

# **EXPLORER 8000 series Drive-Away VSAT Terminal**

User & installation manual



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Document number: 98-145510-E

Release date: 8 June 2017

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# 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, and will void the warranty. Thrane & Thrane A/S assumes no liability for the customer's failure to comply with these requirements.



**WARNING!** Heavy weight - Do not attempt to lift the antenna alone! Use two or more persons or a lifting device. The antenna can weigh up to 70 kg and is difficult to handle.



**WARNING!** Hazardous moving parts - keep fingers and other body parts away from the antenna while the system is powered!



**WARNING!** Be aware of **pinch points** while the antenna is being positioned, deployed or stowed.

#### Power supply

The voltage range for the EXPLORER 8000 series is 100 - 240 VAC (nominal), 50/60 Hz. The socket-outlet shall be installed near the equipment and shall be accessible. See also *System power supply range (input via ACU)* and *Total system power consumption* on page A-1.



**WARNING!** Before disassembling or performing any maintenance or upgrades, unplug the unit from the power source.

#### Grounding



WARNING! Always connect your ACU to the safety ground of your power source (e.g. generator, inverter, line outlet etc.).

#### Do not operate in an explosive atmosphere



**WARNING!** 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

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with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

#### Install and use the antenna with care

Thrane & Thrane A/S assumes no liability for any damage caused by the antenna falling off the vehicle or stressing the mounting base. It is the responsibility of the customer to ensure a safe and correct installation of the antenna. The instructions in this manual are only guidelines.

#### Service

User access to the interior of the system units is not allowed. Only a technician authorized by Cobham SATCOM may perform service - failure to comply with this rule will void the warranty.

#### Microwave radiation hazards

During transmission the antenna radiates Microwave Power. This radiation may be hazardous to humans close to the antenna. During transmission, make sure that nobody gets closer than the recommended minimum safety distance.



WARNING! This device emits radio frequency energy. Do not place your head or other body parts between transmitting feed horn and reflector when the system is operational. Also do not place any objects between feed horn and reflector, as the object may reflect the signal in a different direction than the focal line.

The minimum safe distance applies in a cylinder between the reflector and satellite, parallel with the feed arm (see Figure 1 below). No hazard exists at the back of the reflector. The safe distance varies with the BUC version and the reflector size, see Table 1 on the next page.

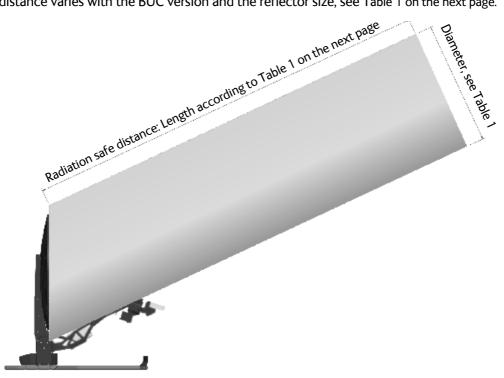


Figure 1: Radiation area

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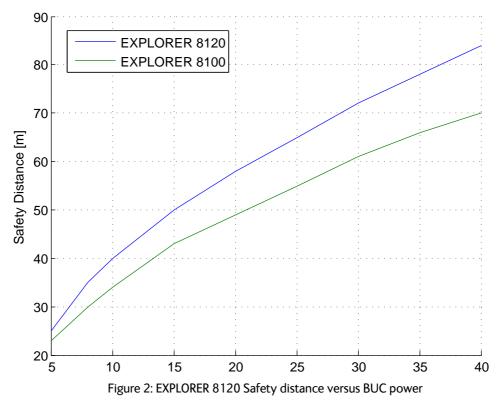
#### Minimum safe distances:

Product	Variant	Safe distance, General public <sup>a</sup>	Safe distance, trained professional operators, short term <sup>b</sup>	Diameter of radiation area
EXPLORER 8100	Ku-band, 8 W BUC	30 m	1 m	
	Ku-band, 20 W BUC	49 m	1 m	1200 mm
	Ku-band, no BUC	Depends on BUC, see Figure 2 below		1200 111111
	Ka-band	36 m	1 m	
EXPLORER 8120	Ku-band, 8 W BUC	35 m	1 m	1400 mm
	Ku-band, 20 W BUC	58 m	1 m	
	Ku-band, no BUC	Depends on BL	JC, see Figure 2 below	

Table 1: Minimum safe distances

- a. Uncontrolled environment, based on a radiation level of  $10\ W/m^2$
- b. Controlled environment, based on a radiation level of 100 W/m<sup>2</sup>

For different BUCs for the EXPLORER 8120, read the safe distance below in Figure 2.



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#### Mechanical "stay-clear" area, EXPLORER 8100



**WARNING!** Stay clear of the antenna when it is powered! The antenna dish can move quickly across a large area, and can cause injury to persons close to the antenna. When the antenna is powered, make sure nobody gets closer than the limits of the "Stay-clear area" shown below.

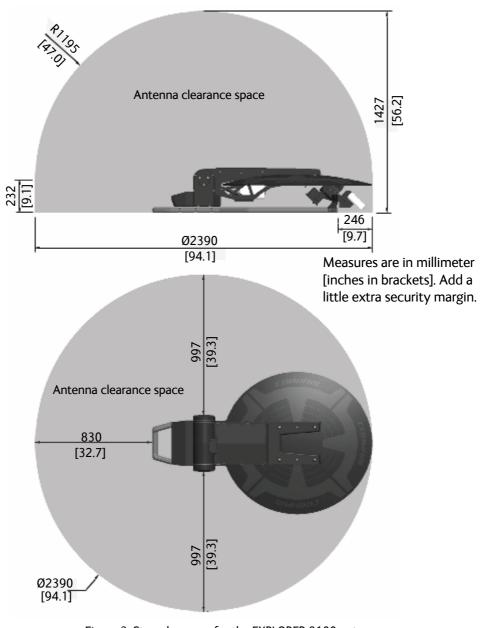


Figure 3: Stay-clear area for the EXPLORER 8100 antenna  $\,$ 

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#### Mechanical "stay-clear" area, EXPLORER 8120



**WARNING!** Stay clear of the antenna when it is powered! The antenna dish can move quickly across a large area, and can cause injury to persons close to the antenna. When the antenna is powered, make sure nobody gets closer than the limits of the "Stay-clear area" shown below.

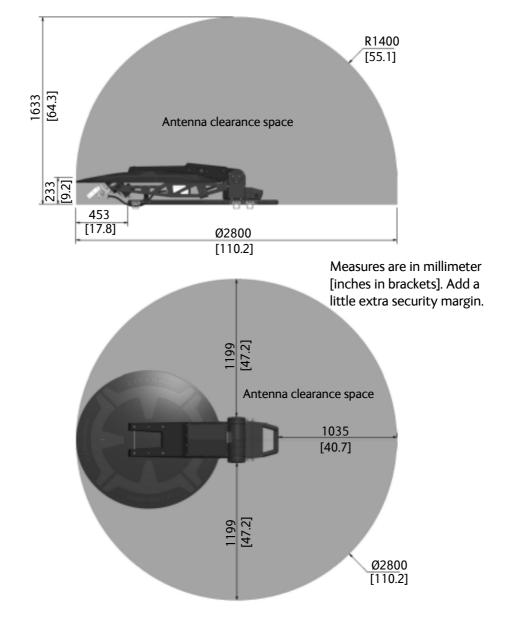


Figure 4: Stay-clear area for the EXPLORER 8120 antenna

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# About this manual

## 1.1 Manual overview

This manual has the following chapters:

- Introduction
- Installation
- Interfaces
- Initial setup and basic functions
- Setup and operation
- Service and maintenance

This manual has the following appendices:

- Technical specifications
- VSAT modem cables
- VSAT modem settings
- Command line interface
- System messages
- DVB-S/DVB-S2 satellites for Ku-Band
- Approvals

#### 1.1.1 Intended readers

This is an installation and user manual for the EXPLORER 8100 and EXPLORER 8120 systems, intended for installers and users of the system. It is important that you observe all safety requirements listed in the beginning of this manual, and install and use the system according to the guidelines in this manual.

Service that requires access to the interior of the system units may only be performed by a technician authorized by Cobham SATCOM.

#### 1.1.2 Software version

This manual is intended for EXPLORER 8100 and EXPLORER 8120 with software version 1.58 (Antenna and ACU). The modem software version is shown in its own web interface.

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# 1.1.3 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.

# 1.2 Precautions

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.

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.

See also the Safety summary on page iii.



**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.

# Introduction

This chapter has the following sections:

- EXPLORER 8000 series Drive-Away VSAT System
- · Description of the system components
- Part numbers

# 2.1 EXPLORER 8000 series Drive-Away VSAT System

#### 2.1.1 Overview

The EXPLORER 8000 series is a series of drive-away VSAT antenna systems for vehicle roof mounting. It comes in the following versions:

- EXPLORER 8100 (1 m reflector):
  - Ku Band with 8 W BUC
  - Ku Band with 20 W BUC
  - Ku Band with no BUC
  - Ka Band (Viasat eTRIA)
- EXPLORER 8120 (1.2 m reflector):
  - Ku Band with 8 W BUC
  - Ku Band with 20 W BUC
  - Ku Band with no BUC

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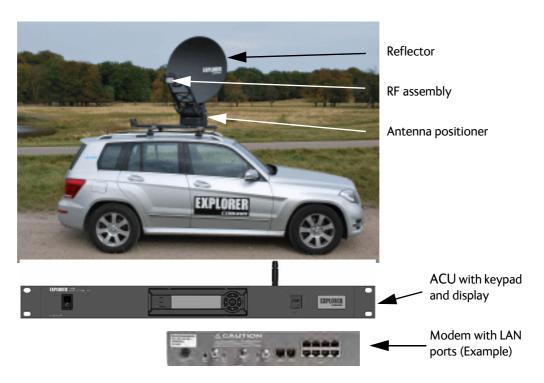


Figure 1: Major system components, example with EXPLORER 8100

The auto-deploy system allows personnel with minimal satellite experience to easily configure and operate this terminal enabling the user to access any broadband application over satellite.

The EXPLORER VSAT systems are easy to install, set up, and commission by a non-specialist technician. The system has the following system units:

- 1. One 2-axis semi-stabilized antenna for either Ku or Ka VSAT satellites.
- 2. One 1-Rack-Unit Antenna Control Unit (ACU) containing keypad and display and LAN/WLAN ports for system access and internal communication.

**VSAT** modem: Apart from the two units that make up the EXPLORER VSAT system, you need a VSAT modem to provide the IP services on the RF link. For a list of supported VSAT modems see *VSAT* modem unit on page 2-9.

The antenna provides a stable RF link and the modem provides services on the RF link.

#### 2.1.2 Satellite service

The EXPLORER 8100 operates in the Ku-band (10.7 to 14.5 GHz) or the Ka-band (Viasat eTRIA,19.7 to 30 GHz), depending on the EXPLORER 8100 model.

The EXPLORER 8120 operates in the Ku-band (10.7 to 14.5 GHz).

Service capabilities are determined by the connected VSAT modem.

#### 2.1.3 Service activation

The service is activated by your service provider. For details, contact your service provider.

# 2.2 Description of the system components

# 2.2.1 Antenna pedestal/positioner

Antenna pointing is achieved with a 2-axis semi-stabilized pedestal. The Azimuth drive comprises a dual gear and belt drives, the Elevation drive a dual gear. Both drives have a manual stow function. An emergency stop button is placed on the side of the antenna.

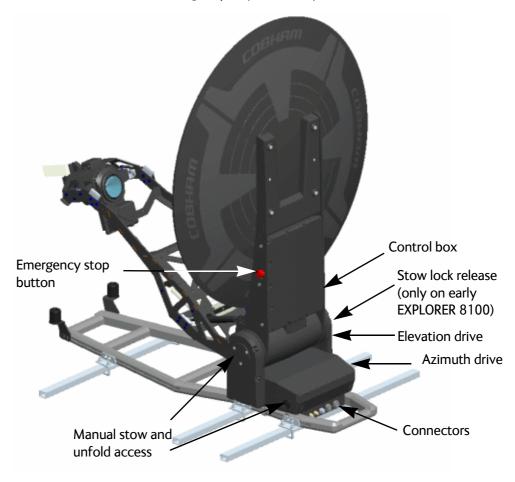


Figure 2: EXPLORER 8100 antenna system components, part 1

The location of the EXPLORER 8120 system components is the same as on the EXPLORER 8100 shown above.

Deployment of the antenna unfolds the Reflector- and Feed support structure. The Feed position is controlled by 2 gas-springs, which are compressed when the antenna is in stowed position. Internal cable-wraps are included in both drives, whereas the Feed and GNSS antenna connecting cables are exposed on the Feed Support Structure.



Figure 3: EXPLORER 8100 antenna system components, part 2

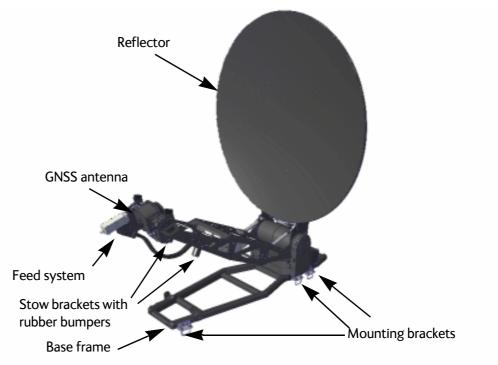


Figure 4: EXPLORER 8120 antenna system components, part 2

## 2.2.2 RF assembly

The RF assembly varies depending on the antenna type. The following pages show the RF assemblies for EXPLORER 8100 Ku-Band, EXPLORER 8120 Ku-Band and EXPLORER 8100 Ka-Band.

#### **Ku-Band RF assembly**

The Ku version features a distributed RF system with a Block Up Converter (BUC) placed in the middle of the Feed support structure, connected to the Feed (Ortho Mode Transducer (OMT)/Low Noise Blockdown converter (LNB)) via a Flexible Wave Guide (FWG). A motor driven Polarizer is present.

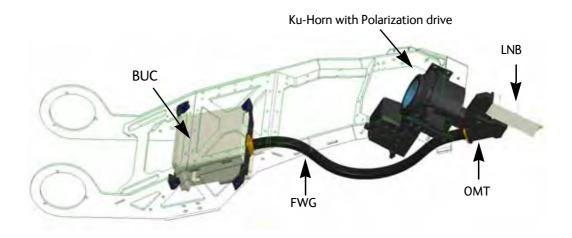


Figure 5: Components of the EXPLORER 8100 Ku-Band RF assembly

The location of the RF components are the same on the EXPLORER 8120 as on the EXPLORER 8100 shown above.

#### Ka-Band RF assembly

In the Ka Eutelsat/Viasat version, the components in the RF assembly are integrated in a monolithic Transmit and Receive Integrated Assembly (eTRIA) unit, placed at the end of the Feed arm. For specifications on the eTRIA, see *ViaSat eTRIA* on page A-11.

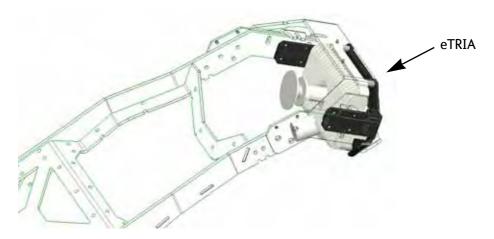


Figure 6: Components of the Ka-Band RF assembly

### 2.2.3 Antenna Control Unit (ACU)

#### **ACU**

The ACU manages all communication between the antenna and the connected modem. The ACU has status LEDs, a display and a keypad. It also provides a flexible configurable LAN interface (DHCP client/server, static IP address etc.) and a built-in web interface for configuration of the system. The ACU comes in two versions, a 500 W version and a 1000 W version.



Figure 7: ACU front panel

For details of the interfaces of the ACU, see *Interfaces of the Antenna Control Unit (ACU)* on page 4-1.



Figure 8: ACU connector panel

# 2.2.4 Keypad and display

Using the keypad and display on the ACU you can deploy, stow and stop the antenna, including monitoring the system (warnings, errors and information). See *Keypad and display menus* on page 6-27 for a full list of menus and details on how to use the display and keypad.

The menus show how the system has been configured. You can also see events (warnings, errors and information). Signal strength indication is rendered on the display as 7 blocks on the main display.



Figure 9: Keypad and display (detailed, example)

The display has a two line menu system. The display also supports two status lines (Upper and Lower) for compact satellite and antenna information. For a description of the LED light indicators see *LEDs on the keypad of the ACU* on page 7-8.

#### 2.2.5 Web interface

The VSAT system has a built-in web interface, which has two levels:

- Mobile web interface, used for basic operations and status. Accessed from a smartphone or tablet.
- Computer web interface, used for configuration, line-up, troubleshooting, extended status information etc. Accessed from a computer.

#### Mobile web interface

When you access the web interface from a smartphone or tablet you get access to the mobile web interface, which offers the following basic operations and status:

- Deploy, Stow and Stop the antenna
- Activate satellite profile
- · See status and events
- Access the full web interface

To access the mobile web interface:

- 1. Connect your smartphone or tablet to the WLAN access point of the ACU. For information on WLAN setup see *WLAN settings* on page 6-16.
- 2. In the browser of your smartphone or tablet, type in the IP address for the web interface. By default the IP address is http://192.168.0.1.

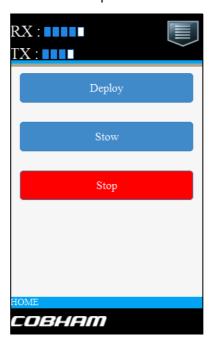


Figure 10: Mobile web interface, for basic operation

#### Web interface for setup and troubleshooting

To fully configure the VSAT system, use a computer with a standard Internet browser to access the built-in web interface.

The web interface is mainly used for calibration of the system, first-time setup of satellite and modem profiles, setup of the LAN ports, WLAN use and administrating admin and guest access rights. You can also deploy, stow and stop the antenna, and monitor the system (warnings, errors and information) with the web interface.

The web interface can be accessed using LAN or WLAN, if configured. see *WLAN settings* on page 6-16. Note that you must use the LAN connection when you first configure the WLAN interface.

#### To access the web interface:

- 1. Connect your computer to the LAN 1 or WLAN interface. For details on LAN/WLAN interface setup see *To configure the LAN network* on page 6-14.
- 2. Enter the IP address for the web interface. The default IP address is http://192.168.0.1. For details about further configuration and use, see *Setup and operation* on page 6-1.

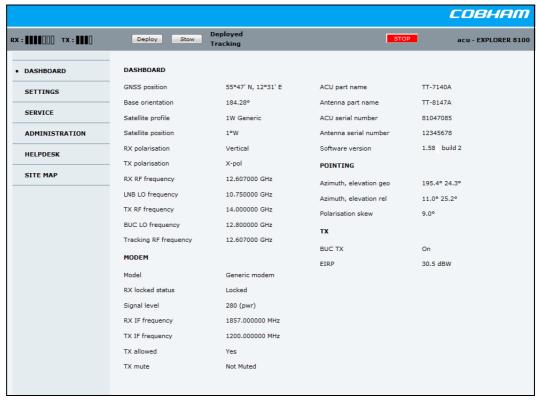


Figure 11: Web interface, DASHBOARD (example, EXPLORER 8100 Ku-Band)

### 2.2.6 LAN ports and WLAN

The ACU has five configurable LAN connectors (type RJ45). LAN 2, LAN 3 and LAN 5 are switched, i.e. the configuration for LAN 5 also applies to LAN 2 and LAN 3.

The default configuration is as follows:

- LAN 1 is used for system control via the web interface.
   If you want to use the front connector instead of LAN 1, connect the short LAN cable (37-206570-025) between LAN 1 and LAN X (Front) in the connector panel. LAN X is internally connected to the front LAN connector.
- LAN 5 is used to connect to the VSAT modem.
- LAN 4 is configured as a DHCP client.

The ACU has a WLAN module. Access to one of the LAN ports using WLAN must be set up in the web interface, see *To configure the LAN network* on page 6-14.

#### 2.2.7 Power supply

The power input for the ACU and modem is specified as follows: Nominal:100-240 VAC, 50/60 Hz, using IEC320 connector. The antenna is powered by the ACU.

#### 2.2.8 VSAT modem unit

The EXPLORER 8000 series is designed to be operated with third-party VSAT modems.

#### VSAT modems for Ku Band

The following VSAT modems are supported: for Ku-Band:

- iDirect OpenAMIP (iNFINITY/Evolution)
- iDirect Serial (iNFINITY/Evolution)
- Comtech CDM-570/625
- · Gilat SkyEdge II
- STM SatLink 2900

Additional VSAT modems may also be supported using the "Generic modem" or "Generic OpenAMIP" setup in the web interface of the VSAT system.

- Generic OpenAMIP: Used for OpenAMIP modems that are not in the dropdown list (e.g. Newtec). This profile uses the information from the modem.
- **Generic modem**: Used for other modems that are not in the list. You must enter the information manually in this profile.

A **Service modem** profile is also available, e.g. for situations where a reference satellite is needed, see *To use a reference satellite* (*Ku only*) on page 6-9.

#### VSAT modem for Ka Band

The following VSAT modem is supported for **Ka-Band**:

Surfbeam II Pro

# 2.3 Part numbers

# 2.3.1 EXPLORER 8100 system

## System part numbers

The following EXPLORER 8100 system part numbers are available:

Part number	Description	ACU	Antenna
408157A-50013	EXPLORER 8100 Ku VSAT System (no BUC, 1000 W ACU)	EXPLORER Antenna Control Unit, 1000 W	EXPLORER 8100 Ku VSAT Antenna (no BUC)
408157A-50211	EXPLORER 8100 Ku VSAT System (8 W BUC, 500 W ACU)	EXPLORER Antenna Control Unit, 500 W	EXPLORER 8100 Ku VSAT Antenna (8 W BUC)
408157A-50313	EXPLORER 8100 Ku VSAT System (20 W BUC, 1000 W ACU)	EXPLORER Antenna Control Unit, 1000 W	EXPLORER 8100 Ku VSAT Antenna (20 W BUC)
408157B-50551	EXPLORER 8100 Ka VSAT System	EXPLORER Antenna Control Unit, 500 W	EXPLORER 8100 Ka VSAT Antenna (Viasat eTria)

Table 2-12: System part numbers for the EXPLORER 8100 systems

#### **Conversion kits**

The following conversion kits are available for the EXPLORER 8100 system:

Part number	Description
408157A-100	EXPLORER 8100 eTRIA Conversion Kit
408157B-100	EXPLORER 8100 Ku Conversion Kit
408157A-200	EXPLORER 8100 20W BUC Kit

Table 2-13: Conversion kit part numbers for the EXPLORER 8100 systems

# 2.3.2 EXPLORER 8120 system

# System part numbers

The following EXPLORER 8120 system part numbers are available:

Part number	Description	ACU	Antenna
408158A-50013	EXPLORER 8120 Ku VSAT System (No BUC, 1000 W ACU)	EXPLORER Antenna Control Unit, 1000 W	EXPLORER 8120 Ku VSAT Antenna (No BUC)
408158A-50211	EXPLORER 8120 Ku VSAT System (8 W BUC, 500 W ACU)	EXPLORER Antenna Control Unit, 500 W	EXPLORER 8120 Ku VSAT Antenna (8 W BUC)
408158A-50313	EXPLORER 8120 Ku VSAT System (20 W BUC, 1000 W ACU)	EXPLORER Antenna Control Unit, 1000 W	EXPLORER 8120 Ku VSAT Antenna (20 W BUC)

Table 2-14: System part numbers for the EXPLORER 8120 systems

# Installation

This chapter has the following sections:

- To unpack the system
- To install the EXPLORER 8000 series

# 3.1 To unpack the system

The antenna is attached to the bottom of the transport box. To unpack the antenna you must remove the screws attaching the antenna to the packing material.



**WARNING!** Heavy weight - Do not attempt to lift the antenna alone! Use two or more persons or a lifting device. The antenna can weigh up to 70 kg and is difficult to handle.



**CAUTION!** Do not lift the antenna by the small metal bar on the back of the reflector. It is not designed to hold the weight of the antenna.

#### 3.1.1 What's in the box



**CAUTION!** For early versions of EXPLORER 8100 only: Do not manually unfold the antenna without first releasing the stow lock! If it is necessary to unfold the antenna in order to access the screws attaching the antenna to the packing material, you must first release the stow lock as described in *Manual unfolding* on page 7-11.

Unpack the antenna and ACU and check that the following items are present:

- EXPLORER 8100 Ku VSAT antenna (no BUC, 8 W BUC or 20 W BUC), or EXPLORER 8100 Ka VSAT antenna (Viasat eTRIA), or EXPLORER 8120 Ku VSAT antenna (no BUC, 8 W BUC or 20 W BUC)
- EXPLORER Antenna Control Unit (ACU) (500 W or 1000 W)
- With the ACU:
  - AC Power cord 1.8 m, US wall plug (37-207152-000)
  - AC Mains cable 1.8 m, Schuko (Euro) wall plug (37-207148-000)
  - Ethernet cable 2 m (37-203213-A)
  - Short Ethernet cable 0.25 m (37-206570-025)
  - WLAN antenna (88-139591-A)
  - WLAN TNC key for mounting the WLAN antenna (41-140645-C)
  - Quick guide (98-146768)

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- With the antenna:
  - Cable harness, antenna to ACU and modem, 10 m (37-145530)
  - Hand crank for manual operation (62-147900)
  - Hex L key 4 X 142 mm for manual operation (covers and stow lock) (51-207294-000)
  - For antenna installation: 6 mounting brackets (41-145536-A) and Thule rail adapter (41-145220-A), nylon lock nuts and washers
  - Ka only: F-to-SMA adapter for connection to modem (31-207170-000)
  - Safety sheet (99-150490)

## 3.1.2 Initial inspection

Inspect the shipping cartons and wooden box 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 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, i.e. removing the top and sides of the wooden box and opening the cartons, inspect it 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.

# 3.2 To install the EXPLORER 8000 series

# 3.2.1 Prerequisites

#### Vehicle

The antenna is intended for installation on a vehicle, taking advantage of the vehicle's suspension system during transport. Inadequate or no suspension, e.g. trailer mount, will require special measures - contact your dealer or factory before such installation.

Make sure the vehicle and roof rails are approved to carry the weight of the antenna. See *Weights and measures* on page A-3.

#### Magnetizable material

When you install the antenna, make sure the amount of magnetizable material close to the antenna is as small as possible, as magnetizable material could interfere with the magnetometer and affect the precision of the system. If in doubt, make a test setup prior to final manufacture of the supporting structure.

#### Line of sight

The antenna should be installed in such a way that no objects on the vehicle can block the line of sight from the antenna in any direction.

#### Mechanical obstructions

Make sure there are no objects on the vehicle that can obstruct the mechanical movement of the antenna. Preferably do not place any objects within the stay-clear area shown in page vi. If you cannot avoid objects inside the stay clear area, you must define a blocking zone. For details, see *Blocking zones* on page 6-11.

#### 3.2.2 Installation of the antenna on the vehicle



**WARNING!** Heavy weight - Do not attempt to lift the antenna alone! Use two or more persons or a lifting device. The antenna can weigh up to 70 kg and is difficult to handle.



**CAUTION!** Do not lift the antenna by the small metal bar on the back of the reflector. It is not designed to hold the weight of the antenna.



**CAUTION!** Make sure that the Azimuth base faces towards the front of the vehicle as shown in Figure 1 below. Otherwise the wind pressure may cause damage to the antenna when the vehicle is moving!



This end towards the front of the vehicle

Figure 1: Position of the antenna (stowed) on the vehicle

To install the antenna to the transport vehicle do as follows:

1. Safely and securely install the antenna's mounting frame to the roof of the vehicle.



**CAUTION!** The major part of the weight is on the front end (Azimuth base) of the structure. Pay special attention to support for this area when you plan the installation.

You can mount the antenna on a roof-rack (Thule-bars) or mounted on a custom made structure/enhancement of the vehicle roof or truck bed, see *Custom made structure* on the next page. For optimum servo performance, resilience to wind loads and vehicle movements, the azimuth base should be stiffly supported.

The mounting frame of the antenna has lengthwise adjustable brackets to accommodate different placements of the supports. If you are not using a roof rack, omit the U-bars.

#### Roof-rack mount

We recommend a 3-bar solution over a 2-bar solution whenever possible. Adhere to the load limits of the roof-rack manufacturer and use sturdy, professional grade racks.

#### **Custom made structure**

Custom structures should likewise focus on supporting the azimuth base.

Avoid large amounts of magnetizable material close to the antenna - it could adversely affect the magnetometer. If in doubt, make a test setup prior to final manufacture of the supporting structure.

For measures for antenna installation, see *Measures for antenna installation* on page A-14. See also *Weights and measures* on page A-3 and *Antenna dimensions* on page A-12.

#### 3.2.3 Installation of the ACU

To install the ACU, do as follows:

 If you are going to use WLAN, connect the WLAN antenna to the connector marked WLAN in the ACU connector panel. The WLAN antenna is part of the accessories supplied with the EXPLORER 8000 series system.



**CAUTION!** Turn the WLAN antenna into horizontal position before sliding the unit into the rack. The WLAN antenna may be damaged if it is placed in a vertical position.



Figure 2: ACU connector panel with WLAN antenna

- 2. If you are going to use the LAN connector on the front, connect the enclosed patch cable (37-206570-025) between LAN1 and LANX (Front) on the rear of the ACU.
- 3. Slide the ACU into a 1U space in a 19" rack.



We recommend supporting the ACU either with rails on the side of the rack system or by attaching it with screws on the side using the 2 M4 inserts on each side of the ACU (see ACU left and right side on page A-20).

4. Mount the screws on 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.

#### 3.2.4 Installation of the VSAT modem

For a list of supported VSAT modems see *VSAT modem unit* on page 2-9.

- 1. Mount the VSAT modem close to the ACU, preferably at a distance less than 1 m.
- 2. Connect all cables. See *VSAT modem settings* on page C-1 for a description of the connectors for supported VSAT modems. For cable specifications see *VSAT modem cables* on page B-1.

## 3.2.5 To connect the ACU, VSAT modem and antenna pedestal

The connections to be made depend on the VSAT system (Ku or Ka) and the VSAT modem used. The drawings on the next pages show an overview of connections in an EXPLORER 8000 series Ku system and an EXPLORER 8000 series Ka system.

- For details on how to connect the modem, see *VSAT modem settings* on page C-1.
- For details on the interfaces, see *Interfaces* on page 4-1.

