-0	Antenna	ERROR	Pol Motor prod data	Internal production data invalid.
0A501-0	Antenna	ERROR	Pol Motor ZRM	No zero reference found. Check from motor to ZRM and free movement of the antenna.
0A580-0	Antenna	ERROR	Pol Motor Driver fault	Driver could not move antenna. Check free movement of the antenna.
0A581-0	Antenna	ERROR	Pol Motor Power fault	No power to motor driver. Check input power to system.
0A582-0	Antenna	ERROR	Pol Motor Shutdown	Internal error. Motor is shut down.
0A583-0	Antenna	WARNING	Pol Motor Over temperature warning	Motor temperature too high.
0A584-0	Antenna	ERROR	Pol Motor Over temperature fault	Motor temperature too high. Motor shut down.
0A585-0	Antenna	INFO	Pol Motor Over current fault	Over current protected activated. Check free movement of antenna.
0A586-0	Antenna	ERROR	Pol Motor No response	No communication with motor. Check cable.
0B060-0	APSM	INFO	NMEA 0183 parse error	No valid NMEA input. Check NMEA 0183 cable. (!T,!S)
0B061-0	APSM	WARNING	Heading data	No valid heading input received. Check NMEA 0183 cable. (!T,!S)
0B062-0	APSM	WARNING	APSM AUX temperature warning	Temperature too high. (!T,!S)

Table F-1: Event messages (Continued)

ID	Module	Type	Description	Explanation
0B063-0	APSM	ERROR	APSM AUX temperature failure	Temperature too high. AUX shut down. (!T,!S)
0B064-0	APSM	WARNING	APSM EBUS temperature warning	Temperature too high. (!T,!S)
0B065-0	APSM	ERROR	APSM EBUS temperature failure	Temperature too high. EBUS shut down. (!T,!S)
0B066-0	APSM	WARNING	APSM LNB temperature warning	Temperature too high. (!T,!S)
0B067-0	APSM	ERROR	APSM LNB temperature failure	Temperature too high. LNB shut down. (!T,!S)
0B068-0	APSM	WARNING	APSM Main temperature warning	Temperature too high. (!T,!S)
0B069-0	APSM	ERROR	APSM Main temperature failure	Temperature too high. APSM shut down. (!T,!S)
0B070-0	APSM	INFO	APSM AUX Under voltage lockout	Voltage too low. (!T,!S)
0B071-0	APSM	INFO	APSM BUC Under voltage lockout	Voltage too low. (!T,!S)
0B072-0	APSM	INFO	APSM EBUS Under voltage lockout	Voltage too low. (!T,!S)
0B073-0	APSM	INFO	APSM LNB Under voltage lockout	Voltage too low. (!T,!S)
0B074-0	APSM	INFO	APSM Main Under voltage lockout	Voltage too low. (!T,!S)
0B080-0	APSM	INFO	APSM AUX Over current protection	Too high current. AUX shut down. (!T,!S)
0B081-0	APSM	INFO	APSM BUC Over current protection	Too high current. BUC shut down. (!T,!S)
0B082-0	APSM	INFO	APSM EBUS Over current protection	Too high current. EBUS shut down. (!T,!S)
0B083-0	APSM	INFO	APSM LNB Over current protection	Too high current. LNB shut down. (!T,!S)

Table F-1: Event messages (Continued)

ID	Module	Type	Description	Explanation
0B084-0	APSM	INFO	APSM Main Over current protection	Too high current. APSM shut down. (!T,!S)
0B090-0	APSM	INFO	APSM AUX Over voltage protection	Voltage too high. (!T,!S)
0B092-0	APSM	INFO	APSM EBUS Over voltage protection	Voltage too high. (!T,!S)
0B093-0	APSM	INFO	APSM LNB Over voltage protection	Voltage too high. (!T,!S)
0B094-0	APSM	INFO	APSM Main Over voltage protection	Voltage too high. (!T,!S)
0B0A0-0	APSM	ERROR	APSM Communication error	No communication with APSM. Check internal connections in ACM. (!T,!S)
0B0A1-0	APSM	ERROR	BDCM Communication error	No communication with BDCM. Check main antenna cable. (!T,!S)
0D000-0	BDCM	WARNING	BDU PSU temperature too high	BDU PSU temperature too high.
0D001-0	BDCM	WARNING	BDU PSU fan does not work	BDU PSU fan does not work.
0D002-0	BDCM	ERROR	BDU PSU will shutdown	BDU PSU will shutdown.
0D003-0	BDCM	ERROR	BDCM prod data	BDCM prod data is invalid
0E000-0	AIMO	ERROR	AIM-O Communication	Startup of communication with AIM-O failed.
0E001-0	AIMO	ERROR	AIM-O PLL out of lock	PLL out of lock
0E002-0	AIMO	ERROR	AIM-O voltage range	Voltage measured at AIM-O is not within expected range
0E003-0	AIMO	ERROR	AIM-O cal data	AIM-O calibration data is invalid
0F000-0	BIMO	ERROR	BIM-O Communication	Startup of communication with BIM-O failed.
0F001-0	BIMO	ERROR	BIM-O PLL out of lock	PLL out of lock