#### Ku-band, connections

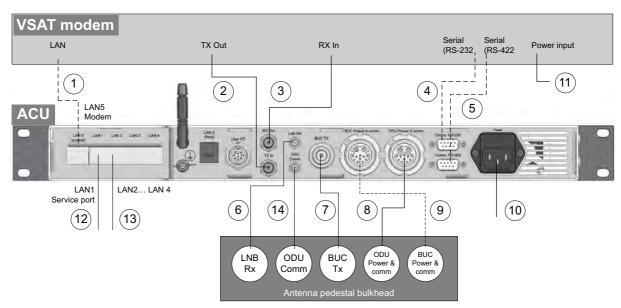


Figure 3: Ku-Band: Connection between antenna, ACU and VSAT modem

Important

If you replace antenna cables you must make a cable calibration. See *Ku-Band version only: Cable calibration* on page 6-22.

Connect the cables as described below:

Note

The cables 6, 7, 8 and 14 are delivered as a cable bundle.

- 1. If you are using LAN to connect the VSAT modem to the system, connect any LAN port on the VSAT modem to the LAN 5 control port on the ACU.
- 2. Connect the VSAT modem's Tx Out port to the ACU's Tx In port.
- 3. Connect the VSAT modem's Rx In port to the ACU's Rx Out port.
- 4. If applicable, connect the VSAT modem's RS-232 port to the ACU's RS-232 port.
- 5. If applicable, connect the VSAT modem's RS-422 port to the ACU's RS-422 port.
- 6. Connect the LNB Rx port on the antenna pedestal to the ACU's LNB Rx port. Seal the connection at the pedestal with splicing tape.
- 7. Connect the BUC Tx port on the antenna pedestal to the ACU's BUC Tx port. Seal the connection at the pedestal with splicing tape.
- 8. Connect the ODU Power & comm. port on the antenna pedestal to the ACU's ODU Power & comm. port.
- 9. If applicable, connect the BUC Power & comm. port on the antenna pedestal to the ACU's BUC Power & comm. port.

Note Remember to set up the system with the correct BUC interface. See antenna\_data buc on page D-4.

10. Connect the ACU to an AC power source (Standard IEC320 on ACU).

11. Connect the VSAT modem to an AC power source.

12.Use LAN1 to access the web interface.

13. For LAN2, LAN3 and LAN4, see To configure the LAN network on page 6-14.

14. Connect ODU Comm. on the antenna pedestal to ODU Comm. on the ACU

#### Ka-band, connections

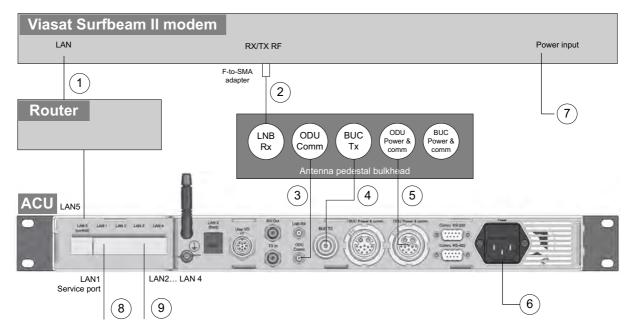


Figure 4: Ka-Band: Connection between antenna, ACU and VSAT modem

Connect the cables as described below:

Note The cables 2, 3, 4 and 5 are delivered as a cable harness.

- 1. Connect the LAN port on the VSAT modem to a router connected to the LAN 5 control port on the ACU.
- Connect the RX/TX RF connector on the VSAT modem to the LNB RX connector on the antenna pedestal, using the F-to-SMA adapter included in the delivery (31-207170-000). Seal the connection at the pedestal with splicing tape.
- 3. Connect the **ODU Comm**. connector on the antenna pedestal to the **ODU Comm**. connector on the ACU. Seal the connection at the pedestal with splicing tape.
- 4. Connect the BUC TX connector on the antenna pedestal to the BUC TX connector on the ACU (this connection is not used for the Ka-Band version, but is part of the cable bundle). Seal the connection at the pedestal with splicing tape.
- 5. Connect the ODU Power & comm. connector on the antenna pedestal to the ODU Power & comm. connector on the ACU.
- 6. Connect the ACU to an AC power source (Standard IEC320 on ACU).
- 7. Connect the VSAT modem to a suitable power source.
- 8. Use LAN1 to access the web interface.
- 9. For LAN2, LAN3 and LAN4, see To configure the LAN network on page 6-14.

# Interfaces

This chapter is organized in the following sections:

- Interfaces of the Antenna Control Unit (ACU)
- Interfaces of the antenna
- Interfaces of the VSAT modem

# 4.1 Interfaces of the Antenna Control Unit (ACU)

#### 4.1.1 WLAN interface

The ACU has a WLAN interface for wireless access to the system. To be able to use the WLAN interface, you must first set it up in the web interface, from a computer connected to the front LAN connector or LAN 1 in the connector panel of the ACU. For details, see *To configure the LAN network* on page 6-14 and *WLAN settings* on page 6-16.

## 4.1.2 LEDs, display and keypad



Figure 1: ACU display and keypad and LEDs

# 4.1.3 ACU Connector panel — overview



Figure 2: ACU connector panel overview

The connector LAN on the front panel is internally connected to the LAN X connector in the connector panel. Typically you connect LAN X to the service port at LAN 1 with a straight Ethernet cable. Then you can access the service port from the front of the ACU.

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# 4.1.4 AC Input connector

Provide AC power to the ACU from a standard 100-240 VAC supply using the cable included in the delivery. First find a suitable connector for your AC Mains supply and mount it on the cable according to the table below.



**CAUTION!** You must connect all three pins (Live, Neutral and Earth), in order to meet the isolation requirements for the system.

The AC connector on the ACU is an IEC320 connector for universal AC power input.

Outline (on the ACU)	Pin function	Wire color
	Live (L)	Brown
	Neutral (N)	Blue
N E	Earth (E)	Green/Yellow

Table 4-3: ACU AC Input connector, pin assignment

#### 4.1.5 Connectors for antenna connection

A cable bundle with all necessary cables between antenna and ACU is delivered with the system. There are 5 connectors on the ACU for connection to the antenna:

- BUC TX: N-connector for signal and power to the BUC.
- LNB RX: SMA-connector for signal from the LNB to the ACU and power to the LNB
- ODU Power & comm: GTC C4 female connector for antenna power (ODU power), stow indicator signal and internal system communication.

Outline (on the ACU)	Pin	Pin function
	P1	ODU Power RTN
Lb15	P2	ODU Power +48V
P1 P2	Р3	Reserved
P11 P9	P4	Reserved
P8————————————————————————————————————	P5	GND
P7 P4	P6	Com1 antenna ID
∟ <sub>P10</sub>	P7	Com2 antenna ID
Front VIEW	P8	Reserved
	Р9	Reserved
	P10	Reserved
	P11	GND
	P12	Stow indicator switch

Table 4-4: ACU Circular connector, ODU Power & comm, outline and pin assignment

Outline Pin function Wire color Pin (on the ACU) Р1 **BUC Power** Black/Red P2 **BUC Power Rtn** Black/White Р3 **GND** Ρ4 **GND P**5 **BUC Serial RX-**Red P6 **BUC Serial RX+** Orange Р7 **BUC Serial TX-**Yellow **P8 BUC Serial TX+** Front view Green Р9 Keyline -Blue P10 Band Select + gray P11 Keyline + **Purple** P12 Band Select -White

BUC Power & Comm.: GTC C4 female connector.

Table 4-5: ACU Circular connector, BUC Power & comm, outline and pin assignment

 ODU Comm: SMA connector used for Housekeeping communication between the ACU and the antenna.

#### 4.1.6 Rx/Tx connectors for VSAT modem

**RX Out** and **TX In** are F-connectors for connection to the Rx and Tx channels of the VSAT modem.

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

Table 4-6: ACU F connector, Rx and Tx, outline and pin assignment

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

## 4.1.7 RS-232 and RS-422 connectors for VSAT modem

Use these connectors to connect the ACU to the VSAT modems with serial interfaces. See Appendix C, *VSAT modem settings*.

#### **RS-232**

Outline (on the ACU)	Pin	Pin function
	1	Not connected
	2	RXD
1 5	3	TXD
	4	DTR
6 9	5	Ground
	6	DSR
	7	RTS
	8	CTS
	9	Receive Signal Strength Indicator

Table 4-7: ACU RS-232 connector, male, outline and pin assignment

## RS-422

Outline (on the ACU)	Pin	Pin function
	1	Ground
	2	Line A RXD (+)
1 5	3	Line B TXD (+)
	4	Ground
6 9	5	Ground
	6	Not connected
	7	Line A RXD (-)
	8	Line B TXD (-)
	9	Not connected

Table 4-8: ACU RS-422 connector, male, outline and pin assignment

#### 4.1.8 LAN connectors

The LAN connectors on the ACU are used for system setup and for connection to the VSAT modem.



These connectors are normally only for communication within the VSAT system, not for connection to the Internet. For Internet connection, connect to your VSAT modem.

The maximum cable length per connection is 100 m. Depending on the VSAT modem connected, a LAN connector may be used for modem control.



The EXPLORER VSAT system is not designed to be connected directly to the Internet. It must be located behind a dedicated network security device such as a fire wall.

You should change the default passwords as anyone with access and malicious intent can render the VSAT system inoperable.

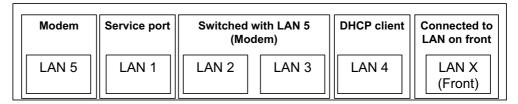


Figure 9: ACU LAN connectors on rear panel (default setup)

Cable type: CAT5, shielded.

For information how to configure the LAN network see *To configure the LAN network* on page 6-14.

Outline	Pin	Pin function	Wire color
1 2 3 4 5 6 7 8	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 4-10: ACU LAN connectors, outline and pin assignment

#### 4.1.9 User I/O

The User I/O connector is an 8-pin circular connector for user inputs and outputs, such as muting the antenna or signalling Rx lock.

A short cable with a mating connector is available from Cobham SATCOM (part number S-37-146760).

#### Pinout and functions

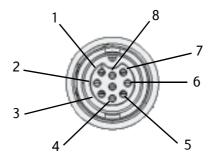


Figure 11: ACU User I/O connector, pinout

Pin	Pin function	Direction	Туре	Description	Wire color <sup>a</sup>
1	ACU Chassis	common	-	-	Black
2	RX Lock	output	12 or 24 V logic	High when RX locked	Brown
3	Stow indicator switch	output	Switch in antenna	Connected to GND (closed) when antenna stowed, otherwise open	Orange
4	TX Mute	input	3-32 V logic	Pull up to mute the antenna	Yellow
5	Stow input	input	3-32 V logic	Float or pull up to force antenna to stow. Ground to allow standard control of deploy/stow <sup>b</sup>	Green
6	IF29 Aux1	input	3-32 V logic	Spare input	Blue
7	Do not connect!	input or output	3-32 V logic or open drain	Spare input/output, for future use	Violet
8	Do not connect!	input or output	3-32 V logic or open drain	Spare input/output, for future use	White

Table 4-12: ACU User I/O connector, Pin assignment, functions and wire color

- a. The wire colors apply to the corresponding I/O cable available from Cobham SATCOM.
- b. The Stow input must be enabled in the web interface in order to work. See *Stow input* (discrete I/O) on page 6-19.

For specifications, see *Specifications for User I/O connector* on page A-5.

## 4.2 Interfaces of the antenna

#### 4.2.1 VSAT air interface

The antenna operates in the Ku-band (10.7 to 14.5 GHz) or the Ka-band (19.2 to 30 GHz). Service capabilities are determined by the connected VSAT modem.

#### 4.2.2 GNSS air interface

The antenna has a GNSS receiver for positioning input from the Positioning system.

## 4.2.3 Earth magnetic field interface (electronic compass)

The EXPLORER 8000 series has an electronic compass to support the pointing process.



You must calibrate the compass after first installation and every time you have reinstalled it, see *Compass calibration* on page 6-19.

#### 4.2.4 Connectors on the antenna

The connectors on the rear of the antenna are located as shown below:

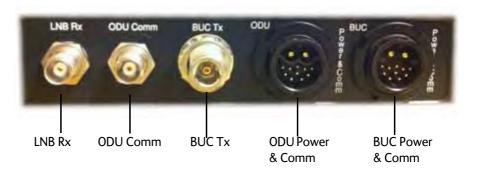


Figure 13: Connectors on the rear side of the antenna

A cable bundle with all necessary cables between antenna and ACU is delivered with the system. There are 5 connectors on the antenna for connection to the ACU:

- LNB Rx: TNC connector with signal from the LNB to the ACU and power to the LNB
- ODU Comm: TNC connector used for Housekeeping communication between the ACU and the antenna.
- BUC Tx: N-connector for signal and power from the ACU to the BUC.
- ODU Power & Comm: GTC C4 male connector for antenna power (ODU power) and information of the antenna to the ACU. For pinout see *Connectors for antenna connection* on page 4-3.
- BUC Power & Comm: GTC C4 male connector for power supply to the BUC and for communication with the BUC. For pinout see *Connectors for antenna connection* on page 4-3.

The connectors on the front of the antenna are partially hidden behind the reflector as shown.

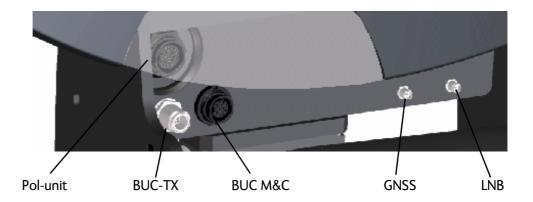


Figure 14: Connectors on the front of the antenna

- Pol-unit. GTC C4 female connector for connecting to the Pol-unit.
- BUC-TX: N-connector for signal and power from the antenna control box to the BUC.



Remember to configure the system for the BUC connector you are using (N-connector alone or M&C connector and N-connector). See <code>antenna\_databuc</code> on page D-4. Also remember to use the corresponding connectors on the ACU (BUC TX and/or BUC Power & Comm.).

• BUC M&C (Monitor & Control). GTC C3 female connector for DC power and communication between the antenna control box and the BUC.

Outline	Pin	Pin function	Wire color	AWG
P1 \P2	1	BUC Power	Black/Red	14
P12-P9	2	BUC Power RTN	Black/White	14
P3	3	GND	Drain wire	-
P11—P4	4	NC	NC	-
P6 P5	5	BUC Serial RX-	Red	22
∟ <sub>P10</sub>	6	BUC Serial RX+	Orange	22
	7	BUC Serial TX-	Yellow	22
	8	BUC Serial TX+	Green	22
	9	Keyline -	Blue	22
	10	Band select +	gray	22
	11	Keyline +	Purple	22
	12	Band select -	White	22

Table 4-15: Pinout for BUC M&C connector on antenna front

- GNSS: SMA connector for input from the GNSS receiver
- LNB: SMA connector for input from the LNB (Ku) or input/output for eTRIA (Ka)

## 4.2.5 Emergency stop button

The antenna has a emergency stop button for service purposes or emergency stop. In normal operation the switch is on. When you switch it off (push the button) it stops in the latest position and brakes the DC Motors and turns the BUC off.

To stop the antenna, push the red emergency stop button at the back of the antenna dish.



Figure 16: Emergency stop button

Important

If you want to manually stow the antenna, it is not enough to stop the antenna. For safety reasons you must remove power from the system before manually stowing the antenna. For details on how to manually stow the antenna, see *To stow and unfold the antenna manually* on page 7-9.

To release the emergency stop, turn the emergency stop button and move away from the antenna. The antenna restarts.

# 4.3 Interfaces of the VSAT modem

For interfaces of the VSAT modem and how to connect a VSAT modem correctly to the ACU, see the user documentation of the VSAT modem. For step-by-step guidelines how to set up the VSAT modem see Appendix C, VSAT modem settings.

# Initial setup and basic functions

This chapter describes the initial setup and basic functions of the EXPLORER 8000 series VSAT systems.

For information on configuration with the web interface and how to use the display and keypad, see *Setup and operation* on page 6-1.

This chapter has the following sections:

- To drive with the antenna installed
- Prerequisites for installation
- Initial setup
- Start up and basic functions

## 5.1 To drive with the antenna installed

The antenna must be stowed when you drive the vehicle. The maximum speed depends on your installation, but it must never exceed 130 km/h.



**WARNING!** Incorrect installation of the antenna may cause the antenna to fall off the vehicle or stress the mounting base. Thrane & Thrane A/S assumes no liability for any damage caused by the antenna falling off the vehicle or stressing the mounting base. It is the responsibility of the customer to ensure a safe and correct installation of the antenna. The instructions in the Installation manual are only guidelines.

# 5.2 Prerequisites for installation

#### 5.2.1 Location for transmission

#### Line of sight

Make sure the vehicle with the VSAT system is parked where there is free view to as much of the sky as possible.

If possible, park the vehicle in such a way that the antenna, when deploying, points in the approximate direction of the satellite. This is to avoid excessive movements of the antenna and to improve the acquisition time. If the satellite elevation is close to Zenith, the antenna elevation angle should preferably be less than 82 degrees.

#### Space for antenna movement

Make sure the vehicle is parked in a place where the antenna can move freely in all directions, according to the Stay clear areas shown in Figure 3 on page vi and Figure 4 on page vii.

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If you cannot avoid obstacles, you must define a blocking zone to make sure the equipment is not damaged. See *Blocking zones* on page 6-11.

#### Unexpected antenna movements

The movements of the antenna can be very powerful and hazardous to human beings. For this reason, the antenna has a safety feature that prevents or limits unexpected movements of the antenna, e.g. if the antenna has to repoint after a period with no movements. In this case, you can set up the antenna so that the user must actively choose to continue. If you need to avoid user interaction to allow the antenna to continue operation, you can set up the antenna for Unmanned operation. See *Antenna stabilization and safety* on page 6-10.



**WARNING!** Make sure nobody can get close to the antenna, especially if you use the unmanned operation feature! Observe the stay clear area whenever the antenna is powered. See the mechanical stay-clear areas on page vi and page vii.

#### Avoid magnetizable material

Make sure the vehicle with the antenna is not parked close to large areas of magnetizable material, as this could interfere with the precision of the compass function.

## 5.2.2 Wind speed considerations

The antenna is designed to operate under high wind speeds, see the wind speed specifications on page A-3. Note that the antenna may point away from the satellite in winds blowing faster than the operational wind speed limit.

Important

Do not operate the terminal at wind speeds exceeding the operational wind speeds. In case the wind speeds exceed the operational wind speed limit while the antenna is already assembled or operational, bring the antenna to the stow position. In case the wind speeds exceed the survival wind speed limit while the antenna is already assembled or operational, and you cannot stow the antenna with the electronic stow function, bring the antenna manually back to the stow position. See *To stow and unfold the antenna manually* on page 7-9.

# 5.3 Initial setup

After you have installed and connected the antenna, ACU and modem, you must make some initial configuration in the web interface before you can use the system. Go through the following steps to set up your VSAT system:

1. Ku-Band versions: If you have installed a new BUC, you must configure the system for the new BUC, using the command **antenna\_data** buc. See *BUC installation* on page 7-13 and *antenna\_data* on page D-4.



If you have purchased the No-BUC version of the antenna, there will be no power on any of the connectors for the BUC connection until you have configured the system with the antenna\_data buc command.

- 2. Ku-Band versions: If you have replaced cables or installed a new BUC, you must make a cable calibration. See *BUC installation* on page 7-13 and *Ku-Band version only: Cable calibration* on page 6-22.
- 3. Make a Compass calibration. See *Compass calibration* on page 6-19.



You must make a compass calibration every time the antenna is reinstalled. If the compass is not calibrated the system will not work properly!

- 4. Create satellite profiles and modem profiles. See *Satellite profiles* on page 6-7 and *Modem profiles* on page 6-6.
- 5. If you want to control the system using a WLAN connection, you must first set up the use of WLAN in the ACU. See *To configure the LAN network* on page 6-14 and *WLAN settings* on page 6-16.

After calibration and creation of satellite profiles and modem profiles you can deploy the antenna as described in the next section.

# 5.4 Start up and basic functions



First time after installation or service, you must calibrate the VSAT system and configure satellite and modem profiles as described in the previous section.

After power on you must deploy the antenna. How to do this is described in the following sections. Once you have finished the transmission you must stow the antenna again.

During commissioning you might need to manually jog the antenna, see *To line up or jog the antenna* on page 6-22.



**WARNING!** Stay clear of the antenna! Be aware of movements and pinch points, especially while the antenna is being positioned, deployed or stowed.

1. Switch on the ACU and the VSAT modem. The ACU starts up and goes through an initialization procedure.

2. Wait until the Power LED and the Fail/Pass LED on the ACU light steady green and the display shows Not ready: Not deployed. Then you can deploy the antenna.

To deploy and stow the antenna you can use the keypad and display on the ACU, a smartphone or tablet, or a PC and the built-in web interface.

You must stow the antenna before moving the vehicle.

## 5.4.1 To deploy the antenna



It may take some time after the antenna is deployed before the modem is ready to start the acquisition procedure. If this time exceeds the time-out limit, you may get a popup in the display and in the web interface asking you to Deploy again. This is for safety reasons, in order to avoid sudden unexpected movements of the antenna. See *Antenna stabilization and safety* on page 6-10.

#### To deploy the antenna using the keypad and display

When the system has started up, do as follows:

1. Shortcut: Press and hold ▲ for 2 seconds.



It may take up to 10 seconds before the antenna starts to deploy.

To learn how to use the keypad see *Keypad and display menus* on page 6-27. You can also deploy the antenna using the display menu system.

- Wait until the ACU display shows TRACKING.
   You may have to select Deploy again to allow the acquisition procedure, see note above.
- 3. Check that your modem is ready. The indications may differ depending on the modem type, refer to the documentation for your modem.

When the modem is ready, you can use it to connect to the Internet via the VSAT satellite system.

#### To deploy the antenna using the mobile web interface

- 1. Connect your smartphone or tablet to the WLAN access point of the ACU. For information on WLAN setup, see *WLAN settings* on page 6-16.
- 2. In the browser of your smartphone or tablet, type in the IP address for the web interface. By default the IP address is http://192.168.0.1.
- 3. When the system has started up, tap **Deploy**.
- 4. Check the status on your smartphone/tablet. You may have to confirm before the acquisition procedure can start, if too much time has passed after the deployment of the antenna.
- 5. Check that your modem is ready. The indications may differ depending on the modem type, refer to the documentation for your modem.

When the modem is ready, you can use it to connect to the Internet via the VSAT satellite system.

#### To deploy the antenna using the web interface

- 1. Connect a PC to the **LAN1** or front **LAN** connector at the ACU. You may also use WLAN, if it is configured.
- 2. Open an Internet browser and type the IP address (default http://192.168.0.1).
- 3. When the system has started up, click the **Deploy** button.

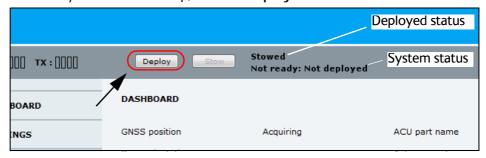


Figure 1: To deploy the antenna using the web interface

- 4. Check the status in the web interface. You may have to confirm before the acquisition procedure can start, if too much time has passed after the deployment of the antenna.
- 5. Wait until the system status shows Tracking.
- 6. Check that your modem is ready. The indications may differ depending on the modem type, refer to the documentation for your modem.

When the modem is ready, you can use it to connect to the Internet via the VSAT satellite system.

## 5.4.2 To stop the antenna

You can stop the antenna, e.g. if some object is interfering with the movement of the antenna and you cannot access the emergency stop button. If you are close to the ACU, you can use the on/off button to switch off the system. This will immediately stop the antenna movement.

You can also use the electronic stop function, which is described below.



**WARNING!** This is not the same function as the emergency stop button! In emergency situations, use the emergency stop button if possible. The emergency stop button switches off the motors, whereas the electronic stop function just stops the movement.

#### To stop the antenna using the display and keypad

To learn how to use the keypad see *Keypad and display menus* on page 6-27.

- 1. Press **OK** to enter the menu system and press **OK** again to access the **OPERATION** page.
- 2. Press ▼ until STOP is selected, and press OK.

- 3. Check that the status shows STOPPED.
- 4. To start the antenna again, select OPERATION > START.

  The antenna restarts. Select OPERATION > DEPLOY when you are ready to continue.

#### To stop the antenna using the mobile web interface

- 1. Connect your smartphone or tablet to the WLAN access point of the ACU. For information on WLAN setup, see *WLAN settings* on page 6-16.
- 2. In the browser of your smartphone or tablet, type in the IP address for the web interface. By default the IP address is http://192.168.0.1.
- Tap Stop.The Stop button changes to Start.
- 4. To start the antenna again, tap **Start**.

  The antenna restarts. Tap **Deploy** when you are ready to continue.

#### To stop the antenna using the web interface

- 1. Connect a PC to the **LAN1** or front **LAN** connector at the ACU. You may also use WLAN, if it is configured.
- 2. Open an Internet browser and type the IP address (default http://192.168.0.1).
- 3. At the top, click the red **Stop** button.

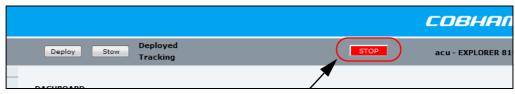


Figure 2: To stop the antenna using the web interface

The **Stop** button changes to **Start** and the system status shows **Stopped**.

To start the antenna again, click Start.
 The antenna restarts. Select Deploy when you are ready to continue.

#### 5.4.3 To stow the antenna

The antenna must be set into the stow position before moving the vehicle.



**WARNING!** Be aware of pinch points while the antenna is being positioned, deployed or stowed.



You can stow the antenna manually, if for some reason the system is inoperable (loss of power or similar). For details, see *To stow and unfold the antenna manually* on page 7-9.

#### To stow the antenna using the keypad and display

Shortcut: Press and hold ▼ for 2 seconds.

To learn how to use the keypad see Keypad and display menus on page 6-27.

You can also stow the antenna using the display menu system.

#### To stow the antenna using mobile web interface

- 1. Connect your smartphone or tablet to the WLAN access point of the ACU. For information on WLAN setup, see *WLAN settings* on page 6-16.
- 2. In the browser of your smartphone or tablet, type in the IP address for the web interface. By default the IP address is http://192.168.0.1.
- 3. Tap Stow.
- 4. Check that the status shows Stowed.

## To stow the antenna using the configuration web interface

- 1. Connect a PC to the LAN1 connector.
- 2. Open an Internet browser and type the default IP address: http://192.168.0.1.
- 3. At the top of the page, click the button **Stow**.

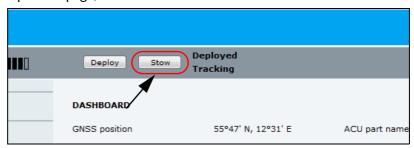


Figure 3: To stow the antenna using the web interface

4. Check that the status shows Stowed.

# Setup and operation

This chapter has the following sections:

- The web interface
- Keypad and display menus
- SNMP support

## 6.1 The web interface

The VSAT system has a built-in web interface, which has two levels:

- Mobile web interface, used for basic operations and status. Accessed from a smartphone or tablet.
- Configuration web interface, used for configuration, line-up, troubleshooting, extended status information etc. Accessed from a computer.

#### 6.1.1 Mobile web interface

When you access the web interface from a smartphone or tablet you get access to the mobile web interface, which offers the following basic operations and status:

- Deploy, stow and stop the antenna
- Activate satellite profile
- See status and events
- Access the configuration web interface

#### To access the mobile web interface of the ACU

- 1. Power up the VSAT system, i.e. switch on the ACU. Wait until the LEDs on the front plate of the ACU show that the system is ready to be accessed.
  - Power LED: Green
  - Fail/Pass LED: Steady green.
- 2. Connect your smartphone or tablet to the WLAN of the ACU. For details on WLAN setup, see *WLAN settings* on page 6-16.
- 3. Open your Internet browser and enter the IP address of the ACU. The default IP address is http://192.168.0.1.

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The mobile web interface opens.

The deploy, stow and stop functions are described in *Start up and basic functions* on page 5-3.



Figure 1: Mobile web interface, main screen

To access the menu, tap the ikon in the top right corner.

#### Menu:

- **Status** shows information such as system status, host name, position, heading, selected satellite profile, modem etc.
- Satellites lets you select which satellite to activate, see the next section.
- Eventlist shows a list of currently active events (if any).
- **Desktop** gives access to the "computer web interface", i.e. the full version of the web interface.
- Help opens the user & installation manual for the EXPLORER 8000 series VSAT system.

#### To select and activate a satellite profile

- 1. From the menu, select Satellites.
- 2. Select the satellite profile you want to activate.
- 3. Tap Activate.

## 6.1.2 Configuration web interface

Use the built-in web interface of the ACU to make a full configuration of the VSAT system with the correct VSAT modem, the satellite positions you intend to use and other parameters. You can use a standard Internet browser.

#### To access the configuration web interface

To access the web interface of the ACU do as follows:

- 1. Power up the VSAT system, i.e. switch on the ACU. Wait until the LEDs on the front plate of the ACU show that the system is ready to be accessed.
  - Power LED: Green
  - Fail/Pass LED: Steady green.
- Connect a PC to LAN interface 1 (Service port, standard Ethernet) of the ACU or to the front LAN connector of the ACU. You can also connect to the WLAN interface if configured.
- 3. Open your Internet browser and enter the IP address of the ACU. The default IP address is http://192.168.0.1.
- 4. By default, the web interface shows the **DASHBOARD** page. However, you can set up a password protection, so that you have to log in before you can get access to the web interface. See *User permissions (guest login)* on page 6-24.

When the Dashboard (or the Guest login page) is displayed, you know that the connection to the VSAT system can be established. The web interface is ready for use. You can continue to configure the system.

If you cannot establish a connection there might be problems with the Proxy server settings of your PC ("Use proxy server" must be disabled in your PC).

If you want to use another LAN port you must configure it according to your network requirements. For information how to configure the LAN connectors *To configure the LAN network* on page 6-14.

#### Information and controls in the top bar of the web interface

The top bar, which is independent of the selected page, shows the signal strength, the deployed status, the system status, and, if an event is active, a warning icon.

The buttons **Deploy**, **Stow** and **Stop** are also available from the top bar. For details on these functions, see *Start up and basic functions* on page 5-3.

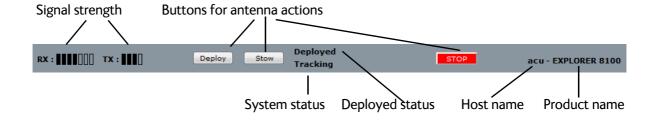


Figure 2: Top bar in Dashboard

#### Examples of system status:

- Antenna SW upload
- Antenna POST (Power-On Self Test)
- Ready (waiting for data from the modem or no satellite profile selected)
- Tracking (antenna is locked to the satellite signal and ready to send/receive.
- Not ready: Not deployed (the system is waiting for the user to deploy the antenna)
- Safe mode (error, followed by an error description)
- <active event message>

## Information fields on the Dashboard



The information on the Dashboard varies depending on the antenna and the used satellite and modem profiles.

DASHBOARD	Description
GNSS position	Current position, reported by the GNSS module or entered manually
Base orientation	Orientation of the mounting base relative to estimated North
Satellite profile	Name of the currently active satellite profile
Satellite position	Position of the satellite selected in Satellite profile
RX polarization	Horizontal, Vertical, (Left-hand or Right-hand)
TX polarization	Horizontal, Vertical, (Left-hand or Right-hand)
RX RF frequency	Receiving frequency
LNB LO frequency	The LNB Local Oscillator frequency
TX RF frequency	Transmitting frequency
BUC LO frequency	The BUC Local Oscillator frequency
Tracking RF frequency	Current RF tracking frequency
ACU part name, Antenna part name, ACU serial number, Antenna serial number, Software version	Part names, serial numbers for ACU and antenna, software version of the VSAT system
POINTING	Description
Azimuth, elevation geo	Current value for geographic azimuth and elevation
Azimuth, elevation rel	Current value for relative azimuth and elevation
Polarization skew	Current value for polarization skew

Table 6-3: DASHBOARD information fields

MODEM	Description
Model	VSAT modem name, entered in SETTINGS > Modem profiles.
RX locked status	Shows whether or not the system has locked to the incoming signal.
Signal level	Current input signal level from VSAT modem.
	iDirect openAMIP modem: (PWR) 0-500, delivered by the connected modem. For values <250 the antenna searches after a new signal.
	Other modem: Signal level in dB.
RX IF frequency	RX IF frequency read from the VSAT modem
TX IF frequency	TX IF frequency read from the VSAT modem
TX allowed	On or Off. Indicates if the VSAT modem supplies the 10 MHz reference signal on its TX connector (On) and if an iDirect OpenAMIP modem indicates modem Locked and Tx ON in the OpenAMIP message L (L 1 1).
TX mute	Muted or Not muted. Indicates whether or not the antenna is muted. You can mute the antenna using the TX mute input on the User I/O connector. See <i>User I/O</i> on page 4-7.
TX	Description
BUC TX	On or Off. Shows if the VSAT system has enabled the BUC or not. It is the same TX ON/TX OFF as shown in the display of the ACU, see <i>Keypad and display menus</i> on page 6-27.
BUC output power	Shows whether or not the BUC is transmitting and the power level. At the P1dB compression point 4 bars are filled.
EIRP	The EIRP readout is only valid for continuous modulated signals and is for indicative use only (limited accuracy).

Table 6-3: DASHBOARD information fields

## 6.1.3 Modem profiles

A modem profile contains all VSAT modem settings that are necessary for a successful connection to the satellite. The data you have to fill in are provided by your VSAT service and modem provider. You must add at least one modem profile.

#### Modem profile - New entry and Edit

On the page Modem profiles you create, edit or delete modem profiles.

To add or edit a modem profile, do as follows:

1. Select SETTINGS > Modem profiles and click New entry or Edit.



For the Ka-Band system there is currently only one modem, the Surfbeam II modem.

- 2. Fill in a modem profile name of your own choice.
- 3. Select one of the supported modems from the drop down list. Once you have selected a VSAT modem, entry fields required for this VSAT modem are displayed.

Generic OpenAMIP: If you have an OpenAMIP modem that is not included in the list, select Generic OpenAMIP.

Generic modem: If you have another modem that is not included in the list, select the generic modem. With this modem profile you enter all information about the modem manually.

**Service modem:** This is mainly used for reference satellites<sup>1</sup> and for troubleshooting purposes.

- 4. Fill in or edit the data provided by your VSAT service provider.
  - Enter the passwords, if needed.
  - Select the modem baud rate
  - Select whether you want to use the 10 MHz reference from the ACU (Internal) or the VSAT modem (VMU). "Cleaned" means that any noise on the 10 MHz reference signal is removed before using the reference.

#### Important

The VSAT system can work either using the Rx or Tx 10 MHz reference signals provided by the modem or using its own built-in 10 MHz reference (RX only). The setting in the ACU must match the setting in the modem.

- GNSS output: Some modems need the current GNSS position from the ACU. If the modem needs the GNSS position, you must select the baud rate for the RS-232 interface from the GNSS output dropdown list. Otherwise select Disabled.
- For generic modem: Select the RSSI Lock Type and type in the RSSI Lock Level.
- <u>For OpenAMIP IP address</u>: Make sure that you have entered this IP address also for the LAN connector that is used for the OpenAMIP modem, see *To configure the LAN network* on page 6-14.
- 5. Click Apply to add the new profile to the list of modem profiles or to accept the edits.

<sup>1.</sup> For details on how to use a reference satellite profile, see *To use a reference satellite (Ku only)* on page 6-9.

## 6.1.4 Satellite profiles

On the page **Satellite profiles** you add, edit, delete and activate satellite profiles. A satellite profile contains all settings that are necessary for a successful connection to the satellite, including a modern profile. Most of the data you have to fill in are provided by your VSAT service provider.

You must activate one satellite profile.

To activate a satellite profile, click Activate next to the profile name.



You must add at least one modem profile before you can add a satellite profile. See *Modem profile – New entry and Edit* on page 6-6.

#### To select a reference satellite (Ku only)

If you are going to use a reference satellite, select the satellite from the dropdown list and click **Apply**.



First you have to create a reference satellite profile that uses the Service modem profile.<sup>a</sup>

a. For details on how to use a reference satellite profile, see *To use a reference satellite (Ku only)* on page 6-9.

#### Satellite profiles - New entry and Edit



You cannot edit nor delete an active profile. Make sure the profile is not active before you edit or delete it.

- 1. Select **SETTINGS** or **Satellite profiles**.
- 2. Click Edit or New entry.

Each satellite profile has one assigned modem profile. The parameters vary depending on the selected modem profile.

For a Generic modem you enter all parameters in the satellite profile manually.

3. Enter or edit the Satellite profile name.



It is helpful to assign a name containing the location where the Satellite profile is to be used (e.g. *Central America*) and possibly the provider.

- 4. Select a modem profile. The page automatically displays the parameters available for the selected modem profile.
  - For instruction how to add a modem profile see *Modem profile New entry and Edit* on page 6-6.
- 5. Enter the data for the satellite that you want to use. For satellite data see *DVB-S/DVB-S2* satellites for *Ku-Band* on page F-1 or www.lyngsat.com. If you have selected a satellite from the list, some of the information is filled in automatically.
- 6. Click **Apply** to save the settings for the satellite profile.

Depending on the selected modem profile, some or all of the below settings may be available. You get most of the information from your VSAT provider.

Setting	Values	Explanation
Predefined satellites	User defined data or selection of satellites	Select a satellite from the list, or select User defined data and enter all information manually.
Use reference satellite	Checkbox	Select Use reference satellite if you are going to use a reference satellite. See <i>To use a reference satellite (Ku only)</i> on page 6-9.
Satellite position	degrees E or W	Position of the satellite
Polarisation skew	degrees	See documents from VSAT provider
Maximum inclination	degrees	Sets the satellite search window size to match inclined orbit satellites.
Elevation cutoffl	degrees	The minimum elevation angle for the antenna to function. According to FCC (FCC §25.205) regulations the Elevation cutoff must be minimum 5 degrees.
RX polarisation	Horizontal or vertical	Polarization of the desired RX signal
TX polarisation	X-pol or empty	Polarization of the TX signal - relative to the desired RX signal. Orthogonal (X-pol) or same (Co-pol).
RX IF frequency	MHz	RX IF frequency from the VSAT modem
LNB LO frequency	9.75 or 10.75 GHz	Select 9.75 if the RX frequency is between 10.7 GHz and 11.7 GHZ
		Select 10.75 if the RX frequency is between 11.7 GHz and 12.75 GHZ
RX RF frequency	GHz	Receiving frequency
TX RF frequency	GHz	Transmitting frequency
Tracking type	Narrow band, VSAT modem RSSI, DVB-S/DVB-S2 or Wideband power	Select which signal should be used for tracking.
RX frequency	Modem or User defined	Select Modem to use the modem RX frequency or select User defined and enter the RX frequency manually.

Table 6-4: Settings for satellite profile

#### To use a reference satellite (Ku only)

If your VSAT modem cannot communicate to the antenna that it is locked to the correct satellite, you can initially use a reference satellite that the antenna can identify without the modem.

To use a reference satellite, do as follows:

- 1. On the Modem profiles page, create and save a modem profile using the Service modem. For details, see *Modem profile New entry and Edit* on page 6-6.
- 2. On the Satellite profiles page, create and save a reference satellite profile that uses the Service modem profile. For details, see *Satellite profiles New entry and Edit* on page 6-7.
- 3. Create your real satellite profile for the connected modem.
- 4. In the real satellite profile, select Use reference satellite.
- 5. In the Satellite profiles page under Reference satellites, select the reference satellite profile from step 2 above and click Apply.

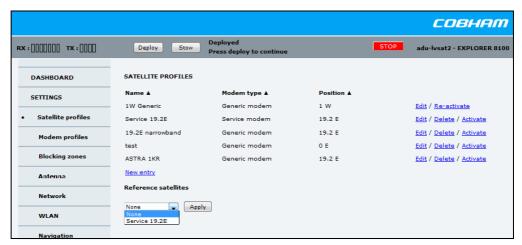


Figure 5: Web interface: SETTINGS - select reference satellite

6. Activate the real satellite profile.

With this satellite profile activated, every time you deploy the antenna it will start up using the reference satellite and automatically switch to the real satellite when possible.

## 6.1.5 Antenna stabilization and safety

The antenna movements of the VSAT system can be hazardous to people who are close to the antenna. Always stay out of the **Stay clear area** shown in page vi and page vii. If you have to enter the stay clear area, stop the antenna with the emergency stop button or power off the system from the ACU.

In the web interface you can set up whether or not you want the system to ask for user acknowledgement before moving the antenna.

The antenna also has Dynamic Pointing Correction (stabilization feature) that compensates for movements in the vehicle e.g. if people are getting in our out of the vehicle while it is deployed and active.<sup>1</sup>

- 1. Select SETTINGS > Antenna.
- 2. Select the Operational mode.
  - User acknowledgement (Default setting): The user interface will ask for acknowledgement when the antenna is about to move after at least one minute without moving. The antenna will not move until someone has acknowledged.
  - No user acknowledgement: The antenna will move autonomously when necessary, e.g. if there is a new satellite position from the modem.
  - Unattended: The antenna will move autonomously when necessary, and attempt to maintain the connection at all times, independently of the user. For example, if the antenna enters safe mode because of an error, it will restart.
- 3. Select **Auto stow on vehicle movement** if you want the antenna to stow automatically when the vehicle moves. This setting is disabled by default.
- 4. Select the Stabilization mode.
  - Continuous (Default setting): The antenna continuously compensates for movements in the vehicle to keep a stable position in relation to the satellite.
  - Off: Antenna stabilization is not used
  - **Automatic**: The antenna periodically adjusts the position to compensate for movements in the vehicle.
- 5. Click Apply.

<sup>1.</sup> The antenna is designed to compensate for a change of pointing angle due to a tilt of the platform. It is not designed for tracking on a moving platform. The pedestal azimuth and elevation joint has an angle acceleration limit of 14 Deg/s<sup>2</sup> and a positioner angular speed limit of 9 Deg/s. If the tilt speed of the platform is slow and can be compensated within the speed limits of the joints, the connection to the satellite will not be interrupted. If the platform movements are faster than the speed limits of the joints, the antenna will for a short moment not point correctly towards the satellite, but it will regain the correct pointing towards the satellite within a short time.

## 6.1.6 Blocking zones

If possible, avoid any objects within the stay clear area shown in *Mechanical "stay-clear"* area, EXPLORER 8100 on page vi. If it cannot be avoided, you must enter blocking zones for the area where the object is located. When the antenna meets a blocking zone, the display and the web interface show "Blocking zone" and the antenna attempts to find another path to the satellite signal.



The antenna should be placed on a plane surface relative to the ground, in order for the elevation values to be precise during the Jog process.

There are two types of blocking zone:

- Boom blocking zone: Prevents the boom from colliding with the blocking object.
- Dish blocking zone: Prevents the dish from colliding with the blocking object.

For both types, you must define an azimuth low limit and an azimuth high limit. A boom blocking zone additionally needs a high elevation limit to be defined (the low elevation limit will be set to 0). A dish blocking zone, on the other hand, additionally needs a low elevation limit to be defined (the high elevation limit will be set to 100 degrees).

The blocking zone limits are found as follows:

- 1. Switch on the system and access the web interface. See *To access the configuration web interface* on page 6-3.
- 2. Deploy the antenna and switch to Jog mode as soon as possible. See *To line up or jog the antenna* on page 6-22.
- 3. For Ku antennas only: Jog Polarization to 0 Deg (so that the waveguide reaches down as far as possible).
- 4. First define the boom blocking zones as follows (see Figure 6)

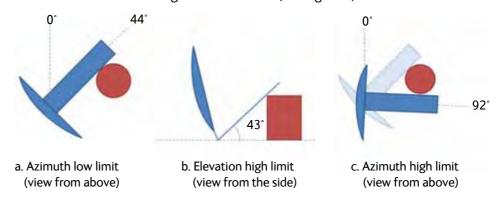


Figure 6: Boom blocking zones, example with cylinder-shaped blocking object

a. **Boom blocking zone**, azimuth low limit: Carefully jog the antenna clockwise (increasing Azimuth) until the boom is as close as possible to the blocking object, and so that the antenna can move freely in Elevation without touching the object.

Go to SETTINGS > Blocking zones, select Boom and read the "Current azimuth" at the top - this is the low azimuth limit of the boom blocking zone. Type it in as the first Azimuth value and click Apply (but not Active).

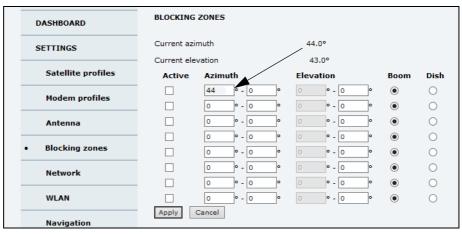


Figure 7: Web interface, Boom blocking zones

Go back to the Jog page.

b. Boom blocking zone, elevation high limit: Jog to the lowest elevation angle that allows the antenna to move all the way past the object in Azimuth. Go to the Blocking zones page and read the "Current elevation" - this is the high elevation limit of the boom blocking zone. Type it in under Elevation and click Apply. If the antenna is completely blocked, use 100 Deg when you type in the blocking zones. Go back to the Jog page.



The elevation set in the Blocking zones page is the elevation of the signal beam. Some parts on the antenna may be below the elevation angle (e.g. the Forward Wave Guide), so you should add a little margin to keep all antenna parts clear of the object(s).

- c. Boom blocking zone, azimuth high limit: Jog the antenna counterclockwise (decreasing azimuth) as close as possible to the blocking object, and so that the antenna can move freely in Elevation without touching the object. Go to the Blocking zones page and read the "Current azimuth" this is the high azimuth limit of the boom blocking zone. Type it in and click Apply. Go back to the Jog page.
- 5. Jog the antenna at least 5 degrees away from any blocking zone.
- 6. Define the dish blocking zones as follows: (see Figure 8)

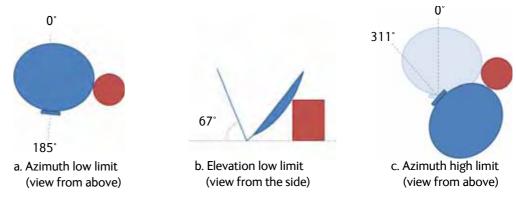


Figure 8: Dish blocking zones, example with cylinder-shaped blocking object

a. **Dish blocking zone**, azimuth low limit: Carefully jog the antenna clockwise until the dish is as close as possible to the blocking object, and so that the antenna can move freely in Elevation without touching the object.

Go to the **Blocking zones** page, select **Dish** at the next free line and read the "Current azimuth" - this is the low azimuth limit of the dish blocking zone. Type in the low azimuth limit and click **Apply** (but **not** Active).

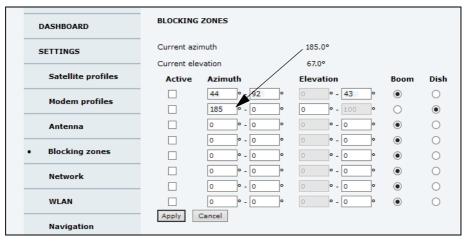


Figure 9: Web interface, Boom blocking zones

- b. **Dish blocking zone**, elevation low limit: Jog to the highest elevation angle that allows the antenna (dish) to move all the way past the object in Azimuth. Go to the **Blocking zones** page and read the "Current elevation" this is the low elevation limit of the dish blocking zone. Type it in under **Elevation** and click **Apply**. If the antenna is completely blocked, use 0 degrees when you type in the blocking zones.
- c. Dish blocking zone, azimuth high limit: Jog the antenna counterclockwise as close as possible to the blocking object, and so that the antenna can move freely in Elevation without touching the object. Go to the Blocking zones page and read the "Current azimuth" this is the high azimuth limit of the dish blocking zone. Type it in and click Apply.
- 7. If there are more blocking objects, repeat the procedure above for each blocking object.
- 8. Select Activate for each blocking zone and click Apply.

After defining and activating the blocking zones you can test it using the Jog function. Jog the antenna carefully until it meets the defined blocking zone. Observe that it stops at the blocking zone and that the display and the web interface show a warning.

## 6.1.7 To configure the LAN network

On this page you can set up the LAN network and enter a host name. The host name helps identifying the VSAT system.



The VSAT system is not designed to be connected directly to the Internet. It must be located behind a dedicated network security device such as a fire wall. You should change the default passwords as anyone with access and malicious intent can render the system inoperable.

To configure the LAN network, do as follows:

- 1. Select SETTINGS > Network.
- 2. Make the necessary changes on this page and click **Apply**. For available options for the network configuration, see Table 6-11 on page 6-15.

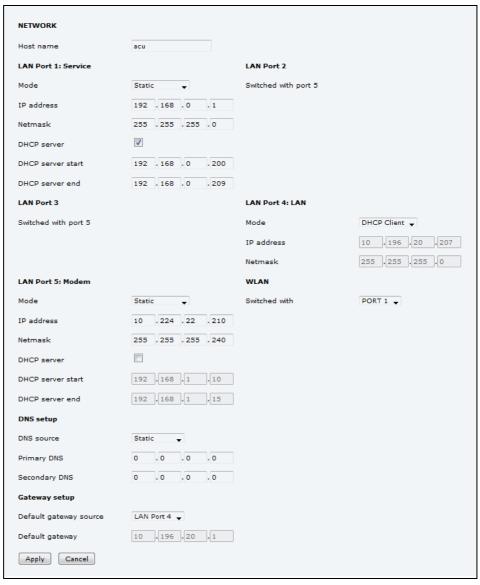


Figure 10: Web interface: SETTINGS, Network (default settings)

### Important

Make sure that the networks do not use IP address ranges that overlap.

Sections	Preferred use
NETWORK Host name	The host name is used for identifying the VSAT system, and is displayed in the web interface (right side of top line, next to the product name). The default host name is acu. You can change the name. Letters (a-z), digits (0-9) and hyphen (-) are allowed as legal characters.  Note: The host name must start with a letter.
LAN Port 1	LAN port 1 is the service port and is used to access the web interface. By default this port has the static IP address http://192.168.0.1; the current value can be shown in the ACU display (NETWORK > PORT 1 IP).
	If you want a different setup for LAN port 1, you can change the IP settings. You get the default settings back by resetting to factory default.
LAN Port 2, 3 and 5	By default, LAN port 5 is dedicated to the modem connection. If you want a different setup for LAN port 5, you can change the IP settings.
	LAN 3 and 5 are switched with LAN 2, i.e. they are always on the same network and have the same IP settings as LAN 5.
LAN Port 4	LAN port 4 is configured to be a DHCP client. You can change the IP settings according to your needs.
WLAN	The wireless port can be connected to one of the other ports.  Set here which of the ports 1 to 5 you want to access with WLAN. If you want to access the web interface with WLAN, select the service port (LAN 1 by default).
	For details on the WLAN interface setup, see <i>WLAN settings</i> on page 6-16.

Table 6-11: Setup of LAN network

#### Static IP or DHCP Client



The DHCP server is enabled by default.

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 you must specify a unique IP address and a sub-net mask.

#### **DHCP Server Settings**

When Mode is set to Static, you can select to let the LAN port act as a DHCP server.

The DHCP start and end addresses must be on the same subnet as the port's static IP.

#### **DNS** setup

If you have access to a Domain Name Server (DNS) you can specify the address of the email server by using the server name instead of its IP address. This can be used in Outgoing mail server in *Email setup* on page 6-17.

You may statically specify the address of one or two DNS servers. 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 ACU 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.

## 6.1.8 WLAN settings

On the WLAN page you can enable and set up the WLAN access point. Do as follows:

- First, on the SETTINGS > NETWORK page, link the WLAN interface to one of the LAN interfaces. Typically, you link WLAN to LAN 1, which is used to access the web interface of the VSAT system. See *To configure the LAN network* on page 6-14.
- 2. Select SETTINGS > WLAN from the left navigation pane.
- 3. Enable or disable the WLAN (default: Disabled).
- 4. Select the **Country** for your present location.
- WLAN channel can be changed, channels available depend on the setting for Country.
- - Enabled: WLAN access point is shown to other users.
  - Disabled: WLAN access point is hidden.
- 7. Type in the SSID of your choice or accept the default SSID, which is Cobham. The SSID is the name of the wireless local area network. It is a text with maximum 32 characters.
- 8. Select the **Security** standard. Select one of the following encryption standards:
  - Disabled (default)
  - WEP-64, enter the encryption key in hexadecimal format.
  - WEP-128, enter the encryption key in hexadecimal format.
  - WPA-PSK, enter the encryption key in hexadecimal or text format.
  - WPA2-PSK, enter the encryption key in hexadecimal or text format.
- 9. Select the **Key type** (hexadecimal or ascii) and type in the **Encryption key** for the selected **Security** standard. This is not applicable if you have selected **Disabled**.

10.Click Apply.

## 6.1.9 Navigation

On this page you can enter a fixed position or a fixed base heading. Do as follows:

- 1. Select **SETTINGS** > **Navigation** from the left navigation pane.
- 2. Set the Heading (Compass direction) and Position.

Item	Description
(Compass	Automatic - magnetic heading is used (default setting).  Manual - enter a value for the direction of the antenna as an alternative to the magnetic heading (0 to 360 degrees, precision ±20°. 0 degrees is North).
	GNSS - GNSS module is used for current position (default setting).  Manual - enter values from other position source. (Accuracy should be better than 50 m.)

Table 6-12: Web interface: SETTINGS > Navigation

3. Click **Apply** for each of the new settings.

## 6.1.10 Email setup

To be able to send diagnostics reports and other system information using e-mail you must set up a couple of parameters. Contact your IT department for the specific data.

To configure the e-mail setup, do as follows:

- 1. Select **SETTINGS** > **E-mail** setup from the left navigation pane.
- 2. Enter the data for Outgoing mail server (SMTP), SMTP port number, SMTP authentication, User name and password. This data is typically provided by your IT department.



You must set **Outgoing mail** server to an IP address if DNS has not been set up in **DNS** setup in *To configure the LAN network* on page 6-14.

## 6.1.11 Reports, syslog and SNMP traps

You can set up the system to send the following reports and messages:

- Diagnostics report
- Remote syslog
- · SNMP traps

#### To send a diagnostics report

You can send automatically generated diagnostic reports at fixed intervals. The diagnostic report contains information relevant for the service personnel during troubleshooting. To set up sending a diagnostics report, do as follows:



You must first set up the Email. See the previous section, *Email setup*.

1. Select **SETTINGS** > **Reporting** from the left navigation pane.

Important

Note that the diagnostics report also shows the WLAN key.

- 2. Under Diagnostics report, enter the following:
  - E-mail sender
  - E-mail recipients (comma separated)
  - Send interval: Select e-mail disabled (default), day with 2-minute samples, week
    with hourly samples or month with hourly samples. The report contains statistics
    data for the selected intervals.
- 3. Click Apply.

You can also send the report at any time by clicking **Send now**. Use **Send now** to validate the e-mail setup. See also *Help desk and diagnostics report* on page 7-2.

## Remote syslog

You can set up the antenna to 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 > Reporting.
- 2. In the section Remote syslog select On to enable remote syslog (default: Off).
- 3. Enter the IP address of the syslog server to which the syslog messages will be sent.
- 4. Click Apply.

#### **SNMP** traps

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).

To set up reporting SNMP traps to an SNMP server, do as follows:

- Select SETTINGS > Reporting.
- 2. In the section SNMP traps select On to enable sending of SNMP traps (default: Off).
- 3. Enter the IP address of the SNMP trap receiver/manager to which the SNMP traps will be sent.
- 4. Enter the 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.

## 6.1.12 Stow input (discrete I/O)

You can use pin 5 on the I/O connector on the ACU to force the antenna to stow. E.g. if you connect pin 5 to the ignition and enable the stow input in the web interface, the antenna will automatically stow when you start the vehicle. Do as follows:

- 1. Connect pin 1 in the I/O connector to GND in your connected equipment, e.g. the ignition system of your vehicle.
- Connect pin 5 in the User I/O connector to "high" when the antenna should be forced to stow, e.g. when the ignition in the vehicle is switched on.
   For specifications for the User I/O interface, see *Interfaces of the antenna* on page 4-8.
- 3. Connect pin 5 in the User I/O connector to GND when the normal stow functions should apply, e.g. when the ignition is off.
- 4. In the web interface, select SETTINGS > Discrete I/O.
- 5. Under Stow input, select Enable.
- 6. Click Apply.

The antenna will now automatically stow when voltage is applied to pin 5 in the User I/O connector. When pin 5 is connected to GND, the normal stow functions apply.

# 6.1.13 Compass calibration



You must make a compass calibration after first installation and every time the antenna is reinstalled. If the compass is not calibrated the system will not work properly!



You can set up whether or not you need administrator password to access calibration. See *User permissions (quest login)* on page 6-24.

With the system installed in the vehicle, park the vehicle and make a compass calibration in 4 directions with approximately 90 degrees between them.

Do as follows:

1. Make sure the antenna is stowed before calibration.

- 2. Locate a flat area for parking the vehicle. Make sure there are no large magnetizable objects (e.g. containers or trucks) close to the parking spot it could affect the precision of the system.
- 3. Find fix points for parking the vehicle in four directions with approximately 90 degrees (± 10 degrees) between them. You can start in any direction, it does not necessarily have to be North-East-South-West.

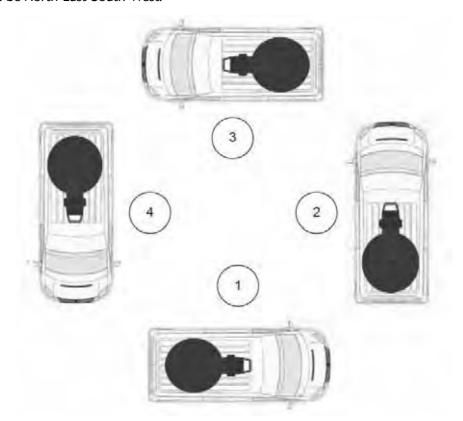


Figure 13: Compass calibration, vehicle positions

- 4. Park the vehicle in the first position.
- 5. Switch on the ACU. The ACU starts up and goes through an initialization procedure.
- 6. Wait until the Power LED and the Fail/Pass LED light steady green.
- 7. Connect a computer, start your browser and access the web interface.
- 8. Click SERVICE > Calibration and locate the section Compass calibration.

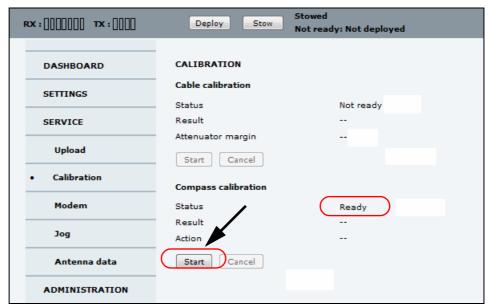


Figure 14: Web interface: SERVICE, Calibration, Compass calibration

- 9. When the Status field under Compass calibration shows Ready, click Start. The first calibration step begins. When the first step is completed, the Result field shows Done and the Start button changes to a Continue button.
- 10. When the first part is completed, move the vehicle so that it is parked approximately on a 90 degrees angle relative to the previous position, see Figure 13.
- 11.Click Continue.
- 12. When the **Result** field shows **Done**, move the vehicle 90 degrees again, so that it is parked approximately on a 180 degrees angle relative to the first position and click **Continue**.
- 13. When the **Result** field shows **Done**, move the vehicle 90 degrees again, so that it is parked approximately on a 270 degrees angle relative to the first position and click **Continue**
- 14. When the **Result** field shows **Done** and the button changes to **Start** again, the compass calibration is completed.

### 6.1.14 Ku-Band version only: Cable calibration

If you have the Ku-Band version of the VSAT system, use the web interface to make a cable calibration to ensure that Tx power is calibrated at all frequencies.

Important

For the system to work properly you must make a cable calibration in the following cases:

- After installation
- After replacing antenna cables
- After replacing the BUC
- After service



**WARNING!** Stay clear of the antenna during Cable calibration! The antenna is moving and transmitting during the calibration procedure. For Stay clear area see *Mechanical "stay-clear" area, EXPLORER 8100* on page vi or *Mechanical "stay-clear" area, EXPLORER 8120* on page vii. For radiation safety distance, see *Microwave radiation hazards* on page iv.

- 1. Deploy the antenna.
- 2. On the page SERVICE > Calibration click Start in the section Cable calibration.
- 3. Wait typically for 2 minutes for the calibration to finish.

A message is displayed when the calibration has been completed successfully. This 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.

When servicing the system it is recommended to make a cable calibration 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 with the satellite operator to verify that the VSAT modem configuration is correct.

The VSAT system is calibrated now. If the calibration failed there will be a message on the calibration screen.

# 6.1.15 To line up or jog the antenna

You can use the Lineup/Jog function to deliberately offset the antenna position. This is useful when you define blocking zones, for testing and troubleshooting and sometimes also during commissioning.

- Connect a PC to the LAN1 or front LAN connector at the ACU.
   You may also use WLAN, if it is configured.
- 2. Open an Internet browser and type the default IP address: http://192.168.0.1.
- 3. If the antenna is not already deployed, click **Deploy** in the top bar of the web interface.
- 4. Navigate to the page SERVICE > Jog and click Activate Jog or Activate Lineup.
  - Lineup is typically used during commissioning. If you selected Lineup, the antenna will be able to transmit during the Lineup procedure. You can enter offsets for the

- position coordinates of the active profile, but you cannot change the coordinates of the active profile.
- If you selected Jog, the antenna will not be transmitting, and you can enter any
  position coordinates.