Table F-1: Event messages (Continued)

ID	Module	Type	Description	Explanation
0F002-0	BIMO	ERROR	BIM-O voltage range	Voltage measured at BIM-O is not within expected range
0F003-0	BIMO	ERROR	BIM-O cal data	BIM-O calibration data is invalid
0F004-0	BIMO	WARNING	VMU reference signal	There is no VMU Rx or Tx reference signal. Whether this is Rx or Tx reference depends on the user's selection on the modem profile page in the web interface. Make sure the VMU Rx/Tx cable is connected and that the VMU is configured to output the RX/TX reference signal.
0F005-0	BIMO	WARNING	No BIMO Master PLL	BIMO Master PLL out of lock
0F006-0	BIMO	WARNING	No BIMO LO PLL	BIMO LO PLL out of lock

Table F-1: Event messages (Continued)

Inmarsat GX satellites

This appendix contains examples of satellite data for azimuth calibration.

The following figure shows the coverage map of the GX service.

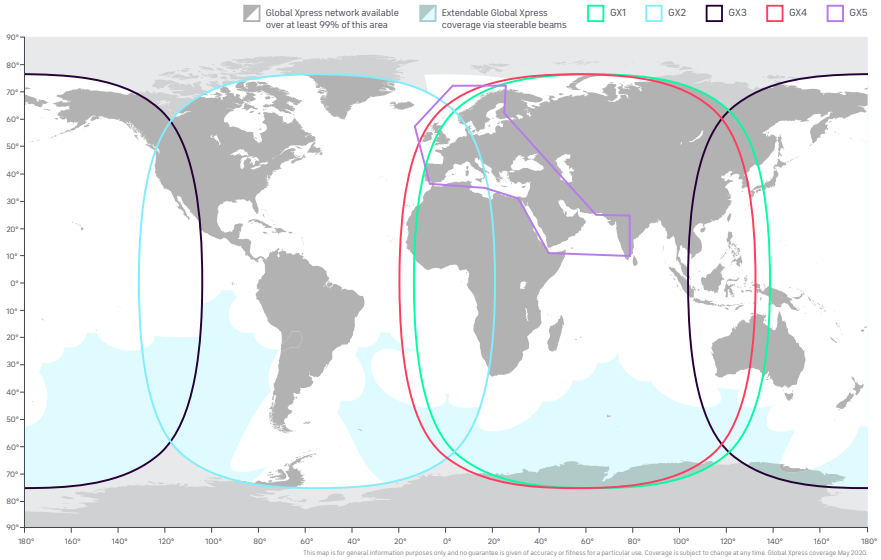


Figure G-1: GX coverage map

Satellite	Position	Frequency	Satellite identifier
GX1 –IOR	62.6 E	19.707 GHz	GSC
GX2 –AOR	55 W	19.707 GHz	GSC
GX3 –POR	179.6 E	19.707 GHz	GSC
GX4 –IOR	56.6 E	19.707 GHz	GSC
GX5 –EME	11.0 E	19.701 GHz	GSC

Table G-1: Inmarsat GSC satellite information

EU Declaration of Conformity

Hereby **Thrane & Thrane A/S trading as Cobham SATCOM** declares that the following equipment complies with the specifications of:

RED directive 2014/53/EU concerning Radio Equipment
RoHS directive 2011/65/EU concerning Restriction of Harzardous Substances including delegated directive (EU) 2015/863.

Equipment included in this declaration

		Consists of								
Ku-Band		**Above Deck Unit**			**Below Deck Unit**			**Modem**		
Model	Description	Model	Description	Part no.	Model	Description	Part no.	Model	Description	Part no.
7560C	SAILOR 600 XTR Ku 6W System	7506C	SAILOR 600 XTR Ku, 6W ADU	407506C-xxx	7516A	SAILOR XTR Below Deck Unit	407516A-xxx	N/A	Third Party Ku-band modem	N/A
7580A	SAILOR 800 XTR Ku 8W System	7508A	SAILOR 800 XTR Ku, 8W ADU	407508A-xxx						
7580B	SAILOR 800 XTR Ku 16W System	7508B	SAILOR 800 XTR Ku, 16W ADU	407508B-xxx						
7590A	SAILOR 1000 XTR Ku 8W System	7509A	SAILOR 1000 XTR Ku, 8W ADU	407509A-xxx						
7590B	SAILOR 1000 XTR Ku 16W System	7509B	SAILOR 1000 XTR Ku, 16W ADU	407509B-xxx						
Ka-band		**Above Deck Unit**			**Below Deck Unit**			**Modem**		
Model	Description	Model	Description	Part no.	Model	Description	Part no.	Model	Description	Part no.
7560A	SAILOR 600 XTR Ka 4.5W System	7506A	SAILOR 600 XTR Ka, 4.5W ADU	407506A-xxx	7516A	SAILOR XTR Below Deck Unit	407516A-xxx	7023A	SAILOR GX Modem Unit (GMU)	407023A-xxx
7560D	SAILOR 600 XTR Ka 9W System	7506D	SAILOR 600 XTR Ka, 9W ADU	407506D-xxx						
7590C	SAILOR 1000 XTR Ka 4.5W System	7509C	SAILOR 1000 XTR Ka, 4.5W ADU	407509C-xxx						
7590D	SAILOR 1000 XTR Ka 9W System	7509D	SAILOR 1000 XTR Ka, 9W ADU	407509D-xxx						

"xxx" is 3 characters, that determine the product branding, where only labels, logo and user interface varies.

The full text of the EU declaration of conformity is available at the following internet address:
http://sync.cobham.com/satcom/support/downloads

Type Approval Certificate

Cobham
Model SAILOR 1000 XTR GX

Certificate Number: GXM100TNT-09

Cobham, the manufacturer of the terminal SAILOR 1000 XTR GX has submitted documents which demonstrate that the user terminal when operating in the environmental conditions set forth in its Type Approval Particulars meets the technical requirements for use with the Inmarsat Satellite Communications System.

Cobham has certified that all other units of the same type will meet all technical requirements in a similar manner to the unit subjected to test, and that the tests have been conducted in accordance with procedures approved by Inmarsat. The full technical details of the SAILOR 1000 XTR GX are documented in its Type Approval Particulars.

Inmarsat does hereby certify that the SAILOR 1000 XTR GX model identified herein is acceptable for use in the Commercial Ka Band with the Inmarsat GX Satellite Communications System as of the date of this Certificate.

Inmarsat Global Limited

By Patrick Sharkey

Name: Patrick Sharkey

Title: Senior Director
User Terminal Engineering

Signed:

Approval Date: 10th of November 2021

1. This certificate is intended only as formal notification to the manufacturer that Inmarsat has determined, on the basis of information submitted by Cobham using test procedures approved by Inmarsat that the UT model of the type identified herein meet the standards for use with the Inmarsat System. This certificate is not a warranty of the performance or fitness for purpose of the SAILOR 1000 XTR GX and Inmarsat hereby expressly disclaims any and all liability arising out of or in connection with the issuance, use, or misuse of this certificate.
2. This certificate is not intended to replace any required national regulatory type approvals for the placement of market of UT models of the type identified in the Certificate. It is the responsibility of the manufacturer of the UT model to obtain the required national regulatory type approval before the terminal can be placed in the markets within the regulatory sovereignty region of the countries of concern. In addition, the operation of the UT model may also be subject to national licensing requirements.

Inmarsat Global Limited
99 City Road
London, EC1Y 1AX
United Kingdom.

inmarsat
Total Communications Network™

Inmarsat type approval (SAILOR 1000 XTR GX-R2)

Type Approval Certificate

SAILOR 600 XTR GX-R2

Certificate Number: GXM060TNT-10

Inmarsat Global Limited

By

Name: Patrick Sharkey

Title: Senior Director
User Terminal Engineering

Signed: Patrick Sharkey

Approval Date: 5th of April 2022

Cobham, the manufacturer of the terminal SAILOR 600 XTR GX-R2 has submitted documents which demonstrate that the user terminal when operating in the environmental conditions set forth in its Type Approval Particulars meets the technical requirements for use with the Inmarsat Satellite Communications System.