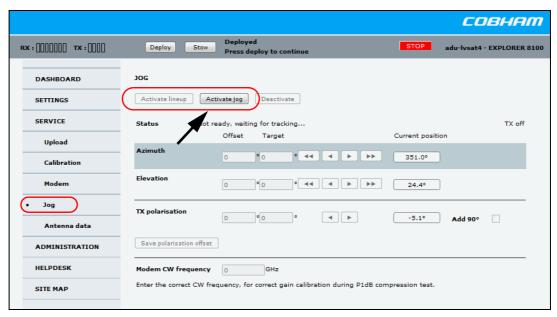


Figure 15: To line up or jog the antenna using the web interface

- 5. Click the arrow buttons for Azimuth or Elevation to change the offset, or type in specific values.
  - and 
     change the offset with 0.1° increments.
  - **◄** and **▶** change the offset with 1.0° increments.

The current position as well as the offset is shown on the screen.

Note There

There may be slight deviations (or "random walk") of a few tenths degrees.

- 6. **For Ka-Band**: Select **Deactivate** to return to normal operation and reactivate the selected satellite profile.
- 7. For Ku-Band only: Continue to the next steps.
- 8. Click the arrow buttons for TX polarisation to change the offset, or type in a specific value. You may also select Add 90°.

The current position as well as the offset is shown on the screen.

- 9. Click Save polarisation offset.
- 10.Enter the correct **Modem CW frequency**.

This is provided by the satellite operator, typically when talking to the satellite operator on the phone before doing a P1dB compression measurement.

11. When the lineup or jog procedure is ended, select **Deactivate** to return to normal operation and reactivate the selected satellite profile.

For information on the submenus **Modem** and **Antenna data**, see chapter 7, *Service and maintenance*.

#### 6.1.16 Administration

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

- Access to the administration settings (user name, password)
- User permissions (quest login)
- To import and export a system configuration
- Reset to factory default

#### Access to the administration settings (user name, password)

You can log on as an administrator or as guest (user name: guest, password: guest). The Administration settings require an Administration user name and password. To log on as administrator, do as follows:

- 1. Enter the IP address of the VSAT system.
- If you are prompted, enter the Administration user name and password. If not, select ADMINISTRATION and then enter the administrator user name and password. The default user name is admin and the default password is 1234.
- 3. Click Logon.
- 4. Select ADMINISTRATION.

The Administration page is now updated to let you change the user name and password or log off Administration.

To change the administrator password, do as follows:

- 1. In the ADMINISTRATOR > User login page, locate the section Change Logon.
- 2. Type in the new password and retype it on the next line.
- 3. Click Change. At the next logon the new password is required.

To reset the administrator password, do as follows:

- 1. Contact your service partner for a reset code. Report the serial number of the ACU. You find it in the **Dashboard**, **ACU serial number**.
- 2. Click the link Forgot administrator password? on the LOGON page.
- 3. Type in the reset code obtained from your service partner and click Reset.
- 4. Type in the user name admin, the default password 1234 and click Logon.

#### To log off administration

If you have not entered anything for 30 minutes under **ADMINISTRATION**, you are logged off automatically. To log off manually, click **Logoff** in the **ADMINISTRATION** page.

## 6.1.17 User permissions (guest login)

You can manage user access to certain functions of the VSAT system. You can allow or deny users that are not administrators (user name: guest, password: guest) access to certain

functions and make these pages read-only. This is useful if you want to protect the system against unintended changes or tampering of the system.



Study this screen thoroughly and decide which areas of the VSAT system you want to give non-administrator users (user name: guest) access to.

To set up the user permissions for guest users, do as follows:

- 1. Select ADMINISTRATION > User permissions.
- 2. For each item under ALLOW USERS TO: select
  - Yes to allow the quest user access
  - **No** to block the **guest user** access to the settings. Then the pages are read-only, changes cannot be made by the guest user.

Change network: Locks the page SETTINGS > Network. Use this page to change IP configuration of the LAN connectors of the ACU. For further information see *To configure the LAN network* on page 6-14.

3. Click Apply.

### 6.1.18 To import and export a system configuration

If you need to reuse a configuration in another VSAT system, you can save the current configuration to a file, which can then be loaded into another VSAT system. You can also use this feature for backup purposes.



Load and save configurations can only be done with the same software version in the units involved.

The configuration file contains all the settings you have entered during system setup: satellite profiles, modem profiles, LAN setup, user permissions etc.

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

- Select ADMINISTRATION > Export/import config.
- 2. Click the button **Export**. Follow the download instructions on the screen. You can use this configuration file for upload to another VSAT system,

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

- 1. Select ADMINISTRATION > Export/import config.
- 2. Click the button **Brows**e and locate the configuration file (.cfg file) you want to upload. Then click the button Open.
- 3. In the web interface click the button **Upload**.

To clone a system configuration, do as follows:

- 1. Reset to factory default, see the following section for details.
- 2. Import a configuration from file, see section above.

### 6.1.19 Reset to factory default

To reset to factory default settings, do as follows:

1. Select ADMINISTRATION > Factory default.

Important

Reset to factory default will delete or reset all the settings listed below!

- Navigation settings
- All added satellite profiles
- All added modem profiles
- Changes in the network setup
- · User permissions
- · ACU display: brightness setting
- 2. Click Reset to factory default.



After resetting to factory default: When you power on the system, make sure the antenna is connected to the ACU. If not, the list of available modem types under SETTINGS > Modem profiles may not be correct, because the ACU cannot determine whether the antenna type is Ka or Ku.

### 6.1.20 Help desk

The Help desk pages in the web interface are described in the Service chapter under *Help desk and diagnostics report* on page 7-2.

### 6.2 Keypad and display menus

### 6.2.1 Keypad and display

With the display menu you can do basic operations such as deploy, stow and stop the antenna or apply the service function. You can also select which satellite profile to use.

In the menu system you can also see how the system has been configured. To configure the system, use a connected PC and the web interface.

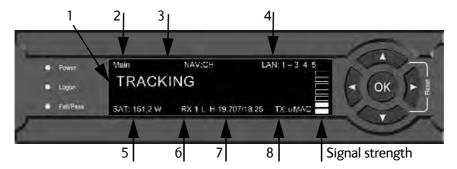


Figure 16: Display and keypad of the ACU (example)

1. Current status of the VSAT system (examples):

**NOT READY: NOT DEPLOYED** 

TRACKING

ANTENNA SW UPLOAD

ANTENNA POST (Power-On Self Test)

READY (waiting for data from the modem or no satellite profile selected) SAFE MODE (used e.g. for software recovery)

- 2. Current menu, see *The menu tree* on page 6-29.
- 3. **NAV**: Navigational information

First letter: G (Valid position signal received from the GNSS module) or g (No valid GNSS fix)

Second letter: H (Valid heading data) or h (No valid heading data).

- 4. LAN: LAN connectors used, 1, 2, 3, 4, 5, -.
- 5. SAT: Longitude, satellite position of the currently active satellite profile.
- 6. RX:

1 (RX Lock, - or 1),

L (RX polarization of currently active satellite profile: L (left-hand), R (right-hand), H (Horizontal) or V (Vertical)).

- 7. RF tracking frequency in GHz and LNB LO Frequency.
- 8. TX: <TX mute> <Modem TX> <ODU TX> <TX pol>
  - <TX mute> = [U,u] (Muted by external signal on User I/O connector: U (unmuted) or u (muted).
  - <Modem TX> = [m,M], M (valid TX signal on modem) or m (no valid TX signal on modem)
  - <ODU TX> = [a,A] A (valid TX signal on antenna) or a (no valid TX signal on antenna)

<Tx pol> = [-, X, C] (TX polarization of currently active satellite profile: X (Cross-pol), C (Co-pol) or - (unknown)).

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

### 6.2.2 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  $OK + press extbf{ iny}$  to brighten or  $extbf{ iny}$  to darken display.
- 3. Release **OK** to leave the brightness menu.

### 6.2.3 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 or enter a number, digit by digit.



- Use the arrow keys 

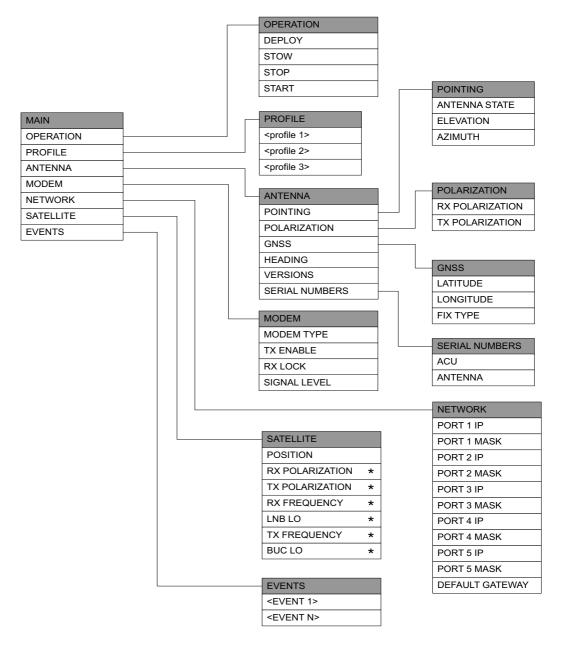
  and 

  to go through the settings and move from one digit to the next.
- Press **OK** to select a setting.
- Press ◀ again to move one level up. If applicable, confirm to store the new setting by pressing OK.

#### 6.2.4 The menu tree

With the display menu you can do basic operations such as deploy, stow and stop the antenna or apply the service function. You can also select which satellite profile to use.

In the menu tree you can also see how the system has been configured. To configure the system, use a connected PC and the web interface.



\* Only present for Ku band

Figure 17: Menu tree in the display

### Top-level menu

Top-level menu	Description	
MAIN	View with current status of the VSAT system.	
	The status screen is displayed again after a time out of 10 minutes. 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.	
	Press any key (except left arrow) to enter the menu at MAIN.	
OPERATION	Allows you to deploy, stow or stop the antenna.	
PROFILE	Allows you to select which satellite profile to use.	
ANTENNA	Shows the current antenna parameters, position, polarization, software version and serial numbers of the antenna and ACU.	
MODEM	Modem information, including modem type, signal level and status for TX enable and RX lock	
NETWORK	Shows the IP addresses and netmasks of the LAN connectors on the ACU, and the default gateway.	
SATELLITE	Current satellite information. This information is configured using the web interface.	
EVENTS	View system events. Number of active events are shown as: X ACTIVE EVENTS in the MAIN display. Press OK to see the list.	

Table 6-18: Top-level menus

### Menu descriptions

OPERATION	Description	
DEPLOY	Press OK to deploy the antenna	
STOW	Press <b>OK</b> to stow the antenna	
STOP	Press <b>OK</b> to stop the antenna immediately. The status shows <b>STOPPED</b>	
START	Press <b>OK</b> to start the antenna when it has been stopped.  After starting the antenna you must deploy it again.	

Table 6-19: OPERATION menu

PROFILE	Description	
<profile></profile>	Lists the available satellite profiles. Use $\blacktriangle$ and $\blacktriangledown$ to go through the profiles and press <b>OK</b> to select the profile you want to activate.	

Table 6-20: PROFILE menu

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		
POLARIZATION	RX POLARIZATION: HORIZONTAL, VERTICAL, (LEFT or RIGHT) TX POLARIZATION: HORIZONTAL, VERTICAL, (LEFT or RIGHT)		
GPS	LATITUDE: current latitude, read from GNSS module LONGITUDE: current longitude, read from GNSS module FIX TYPE: 2D or 3D or USER (USER means the position is entered manually)		
HEADING	Orientation of the mounting base in relation to estimated North.		
VERSIONS	Current software version of the antenna		
SERIAL NUMBERS	Serial numbers of the antenna and the ACU		

Table 6-21: ANTENNA menu

MODEM	Description		
MODEM TYPE	Current 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.		
SIGNAL LEVEL	Current input signal level from the VSAT modem, in dB.		

Table 6-22: MODEM menu

NETWORK	Description	
PORT 1 IP	Current IP address for LAN1 (service port)	
PORT 1 MASK	Current netmask for LAN1	
PORT 2 IP	Current IP address for LAN2 (modem port)	
PORT 2 MASK	Current netmask for LAN2 (modem port)	
PORT 3 IP	Current IP address for LAN3	

Table 6-23: NETWORK menu

NETWORK	Description	
PORT 3 MASK	Current netmask for LAN3	
PORT 4 IP	Current IP address for LAN4	
PORT 4 MASK	Current netmask for LAN4	
PORT 5 IP	Current IP address for LAN5	
PORT 5 MASK	Current netmask for LAN5	
DEFAULT GATEWAY	Current default gateway	

Table 6-23: NETWORK menu (Continued)

SATELLITE	Description		
POSITION	Current satellite position		
RX POLARIZATION <sup>a</sup>	-, HORIZONTAL, VERTICAL, (LEFT or RIGHT)		
TX POLARIZATION <sup>a</sup>	-, HORIZONTAL, VERTICAL, (LEFT or RIGHT)		
RX FREQUENCY <sup>a</sup>	Current RX frequency		
LNB LO <sup>a</sup>	LNB LO frequency		
TX FREQUENCY <sup>a</sup>	Current TX frequency		
BUC LO <sup>a</sup>	BUC LO frequency		

Table 6-24: SATELLITE menu

#### a. Only for Ku antenna

EVENT	Description
<event></event>	In this menu all active events are listed. Use $\blacktriangle$ and $\blacktriangledown$ to go through the active events.
	Events can be of the type WARNING or ERROR.
	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. Press > to see the remaining text.

Table 6-25: EVENTS menu

**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 a change.

### 6.3 SNMP support

The EXPLORER 8000 series 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 EXPLORER 8000 series 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 for your VSAT system.

The MIB entries are grouped as shown below:

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



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 ACU.

You can download the ACU MIB file directly from the ACU:

- 1. Go to the HELPDESK page.
- 2. Click the link Download MIB file
- 3. Save the file on your computer.

You can also download the ACU MIB from Cobham eSupport web site.

# Service and maintenance

This chapter has the following sections:

- General support
- Software update
- Status signalling with LEDs and status messages
- To stow and unfold the antenna manually
- BUC installation
- Replace the antenna or ACU
- To return units for repair

### 7.1 General support

#### Contact for support

If this manual does not provide the remedies to solve your problem, contact your service provider.

#### 7.1.1 Preventative maintenance

The EXPLORER 8000 series is constructed to require a minimum amount of regular maintenance.



WARNING! Potentially hot surface when the system is operated in hot environments without the possibility for ventilation. Contact may cause burn. Allow to cool before servicing.

Make the following checks on a regular basis:

- Inspect the reflector front surface for physical damage including chips and cracks. Any substantial damage can affect antenna performance and may require the reflector to be replaced.
- Check the feed horn membrane for cracks or damage.
- Check that the mechanical connection between reflector arm and Feed boom is firm. There must be no slackness in the connection between reflector arm and Feed boom.
- Check the flexible wave guide between the BUC and the feed for cracks or damage.
- Check that the polarization module can rotate.
- Use low-pressure washing and soft scrubbing to rinse off grit and reduce wear.

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### 7.1.2 Help desk and diagnostics report

During the installation you can enter the support contact for this installation.

- 1. To access the Help desk (Support page), select **HELPDESK** from the left navigation pane.
- 2. Under Contact, click the link, enter support contact information and click Apply.
- 3. Under MIB file, you can download a MIB file from the ACU for retrieving configuration and present settings via SNMP. For details, see section 6.3 *SNMP support* on page 6-33.
- 4. Under **User manual** you can either download the built-in user manual to your PC or upload a newer version of the manual from your PC to the ACU.
  - Click the Download manual link to see the manual.
  - To upload a different version to the ACU, click Browse... and select the manual from your PC, then click Upload.
- 5. At Legal notices you can see the licence text for the source code of the parts of the EXPLORER 8000 series software that fall under free and open source software.
- 6. In the section **Download Reports** click the button **Download**. If you need to include modem information in the report, select **Modem** and click **Apply** before you download the report. The Diagnostic report (txt file) is downloaded to your computer.

The Diagnostics report contains information relevant for the service personnel during troubleshooting. It is also useful documentation of the current setup. It contains all parameters set during configuration. The main sections are:

- Software
- System
- Hardware
- Setup System data
- Network LAN Configuration
- Modems
- 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

#### 7.1.3 Event list

When an event is registered, the web interface shows an event icon \( \text{\text{!}} \) in the icon bar as long as the event is active. The ACU display shows also active events. 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 HELPDESK > Event list from the left navigation pane.

The Event list 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. Active events are cleared from the event list when the error is cleared. They are moved to the section **Notifications** and are displayed for 24 hours. All entries in the section **Notifications** are deleted automatically after 24 hours and after restart of the system. For a list of all events with description, error code (ID), explanation and remedy see *System messages* on page E-1.

#### 7.1.4 Self test

You can start a self test of the antenna and ACU.



The VSAT system will reboot to perform the self test. Rebooting the ACU will terminate all existing connections.

- 1. Select SERVICE > Self test.
- 2. Select **Restart antenna** or **Restart terminal**, depending on whether you want to test the antenna alone or the system.

#### 7.1.5 Restart

To restart the system do the following:

1. Press and hold ▲ and ▼ until the ACU display shuts down and the antenna reboots.



Figure 1: To restart the system

2. Wait until the antenna has rebooted and is operational again. The last active satellite profile will be used.

If you want to reset the VSAT system to factory defaults, see *Reset to factory default* on page 6-26.

### 7.2 Software update

### 7.2.1 Prerequisites

The following items are required to make a software update:

- One computer with a standard Ethernet port available.
- A standard Internet browser.
- 1024 x 768 pixels or higher display resolution (best viewed with small fonts).
- One straight LAN cable.
- Access to the file with the new software.

#### 7.2.2 Software update procedure

#### To update the VSAT system software

The antenna software is automatically updated when the ACU software has been updated.



Software update should only be done by qualified service personnel.

- 1. Power up the VSAT system, i.e. switch on the ACU.
- 2. Connect a PC to LAN interface 1 (Service port, standard Ethernet). If you want to use another LAN port to access the web interface you must configure it according to your network requirements. See *To configure the LAN network* on page 6-14 for more information.
- 3. Open your Internet browser and enter the IP address of the VSAT system. The default IP address is http://192.168.0.1.
- 4. Type in the user name admin and the password 1234 to access the Dashboard.
- 5. The web interface shows the DASHBOARD page.
- 6. Click **SERVICE** in the navigation pane. The **UPLOAD** page is displayed.

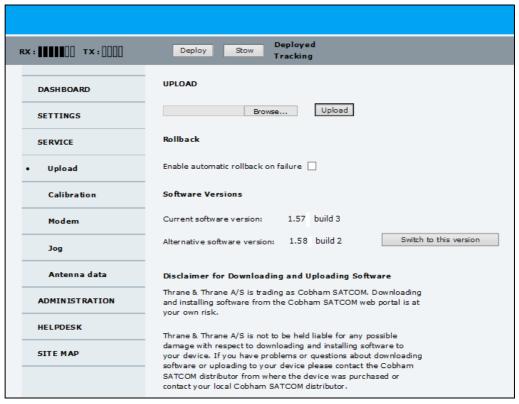


Figure 2: Software update with the web interface

- 7. Click Browse... and locate the new software file.
- 8. Click Upload.



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

- 9. You can select **Enable automatic rollback on failure**, then the system returns to the previous software if the installed software fails.
- 10. Click **Switch to this version** if you want to force the system to use the alternative software version stated under **Software versions**.

Note that the upload procedure takes a couple of minutes. When done, the ACU automatically restarts with the new software version.

The start-up procedure after a software upload takes longer than the usual start-up time, as the software in the antenna must also be updated. The ACU display shows: **ANTENNA SW UPLOAD**.

#### To verify the software update

- 1. The software version can be viewed in the DASHBOARD window of the web interface.
- 2. After completing the software update procedure, the VSAT system will perform a POST (Power On Self Test).
- 3. When the POST has finished, the green Pass/Fail LED on the keypad 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.

CO Deployed Deploy Stow acu • DASHBOARD DASHBOARD 55°47' N, 12°31' E GNSS position ACU part name TT-7140A SETTINGS Base orientation 184,28° Antenna part name TT-8147A SERVICE Satellite profile 1W Generic 81047085 ACU serial number ADMINISTRATION Satellite position 1°W Antenna serial number 12345678 Software version 1.58 build 2 RX polarisation Vertical HELPDESK TX polarisation POINTING SITE MAP RX RF frequency 12,607000 GHz Azimuth, elevation geo 195.4° 24.3° LNB LO frequency 10.750000 GHz Azimuth, elevation rel 11.0° 25.2° TX RF frequency 14.000000 GHz Polarisation skew 9.0° BUC LO frequency 12.800000 GHz ΤX Tracking RF frequency 12.607000 GHz BUC TX On MODEM Model Generic modem Signal level 280 (pwr) RX IF frequency 1857.000000 MHz TX IF frequency 1200.000000 MHz TX allowed Yes Not Muted TX mute

4. Verify that the software update has been completed successfully. You find the software version number in the DASHBOARD window of the web interface.

Figure 3: Verifying software update

#### Software recovery procedure (SAFE MODE)

To recover from a failed software upload, turn off the ACU and turn it on again. Then repeat the upload procedure as described in *Software update* on page 7-4. If this does not help, use the following procedure:

- 1. Switch off the ACU.
- 2. Press and hold down the arrow keys  $\triangleleft$  and  $\triangleright$  simultaneously.
- 3. While holding down ◀ and ▶, Switch on the ACU and wait for the display to show SAFE MODE in the top left corner.
- 4. Release the arrow keys.
- 5. Connect a PC to LAN port 1 (service port) of the ACU.
- 6. Set the IP address of the PC to static: IP:192.168.0.2, Subnet: 255.255.255.0.
- 7. Open an Internet browser and type http://192.168.0.1 (Default IP address of the ACU). The software upload page opens.
- 8. Click Browse... and locate the software file.
- 9. Click Upload.

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



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

#### Software update (VSAT modem)

Refer to the documentation for your VSAT modem.

### 7.3 Status signalling with LEDs and status messages

#### **Built-In Test Equipment**

The VSAT system has 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.
- Person Activated Self Test (PAST), which is initiated by starting a self test in the web interface HELPDESK > Self test.

For details on error messages after a POST or a self test see *Event list* on page 7-2.

#### Means of signalling

The VSAT system provides various methods for signalling the system status.

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

- Power on/off
- Logon
- Fail/Pass

See LEDs on the keypad of the ACU on the next page.

**Display and web interface**: In addition to general status messages, the display and the built-in web interface of the ACU show any events (BITE error codes) with a short message describing each error.

See *System messages* on page E-1.

## 7.3.1 LEDs on the keypad of the ACU

There are 3 LEDs: Power, Logon and Fail/Pass LED.

LED	Behavior	Description	
Power	Steady green	Power supply OK	
	Steady red	Power supply failure	
	Off	No power	
Logon	Flashing green	Current status is displayed:	
		<ul><li>Searching satellite</li><li>Identifying satellite</li><li>Carrier lock &amp; TX enabled from modem</li></ul>	
	Steady green	Satellite link established	
	Off	No satellite link acquired	
1 '		A fault which prevents operation is present in the system (ACU, antenna, MODEM).	
	Flashing green	A Power On Self Test (POST) or Person Activated Self Test (PAST) in progress. The current status is displayed.	
	Flashing red	Active BITE failure or warning. The event is shown in the ACU display.	
	Steady green	No faults.	

Table 7-4: LEDs on the ACU

# 7.4 To stow and unfold the antenna manually



**CAUTION!** Always release the stow lock before you operate the antenna manually! The stow lock will be damaged if it is not released before you operate the antenna manually.

#### 7.4.1 Manual stow

If for some reason the system is inoperable, e.g. due to loss of power or similar, you can stow the antenna manually.

Do as follows:

- 1. Find the Hex L key and the Hand crank included in the delivery.
- 2. If the Feed boom of the antenna is not pointing straight, aligned with the antenna base frame, you must adjust the Azimuth as described in the next steps.
- 3. Find the adjustment location for Azimuth shown in the picture below and unscrew the cover for the adjustment bolt.

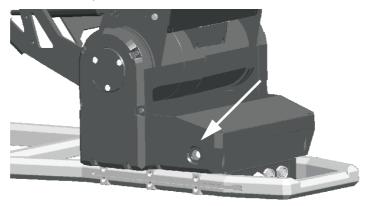


Figure 5: Manual stow, azimuth adjustment

- 4. Use the Hand crank on the Azimuth adjustment bolt to adjust the Azimuth until the antenna is aligned with the base frame of the antenna.
- 5. For Ku-version only: Before adjusting the Elevation, turn the OMT/LNB assembly 45 degrees by hand to make sure that the Flexible Wave Guide does not get caught between the Feed boom and the base frame.



Figure 6: Manual stow, Turn OMT/LNB assembly 45 degrees

Step 6 and 7 are only for antennas with the stow lock mechanism (marked with this warning on the elevation adjustment cover).

If you do not have this antenna version, go directly to step 8.



6. In both sides of the antenna, use a hex L key to remove the screws for the circular covers.



Figure 7: Covers for manual elevation adjustment and stow lock release

7. Insert the hex L key at the top of the L-shaped hole, tip it downwards and follow the direction of the hole to the left to release the lock.



Leave the hex L key in the Released position while adjusting the elevation.



Figure 8: Stow lock release

8. Go back to the other side of the antenna and use the Hand crank to adjust the elevation (turn counter-clockwise to stow the antenna).



If you have the stow brake version of the antenna you must first remove the small cover. You can do this with the Hand crank.



Figure 9: Manual elevation adjustment

- 9. When the Feed boom is close to the base frame, check that the rubber bumpers on the base frame touch the feed boom correctly in both sides (straight and symmetrically).
- 10. Continue adjusting with the Hand crank until the rubber bumpers are slightly compressed and the antenna is completely stowed.
- 11. Remove the screw driver from the Elevation stow lock release mechanism.
- 12.Remount the three covers (Elevation adjustment, Elevation stow lock release and the small cover for the Azimuth adjustment).

#### 7.4.2 Manual unfolding



**CAUTION!** There are two versions of the EXPLORER 8100 antenna. One with a stow lock mechanism and one with a stow brake. For the stow lock version it is important to release the stow lock before adjusting the elevation. The stow lock will be damaged if it is not released before the antenna is unfolded.

Do as follows:

Step 1 and 2 are only for antennas with the stow lock mechanism (marked with this warning on the elevation adjustment cover).

If you do **not** have this antenna version, **go directly to step 3**.



1. In both sides of the antenna, use a hex L key to remove the screws for the circular covers.



Figure 10: Covers for manual elevation adjustment and stow lock release

2. Insert the hex L key at the top of the L-shaped hole, tip it downwards and follow the direction of the hole to the left to release the lock.



Leave the hex L key in the Released position while adjusting the elevation.

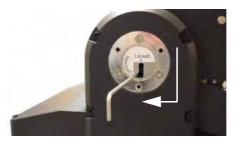


Figure 11: Stow lock release

3. Go back to the other side of the antenna and use the Hand crank to adjust the elevation (turn clockwise to unfold the antenna).



If you have the stow brake version of the antenna you must first remove the small cover. You can do this with the Hand crank.



Figure 12: Manual elevation adjustment

- 4. When the Feed boom is free of the stow brackets, you can adjust the azimuth as described in step 3 and step 4 in the previous section.
- 5. When you have finished adjusting the elevation, remove the screw driver from the Elevation stow lock release mechanism.
- 6. Remount the covers for the adjustment locations (Elevation adjustment, Elevation stow lock release and the small cover for the Azimuth adjustment).

### 7.5 BUC installation

You may need to install a BUC on the antenna if you have purchased the "no BUC" antenna version or you want to replace the BUC e.g. with a more powerful BUC. The following BUC installation kit is available from Cobham SATCOM:

20 W BUC kit for EXPLORER 8100, part number 408157A-200
 The 20 W BUC kit includes brackets, screws etc. as well as an installation guide explaining how to install the 20 W BUC on an EXPLORER 8100.

An 8 W BUC is also available as spare part.

The mechanical specifications are slightly different on the EXPLORER 8120 compared to the EXPLORER 8100. The following two sections describe the specifications needed for BUC installation on the EXPLORER 8100 and the EXPLORER 8120 respectively.

### 7.5.1 EXPLORER 8100: Mechanical specifications for 3rd party BUCs

If you are mounting a 3rd party BUC on the EXPLORER 8100, make sure that the BUC complies with the following specifications:

Maximum weight of BUC: 6 kg

Maximum size:

Make sure the BUC and the BUC installation complies with the following figures.

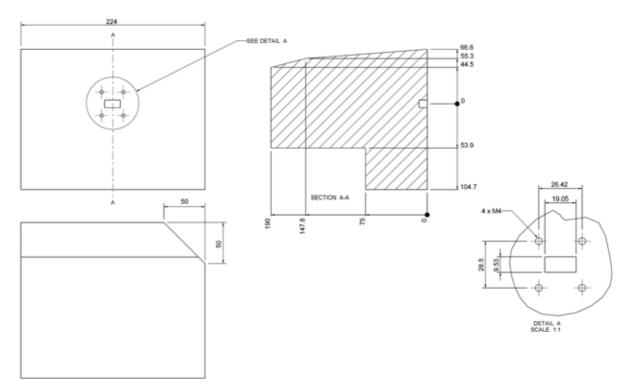


Figure 13: Max. dimensions for BUC (EXPLORER 8100)

In the following figures, Tx - WR75 shows the allowed area for installation of the Waveguide interface.

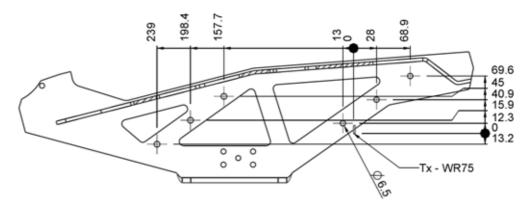


Figure 14: Waveguide position and mounting holes for BUC brackets (EXPLORER 8100)

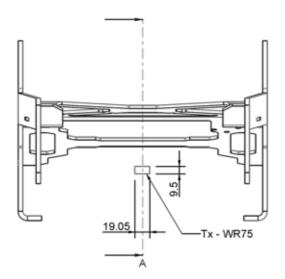


Figure 15: Waveguide position, front (EXPLORER 8100)

### 7.5.2 EXPLORER 8120: Mechanical specifications for 3rd party BUCs

If you are mounting a 3rd party BUC on the EXPLORER 8120, make sure that the BUC complies with the following specifications:

Maximum weight of BUC: 6 kg

Maximum size:

Make sure the BUC size and the BUC installation complies with the following figures.