Cobham has certified that all other units of the same type will meet all technical requirements in a similar manner to the unit subjected to test, and that the tests have been conducted in accordance with procedures approved by Inmarsat. The full technical details of the SAILOR 600 XTR GX-R2 are documented in its Type Approval Particulars.

Inmarsat does hereby certify that the SAILOR 600 XTR GX-R2 model identified herein is acceptable for use in the Commercial Ka Band with the Inmarsat GX Satellite Communications System as of the date of this Certificate.

1. This certificate is intended only as formal notification to the manufacturer that Inmarsat has determined, on the basis of information submitted by Cobham using test procedures approved by Inmarsat that the UT model of the type identified herein meet the standards for use with the Inmarsat System. This certificate is not a warranty of the performance or fitness for purpose of the SAILOR 600 XTR GX-R2 and Inmarsat hereby expressly disclaims any and all liability arising out of or in connection with the issuance, use, or misuse of this certificate.
2. This certificate is not intended to replace any required national regulatory type approvals for the placement of market of UT models of the type identified in the Certificate. It is the responsibility of the manufacturer of the UT model to obtain the required national regulatory type approval before the terminal can be placed in the markets within the regulatory sovereignty region of the countries of concern. In addition, the operation of the UT model may also be subject to national licensing requirements.

Inmarsat Global Limited
99 City Road
London, EC1Y 1AX
United Kingdom.

inmarsat
Total Communications Network™

Glossary

A

ACU	Antenna Control Unit
ADM	ACU Digital Module. A main processor board in the ACU.
ADS	Antenna Diversity Solution
AIMO	Antenna Interface Module
APSM	Antenna Power Supply Module

B

BDCM	BDU Control Module
BDU	Below Deck Unit
BEIDOU	Chinese satellite navigation system
BITE	Built-In Test Equipment
BUC	Block Up Converter

C

CM	Continuous Monitoring

D

DHCP	Dynamic Host Configuration Protocol. A protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network.
DNS	Domain Name Server

E

Eirp	Effective Isotropically-Radiated Power
ESD	ElectroStatic Discharge
ETSI	European Telecommunication Standard Institute

F

FCC	Federal Communications Commission

G

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

H

HDT	HeaDing True, NMEA sentence.

I

IEC	International Electrotechnical Commission
IoT	Internet of Things
IP	Internet Protocol
ISM	Inertial Sensor Module ,

K

KDM	Keyboard and Display Module of the BDU

L

LAN	Local Area Network
LED	Light Emitting Diode
LGPL	Lesser General Public License
LHC	Left Hand Circular
LHCP	Left Hand Circular Polarization
LTE	Long-Term Evolution (also called 4G)

M

MIB	Management Information Base

N

NID	Network IDentification
NMEA	National Marine Electronics Association (standard)

O

OID	Object Identifier, in the context of the Simple Network Management Protocol (SNMP), consists of the object identifier for an object in a Management Information Base (MIB).

P

POST	Power On Self Test. A system test that is activated each time the system is powered on.

R

RF	Radio Frequency. Electromagnetic wave frequencies between about 3 kilohertz and about 300 gigahertz including the frequencies used for communications signals (radio, television, cell-phone and satellite transmissions) or radar signals.

RFI	Radio Frequency Interference. A non-desired radio signal which creates noise or dropouts in the wireless system or noise in a sound system.
RHCP	Right Hand Circular Polarization
ROSS	Roaming Oceanic Satellite Server

S

SNMP	Simple Network Management Protocol. An Internet-standard protocol for managing devices on IP networks. It is used mostly in network management systems to monitor network-attached devices for conditions that warrant administrative attention.

U

UCLI	User Command Line Interface，

UCLICommand Line Interface

V

VLAN	Virtual LAN
VMU	VSAT Modem Unit

Index

D

E

F

G

H

I

L

M

N

O

P

R

S

T

U

V

W

COBHAM SATCOM
Connecting the future

98-175666-C
www.cobhamsatcom.com