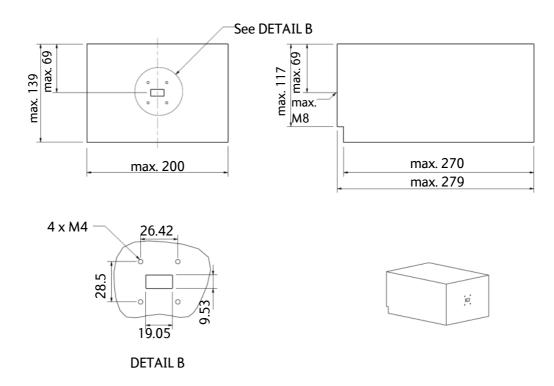


Figure 16: Max. dimensions for BUC (EXPLORER 8120)

In the following figures, Tx - WR75 shows the allowed area for installation of the Waveguide interface.

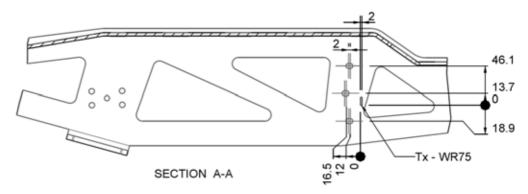


Figure 17: Waveguide position and mounting holes for BUC brackets (EXPLORER 8120)

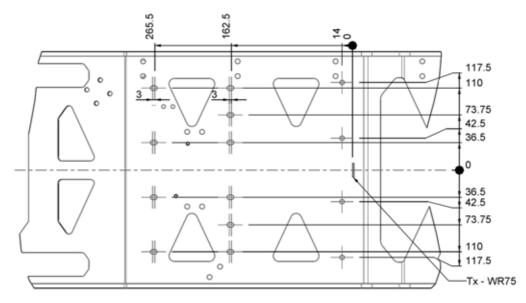


Figure 18: Waveguide position and mounting holes for BUC brackets, Top view (EXPLORER 8120)

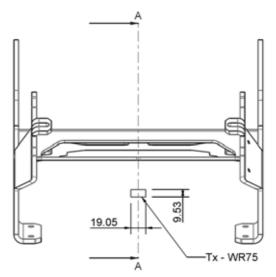


Figure 19: Waveguide position, front (EXPLORER 8120)

#### 7.5.3 Electrical specifications for BUC

The electrical specifications for BUC installation are the same on EXPLORER 8100 as on the EXPLORER 8120.

#### **BUC** connectors

When you connect the installed BUC to the antenna pedestal you may use the BUC TX (N-connector) alone or the BUC M&C (GCT C3 connector) together with the BUC TX connector. For details on the BUC connectors, see page 4-9.

Use the BUC M&C connector if:

- Your BUC requires a BUC M&C connection.
- Your system requires more power than the BUC TX connector alone supports (See specifications in the following section).<sup>1</sup>

#### Electrical specifications for installation of 3rd party BUCs

- Maximum current using the N-connector: 6.3 A (derated)
- Maximum current using the BUC M&C (GTC C3) connector: 12 A (derated)
- Minimum unloaded supply voltage: 47 V
- Cable harness resistance: 0.4 Ohm @ 10 m cable.
   Note: Output power will be lower for cables with higher resistance.

Power available at BUC M&C connector for BUC (average/peak):

ACU type	ACU input voltage	ge BUC M & C output power, Ave./Peak	
ACO type	range	-25° to 50°	50° to 55°
1000 W ACU	110 V to 264 V	505 W / 615 W	475 W / 475 W
	90 V to 110 V	505 W / 590 W	450 W / 450 W
500 W ACU	90 V to 264 V	90 W	

Table 7-20: Power available on BUC M&C (GTC C3 connector)

#### Power available at BUC TX connector (N-connector) for BUC (average/peak):

ACU type	ACU input voltage range	BUC TX output power, Ave./Peak.	
Aco type		55°	
1000 W ACU	90 V to 264 V	188 W / 264 W	
500 W ACU	90 V to 264 V	90 W	

Table 7-21: Power available on BUC TX (N-connector)

If you are using the BUC TX connector alone, DC power is provided together with the RF signal on the same connector. If you are using the BUC M&C connector, the BUC TX connector provides only the RF signal and the BUC M&C connector provides the DC power for the BUC.

#### 7.5.4 To install the BUC

The mounting method differs depending on the BUC and brackets used. Make sure the requirements in the previous sections are met.

1. Install the BUC on the feed boom, using suitable brackets for the form factor of the BUC.



**CAUTION!** Install the front bracket with interface to the Waveguide according to the specifications in Figure 14 (EXPLORER 8100) or Figure 17 (EXPLORER 8120). This is important in order to accommodate free movement of the Waveguide below the Feed boom.

If you have the 20 W BUC kit from Cobham SATCOM, brackets and installation guide are included.

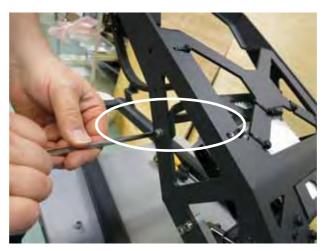


Figure 22: BUC installation, location of front bracket (EXPLORER 8100)

For the rear bracket, the Feed boom has a number of mounting holes for flexible installation of various BUC types. See Figure 14 (EXPLORER 8100) or Figure 17 (EXPLORER 8120).

Do not tighten the screws for the brackets until the Waveguide is connected.

2. Connect the Waveguide to the front bracket and the BUC. Make sure the gaskets on both sides of the bracket are in place before mounting the screws for the Waveguide.







Gaskets

Figure 23: BUC installation, Waveguide (EXPLORER 8100)

- 3. Tighten the screws at the Waveguide to torque 2.5 Nm.
- 4. Tighten the screws for the brackets to torque 10 Nm.
- 5. Connect the BUC TX cable to the N-connector on the front of the antenna, right below the reflector (BUC-TX).

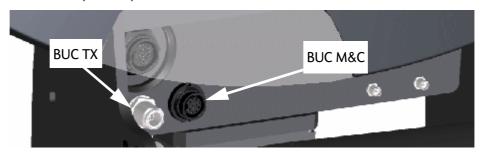


Figure 24: BUC TX and BUC M&C connectors

- 6. If applicable, connect your BUC to the BUC M&C connector next to the BUC TX connector. See *BUC connectors* on page 7-17.
- 7. Fit the BUC cable(s) behind the reflector and through the cable protection sleeve and place cable strips loosely to attach the cable (and protection sleeve) to the Feed boom structure.

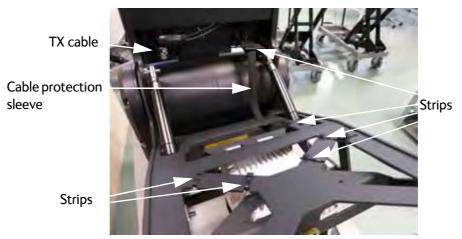


Figure 25: BUC installation, TX cable

- 8. Connect the BUC TX cable to the BUC, tighten the cable strips and cut the excess material off the strips.
- 9. Before you activate the antenna, use the command antenna\_data buc to enter the data for the new BUC. See antenna\_data on page D-4.
- 10. Make a cable calibration as described in *Ku-Band version only: Cable calibration* on page 6-22.

### 7.6 Replace the antenna or ACU

The ACU contains a backup of the antenna data from the PCM unit in the antenna. When the ACU or antenna has been exchanged, you must make sure the units are using the same antenna data. Do as follows:

- 1. Connect a computer and enter the web interface as described in *To access the configuration web interface* on page 6-3.
- 2. Select Service > Antenna data.
- 3. Select the PCM unit in order to copy the antenna data into the ACU.

# 7.7 To return units for repair

Should your Cobham SATCOM product fail, please contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on www.cobham.com/satcom, Technical Service Partner List. You can also access the Partner Portal at www.cobham.com/satcom, 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:

- General specifications
- Antenna specifications
- VSAT LNB Data Sheet (physical LNB)
- VSAT 8W BUC Data Sheet (Extended)
- VSAT 20W BUC Data Sheet (Extended)
- ViaSat eTRIA
- Antenna dimensions
- ACU specifications
- ACU dimensions

# A.1 General specifications

Item	Specifications, EXPLORER 8100	Specifications, EXPLORER 8120
Certification	CE (Safety, EMC & use of spectrum etc.), FCC and IC (radiation pattern etc.), Eutelsat (pointing, radiation pattern etc.)	
System power supply range (input via ACU)	100-240 VAC, 50-60 Hz nom. 90-264 VAC, 43-67 Hz max range	
Total system power consumption 8 W Ku-BUC	160 W two 365 W poak	180W typ / 365W poak
20 W Ku-BUC 3 W Ka-TRIA	160 W typ. 365 W peak 305 W typ. 510 W peak 70 W typ. 270 W peak	180W typ. / 365W peak 325W typ. / 510W peak N/A

Table A-1: General specifications

98-145510-E A-1

# A.2 Antenna specifications

Table A-2: Antenna specifications

Reflector	
Size (nominal)	
EXPLORER 8100	1.0 m
EXPLORER 8120	1.2 m
Optics	Offset, Prime focus, F/D ~0.8
Material	Carbon fiber sandwich

Ka-Band w. eTRIA	Receive	Transmit	
Feed	Switchable circular X-pol, included in eTRIA		
Frequency range (GHz)	19.7 - 20.2	29.5 - 30.0	
Gain (dBi) @ eTRIA in/output	43.9 - 44.5	47.3 - 48.1	
Axial ratio (dB) within -1dB contour	1.66	1.7	
Polarization	LHCP or RHCP	RHCP or LHCP	
eTRIA output power (W)	3		
G/T (dB/°K)	22.2		

Ku-Band	Receive Transmit		
Feed	Rotating linear X-pol 2-port		
Frequency range (GHz)	10.70 - 12.75	13.75 - 14.50	
Gain (dBi) @ LNB input/BUC output	39.3 - 40.8	42 - 42.2	
X-pol discrimination min. (dB) within -1dB contour	21.3	24.1	
Polarization	Linear	Linear X-pol	
Max On-Axis EIRP Spectral Density (dBW/40 kHz) per FCC 25.226 (1.5°)/FCC 25.226 (2.0°)/ Eutelsat EESS502 (1.0°)	34.5 / 36.4 / 34.5		
G/T (dB/°K) @ 30° elev. @ 25° C (10.70 - 12.75 GHz)	18.3 - 19.5		
BUC output power (P1dB min.) (W)	Depends on installed BUC. See sections A.5 and A.6 for BUC specifications		

Mechanical characteristics				
Axis Drive System	2-Axis Positioner + pol axis for Ku-band			
Positioner Geometry	Elevation over Azimuth			
Travel:-Azimuth	±195°			
Travel:-Elevation	0° to 100° relative to antenna base			
Emergency Drive	Hand crank on Azimuth & Elevation			
Travel:-Polarization (Ku only)	-95° to +95°			
Vehicle tilt for full sky coverage (10 - 90° satellite elevation over the horizon)	10° (18%) max.			
Vehicle tilt, operational	32° (60%) max.			
Satellite orbit inclination	+/-15° max.			
Positioner angular speed	9°/s max.			
Positioner angular acceleration	14°/s <sup>2</sup> max.			
Live tracking	Yes - if enabled by user			
Roof mount	Yes			
Thule bar mount	Yes			
Trailer mount	No - additional vibration damping required, contact factory			

Weights and measures			
	EXPLORER 8100	EXPLORER 8120	
Antenna weight Ku / Ka	66 / 61 kg (146 /135 lbs) incl. 8 W BUC, LNB etc.	72 kg/NA (159 lbs/NA) incl. 8 W BUC, LNB etc.	
Antenna length	156 cm (61.5")	177 cm (69.5")	
Antenna, stowed height Antenna, deployed height	35.1 cm (13.8") 142.5 cm (56.1")	35.7 cm (14.1") 163.3 cm (64.3")	

Environmental characteristics			
	EXPLORER 8100	EXPLORER 8120	
Wind Speed - Operational pointing (0.2 Deg. accuracy)	20 m/s (45 mph)	17 m/s (38 mph)	

Environmental characteristics				
	EXPLORER 8100	EXPLORER 8120		
Wind speed - Operational pointing (0.4 Deg. accuracy)	31 m/s (69 mph)	26 m/s (58 mph)		
Wind Speed - Deployed, survival	33 m/s (74 mph)	27 m/s (60 mph)		
Wind Speed - Stowed, survival	45 m/s (101 mph)	42 m/s (94 mph)		
Vehicle max. velocity <sup>a</sup> (stowed)	130	km/h		
Temperature - Operational	-33 to +55 °C (	-27 to +131 °F)		
Temperature - Survival	-40 to +80 °C (-40 to +176 °F)			
Temperature - Storage	-40 to +85 °C (-40 to +185 °F)			
Solar radiation	1120W/m <sup>2</sup> to MIL-STD-810F 505.4 <sup>b</sup>			
IP class	IP55 dust and spray proof in all directions			
Ice survival	5 mm	(0.2")		
Humidity	0 to 100% (condensing)			
Air Pressure, operational	3 km (10000 ft.) AMSL			
Air Pressure, transport	4572 m (15000 tf) AMSL, MIL-SPEC-810E 500.4			
Shock (handling & transportation)	Half sine, 20g/11ms, 3 axis			
Rail transport (X & Y horizontal shock)	Saw tooth 50g/50ms			

a. Note that this specification depends on a number of factors, such as mounting method, wind speed, terrain etc.

b. Natural convection must be maintained at ambient temperatures >  $55^{\circ}$ 

# A.3 Specifications for User I/O connector

### **Electrical specifications**

Pin	Pin function	Input/Output	Parameter	Specification
2	RX Lock	Output	RXL H voltage	12 or 24 V software selectable
			RXL L voltage	0 V
			RXL H source current	20 mA for a LED or a sensitive relay
			RXL L sink current	0 mA
			Protection	ESD and overcurrent
3	Stow	Output	Switch voltage, max.	48 Vpeak
	indicator switch		Switch current, max.	2 A (resistive load)
4	TX Mute	Input	Input H voltage	> 1.0 V input ref. to GND
5	Stow input		Input L voltage	< 0.4 V input ref. to GND
6 7	IF29 Aux1 IF29 Aux2a <sup>a</sup>		Input H sink current	< 0.5 mA @ 3.3 V, < 5.0 mA @ 32 V
8	IF29 Aux2b		Input L source current	< 0.5 mA
			Input allowed voltage range	32 V ref. to GND
			Input Protection	ESD
7 8	IF29 Aux2a <sup>a</sup> IF29 Aux2b	Output	Output H voltage	48 Vpeak, 15 KOhm internal pull up to 5.7 V
			On resistance	< 1 Ohm @ 200 mA
			Sink current	450 mA max. continuous
			Switch time	< 8 µs
			Output protection	ESD
				Overvoltage & overcurrent

Table A-3: ACU User I/O connector, electrical specifications

a. Do not connect AUX2a and AUX2b - they are for future use.

# A.4 VSAT LNB Data Sheet (physical LNB)

The following table shows the data of the LNB fitted in the ADU.  $\,$ 

Interface	Model	Spec.
Input, Ku-band	2-band	WR75 waveguide
Output, IF	2-band	F (50 Ohm)
LO type	2-band	Locked to 10 MHz external reference over IF interface or ACU internal
LO frequencies	2-band	9.75, 10.75 GHz

Table A-4: Technical specifications for VSAT LNB 1/2

Parameter	Condition/remark	Unit	Min.	Typical	Max.
Input frequency range	VSAT	GHz	10.7		12,75
Output (IF) frequency range	2-band	MHz	950		2150
VSWR	Input	-			2.0 : 1
	Output	-			1.7 : 1
Noise Figure	At 25 °C	dB		0,8	
LO stability	Over temp. range	kHz	-10	0	10
Gain		dB		60	
Gain (relative)	Over 500 MHz BW	dB	-2.0	0	2.0
Gain (relative)	Over 36 MHz BW	dB	-0.5	0	0.5
External ref. freq. (input)	Nominal	MHz		10	
Power supply voltage	DC	٧	11.0		19.0
Supply current	DC	mA			350
LO selection voltage	Voltage, low (L) (input)	٧	11.0		14.0
	Voltage, high (H) (input)	٧	16.0		19.0
Temperature range (ambient)	Operation	°C	-30		75
	Storage	°C	-40		85
Dimensions (incl. connector) over all	L	mm			140
	W	mm			58
	Н	mm			50
Weight	Total	g			350

Table A-5: Technical specifications for VSAT LNB 2/2

# A.5 VSAT 8W BUC Data Sheet (Extended)

Interface	Model	Specification
Input, IF	-	N (50 Ohm)
Output, Ku-band	8 W	WR75 waveguide (39.0 dBm min)
Spectrum	-	Non inverting
LO type	-	Locked to 10 MHz external reference over IF interface or ACU internal
LO frequency	Extended	12.80 GHz
TX ON/OFF	-	10 MHz reference ON/OFF
Cooling	-	External temperature controlled fan - not incl. BUC

Table A-6: Technical specifications for VSAT 8 W BUC 1/3

Parameter	Condition/remark	Unit	Min.	Typical	Max.
Output frequency range	VSAT Ext. TX	GHz	13.75		14.50
Input (IF) frequency range	Extended	MHz	950		1700
VSWR	Input (10, 950 - 1700 MHz)	-			2.0:1
	Output (13.75 - 14.50 GHz)	-			2.0:1
Output power at P1dB	Worst case	dBm	39.0		
Output power 10 MHz ref OFF	TX band, at -35 dBm ref.	dBm			-60
Gain (absolute linear)	Over output freq. range	dB	61	65	69
Gain (relative)	Over 500 MHz BW	dB	-2.5	0,0	2.5
Gain (relative)	Over 36 MHz BW	dB	-1.0	0,0	1.0
Spurious	RX band	dBc			-60
	TX band	dBc			-15

Table A-7: Technical specifications for VSAT 8 W BUC 2/3

Parameter	Condition/remark	Unit	Min.	Typical	Max.
Phase noise	10 Hz	dBc/Hz			-50
	100 Hz	dBc/Hz			-60
	1 kHz	dBc/Hz			-70
	10 kHz	dBc/Hz			-80
	100 kHz	dBc/Hz			-90
	1 MHz	dBc/Hz			-110
IMD3	At 2 x +33 dBm carriers	dBc			-26
External ref. freq. (input)	Nominal	MHz		10,000000	
External reference freq. (input)	Deviation	Hz	-100	0	100
Power supply voltage	DC	٧	20.0		50.0
Supply power	DC	W			85

Table A-7: Technical specifications for VSAT 8 W BUC 2/3 (Continued)

Parameter	Condition/remark	Unit	Min.	Typical	Max.
Temperature range	Operation w. external				
	forced cooling	°C	-30		75
	Storage	°C	-40		85
Dimensions	L	mm			176
	W	mm			170
	Н	mm			102
Weight	Total	g			2790

Table A-8: Technical specifications for VSAT 8 W BUC 3/3

# A.6 VSAT 20W BUC Data Sheet (Extended)

Interface	Model	Spec.
Input, IF	-	N (50 Ohm)
Output, Ku-band	20 W	WR75 waveguide (43.0 dBm min. $T_{amb} \le 55^{\circ}C$ )
Spectrum	-	Non inverting
Stability	-	Stable with any passive load on input and output
LO type	-	Locked to 10 MHz external reference over IF interface
LO frequency	Extended	12.80 GHz
TX ON/OFF	-	10 MHz reference ON/OFF
Cooling	-	Internal temperature controlled fan (S)
Protection	-	TX shutdown at over-temperature not required (>70°C ambient air)

Table A-9: Technical specifications for VSAT 20 W BUC 1/3

Parameter	Condition/remark	Unit	Min.	Typical	Max.
Output frequency range	VSAT Ext. TX	GHz	13.75		14.50
Input (IF) frequency range	Extended	MHz	950		1700
VSWR	Input (10, 950 - 1700 MHz)	-			2.0:1
	Output (13.75 - 14.50 GHz)	-			2.0 : 1
Output power at P1dB	Worst case, T <sub>amb</sub> ≤ 55°C	dBm	43.0		
	Worst case, T <sub>amb</sub> > 55°C	dBm	42.5		
Output power 10 MHz ref OFF	TX band, at -35 dBm ref.	dBm			-60
Gain (absolute linear)	Over output freq. range, Min.	dB	64	68	
	Over output freq. range, Max.	dB		68	72
Gain (relative)	Over 500 MHz BW	dB	-2.5	0,0	2.5
Gain (relative)	Over 36 MHz BW	dB	-1.0	0,0	1.0

Table A-10: Technical specifications for VSAT 20 W BUC 2/3

Parameter	Condition/remark	Unit	Min.	Typical	Max.
Spurious/harmonics out	RX band 10.70 - 12.75 GHz	dBm			-56
	13.50 - 13.75 GHz band	dBm			-15
	TX band 13.75 - 14.50 GHz	dBm			-15
	14.50 - 14.80 GHz band	dBm			-17
	Carrier ±10 MHz to 9.99 MHz	dBm			-30
	Carrier ±10 MHz to 50 MHz	dBm			-30
	Out of band <sup>a</sup> 1)	dBm			-26
ACPR at Pout 43.0 dBm,	8PSK, $\alpha$ =0.2, $\Delta$ f=6Mz, $\leq$ 55°C	dBc			-24
5 Msym/s	8PSK, $\alpha$ =0.2, $\Delta$ f=6Mz, $<$ 55°C	dBc			-24
External ref. freq. (input)	Nominal	MHz		10	
External reference freq. (input)	Deviation	Hz	-100	0	100
LO phase noise (output), SSB	10 Hz	dBc/Hz			-50
	100 Hz	dBc/Hz			-60
	1 kHz	dBc/Hz			-70
	10 kHz	dBc/Hz			-80
	199 kHz	dBc/Hz			-90
	≥1 MHz	dBc/Hz			-110

Table A-10: Technical specifications for VSAT 20 W BUC 2/3 (Continued)

a. 0.10 - 10.70 GHz & 12.75 - 13.50 GHz & 14.80 - 26.00 GHz

Parameter	Condition/remark	Unit	Min.	Typical	Max.
Power supply voltage	DC	٧	39.0		50
Supply power	DC	W			185
Temperature range	Operation w. internal forced cooling (no sun)	°C	-30		+70
	Storage	°C	-40		85

Table A-11: Technical specifications for VSAT 20 W BUC 3/3

Parameter	Condition/remark	Unit	Min.	Typical	Max.
Dimensions (incl. connector) overall, fan included (waveguide port on WxH	L	mm			190
	W	mm			125
side)	Н	mm			110
Weight, fan included	Total	g	2500		2900

Table A-11: Technical specifications for VSAT 20 W BUC 3/3 (Continued)

# A.7 ViaSat eTRIA

Parameter	Receive	Transmit	
Frequency range	19.7 to 20.2 GHz	29.5 to 30.0 GHz	
HPA output power P1dB	N/A	35 dBm	
LNA noise figure	1.2 dB N/A		
Small signal gain	55 dB	56 dB	
SSB phase noise at 10 kHz offset	-87 dBc/Hz	-83 dBc/Hz	
Transmit IF	Port 1: 33 to 800 MHz Port 2: 1,000 to 1,500 MHz	1,800 to 2,300 MHz	
Voltage (IF port)	24 to 57 VDC		
DC power consumption (at P1dB)	Typ: 44 W, Max: 52 W		
Operating temperature	-40 to +55 d	legrees Celsius	
Humidity (Condensing)	0 to	100%	
Weight	3.	1 kg	
RF transmit output interface	N/A	RF transmit output interface	
RF receive input interface	Feed horn matched to antenna reflector		
IF connector(s)	Type "F"		
Dimensions (L x W x H incl. heatsink)	321 x 142 x 77 mm		
Reliability MTBF (at 30 degrees Celsius ambient)	>100,000 hr		

Table A-12: Technical specifications for ViaSat eTRIA

# A.8 Antenna dimensions

#### **A.8.1 EXPLORER 8100**

The dimensions shown here are in millimeters, with inches shown in brackets.

### Side view (stowed)

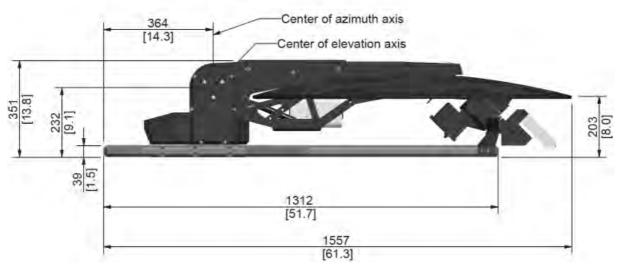


Figure 13: EXPLORER 8100 antenna: Side view (stowed)

## Top view (stowed)

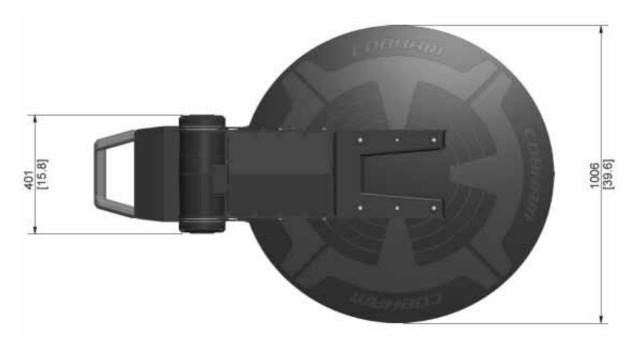


Figure 14: EXPLORER 8100 antenna: Top view (stowed)

## Side view (deployed)

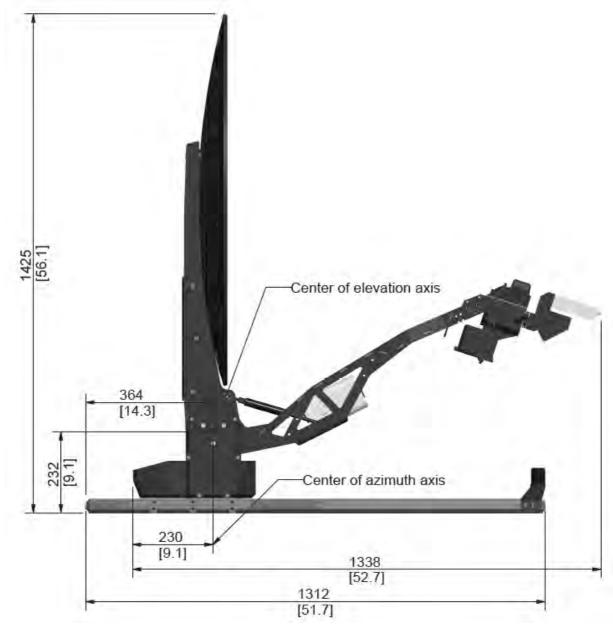


Figure 15: EXPLORER 8100 antenna: Side view (deployed)

#### Measures for antenna installation

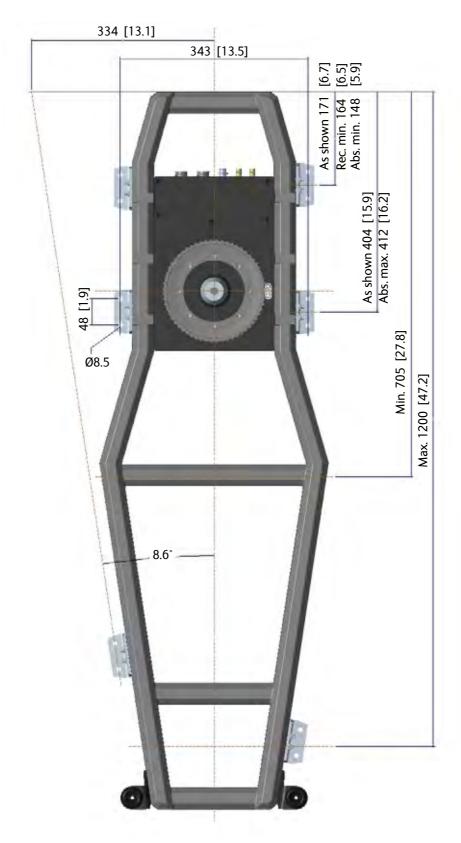


Figure 16: EXPLORER 8100 antenna: measures for antenna installation

## A.8.2 EXPLORER 8120

The dimensions shown here are in millimeters, with inches shown in brackets.

## Side view (stowed)

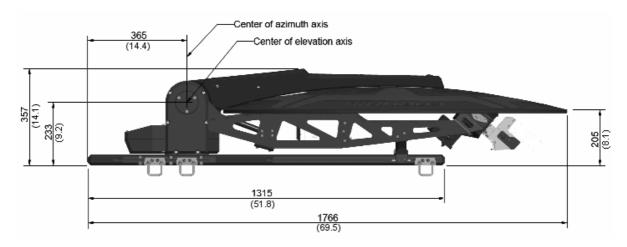


Figure 17: EXPLORER 8120 antenna: Side view (stowed)

## Top view (stowed)

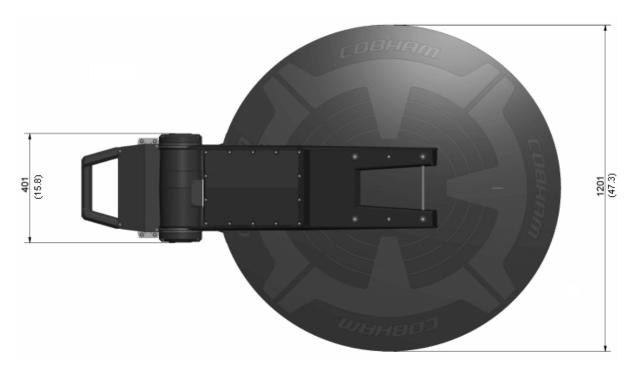


Figure 18: EXPLORER 8120 antenna: Top view (stowed)

# Side view (deployed)

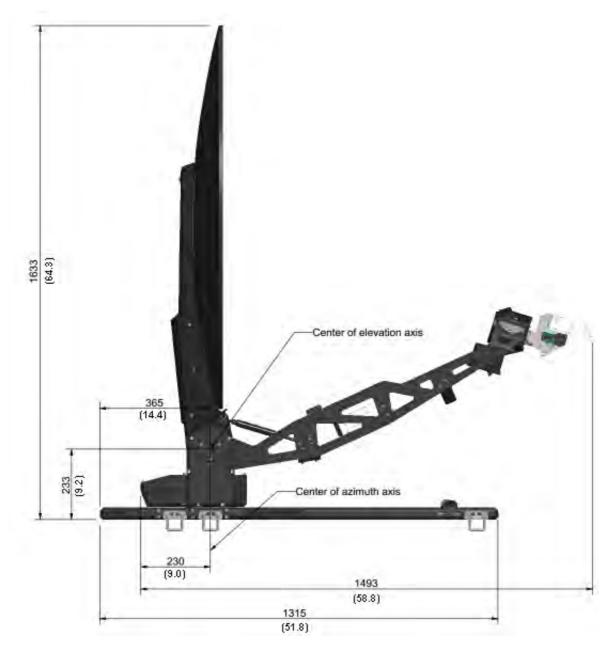


Figure 19: EXPLORER 8120 antenna: Side view (deployed)

## Measures for antenna installation

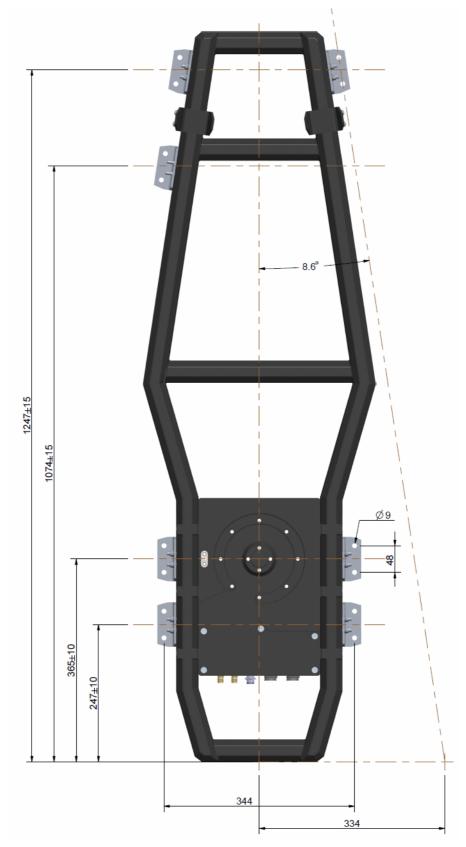


Figure 20: EXPLORER 8120 antenna: measures for antenna installation

# A.9 ACU specifications

Item	Specification
Dimensions, rack mount H x W x D	1 U, 19 inch 43.7 x 482.6 x 475.6 mm (1.72 x 19.0 x 18.7 inches)
Weight	4.3 kg (9.5 lbs)
Ambient temperature	Operational: -25°C to +55°C Survival: -40°C to +80°C Storage: -40°C to +85°C
Humidity	95% (non-condensing)
IP class	IP20
Interfaces	1 x RX Out (Ku: to modem RX in)
	1 x TX In (Ku: from modem TX out)
	1 x LNB RX (Ku: from LNB RX on antenna)
	1 x BUC TX (to BUC TX on antenna)
	1 x ODU Power & Comm. (to <b>ODU Power &amp; Comm</b> . on antenna)
	1 x BUC Power & Comm. (Ku, optional: to BUC Power & Comm. on antenna)
	1 x ODU Comm. (to ODU Comm. on antenna)
	5 x Ethernet, RJ45
	1 x WLAN
	1 x RS-232
	1 x RS-422
	1 x AC power input
	1 x Ground stud
Input power	See System power supply range (input via ACU) and Total system power consumption on page A-1.
Display and controls	OLED display, 5 push buttons, 3 discrete indicator LEDs and ON/OFF switch

Table A-21: Technical specifications for the ACU

# A.10 ACU dimensions

The dimensions shown here are in millimeters, with inches shown in brackets.

## A.10.1 ACU front and top

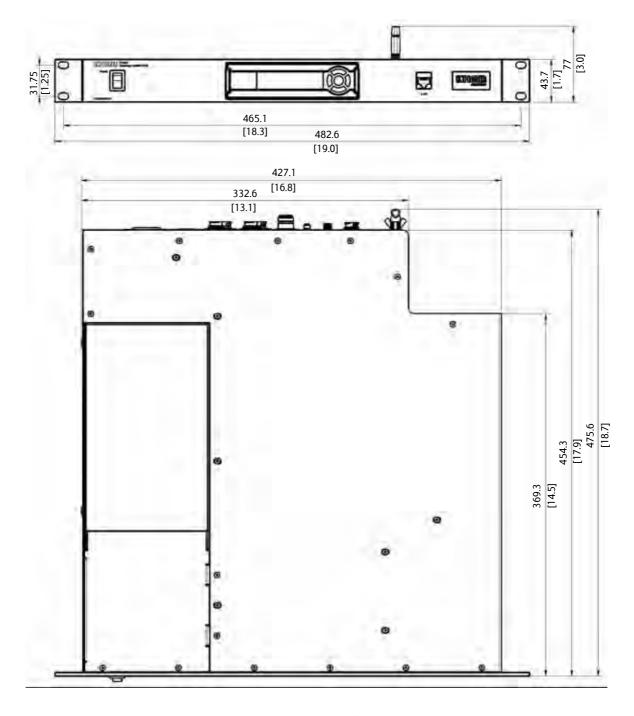


Figure 22: ACU dimensions, front and top

# A.10.2 ACU left and right side

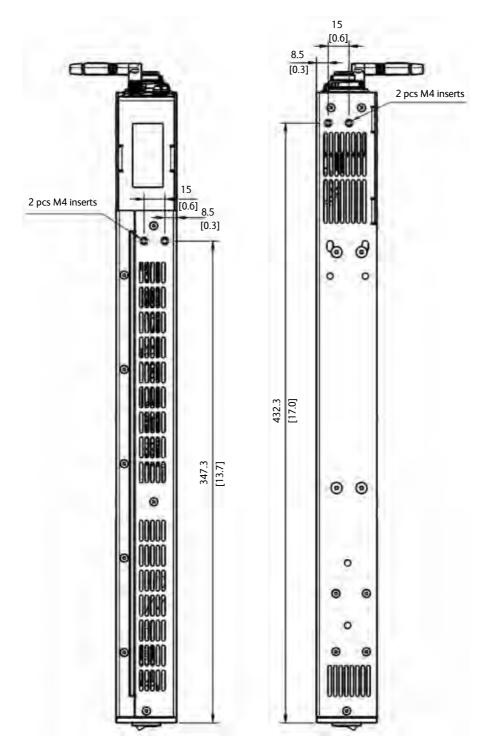


Figure 23: ACU dimensions, left and right side

# **VSAT** modem cables

This appendix contains cable specifications for cables between the ACU and a VSAT modem.

- Modem Cable COMTECH Serial & RSSI TT7016A
- iDirect & SkyEdge 11 VSAT modem serial cable

98-145510-E B-1

# B.1 Modem Cable COMTECH Serial & RSSI TT7016A

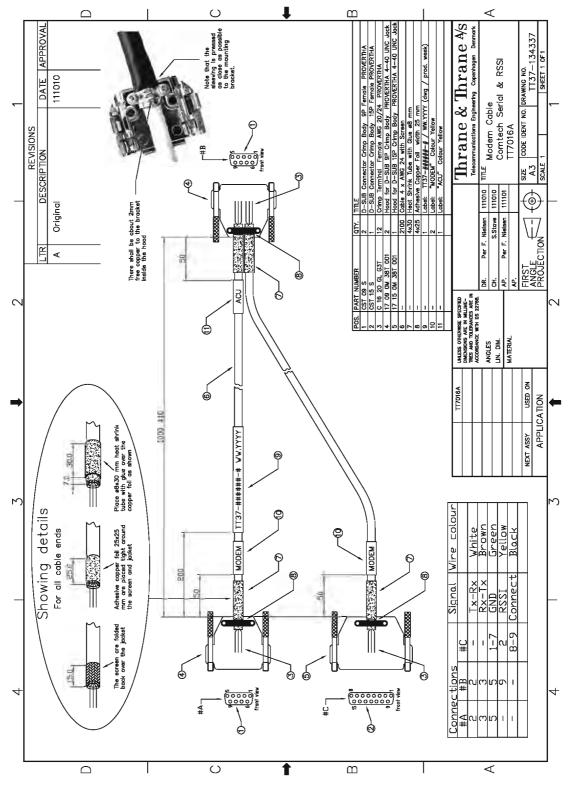


Figure 1: Modem Cable COMTECH Serial & RSSI TT7016A

# B.2 iDirect & SkyEdge II VSAT modem serial cable

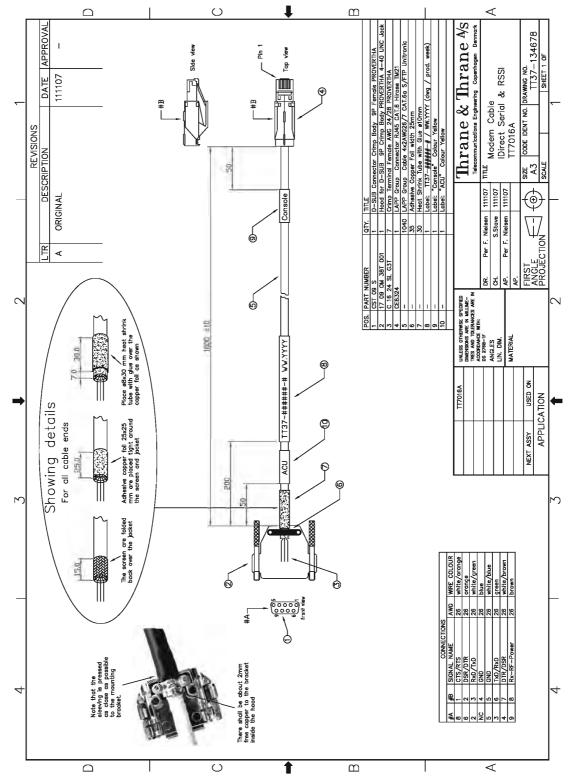


Figure 2: Modem Cable iNFINITI iDirect VSAT modem

# **VSAT** modem settings

In this appendix you find detailed information on how to set up supported VSAT modems.

Important

The information in this appendix may not be up to date. The VSAT modems are 3rd party products in relation to Cobham SATCOM, and Cobham SATCOM has no influence on the functionality of these products.

The following information is only a guideline based on the functionality of the modems at the time of writing.

The appendix has the following sections:

- OpenAMIP setup for iDirect iNFINITI & Evolution
- OpenAMIP setup for Generic OpenAMIP VSAT modems
- Serial setup for iDirect iNFINITI & Evolution
- COMTECH 570L
- STM SatLink 2900 VSAT modem
- Gilat SkyEdge 11 VSAT modem

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# C.1 OpenAMIP setup for iDirect iNFINITI & Evolution

#### C.1.1 Protocol and interfaces

#### Introduction

The following sections describe the protocol and interface between the ACU and an iDirect OpenAMIP VSAT modem. OpenAMIP operation is normally used by service providers offering global VSAT service because the protocol supports roaming between satellites (Automatic Beam Switching).

OpenAMIP, an ASCII message based protocol invented and Trademarked by iDirect is a specification for the interchange of information between an antenna controller (ACU) and a VSAT modem. This protocol allows the VSAT modem to command the ACU to search and lock to a particular satellite as well as allowing exchange of information necessary to permit the VSAT modem to initiate and maintain communication via the antenna and the satellite. In general, OpenAMIP is not intended for any purpose except to permit a modem and the ACU to perform synchronized automatic beam switching.

#### Connections

Connect the ACU and iDirect modem with the following cables:

- Ethernet cable for TCP/IP data communication
- RS-232 console cable for signal strength indication (part number: 407090A-020)

Important

It is important to connect this cable to achieve satisfactory acquisition of the satellite. This is due to missing information in the iDirect OpenAMIP software before version 3.1.1.2/13.0.1.2. RSSI information on the dashboard will only be available with this cable connected.

75 Ohm RF cables F-F connectors for rx and tx frequencies.

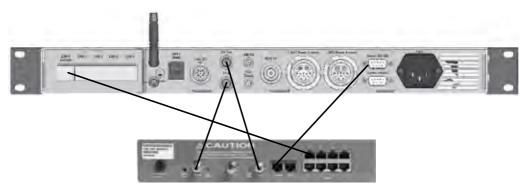


Figure 1: Connecting iDirect iNFINITI 5000 series to the ACU (OpenAMIP)

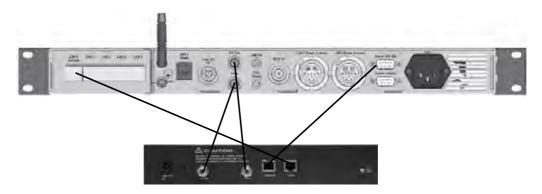


Figure 2: Connecting iDirect Evolution X5 to the ACU (OpenAMIP)

The pin allocation for the RS-232 Console cable is shown below. See also Appendix B on page B-1 for a cable drawing.

Console port (DTE)	RJ-45 pin	Color code	RJ-45 to DB-9 adapter pin	Console device
RTS	1	Blue	8	CTS
DTR	2	Orange	6	DSR
TxD	3	Black	2	RxD
GND	4	Red	NC	GND
GND	5	Green	5	GND
RxD	6	Yellow	3	TxD
DSC	7	Brown	4	DTR
Rx-RF Power	8	White/Grey	9	

Table C-3: RS-232 Console cable for iDirect VSAT modem

#### **Protocol**

The ACU supports all OpenAMIP commands except the X command which is optional. All the supported OpenAMIP commands are shown in the following figure.

	Messages from Ren				Messages from Ante	
iDS/iDX Release	Message	# Para- meters	Mapped to Options File Keys	Options File Group	Message	# Para- meters
iDX 2.0.x	А		keepalive_interval Default value of 15 seconds. Will not appear in Options file unless overwritten.	[ANTENNA]	ā	
	В	2	rx_lcl_osc, tx_lcl_osc	[SATELLITE]		
	Н	2	hunt_frequency, hunt_bandwidth	[SATELLITE]		
	К	1	max_skew Maximum skew of the beam short axis to the geosynchronous arc.	[SATELLITE]		
	P	2	polarity, tx_polarity	[SATELLITE]		
	5	3	longitude, max_lat, pol_skew	[SATELLITE]	S	2
	Т	2	tx_frequency, tx_bandwidth	[SATELLITE]		
	W	1	latlong_interval Message contains single value in seconds. Does not generate Options file key.	[MOBILE]	w	4

Figure 4: Supported OpenAMIP commands

Messages sent from VSAT modem	Explanation		
S -15.000000 0.000000 0.000000	Longitude, Max_lat, Pol_skew		
H 1451.815000 1.905000	Hunt_frequency, Hunt_bandwidth		
PHV	Rx_polarity, Tx_polarity		
B 11250.000000 12800.00000	Rx-lcl_osc, Tx_lcl_osc		
T 1403.290000 0.618000	Tx_frequency, Tx_bandwidth		
A 15	Keepalive_interval in mS [ACU: s message]		
W 300	latlong_interval in seconds [ACU: w message]		
L11	Rx lock, Tx allowed		
K 90.000000	Max_skew		

Table C-5: Messages sent from the VSAT modem to the ACU (examples)

Messages sent from the ACU to the VSAT modem	Explanation
s 1 1	Functional, Tx OK
w 1 55.794010 12.52272 985523005	GPS valid, Latitude, Longitude, Time

Table C-6: Messages sent from the ACU to the VSAT modem (examples)



The iDirect modems only sends the satellite information once when booting. If the ACU has not received the information for some reason, the system cannot point. In that case the modem will automatically boot after 5 minutes and send the satellite information again.

The signal strength from the modem is measured on RS-232 pin 9. It is a DC voltage in the range of 0 - 5 VDC.

Ranges for signal strength		
VDC	Antenna status	
0-2.5	RF energy is detected, but from a wrong or unidentified satellite.	
2.6-5.0	Carrier lock, correct satellite.	

Table C-7: Ranges for signal strength for iDirect OpenAMIP VSAT modem

The signal strength is displayed in the web interface on the Dashboard as 0-500. The minimum value for an Internet connection is 250-260.

## C.1.2 Sample options file

The following section presents a sample iDirect OpenAMIP Options File. The highlighted parameters in bold are important and needed for the VSAT system to function correctly.

See comments in brackets for explanation of the use.

#### [ANTENNA]

```
addr = 10.1.6.2
  (ACU LAN1 IP setting)
connect_timeout = 30
dedicated_interface = ixp0
manufacturer = OpenAMIP
max_skew = 90.000000
model = OpenAMIP
port = 2000
  (ACU Modem Profile setting)
```

```
[BEAMS]
  beam_88 = E36B
  maxbeam = 88
[BEAMS_LOCAL]
  inhibit tx ifzero = 0
[BTP]
  device_mode = tdma
  device_name = btp
  device_path = /dev
[BTP_REQ]
  device_mode = tdma
  device_name = btp_req
  device_path = /dev
[COMPRESSION]
  Threshold = 90
[DEBUG]
  cpu_util_test_enabled = 0
[DVBS2]
  frame_length = 125.000000
  frame_size = short
  mode = acm
  ncr_interval = 3375000
  pilot = 1
  rc\_roll\_off = 0.200000
[ENC]
  auth_level_required = 0
  enc\_enabled = 0
  enc_layer_enabled = 0
  enc_mode = 0
  peer_mode = 1
[ETH0]
  interface = ixp0
  phy_count = 1
[ETH0_1]
  address = 10.1.6.1
  netmask = 255.255.255.128
    (ACU LAN1 subnet setting)
  rip_enabled = 0
  web_server_enabled = 0
```

```
[FREQ_TRANS]
  down_translation = 11300.000000
  up_translation = 12800.000000
    (BUC LO)
[GUI_SERVER_PROXY]
  port = 14599
[LAN]
  lan_gw_ip = 0.0.0.0
  lan_{ip} = 10.1.6.1
  lan_subnet_ip = 255.255.255.128
[MAPSERVER 0]
  hostname = 172.28.1.11
  port = 5003
[MOBILE]
  gps_input = 2
    (2 => GPS via OpenAMIP)
  gps_validation_active = 1
  init_tx_power_offset = 0.000000
  is_mobile = 1
  latlong_acq_interval = 300
  latlong_fail_interval = 10
  latlong_interval = 300
  tx_handshake_enabled = 0
    (BUC mute/unmute is handled by the VSAT terminal!)
[MODEM_INSTALLATION]
  reflector_offset_angle = 0.000000
  remote_lat = 35.890000
  remote long = 14.480000
  spacecraft_long = 35.900000
[MODEM PARAMETERS]
  ref_carrier_fec_block_size = 100
  ref_carrier_modcod_coding_rate = 2
  ref_carrier_modcod_modulation = 1
  ref_carrier_symbol_rate = 360000.000000
  rx acgrange = 100000
  rx_diff = 0
  rx_freq = 1263381999
  rx_mode = 2
  rx_only = 0
  rx\_scram = 1
  rx\_specinv = 0
  rx_symrate = 2778000.000000
  tx bitrate = 1
```

```
tx_power_in_dbm = -32.000000
  tx\_specinv = 0
[NET_ENC]
  id = 10
  is\_encrypted = 0
[NMS]
  broadcast ip = 172.28.1.11
  download_monitor_credentials = 1
  download_monitor_group = 239.192.0.0
  download_monitor_port = 9000
  event_server_ip = 172.28.1.11
  event_server_port = 2860
  generated_by = NMS-14.0.2
  is_nms_managed = 1
  keep_alive_port_number = 2860
  NRD_remote_status_port_number = 2859
  NRD_server_ip = 172.28.1.11
  server_ip = 172.28.1.11
  service_monitor_interval = 1000
  timeout = 20000
[ODU]
  lnb_dc_voltage = 18
  lnb_tone_enable = 0
  music_present = 0
  odu_disable_tx_pwm = 0
  odu_rx_10_mhz = 0
  odu_rx_dc_power = 1
  odu_tx_10_mhz = 1
    (10 MHz Reference to enable BUC unmute)
  odu_tx_dc_power = 1
[ OOB ]
  mem_high_percent = 90
  mem_low_percent = 75
[OPTIONS_FILE]
  carrier_type = 0
  code_version = 14.0.2.7
  did = 117491203
  disable_options_flash_command = 0
  generated_by = NMS-14.0.2
  is\ mesh = 0
  mobile_remote_type = 1
  modem_hardware = X5
  modem sn = 123456
  modem_type = Remote
```

```
product_mode = dvbs2
  upstream_product_mode = idirect_tdma
[ POWER_MANAGEMENT ]
  enable = 0
  sleep\_timeout = 0
[ROUTE_1_0]
  gateway = 0.0.0.0
  interface = sat0
  metric = 1
  netmask = 0.0.0.0
  network = 0.0.0.0
[RX1]
  device_mode = scpc
  device_name = rx1
  device_path = /dev
[SAT0_1]
  address = 10.0.0.13
  netmask = 255.255.240.0
  rip_enabled = 0
  web_server_enabled = 0
[SATELLITE]
  channelname = E36B
  hunt_bandwidth = 0.000000
  hunt_frequency = 1233.660000
  longitude = 35.900000
  max_lat = 0.000000
  max_skew = 90.000000
  min_look_angle = 0.000000
  name = E36B
  noise_reference_frequency = 0.000000
  pol_skew = 0.000000
  polarity = V
  rx_lcl_osc = 11300.000000
  skew_margin = 90.000000
  tx_bandwidth = 0.000000
  tx_frequency = 1234.560000
    (Correct tx freq. ensures same PldB @ all frequencies!)
  tx_lcl_osc = 12800.000000
    (BUC LO)
  tx_polarity = X
```

```
[SECURITY]
  admin_password =
  $idi3$0oAshW$01pJQAAWxgQxLnasMrdrUygxRQ8UHrLjCWW8AwRJuYd1
  JvhpLjZ3QZZNufOT46pY.bzzsX0VH0jaaXcdGDEVsS
  os_password = $1$/K.qAA$oBJORr9q34ycG7juIu60I.
  password =
  $idi3$/B2K3p$.gpGIC9BkGi/lPPh0b90OfwvFmSmEVFTyWKhqa3X.w9h
  Q2oDeXpsYt3qCmJ01H7B.oYElSxyF0ja0AiKStaxTV
[SOF]
  device mode = tdma
  device_name = sof
  device_path = /dev
[SYSTEM_TRAY]
  interval = 5000
  mode = 1
  port = 2859
  server = 172.28.1.11
  service_monitor_group = 239.255.255.1
  service_monitor_port = 9001
[TDMA]
  tx_watchdog_timeout_in_frames = 2
[TX]
  device_mode = tdma
  device_name = tx
  device path = /dev
[TX_SOF]
  device_mode = tdma
  device_name = tx_sof
  device_path = /dev
[UCP]
  max_power_level_in_db = -25.000000
  power_uplink_control_processing = 1
[UDP]
  force_rtp_fullheader = 1
  force_udp_fullheader = 1
  max_hdr_comp_packet_size = 180
  passthru = 1
  payload_comp = 0
[VLAN]
  mode = 0
  vid = 1
```

The option file must use the following information:

Section in the option file	Requirements	
[SATELLITE]	The modem provides RX and TX frequency information via a data connection to the VSAT system.	
	The VSAT system has an extended 8 Watt BUC with LO up conversion frequency of 12.8 GHz.	
	— Example: "tx_lcl_osc = 12800.00000"	
[MOBILE]	The iDirect modem must be set to mobile unit and receive the GPS information from the ACU with the command "w <valid> <lat> <lon> <time>".</time></lon></lat></valid>	
	Example: "is_mobile = 1"	
	Tx handshake must not be enabled in the iDirect modem.	
	Example: "tx_handshake_enabled = 0"	
[ODU]	The VSAT system can work either using the Rx or Tx 10 MHz reference signals provided by the modem or using its own built-in 10 MHz reference signal. It is recommended to use the Tx 10 MHz reference signal from the modem. See also page 6-6 (setup of modem profiles).	
	Example: "odu_rx_10_mhz = 1"	
	The VSAT system needs the Tx 10 MHz reference signal in order to allow TX ON.	
	Example: "odu_tx_10_mhz = 1"	

Table C-8: Information in the VSAT modem option file

## C.1.3 Configuration example (OpenAMIP)

Examples of modem profile and satellite configuration from the ACU web interface are shown in the figures below.

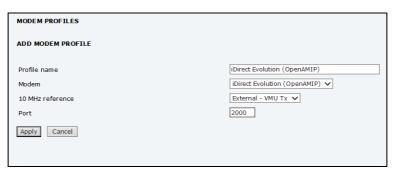


Figure 9: Modem profile, OpenAMIP (example)

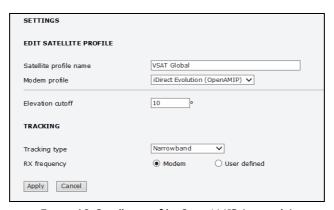


Figure 10: Satellite profile, OpenAMIP (example)

Simple OpenAMIP protocol in iDS 8.0.2.7 is <u>NOT</u> supported by the EXPLORER 8000 series. Full OpenAMIP protocol from iDX 2.0 and up is supported by the EXPLORER 8000 series. OpenAMIP protocol version 15 (iDX 3.2): The option file content in some categories has changed:

- Using console command "options set" is not possible.
- command "tx freq" cannot be used.
- editing the option file must be done manually.

### C.1.4 Troubleshooting

It is expected that the modem has been connected with cables to the ACU and that an iDirect OpenAMIP modem profile and satellite profile have been configured in the web interface of the VSAT system and has been activated. For further details see *Configuration example (OpenAMIP)* on page C-12.

It is recommended to connect the service PC to LAN port 1 of the ACU in order to have access to the web server and IP connection to the attached iDirect OpenAMIP modem.

A telnet or ssh client and Internet browser is needed in order to go through the troubleshooting guidelines. It is recommended to use the telnet/ssh client program called PuTTy, which is available for free on the Internet (http://www.putty.org/).

- 1. Default login to iDirect modems are: User name: admin, Password: P@55w0rd!
- 2. Every time a setting is changed in the iDirect modem, it must be stored in flash using the following command line command:

```
options flash
```

After changing a setting and storing the new setting the modem has to boot its application in order to read and use the new setting. This is done with the command line command:

```
reset application
```

The iDirect options file is divided into sections; the section name is always CAPITAL letters. Each section has several parameters, and each parameter has a value. See the following example:

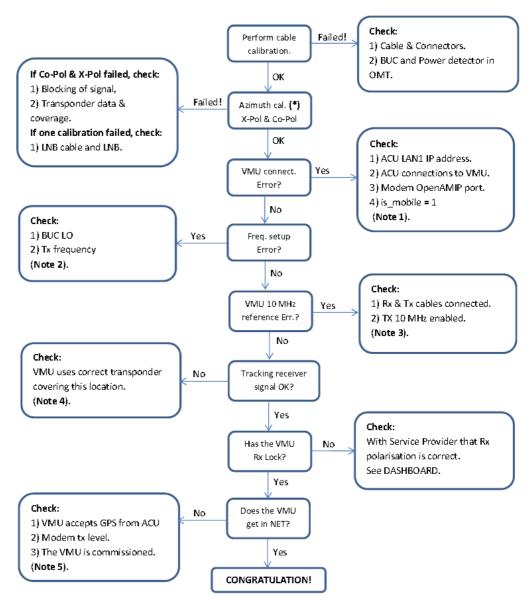
```
[MOBILE]
    gps_input = 2
    init_tx_power_offset = 0.000000
    is_mobile = 1
    latlong_interval = 60
    tx_handshake_enabled = 0
```

To change a setting in the MOBILE section use the options set command. See example of command here:

```
options set MOBILE gps_input 2
```

Note that setting the <code>gps\_input</code> parameter to value 2 is written without an equal sign but only with a space character between parameter name and the value.

You can use the following flow chart and the instructions in the notes later in this appendix.



<sup>\*</sup> Use same transponder polarity with both calibrations.

Figure 11: iDirect OpenAMIP troubleshooting

**Note 1**: Connect to modem with Telnet or serial and issue the following commands:

```
options show ANTENNA
Check: IP address, port # and manufacturer = OpenAMIP.
options show MOBILE
Check: is_mobile = 1
```

Note 2: Connect to modem with telnet and issue command:

```
options show SATELLITE
Check: tx_lcl_osc = 12800.000000,
Check: tx_frequency is between: 950.000000 to 1700.000000
Check: rx_lcl_osc + hunt_frequency is between: 10.7 GHz to 12.75 GHz
```

#### Note 3: Connect to the modem with Telnet and issue commands:

```
options show ODU
Check: odu_tx_10_mhz = 1
options show MOBILE
Check: tx_handshake_enabled = 0
```

#### Note 4: Connect to the modem with Telnet and issue command:

```
beamselector list
```

Write down the transponder number for one of the beams that has line of sight.

Use the command: beamselector switch <number> -f to force the VSAT modem to use this transponder. E.g:

```
beamselector switch 323 -f
```

Use the command: beamselector lock to lock the VSAT modem to this transponder and stay there (until power cycle or reset application).

#### Note 5: Connect to the modem with Telnet and issue commands:

```
options show MOBILE
Check: gps_input = 2
tx power
Try to increase the tx power step by step up to max. -5 dBm, which is around the P1dB level. E.g. tx power -10
```

#### **Examples of commands**

```
options set SATELLITE tx_frequency 1450
options set MOBILE gps_input 2
options set MOBILE is_mobile 1
options set MOBILE tx_handshake_enabled 0
options set ODU odu_tx_10_mhz 1
options flash
If this fails then the options file is write protected!
Change disable_options_flash_command = 0 first!
options set OPTIONS_FILE disable_options_flash_command 0
reset application
Starts the VSAT modem application (soft boot)
```

- Notice that changing options file locally can help determine wrong settings. The settings
  will probably be changed back to original settings when the VSAT modem gets
  synchronized with the hub.
- Tell the NOC about the faulty settings so they can correct configuration.

# C.2 OpenAMIP setup for Generic OpenAMIP VSAT modems

## C.2.1 Interfaces and VSAT modem configuration

The following sections describe how to connect an ACU to an OpenAMIP VSAT modem using the Newtec MDM3100 as an example.

#### Connections

Connect the ACU and Newtec MDM3100 (OpenAMIP modem) with the following cables:

- 75 Ohm RF cables with F connectors at both ends for RX and TX frequencies.
- Ethernet cable for communication with the modem. Connect the Ethernet cable between the OpenAMIP modem and LAN 5 (Control) on the ACU.

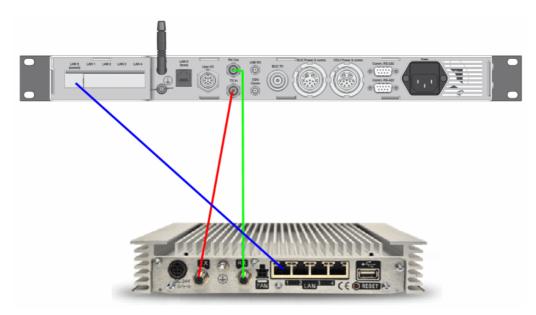


Figure 12: Connecting Newtec MDM3100 to the ACU (OpenAMIP)

#### Modem configuration requirements (Newtec MDM3100)

- 1. Connect a PC with an Ethernet cable to any free LAN port on the VSAT modem.
- 2. Set the PC to static IP address: 192.168.1.2
- 3. Start an Internet browser (e.g. Internet Explorer) and go to URL://192.168.1.1 in order to get access to the web interface of the VSAT modem. For complete configuration possibilities, it may be necessary to log in using the expert login. To log in as Expert enter the following URL in the web browser: http://192.168.1.1/cgi-bin/modem\_status?login
- 4. Log in using the Expert password. Contact your Service Provider for the Expert password.
- 5. Go to Terminal Configuration > Antenna Controlling.

Parameter	Settings
Automatic Pointing	In the <b>General</b> section, enable the option <b>Automatic Pointing</b> for the VSAT modem to work with the EXPLORER VSAT system.
ACU IPv4 Address	In the ACU Interface Configuration section, set the ACU IPv4 Address to the IP address configured for LAN Port 5 on the ACU. See <i>To configure the LAN network</i> on page 6-14.
ACU TCP Port	Enter a valid ACU TCP Port. Use this port on the ACU when creating the appropriate modem profile.
Use L-Band Frequency	Enable this option for the VSAT modem to work with the EXPLORER VSAT system.
TX Polarization	Select the TX Polarization based on the RX polarization configuration from the Service Provider. The valid options are Horizontal and Vertical.
	Note: The VSAT system does not support Co-pol TX Polarization.

Table C-13: Newtec MDM3100 (OpenAMIP) configuration of Antenna Controlling

- 6. Save the Antenna Controlling settings.
- 7. Go to Outdoor Unit under Terminal Configuration.
- 8. If no Outdoor Unit is configured, create one to match your EXPLORER VSAT system.

Parameter	Settings
BUC and Modem Frequency Synchronized	In the General section, enable the option BUC and Modem Frequency Synchronized for the VSAT modem to transmit a 10 MHz reference signal on the TX port.
ODU Type ID	ODU Type ID can be 1 up to 64. Enter an ODU Type ID not in use.
ODO Description	Enter a description so the defined Outdoor Unit is recognizable.
22 kHz Tone	Set this option to Off.
Voltage	Set this option to Off.
Receive L.O.	Select the Receive L.O. to be either 9.75 GHz or 10.75 GHz as these are the supported LNB LO frequencies of the VSAT system.  Note: If the entered Receive L.O. frequency is different, the VSAT system will be in an inoperable state.
Receive L.O. RF Start	Select the Receive L.O. RF Start frequency to be in the range from 10.7 GHz to 12.75 GHz as this is the supported RX frequency range.

Table C-14: Newtec MDM3100 (OpenAMIP) configuration of Outdoor Unit

Parameter	Settings
Receive L.O. RF Stop	Select the Receive L.O. RF Stop frequency to be in the range from 10.7 GHz to 12.75 GHz as this is the supported RX frequency range.
Transmit L.O.	Select the <b>Transmit L.O</b> . to be <b>12.8 GHz</b> as this is the BUC LO of the EXPLORER 81xx. Remember to inform the hub operator about this when doing line up and commissioning.
Transmit L.O. RF Start	Select the <b>Transmit L.O. RF Start</b> frequency to be in the range from <b>13.75 GHz to 14.5 GHz</b> as this is the supported TX frequency range.
Transmit L.O. RF Stop	Select the <b>Transmit L.O. RF Stop</b> frequency to be in the range from <b>13.75 GHz to 14.5 GHz</b> as this is the supported TX frequency range.

Table C-14: Newtec MDM3100 (OpenAMIP) configuration of Outdoor Unit

- 9. Save the ODU Configuration settings.
- 10.Go to Terminal Configuration > Satellite Interface.
- 11. Configure a **Beam** (if not already configured). Contact your Service Provider for correct configuration settings.

## C.2.2 ACU configuration

To set up the ACU to work with a Generic OpenAMIP modem, do as follows:

- 1. Add a modem profile with the Generic OpenAMIP modem. See *Modem profile New entry and Edit* on page 6-6.
- 2. Add a satellite profile using the Generic OpenAMIP modem profile just created. See *Satellite profiles New entry and Edit* on page 6-7.
- 3. Edit the network settings for LAN Port 5 and input the IP information supplied with the modem. See *To configure the LAN network* on page 6-14.
- 4. Activate the satellite profile.

See also the configuration example in the following section.

## C.2.3 Configuration example (Newtec MDM3100)

Examples of modem profile and satellite configuration from the ACU web interface are shown in the figures below.

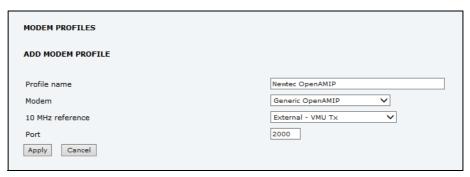


Figure 15: Modem profile, Generic OpenAMIP (example)

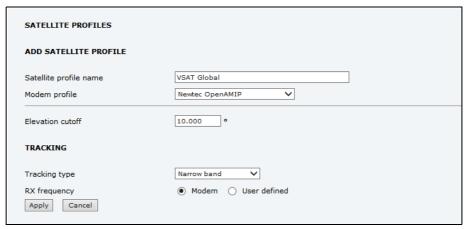


Figure 16: Satellite profile, Generic OpenAMIP (example)

# C.3 Serial setup for iDirect iNFINITI & Evolution

#### C.3.1 Protocol and interfaces

#### Introduction

The following sections describe the protocol and interface between the ACU and an iDirect Serial modem. Serial operation is normally used by service providers offering regional VSAT service.

#### Connections

Connect the ACU and iDirect modem with the following cables:

- RS-232 console cable for control communication
- 75 Ohm RF cables F-F connectors for rx and tx frequencies.

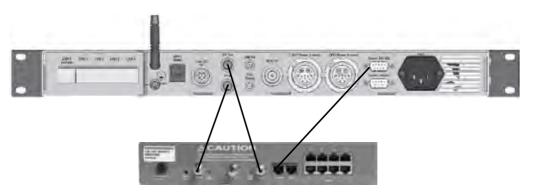


Figure 17: Connecting iDirect iNFINITI 5000 series to the ACU (Serial)

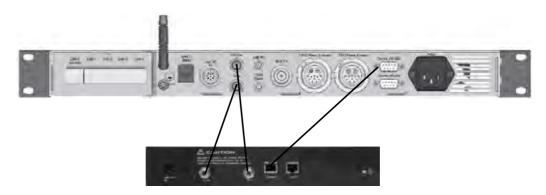


Figure 18: Connecting iDirect Evolution X5 to the ACU (Serial)

The pin allocation for the RS-232 Console cable is shown in Table C-3 on page C-3. See also Appendix B on page C-1 for a cable drawing.

## C.3.2 Console port settings

The iDirect modem must be configured to use the following console port settings:

• Baud rate: 4800 or 9600

Data bits: 8Parity: None

• Stop bit: 1

### **Passwords**

The ACU will log in to the modem using root and user passwords. The default passwords are:

Root: P@55w0rd!

User: iDirect

### Supported commands

After login to the modem the ACU will issue commands to the modem every second. The following commands are supported by the ACU:

- rx snr
- options show FREQ\_TRANS
- rx freq
- tx freq<sup>2</sup>
- latlong <lat> <long>

The signal strength command: rx snr is issued every 2 seconds. The rest of the commands are issued one by one every 2 seconds between each signal strength command. Meaning each of the other commands is issued every 8 seconds.

The signal strength in the ACU display and web interface is shown as dB., e.g. 8.5 dB. The minimum value for Internet connection is around 2-3 dB.

<sup>2.</sup> Not supported from version 15 (iDirect). Causes a TX frequency warning on the EXPLORER VSAT system

# VSAT modem option file

The option file of the VSAT modem must also include the following information:

Section in option file	Description
Satellite information	Receive frequency of the transponder. Used with "rx freq" command Transmit frequency if known, otherwise just a dummy tx frequency (e.g. 1.450 MHz). Used with "tx freq" command.
VSAT system information	The modem provides RX and TX frequency information via a data connection to the EXPLORER VSAT system.
	The VSAT system has an extended 8 Watt BUC with LO up conversion frequency of 12.8 GHz.
GPS	The iDirect modem must be set to mobile unit and receive the GPS information from the ACU with the command "latlong <lat> <long>".  Tx handshake must be disabled in the iDirect modem.</long></lat>
Rx 10 MHz	The VSAT system can work either using the Rx or Tx 10 MHz reference signals provided by the modem or using its own built-in 10 MHz reference signal. It is recommended to use the Tx 10 MHz reference signal from the modem. See also page 6-6 (setup of modem profiles).
Tx 10 MHz	The VSAT system needs the Tx 10 MHz reference signal in order to allow TX ON.

Table C-19: Requirements for VSAT modem option file, Serial

# C.3.3 Configuration example (Serial)

Examples of modem profile and satellite configuration from the ACU web interface are shown in the figures below.

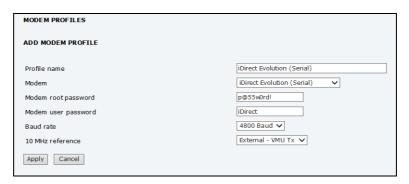


Figure 20: Modem profile, Serial (example)

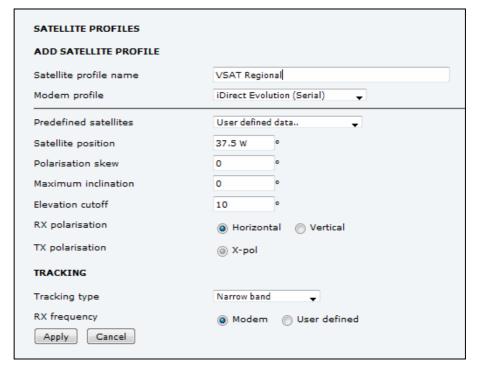


Figure 21: Satellite profile, Serial (example)

# C.4 COMTECH 570L

### C.4.1 Protocol and interfaces

The following sections describe how to connect the ACU to a COMTECH 570L VSAT modem.

### **Protocol**

The ACU supports 4800 or 9600 baud on the serial port. You can set the baud rate of the COMTECH 570L at its front MMI.

The ACU issues the following commands on the serial interface to the COMTECH 570L modem:

- 0000/EBN?
- 0000/TFQ?
- 0000/LLO?
- 0000/BLO?
- 0000/RFQ?

An example of the serial communication between the ACU and the COMTECH 570L modem is shown below:

0000/EBN?

0000EBN=11.8

0000/TFQ?

0000/TFQ=1310.7956

0000/EBN?

0000/EBN=11.8

0000/LLO?

0000/LLO=10000+

0000/EBN?

0000/EBN=11.9

0000/BLO?

0000/BLO=12800-

0000/EBN?

0000/EBN=11.8

0000/RFQ?

0000/RFQ=1367.5500

Command	Description
EBN?	This command is used to show the signal strength in the web interface and on the display of the VSAT system to determine if the COMTECH 570L modem is in Rx Lock.
	The signal strength goes from 0dB - 16dB, +16dB indicates a signal greater than 16dB, 99.9dB indicates no Rx Lock.
TFQ?	TFQ (Transmit Frequency) is used to calibrate the Tx chain in real time, in order to have same output power independent of frequency, temperature and antenna cable length.
LLO?	LLO (LNB LO) is used to set up the LNB LO frequency for the system.
BLO?	BLO (BUC LO) is used to read the BUC LO. This makes the ADU compatible with future VSAT products using a different BUC LO.
RFQ?	RFQ (Receive Frequency) is used as tracking frequency for VSAT.

Table C-22: COMTECH 570L, commands for serial communication

### Connections

Connect the ACU and the COMTECH 570L with the following cables:

- Standard RS-232 serial cable (using 300KHz Narrow Band tracking receiver)
- Or COMTECH Serial & RSSI cable (using Modem RSSI tracking)
- 2 pcs. 75 Ohm RF cables F-F connectors for rx and tx frequencies.

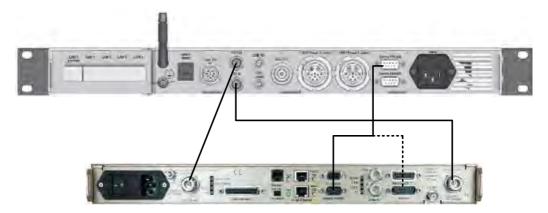


Figure 23: Connecting COMECH 570L to the ACU (example)

In most cases it is recommended to use the antenna that is built into the 300 kHz narrow band tracking receiver to track the satellite, and you can connect the ACU to the VSAT modem with a standard RS-232 serial cable.

For Modem RSSI tracking use a cable according to the specifications at *Modem Cable COMTECH Serial & RSSI TT7016A* on page B-2 (Cobham part number: 407090A-021).

# C.4.2 Configuration example (COMTECH 570L)

Examples of the modem profile and satellite configuration from the ACU web interface are shown in the figures below.

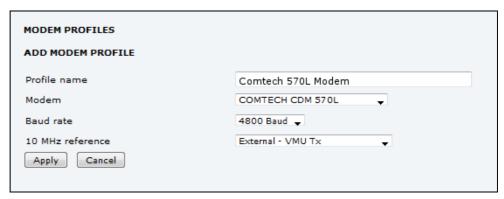


Figure 24: Modem profile, COMTECH 570L (example)

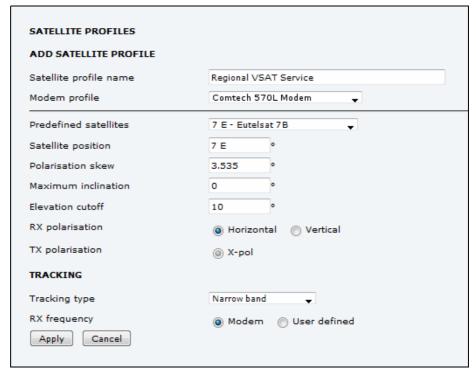


Figure 25: Satellite profile, COMTECH 570L (example)

# C.5 STM SatLink 2900 VSAT modem

## C.5.1 Interfaces and VSAT modem configuration

The following sections describe how to connect an ACU to an STM SatLink 2900 VSAT modem. The STM SatLink 2900 and the EXPLORER VSAT system are fully integrated and require almost no user setup.

STM SatLink 2900 software version required: 14.2.0 or higher.

### Connections

Connect the ACU and STM SatLink 2900 with the following cables:

- Ethernet cable for TCP/IP data communication. Connect LAN A on the VSAT modem to LAN 1 on the ACU.
- 75 Ohm RF cables F-F connectors for RX and TX frequencies

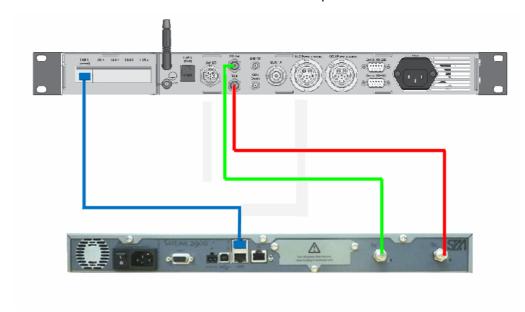


Figure 26: Connecting STM SatLink 2900 VSAT modem to the ACU

### Modem configuration requirements

Type the following command in a modem console to set up the STM Satlink 2900 modem to use the EXPLORER VSAT system:

odu antenna <antenna id> odu txtype 62 odu lnb 62

To display the antenna setup for the STM Satlink 2900 modem, type:

odu antctrl show

### Example:

odu antctrl show

Antenna Controller Configuration

Type : Thrane & Thrane EXPLORER 8100

Enabled : All

IP address : 10.110.2.226

Polling frequency : 5 sec
Antenna Stability Tries : 300

Antenna Controller Status

\_\_\_\_\_

Controller detected : no
Packets sent : 0
Packets received : 0

## C.5.2 ACU configuration

To set up the ACU to work with an STM Satlink 2900 VSAT modem, do as follows:

- 1. Add a modem profile with the STM Satlink 2900 modem. See *Modem profile New entry and Edit* on page 6-6.
- 2. Add a satellite profile using the STM Satlink modem profile just created. See *Satellite* profiles New entry and Edit on page 6-7.
- 3. Edit the network settings and input the IP information supplied with the modem. See *To configure the LAN network* on page 6-14.
- 4. Activate the satellite profile.

# C.5.3 Configuration example (STM Satlink 2900)

Examples of modem profile and satellite configuration from the ACU web interface are shown in the figures below.



Figure 27: Modem profile, STM SatLink 2900 (example)

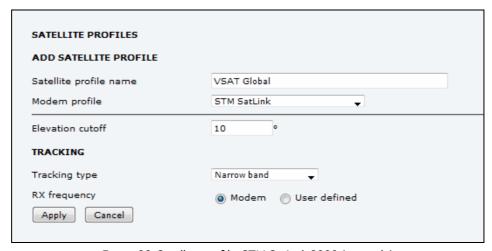


Figure 28: Satellite profile, STM SatLink 2900 (example)

# C.6 Gilat SkyEdge II VSAT modem

## C.6.1 Interfaces and VSAT modem configuration

The following sections describe how to connect an ACU to a Gilat SkyEdgeII VSAT modem. The Gilat SkyEdge II and the VSAT system are fully integrated and require only little user setup.

### Connections

Connect the ACU and Gilat SkyEdge II with the following cables:

- 75 Ohm RF cables F-F connectors for RX and TX frequencies
- Serial cable for communication with the modem. Connect SERIAL on the VSAT modem to RS-232 on the ACU.

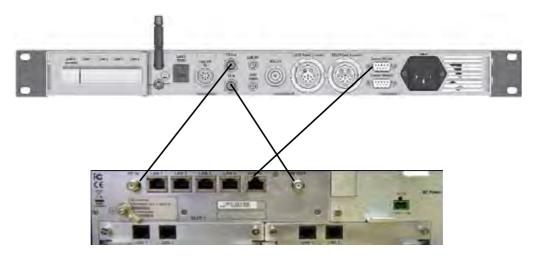


Figure 29: Connecting Gilat SkyEdge II VSAT modem to the ACU

### Modem configuration requirements

- 1. Connect a PC with an Ethernet cable to LAN port 1 of the VSAT modem.
- 2. Set the PC to static IP address: 192.168.1.2
- 3. Start an Internet browser (e.g. Internet Explorer) and go to URL://192.168.1.1 in order to get access to the web server of the VSAT modem.
- 4. Login with: User name: inst and Password: \$Sat2598\$
- 5. Go to the menu Installer.

Parameter	Settings
RF Downlink frequency	In the section <b>General</b> the RF Downlink frequency is shown. Write it down as it is going to be used for the selection of LNB LO.
	Further down on the page you find the BUC and LNB LO frequencies.
LNB LO	Depending on the RF Downlink frequency select an appropriate LNB LO of 9.75 or 10.75 GHz which will result in an L-band frequency between 1070 and 1275 MHz which is within the operating frequency band of the SkyEdge II Access modem.
BUC LO	Select the BUC to be 12.8 GHz as this is the BUC LO of the EXPLORER VSAT system. Remember to inform the hub operator about this when doing line up and commissioning.
BUC 10MHz Reference Signal	The BUC 10MHz Reference Signal must be configured to ON, otherwise the VSAT system will never allow TX. Scroll further down to enable GPS for the Location Coordinates. This enables the serial protocol of the modem so it can communicate with the ACU.

Table C-30: Configuration of Gilat SkyEdge II VSAT modem

6. Go to the top of the page and press the **Submit** button and **OK** to save the new settings.

The VSAT modem is now configured to be used with the EXPLORER VSAT system.

# C.6.2 ACU configuration

To set-up the ACU to work with a Gilat SkyEdge II VSAT modem, do as follows:

- 1. Add a modem profile with the Gilat SkyEdge II modem. See *Modem profile New entry* and Edit on page 6-6.
- 2. Add a satellite profile using the Gilat SkyEdge II modem profile just created. See *Satellite profiles New entry and Edit* on page 6-7.
- 3. Edit the network settings and input the IP information supplied with the modem. See *To configure the LAN network* on page 6-14.
- 4. Activate the satellite profile.

See also the configuration example in the following section.

# C.6.3 Configuration example (Gilat SkyEdge II)

Examples of modem profile and satellite configuration from the ACU web MMI are shown in the figures below.

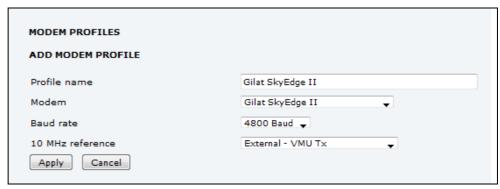


Figure 31: Modem profile, Gilat Sky Edge II (example)

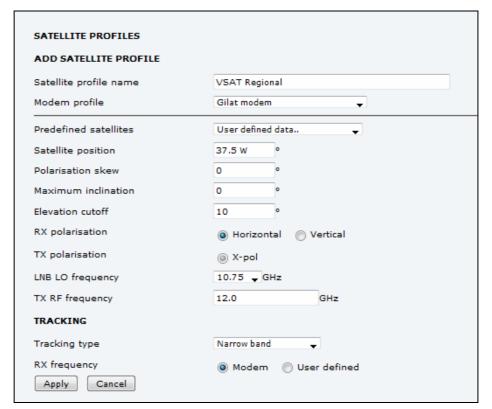


Figure 32: Satellite profile, Gilat Sky Edge II (example)

# Command line interface

This appendix contains a description of the command line interface for the EXPLORER 8000 series VSAT terminals and a command reference for supported commands.

- Introduction
- Supported commands

# D.1 Introduction

After you have done the initial configuration and connected the VSAT system to your network, you can use Telnet to configure the VSAT system. You can also set up VSAT modem parameters. Note that the following sections cover the command line interface for all EXPLORER 8000 series VSAT terminals. Some of the commands may not be relevant for your terminal.

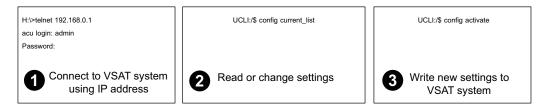


Figure 1: How to use the command line interface (example for telnet)

After successful login you can read and change settings. Use the command <code>config</code> <code>activate</code> to activate the new settings in the ACU. You will need to refresh the browser window before the changed settings become visible.



Every change is performed on the active satellite profile or the active VSAT modem profile. Parameter identifiers are case sensitive.

### D.1.1 Telnet connection

You can access the command line interface via Telnet.

### User name and password

Access to the VSAT system system is protected by a user name and password. This is the same user name and password that is used in the web interface under **ADMINISTRATION**.

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## **Telnet**

The interface is on the standard Telnet port 23 or SSH port 22. Use any LAN port and corresponding IP address of the ACU (except LAN 2 on GX/Ka ACU). To start telnet session do as follows:

- 1. Open a Telnet client of your choice.
- 2. At the prompt, enter the IP address of the ACU, default login **admin** and default password **1234**.



Figure 2: Command line interface, login

## D.1.2 Help

If you enter **help** directly at the prompt **UCLI:**/\$ all available commands are listed. Additionally any command will take **help** as first argument and display detailed information of the specific command.

### D.1.3 Conventions

The command description below uses the following special typography:

Convention	Description
Courier font	Information that is displayed on the screen.
Bold Courier font	Text the user must enter.
<argument></argument>	Required argument
[argument]	Optional argument

Table D-3: Command typography

Example: satellite lon [longitude]
 zone <id> active <yes | no>

# D.2 Supported commands

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

- exit
- help
- system
- antenna\_data
- calib
- test
- trace

## D.2.1 exit

Command	Description
exit	Exits the connection to the VSAT system.

Table D-4: UCLI command: exit

# D.2.2 help

Command	Description
help	Shows a list of commands available, including a short description.

Table D-5: UCLI command: help

# D.2.3 system

Command	Description
system	Shows the sub commands available, including a short description.
system restart	Sends a command to the ACU 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 VSAT system.
system type <antenna type&gt; <oem id=""></oem></antenna 	Sets system antenna and OEM ID type

Table D-6: UCLI command: system

# D.2.4 antenna\_data

Command	Description
antenna_data	Shows the sub commands, unit and description for the command antenna_data
antenna_data select [pcm   backup]	Use antenna data from the specified unit.  To copy antenna data from the PCM to the ACU and use these as primary data, enter:  antenna_data select pcm
antenna_data buc	Shows the 1 dB compression point in 1/100 dBm and the BUC gain in 1/100 dB.
<pre>antenna_data buc [<type> [<parameters>]]</parameters></type></pre>	Sets the BUC type, 1 dB compression point in 1/100 dBm and the BUC gain in 1/100 dB.  Valid range: <type> = std8W, std20W or custom  <parameters> = <power_source> &lt;1dB_compress&gt; <buc_gain>  • <power_source>: 0 (N-connector), 1 (M&amp;C</power_source></buc_gain></power_source></parameters></type>
	<ul> <li>connector) or 2 (Disabled)</li> <li>&lt;1dB_compress&gt;: 3000-5000 (30-50 dBm)</li> <li><buc_gain>: 2500-8000 (25-80 dB)</buc_gain></li> <li>Example: To set the BUC type to the standard 8W BUC, the BUC power source to N-connector, the 1 dB compression point to 39 dBm and the BUC gain to 65 dB, enter the following command: antenna_data buc std8W 0 3900 6500</li> </ul>
antenna_data lnb	Shows the Inb settings

Table D-7: UCLI command: antenna\_data

Command	Description
antenna_data lnb [ <type> [<parameters>]]</parameters></type>	Sets the Inb data.
antenna_data_type	Shows the antenna type
antenna_data type [ <type> [<pol_zero>]]</pol_zero></type>	Sets the antenna type  Valid range: <type> = Ku or eTRIA (Ku must be followed by <pol_zero>)</pol_zero></type>
	<pol_zero> = Pol axis zero value [0-36000]</pol_zero>

Table D-7: UCLI command: antenna\_data (Continued)

## D.2.5 calib

Command	Description
calib	Shows the sub commands, unit and description for the command calib
calib aenc <mask></mask>	Starts absolute encoder calibration
	<mask> defines axes to calibrate, subset of aep</mask>

Table D-8: UCLI command: calib

# D.2.6 test

Command	Description
test	Shows the sub commands, unit and description for the command test
test past <mask></mask>	Starts EXPLORER PAST (Person Activated Self Test).
	<mask> defines axes to test, subset of aep</mask>

Table D-9: UCLI command: test

# D.2.7 trace

Command	Description
trace	Trace debug

Table D-10: UCLI command: trace

# System messages

This appendix has the following sections:

- Event messages overview
- Lists of events

# E.1 Event messages – overview

The EXPLORER VSAT system detects events during

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

When the VSAT system detects an event that requires your action, it issues an event message and the red Fail/Pass LED in the LED panel of the ACU is lit. As long as an event is active, it is shown in the ACU display and the web interface (in HELPDESK > Event list or click the event icon on the DASHBOARD).



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 Notifications section. Notifications are cleared after 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.

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# E.2 Lists of events



These lists include event messages for other products as well as the EXPLORER 8000 series, so some of the listed event messages may never appear in your VSAT system.

## E.2.1 ACU events

Error code (ID)	Severity	Description	Explanation
08060-0	WARNING	Antenna modem	ACU/Antenna communication error detected (framing and parity). If the situation is persistent, check if cable specifications comply (length and attenuation).
08061-0	WARNING	VMU linux shell password	The specified password (root) for the satellite modem is not accepted by the modem.
08062-0	WARNING	VMU debug shell password	The specified password (user) for the satellite modem is not accepted by the modem.
08063-0	ERROR	Antenna connection	The ACU has lost connection with the antenna.
08064-0	ERROR	ADM PLL lock	The intermediate frequency PLL is not in lock. Check the 10 MHz reference signal.
08065-0	WARNING	GNSS data	Missing GNSS data (fix).
08066-0	WARNING	Heading data	Missing heading information. Check cable and heading provider device.
08067-0	ERROR	PCB temperature	ADM temperature too high. Make sure there is compliance with the environmental specifications.
08068-0	ERROR	PSM power	The PSM fails to provide the requested supply voltage.
08069-0	WARNING	Blocking Zone	The antenna has entered a blocking zone.
0806A-0	WARNING	VMU connection	The ACU has lost connection to the satellite modem.
0806B-0	WARNING	ROSS connection	The ACU has lost connection with the ROSS device.
0806C-0	ERROR	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 ACU and antenna. A common mismatch is the absence of Rx or Tx LO parameter in the satellite modem.

Table E-1: Event messages for ACU

Error code (ID)	Severity	Description	Explanation
0806D-0	ERROR	Antenna power	The antenna supply voltage is outside the allowed limits. This may happen if the PSM fails to provide the requested supply voltage.
0806E-0	ERROR	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.
0806F-0	WARNING	ROSS synchronization	The ACU has become out of sync with the ROSS device, most likely because the ACU has been replaced, or the ROSS satellite profile is new. A manual (forced) handoff sequence must be initiated from the ROSS, refer to the ROSS manual.
08073-0	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.
08074-0	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.
08075-0	WARNING	Rx cable calibration	The calibration of the ACU-antenna cable failed. The cable could be defective, too long, of too poor quality, not properly connected, or the VIM or ACU hardware could be defective.
08076-0	WARNING	Incompatible message version	The system is configured as a dual antenna system, but the software versions on master and slave system are different. Ensure that both master and slave have identical software.
08078-0	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.
08079-0	WARNING	ACU Fan	Internal fan is malfunctioning.

Table E-1: Event messages for ACU (Continued)

Error code (ID)	Severity	Description	Explanation
0807A-0	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.
0807C-0	ERROR	System configuration	Invalid ACU / antenna combination.
0807D-0	WARNING	TRIA communication	The SurfBeam modem cannot communicate with the TRIA. Try power cycling the modem.
08100-0	ERROR	PSM low voltage (22 V)	The ADM measures a different antenna voltage than expected. If the problem is not solved by a restart, and the PSM is not reporting any errors, the ADM is probably defective.
08101-0	ERROR	PSM high voltage (48 V)	The ADM measures a different antenna voltage than expected. Check for short circuit of the antenna coax connector. If the problem is not solved by a restart, and the PSM is not reporting any errors, the ADM is probably defective.
08102-0	ERROR	PSM 5 V power	Internal voltage supply error of the ADM.
08103-0	ERROR	ADM hotswap	The ACU is not able to supply the correct voltage to the antenna. Check for short circuits in coax cable and the antenna
08104-0	ERROR	Antenna communication	The ACU cannot communicate with the antenna. Check cable and antenna.
08107-0	ERROR	ADM FPGA load	The ADM FPGA cannot be initialised and loaded.
08108-0	ERROR	TX Power Detector calibration	The power detector calibration is not valid.
08109-0	ERROR	Antenna XIM data	There is a mismatch in the antenna configuration data. Either the PCM or the VIM in the antenna are malfunctioning or one of them has been replaced. In the latter case, select which is the original device in the web interface and restart the system.
0810A-0	ERROR	ADM production data	Production data has been corrupted.

Table E-1: Event messages for ACU (Continued)

Error code (ID)	Severity	Description	Explanation
0810B-0	ERROR	Antenna software version	An error has occurred during upload of software to the antenna, the antenna software version is not as expected. Either the software in the ACU does not meet the minimum version required by the antenna, the software image in the ACU is corrupted or the upload procedure failed because of a communication error.
0810C-0	ERROR	File system integrity	One or more file system partitions are corrupt. You may have lost your settings and collected statistics. If restarting the system does not help, contact your service partner.
0810E-0	ERROR	RF calibration	The RF calibration is not valid.
08840-0	WARNING	Master PLL lock	The master PLL has lost lock. Check the input reference signal.
09000-0	ERROR	KDM 3V3 supply	Internal 3V3 voltage supply error in the KDM.
09001-0	ERROR	KDM 12V supply	Internal 12V voltage supply error in the KDM.
09002-0	ERROR	KDM display	Display hardware error in the KDM.
09010-0	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.
0B000-0	ERROR	PSM production data	Missing or invalid production data in the PSM. Replace it.
0B001-0	ERROR	NMEA 2000 identifier	Missing or invalid production data in the PSM. Replace it.
0B010-0	ERROR	PSM link/SW version	Link to the PSM module could not be established. Either the PSM board is malfunctioning, or - if the system software has just been updated - the software is too old and is not compatible with the PSM hardware.
0B060-0	WARNING	NMEA 0183 parse error	Parse errors detected on the NMEA 0183 interface. Check NMEA 0183 cable, signal levels etc.
0B061-0	WARNING	Power supply temperature	ACU Power supply temperature is high. Improve ventilation or move to a cooler area. Info: 00000000 = Temperature warning, system still operational, but will shut down eventually if temperature keeps rising. 00000001 = Temperature critical, system has shut down to protect the hardware from overheating.

Table E-1: Event messages for ACU (Continued)

# E.2.2 Antenna events

Event ID	Severity	Description	Explanation
0A001-0	ERROR	Production data	Production data is invalid.
0A002-0	ERROR	XIM internal	Antenna configuration data stored in the PCM module is invalid.
0A003-0	ERROR	XIM external	Antenna configuration data stored in the VIM/TIM module is invalid.
0A004-0	ERROR	XIM I/X match	Antenna configuration data stored in the PCM module does not match the configuration data stored in the VIM/TIM module.
0A005-0	ERROR	Antenna type	The configured antenna type is not supported or unknown.
0A006-0	ERROR	PCM FPGA load	The PCM FPGA cannot be initialised and loaded correctly.
0A007-0	ERROR	XIM FPGA load	The VIM/TIM FPGA cannot be initialised and loaded correctly.
0A008-0	ERROR	XIM production	Production/calibration data stored in the VIM/TIM module is invalid.
0A00A-0	ERROR	GNSS initialisation	The GNSS device cannot be initialised. Check cable and GNSS device.
0A014-0	ERROR	AMB device discovery	Missing one or more of the following devices: ISM, DDM and PMM. Check cables.
0A015-0	ERROR	Azi DDM ABS device	Cannot initialise the azimuth DDM. Info: 0x00000000: Device not found (possible cabling problem) 0x0000bbaa: Device internal error (replace device) aa=status, bb=state.
0A016-0	ERROR	Xel DDM ABS device	Cannot initialise the cross-elevation DDM. Info: See 0A015-0.
0A017-0	ERROR	Ele DDM ABS device	Cannot initialise the elevation DDM. Info: See 0A015-0.
0A018-0	ERROR	ISM ABS device	Cannot initialise the ISM Info: 0x00000000: Device not found (possible cabling problem) 0x000cbbaa:  Device internal error (replace device) aa=status, bb=state, c=calibration data error.
0A019-0	ERROR	PMM ABS device	Cannot initialise the PMM. Info: See 0A015-0.
0A01A-0	ERROR	BCM ABS device	Cannot initialise the BCM. Info: See 0A015-0.

Table E-2: Event messages for antenna

Event ID	Severity	Description	Explanation
0A01E-0	ERROR	Sensor sanity	Too many invalid values measured by the ISM during initialisation. Check for vibrations or malfunctioning ISM.
0A021-0	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.
0A022-0	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 0A021-0.
0A023-0	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 0A021-0.
0A024-0	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 0A021-0.
0A025-0	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
0A028-0	ERROR	Demodulator load	The second receiver demodulator cannot be initialised and loaded correctly.
0A029-0	ERROR	XIM PLL lock	The PLL on the VIM/TIM does not lock.
0A02B-0	ERROR	ABS software version	The ABS software version in the antenna is too old to match the hardware requirements. Upload new software via the web interface.
0A034-0	WARNING	ACU communication	The communication link between ACU and antenna is not working.
0A035-0	WARNING	ISM data valid	Sensor measurements from the ISM are invalid. This indicates a malfunctioning ISM.
0A036-0	WARNING	ISM data range	Sensor measurements from the ISM are out of range.
0A037-0	WARNING	GNSS communication	Lost connection to the GNSS device.
0A038-0	WARNING	GNSS data range	Received information from the GNSS device which is out of range.

Table E-2: Event messages for antenna (Continued)

Event ID	Severity	Description	Explanation
0A039-0	WARNING	GNSS device warning	Local GNSS device warning.
0A03A-0	WARNING	GNSS device error	Local GNSS device error.
0A03B-0	ERROR	Azi DDM shutdown	The azimuth motor control has detected one of the following situations: Extreme temperature, voltage, current or velocity. The motor was then shut down. This is usually a temporary situation and is probably fixed by a restart of the system.
0A03C-0	ERROR	Xel DDM shutdown	As Azi DDM shutdown but detected by the cross- elevation motor control.
0A03D-0	ERROR	Ele DDM shutdown	As Azi DDM shutdown but detected by the elevation motor control.
0A03E-0	ERROR	PMM shutdown	As Azi DDM shutdown but detected by the polarisation motor control.
0A03F-0	WARNING	AMB timing	This indicates a busy situation. It may occur during installation procedures. No user interaction is required unless it occurs repeatedly.
0A040-0	WARNING	VIM cable attn	The output power cannot be controlled correctly. Check the Tx chain.
0A041-0	WARNING	BUC voltage low	The voltage for the BUC is too low, probably caused by a malfunctioning VIM or BUC.
0A042-0	WARNING	BUC voltage high	The voltage for the BUC is too high probably caused by a malfunctioning VIM.
0A043-0	WARNING	LNB voltage low	The voltage for the LNB is too low probably caused by a malfunctioning VIM/TIM or LNB.
0A044-0	WARNING	LNB voltage high	The voltage for the LNB is too high probably caused by a malfunctioning VIM/TIM.
0A045-0	WARNING	PMM fan	The fan is not working or the tacho input from the fan is not connected. Check fan cable and fan.
0A046-0	WARNING	Antenna temperature	The temperature of the antenna is too high. Check if the fan is working.
0A047-0	ERROR	VIM PLL lock	The PLL of the VIM/TIM is out of lock. Check the 10 MHz reference signal.
0A048-0	WARNING	VIM tuner lock	The PLL of the second receiver (DVB) is out of lock. Check the 10 MHz reference signal.

Table E-2: Event messages for antenna (Continued)

Event ID	Severity	Description	Explanation
0A049-0	WARNING	Azi encoder slip	A slip of the azimuth encoder has been detected. If this event is not resolved by itself after some time, check the belt and encoder of the azimuth axis.
0A04A-0	WARNING	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.
0A04B-0	WARNING	Ele encoder slip	A slip of the elevation encoder has been detected. If this event is not resolved by itself after some time, check the belt and encoder of the elevation axis.
0A04C-0	WARNING	Pol encoder slip	A slip of the polarisation encoder has been detected. If this event is not resolved by itself after some time, check the belt and encoder of the polarisation axis.
0A04D-0	WARNING	GNSS position	No position available from the GNSS device or position too old.
0A04E-0	WARNING	GNSS velocity	No velocity available from the GNSS device.
0A04F-0	WARNING	Heading data	Heading information is missing in the antenna.
0A050-0	ERROR	Azi DDM communication	Communication error between PCM and azimuth DDM. Check SUB-D connectors and cables.
0A051-0	ERROR	Xel DDM communication	Communication error between PCM and cross-elevation DDM. Check SUB-D connectors and cables.
0A052-0	ERROR	Ele DDM communication	Communication error between PCM and elevation DDM. Check SUB-D connectors and cables
0A053-0	ERROR	ISM communication	Communication error between PCM and ISM. Check SUB-D connectors and cables.
0A054-0	ERROR	PMM communication	Communication error between PCM and PMM. Check SUB-D connectors and cables.
0A055-0	WARNING	Azi DDM warning	The azimuth motor controller has temporarily observed an unusual situation for temperature, voltage, current or velocity. No user interaction required.
0A056-0	WARNING	Xel DDM warning	The cross-elevation motor controller has temporarily observed an unusual situation for temperature, voltage, current or velocity. No user interaction required.
0A057-0	WARNING	Ele DDM warning	The elevation motor controller has temporarily observed an unusual situation for temperature, voltage, current or velocity. No user interaction required.

Table E-2: Event messages for antenna (Continued)

Event ID	Severity	Description	Explanation
0A058-0	WARNING	PMM warning	The polarisation motor controller has temporarily observed an unusual situation with regards to temperature, voltage, current or velocity. No user interaction required.
0A059-0	WARNING	Azi cal. limits	Check limits of the calibration result for the azimuth axis are exceeded. Pointing performance may be degraded. Info: 0x00000040: End stop detected before expected limit 0x00000100: Zero width is low 0x00000200: Zero width is high 0x00000400: Zero slack is high 0x00001000: Friction average is high 0x00002000: Friction peak is high 0x00004000: Friction asymmetry is high Zero width low/high: Zero reference module placement may be incorrect. Zero slack high: Mechanical slack may be too high. Friction average/peak high: Mechanical friction is higher than expected. Friction asymmetry high: Mechanical imbalance may be too high.
0A05A-0	WARNING	Xel cal. limits	Check limits of the calibration result for the cross- elevation axis are exceeded. Pointing performance may be degraded. Info: See 0A059-0.
0A05B-0	WARNING	Ele cal. limits	Check limits of the calibration result for the elevation axis are exceeded. Pointing performance may be degraded. Info: See 0A059-0.
0A05C-0	WARNING	Pol cal. limits	Check limits of the calibration result for the polarisation axis are exceeded. Pointing performance may be degraded. Info: See 0A059-0.
0A05D-0	WARNING	ISM warning	The ISM has temporarily observed an unusual situation for temperature or voltage. No user interaction required. If repeated after cooldown and reboot, check if the ISM or cables around it are defective.
0A05E-0	WARNING	Low elevation	The antenna is not allowed to transmit because the elevation is too low.
0A05F-0	WARNING	Heading range	Heading data range error. External heading unit supplies unreliable data.
0A062-0	WARNING	High elevation	The antenna cannot perform acquisition in gyro-free mode because the elevation is too high.
0A065-0	ERROR	Deploy/Stow	Deploy/stow error. The antenna did not properly unlock (deploy), or the stow switch never closed (stow).
0A066-0	ERROR	OMT error	Problem with OMT. Temperature out of range or OMT cable may be broken.

Table E-2: Event messages for antenna (Continued)

Event ID	Severity	Description	Explanation
0A067-0	WARNING	Automatic stow	The antenna automatically stowed because it detected significant movement.
0A068-0	WARNING	Polarisation tuning	Polarisation tuning was not successful. Polarisation may be incorrect.

Table E-2: Event messages for antenna (Continued)

# **Approvals**

This appendix lists the approvals for EXPLORER 8000 series, organized in sections based on system type.

- EXPLORER 8100
- EXPLORER 8120

# **F.1 EXPLORER 8100**

### F.1.1 Eutelsat

The EXPLORER 8100 Ka VSAT System is Eutelsat Type Approved. The EXPLORER 8100 Ku VSAT System is Eutelsat Characterized. The certificates are added to this appendix in electronic copy.

### F.1.2 CE

The EXPLORER 8100 Ku VSAT System and the EXPLORER 8100 Ka VSAT System are CE certified as stated in the simplified EU Declaration of Conformity enclosed at the end of this appendix.

Note that the simplified EU Declaration of Conformity covers the entire E8000 series. The full Declarations of Conformity can be found on the Cobham SATCOM web site as described in the simplified EU Declaration of Conformity.

### F.1.3 FCC

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- · Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

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### NOTICE:

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

### NOTICE:

Changes or modifications made to this equipment not expressly approved by Cobham SATCOM may void the FCC authorization to operate this equipment.

FCC id for EXPLORER 8100 Ku VSAT System: ROJ-8157A FCC id for EXPLORER 8100 Ka VSAT System: ROJ-8157B

### F.1.4 IC

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This Class [B] digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe [B] est conforme à la norme NMB-003 du Canada.

IC id for EXPLORER 8100 Ku VSAT System : 6200B-8157A IC id for EXPLORER 8100 Ka VSAT System : 6200B-8157B

# Eutelsat s.a. Auto-Pointing Summary Sheet



### Applicant:

THRANE & THRANE A/S trading as COBHAM SATCOM Lundloftegaardsvej 93D, 2800 Kgs. Lyngby DENMARK

Tel: +45 39 55 89 59

Website: www.cobham.com Email: info@cobham.com



Antenna model:
EXPLORER 8100
Diameter:
1.0 m
Standard:
M
Characterization date:
23-02-2017
Validity period:
See remark 5
Last test data submitted on:
23-02-2017

System Description:

Antenna system based on a single piece carbon fibre reflector, front fed offset 1.0 m Ku antenna, with two port linear polarization feed, manufactured by Thrane & Thrane A/S trading as Cobham Satcom, for drive-away applications, with HPA maximum permissible rating as per remark 4.

Maximum Allowed EIRP: For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers):

### In the 14.00 - 14.50 GHz band:

36.1 dBW / 40 kHz for an orbital separation from the adjacent satellite ≥ 1.5° 39.8 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.0° 43.4 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.5° In the 13.75 - 14.00 GHz band: 34.2 dBW / 40 kHz for an orbital separation from the adjacent satellite ≥ 1.5°

34.2 dBW / 40 kHz for an orbital separation from the adjacent satellite > 1.5°
37.7 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.0°
41.0 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.5°

Tx Frequency: 13.75 - 14.50 GHz

Pointing error: < 0.1°

≥ 30.1 dB within +/- 0.1° de-pointing angle

Rx Frequency: 10.70 - 12.75 GHz

Polarization error:

< 1.20

Rx XPD:

> 23.6 dB within +1 dB contour

≥ 29.5 dB within +/- 0.1° de-pointing angle with auto-pointing option

### Remarks:

- Auto-pointing tests were performed via satellite from Lyngby with the ERS of Aflenz on the 25-27 January 2017. RF performance tests were performed on one antenna unit at the Thales Alenia Space test range of Cannes, France on the 20 February 2017.
- 2 The EXPLORER ACU auto-pointing system has been validated with three different Eutelsat satellites, with angles of the polarization plane equal to 3.5°.
- 3 Transmission is not authorized until the peaking process is completed.
- 4 The EXPLORER 8100 comes in three standard configurations: No BUC, 8 and 20W BUC. Installation of HPAs with a power >50 W is not authorized
- 5 The characterisation's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standard at the inspection date.
- 6 Any change to the characterised configuration need to be notified to Eutelsat and may be subject to further tests.

## Eutelsat s.A.

# **ES Summary Sheet**



### Applicant:

THRANE & THRANE A/S trading as COBHAM SATCOM Lundtoftegaardsvej 93D, 2800 Kgs.

Lyngby DENMARK

Tel: +45 39 55 89 59

Website: www.cobham.com Email: info@cobham.com



Antenna model:
EXPLORER 8100
Diameter:
1.0 m
Standard:
M
Characterization date:
23-02-2017
Validity period:
See remark 5

Last test data submitted on:

23-02-2017

### System Description:

Antenna system based on a single piece carbon fibre reflector, front fed offset 1.0 m Ku antenna, with two port linear polarization feed, manufactured by Thrane & Thrane A/S trading as Cobham Satcom, for drive-away applications with HPA maximum permissible rating as per remark 4. The detail of the characterisation of the antenna system with an auto-pointing configuration is available via the following link; http://www.eutelsat.com/files/contributed/satellites/pdf/Autopointing\_Antennas.pdf

Maximum Allowed EIRP: For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers):

### In the 14.00 - 14.50 GHz band:

36.1 dBW / 40 kHz for an orbital separation from the adjacent satellite ≥ 1.5° 39.8 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.0° 43.4 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.5° In the 13.75 - 14.00 GHz band:

34.2 dBW / 40 kHz for an orbital separation from the adjacent satellite ≥ 1.5° 37.7 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.0°

41.0 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.5°

Tx Frequency: 13.75 - 14.50 GHz

Tx Gain: 41.4 dBi (average at 14.25 GHz)

Tx XPD: ≥ 25 dB within -1 dB contour ≥ 30.1 dB within +/- 0.1° de-pointing angle with auto-pointing option Rx Frequency: 10.70 -12.75 GHz

Rx Gain: 39.6 dBi (average at 11.70 GHz)

Rx XPD: ≥ 23.6 dB within -1 dB contour ≥ 29.5 dB within +/- 0.1° de-pointing angle with auto-pointing option

19.4 dB/K typ @ 11.70 GHz at 30° El

### Restrictions and remarks:

- The authorization to operate the terminal is conditioned to the approval to access the Eutelsat S.A. Space Segment (ref. <a href="http://www.eutelsat.com/files/contributed/satellites/pdf/esog110.pdf">http://www.eutelsat.com/files/contributed/satellites/pdf/esog110.pdf</a>. ESOG 110).
- 2 RF performance tests were performed on one antenna unit at the Thales Alenia Space test range of Cannes, France on the 20 February 2017.
- 3 Please refer to the following link for auto-pointing configuration details: http://www.eutelsat.com/files/contributed/satellites/pdf/Autopointing Antennas.pdf
- 4 The EXPLORER 8100 comes in three standard configurations: No BUC, 8 and 20W BUC. Installation of HPAs with a power >50 W is not authorized
- 5 This Summary's validity is subject to regular submission of patterns to confirm that the system remains compliant with measured performance at the inspection date.
- 6 Any change to this configuration needs to be notified to Eutelsat and may be subject to further tests.
- 7 Wind load tests showed that the antenna can withstand wind speeds up to 112.4 Km/h.

# Eutelsat s.a. Type Approval Summary Sheet



Applicant:

Antenna model:

EXPLORER 8100 Ka

Thrane & Thrane A/S trading as Cobham SATCOM

With Viasat E TRIA

Thrane & Thrane A/S trading as Cobham SATCOM Lundtoftegaardsvej 93 D 2800 Kgs. Lyngby Denmark

Contact person: Henrik O. Christensen

Diameter:

Tel.: +45 3955 8800 Standard:

Type Approval (Pef ER-029) date:

**Type Approval (Ref. EB-028) date:** 21-08-2015

Website: <a href="www.cobham.com">www.cobham.com</a>
mailto: <a href="mailto:Henrik.christensen@cobham.com">Henrik.christensen@cobham.com</a>
Most recent test data received on:

13-08-2015

### **System Description:**

Vehicular mounted auto-deploy system with Cobham ACU using Viasat E TRIA for KA-SAT operation. Single piece 1.00 m Carbon fiber reflector for long focal length. Motorized auto-deploy AZ/EL mount, heavy and stable antenna back structure and feed boom. Single optic front fed offset.

**Configurations:** Antenna presented and tested works Viasat network on KA-SAT using the Viasat E TRIA. Antenna is designed for an exchange of the RF front end and for operation in Ku band. Antenna need an additional approval for operation in Ku band.

**Maximum Allowed EIRP** for digital carriers transmitted at the 18 dB/K satellite receive contour of KA-SAT (EESS 502 refers):

20.2 dBW / 4 KHz (equivalent to 30.2 dBW / 40 kHz) for an orbital separation of the adjacent satellite  $\geq$  1.5°

**Tx Frequency:**29.50-30.00 GHz **Rx Frequency:**19.70-20.20 GHz

Tx Gain: Rx Gain:

47.7 dBi (average at 29.75 GHz) 44.1 dBi (average at 19.95 GHz)

Tx XPD: Rx XPD:

 $\geq$  20.5 dB within -1 dB contour  $\geq$  20.4 dB within -1 dB contour

Pointing Error: G/T:

 $\leq$  0.2° @ 72 Km/h 22.2 dB/K, assuming the Viasat E TRIA with

1.5 dB NF

### **Restrictions and remarks:**

- The terminal shall be used solely in VSAT Networks which are conformed with the EU regulations for blanket license agreement. Otherwise the operator has to be in possession of an operating license for above mentioned terminal from its local regulatory office.
- 2) The authorization to operate the terminal is conditioned to the approval to access the Eutelsat S.A. Space Segment (ref. <a href="http://www.eutelsat.com/files/contributed/satellites/pdf/esog110.pdf">http://www.eutelsat.com/files/contributed/satellites/pdf/esog110.pdf</a> ESOG110).
- 3) This type approval has been performed at the outdoor test range of Politecnico di Torino on three units of the same model, in the month of August 2015.
- 4) The type approval's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standard at the inspection date.
- 5) Any change to the type approved configuration needs to be notified to Eutelsat and may be subject to further tests.
- 6) This approval allows only operation in Viasat technology networks on KA-SAT.
- 7) The antenna system can only be operated for maximum wind speeds of up to 72 Km/h (45mph).

# F.2 EXPLORER 8120

### F.2.1 Eutelsat

The EXPLORER 8120 Ku VSAT System i is Eutelsat Type Approved. The certificate is added to this appendix in electronic copy.

### F.2.2 CE

The EXPLORER 8120 Ku VSAT System is CE certified as stated in the simplified EU Declaration of Conformity enclosed at the end of this appendix.

Note that the simplified EU Declaration of Conformity covers the entire E8000 series. The full Declarations of Conformity can be found on the Cobham SATCOM web site as described in the simplified EU Declaration of Conformity.

### F.2.3 FCC

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

### NOTICE:

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

### NOTICE:

Changes or modifications made to this equipment not expressly approved by Cobham SATCOM may void the FCC authorization to operate this equipment.

FCC id: ROJ-8158A

### F.2.4 IC

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This Class [B] digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe [B] est conforme à la norme NMB-003 du Canada.

IC id: 6200B-8158A

### Eutelsat s.a. Auto-Pointing Summary Sheet



### Applicant:

DENMARK

THRANE & THRANE A/S trading as COBHAM SATCOM Lundtoftegaardsvej 93D, 2800 Kgs. Lyngby

Tel: +45 39 55 89 59

Website: www.cobham.com Email: info@cobham.com



Antenna model:
EXPLORER 8120
Diameter:
1.2 m
Standard:
M
Characterization date:
23-02-2017
Validity period:
See remark 5
Last test data submitted on:
23-02-2017

### System Description:

Antenna system based on a single piece carbon fibre reflector, front fed offset 1.2 m Ku antenna, with two port linear polarization feed, manufactured by Thrane & Thrane A/S trading as Cobham Satcom, for drive-away applications, with HPA maximum permissible rating as per remark 4.

Maximum Allowed EIRP: For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers):

### In the 14.00-14.50 GHz band:

39.1 dBW / 40 kHz for an orbital separation from the adjacent satellite ≥ 1.5°
34.6 dBW / 4 kHz (equivalent to 44.6 dBW/40 KHz) for an orbital separation from the adjacent satellite > 2.0°

### In the 13,75-14,00 GHz band:

36.3 dBW / 40 kHz for an orbital separation from the adjacent satellite ≥ 1.5° 42.4 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.0°

Tx Frequency: 13.75 - 14.50 GHz

Pointing error: ≤0.1"

Tx XPD:

> 32.6 dB within +/- 0.1° de-pointing angle

Rx Frequency: 10.70 - 12.75 GHz

Polarization error:

< 1.0"

Rx XPD:

> 26.9 dB within -1 dB contour

≥ 37.9 dB within +/- 0.1° de-pointing angle with auto-pointing option

### Remarks:

- Auto-pointing tests were performed via satellite from Lyngby with the ERS of Aflenz on the 25-27 January 2017. RF performance tests were performed on one antenna unit at the Thales Alenia Space test range of Cannes, France on the 21 February 2017.
- 2 The EXPLORER ACU system has been validated with three different Eutelsat satellites, with angles of the polarization plane equal to 3.5°.
- 3 Transmission is not authorized until the peaking process is completed.
- 4 The EXPLORER 8120 comes in three standard configurations: No BUC, 8 and 20W BUC. Installation of HPAs with a power >50 W is not authorized
- 5 The characterisation's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standard at the inspection date.
- 6 Any change to the characterised configuration need to be notified to Eutelsat and may be subject to further tests.

## Eutelsat s.a. ES Summary Sheet



23-02-2017

### Applicant:

THRANE & THRANE A/S trading as COBHAM

Lundtoftegaardsvej 93D, 2800 Kgs.

Lyngby DENMARK

Tel: +45 39 55 89 59

Website: www.cobham.com Email : info@cobham.com



Antenna model: EXPLORER 8120 Diameter: 1.2 m Standard: Characterization date: 23-02-2017 Validity period: See remark 5 Last test data submitted on:

System Description:

Antenna system based on a single piece carbon fibre reflector, front fed offset 1.2 m Ku antenna, with two port linear polarization feed, manufactured by Thrane & Thrane A/S trading as Cobham Satcom, for drive-away applications, with HPA maximum permissible rating as per remark 4. The detail of the characterisation of the antenna system with an auto-pointing configuration is available via the following link: http://www.eutelsat.com/files/contributed/satellites/pdf/Autopointing\_Antennas.pdf

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Maximum Allowed EIRP: For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers):

### In the 14.00-14.50 GHz band:

39.1 dBW / 40 kHz for an orbital separation from the adjacent satellite ≥ 1.5"

34.6 dBW / 4 kHz (equivalent to 44.6 dBW/40 KHz) for an orbital separation from the adjacent satellite > 2.0°

### In the 13.75-14.00 GHz band:

36.3 dBW / 40 kHz for an orbital separation from the adjacent satellite > 1.5\* 42.4 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.0"

Tx Frequency: 13.75 - 14.50 GHz

42.9 dBi (average at 14.25 GHz)

Tx XPD:

> 26 dB within -1 dB contour

≥ 32.6 dB within +/- 0.1° de-pointing angle with auto-pointing option

Rx Frequency: 10.70 -12.75 GHz

41.2 dBi (average at 11.70 GHz)

Rx XPD:

Rx Gain:

≥ 26.9 dB within -1 dB contour

≥ 37.9 dB within +/- 0.1° de-pointing angle

with auto-pointing option

G/T:

20.8 dB/K typ @ 11.70 GHz at 30° El

### Restrictions and remarks:

- The authorization to operate the terminal is conditioned to the approval to access the Eutelsat S.A. Space Segment (ref. http://www.eutels.at.com/files/contributed/satellites/pdf/esoq110.pdf. ESOG 110).
- 2 RF performance tests were performed on one antenna unit at the Thales Alenia Space test range of Cannes, France on the 21 February 2017.
- 3 Please refer to the following link for auto-pointing configuration details:

http://www.eutelsat.com/files/contributed/satellites/pdf/Autopointing Antennas.pdf

- The EXPLORER 8120 comes in three standard configurations: No BUC, 8 and 20W BUC. 4 Installation of HPAs with a power >50 W is not authorized.
- This Summary's validity is subject to regular submission of patterns to confirm that the system 5 remains compliant with measured performance at the inspection date.
- 6 Any change to this configuration needs to be notified to Eutelsat and may be subject to further tests.
- Wind load tests showed that the antenna can withstand wind speeds up to 92.8 Km/h. 7



# **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

### **Equipment included in this declaration**

Model	Description	Part no.
8157A,	EXPLORER 81xx Ku VSAT antenna systems	408157A
8158A		408158A
Consists of		
8147A,	EXPLORER 81xx Ku VSAT Out Door Unit (ODU)	408147A-xxx-yyy
8148A		408148A-xxx-yyy
7140A	EXPLORER Antenna Control Unit (ACU)	407140A-xxx-yyy

Model	Description	Part no.
8157B	EXPLORER 8100 Ka VSAT antenna systems	408157B
Consists of		
8147B	EXPLORER 8100 Ka VSAT Out Door Unit (ODU)	408147B-xxx-yyy
7140A	EXPLORER Antenna Control Unit (ACU)	407140A-xxx-yyy

<sup>&</sup>quot;xxx" is 3 characters, determining 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

Document no.: 99-157499-A

<sup>&</sup>quot;yyy" is 3 numbers, determining the configuration of BUC and PSU

Α

ABS ADU Bus Slave

ACU Antenna Control Unit

ADM ACU Digital Module. A main processor board in the ACU.

AMB Antenna Module Bus

В

BUC Block Up Converter. The BUC can be thought of as the "transmitter", and its actions are

effectively the opposite to the LNB. The BUC consists of the Up Converter and HPA.

C

CE Conformité Européenne. This term signifies that a CE certified product conforms to

European health, environmental, and safety regulations. In short, it makes the product

legal to be sold in the European Union.

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.

DVB Digital Video Broadcasting, a set of standards relating to digital television.

Ε

EIRP Effective Isotropically-Radiated Power. The amount of power that would have to be

emitted by an isotropic antenna (that evenly distributes power in all directions) to produce the peak power density observed in the direction of maximum antenna gain.

eTRIA Transmit and Receive Integrated Assembly

F

FPGA Field Programmable Gate Array

FWG Flexible Wave Guide

98-145510-E Glossary-1

G

GNSS Global Navigation Satellite System, e.g. GPS.

GPS Global Positioning System. A system of satellites, computers, and receivers that is able to

determine the latitude and longitude of a receiver on Earth by calculating the time

difference for signals from different satellites to reach the receiver.

K

KDM Keyboard and Display Module of the ACU

L

LAN Local Area Network. A computer network covering a small physical area, like a home,

office, school or airport. The defining characteristics of LANs, in contrast to wide-area networks (WANs), include their usually higher data-transfer rates, smaller geographic area,

and lack of a need for leased telecommunication lines.

LED Light Emitting Diode

LNB Low Noise Blockdown converter. A device used to amplify or boost the weak received

signal without amplifying the noise signals (hence the "low noise" part of LNB) and to convert the high frequencies of the signal into lower frequencies, a process called down converting, for conveyance to the indoor equipment (demodulator) for processing.

M

MIB Management Information Base

0

ODU OutDoor Unit. The part of the system that is placed outdoors, e.g. the antenna.

OMT Ortho Mode Transducer

P

PAST Person Activated Self Test

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 kHz and about 300

GHz including the frequencies used for communications signals (radio, television, cell-

phone and satellite transmissions) or radar signals.

98-145510-E Glossary-2

S

SSID

Service Set IDentifier. An SSID is the name of a wireless local area network (WLAN). All wireless devices on a WLAN must use the same SSID in order to communicate with each other.

٧

**VSAT** 

Very Small Aperture Terminal. An earthbound station used in satellite communications of data, voice and video signals, excluding broadcast television. A VSAT system consists of a two-way satellite ground station and a stabilized VSAT antenna with a dish antenna that is smaller than 3 metres.

W

WLAN Wireless LAN, wireless network

98-145510-E Glossary-3

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